

Appendix: Previously Reviewed Baseline Upgrade Recommendations for the July 2021 PJM Board Review

Note: Items presented at the June 2021 TEAC & SRRTEP(s) will also be recommended for Board approval.

Changes for Existing Projects

Baseline Reliability Projects



115kV Line #81 and 230kV Lines #239 and #2056 Partial Rebuild

Solution:

Rebuild the 18.6 mile section of 115kV Line #81 which includes 1.7 miles of double circuit Line #81 with 230kV Line #2056 and 1.3 miles of double circuit Line #81 with 230kV Line #239. This segment of Line #81 will be rebuilt to current standards with a minimum rating of 261 MVA. This segment of Line #239 will be rebuilt to current standards with a minimum rating of 1046 MVA. Line #2056 rating will not change. (b3114)

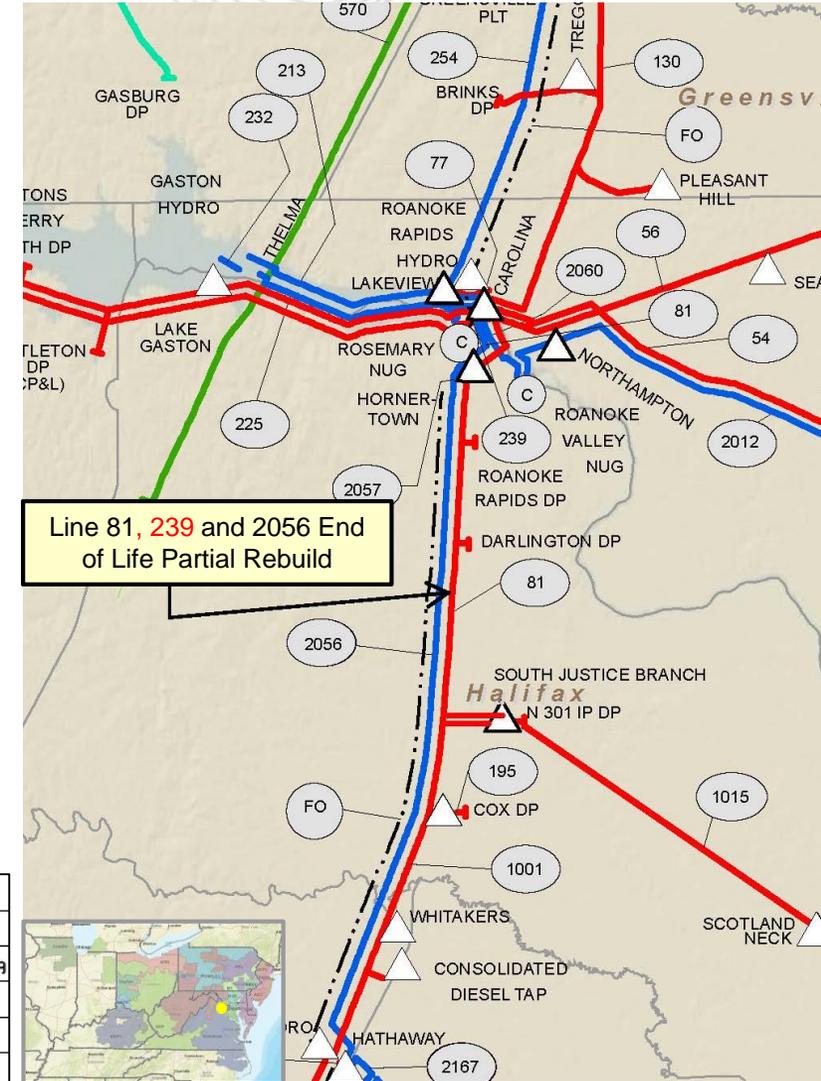
Alternative: No feasible alternatives

Estimated Project Cost: \$25M

Required In-service Date: Immediate Need

Projected In-service Date: 12/31/2025

Project Status: Conceptual



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



Chickahominy 230kV Breaker “SC122”, “205022”, 209122”, 210222-2”, “28722”, “H222” “21922”, “287T2129” Replacements

Process Stage: Cancellation

Criteria: Over Duty Breaker

Assumption Reference: none

Model Used for Analysis: 2025 short circuit model

Proposal Window Exclusion: Station Equipment

Problem Statement:

Eight (8) Chickahominy 230kV breakers are over duty: “SC122”, “205022”, 209122”, 210222-2”, “28722”, “H222”, “21922”, “287T2129”

Significant Driver:

b3213: Install 2nd Chickahominy 500/230 kV transformer. (Generator Deactivation of Chesterfield 5 and 6).

Existing Facility Rating: 50kA interrupting rating

Solution Cancellation Driver: AB2-068 Generator Withdrawn

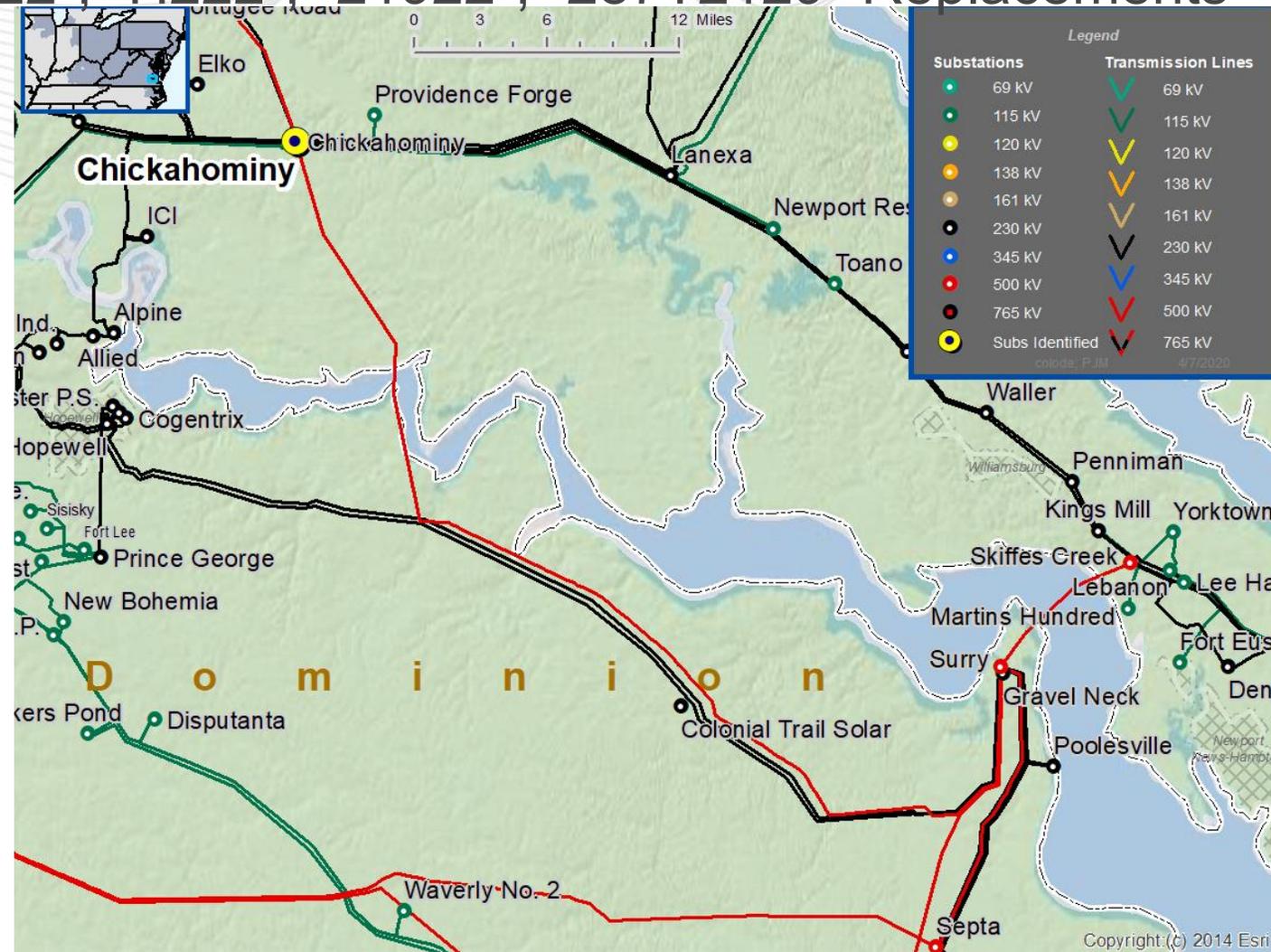
Recommended Solution Cancellation:

b3213.1: Replace the eight (8) Chickahominy 230kV breakers with 63kA breakers: “SC122”, “205022”, 209122”, 210222-2”, “28722”, “H222”, “21922”, “287T2129”

- Estimated Cost:** \$3.76M Replace the eight breakers with 63kA breakers (\$0.47M each)

Required In-Service: 6/1/2023

Previously Presented: 12/1/2020



Problem Statement:

Increased customer load expectations connected to the Waldo Run 138 kV substation are causing several Gen Deliv, N-1 Thermal, and N-1 low voltage violations in the vicinity of Waldo Run, Oak Mound, Pruntytown and Fairview.

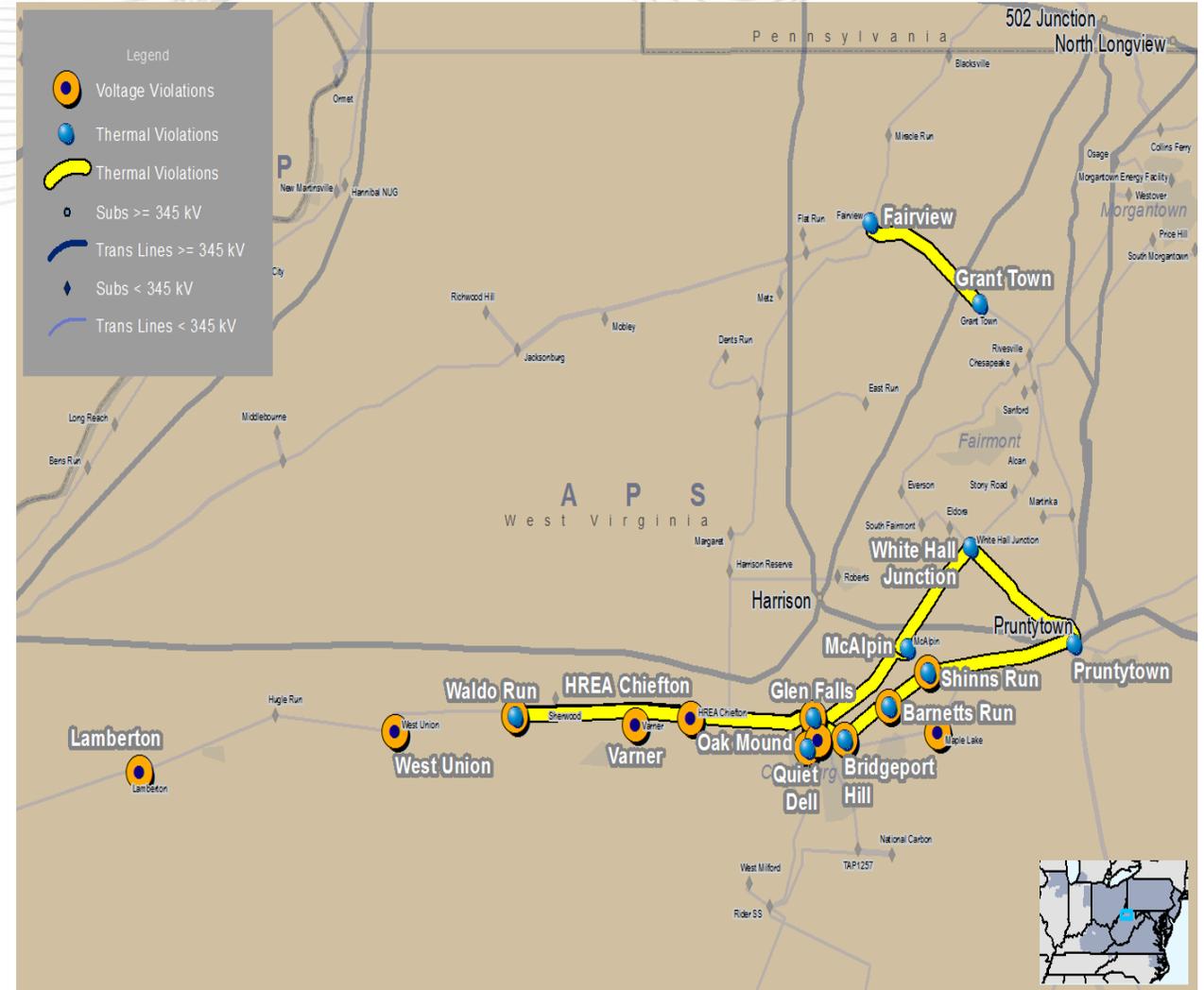
Immediate Need:

Due to the immediate need, the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be the Designated Entity.

Alternatives considered:

1. Reconductor/rebuild overloaded 138 kV facilities with VAR support near the load – est. cost **\$160M**
2. Install new Pruntytown-Oak Mound 138 kV line, **reconductor two 138 kV lines, and add VAR support** near the load – est. cost **\$198M**
3. Construct a new 500/138 kV substation to provide EHV source to the Marcellus shale load growth area – est. cost **\$142M**

By injecting the 500/138 kV source into the area expecting Marcellus shale load growth, we are designing the BES to withstand additional load requests in the area. The alternative solutions apply a temporary resolution at a higher cost to resolve expected load concerns, with no room for growth. The gas industry is greatly expanding in the Doddridge County area of WV, and the recommended solution allows for future support.



Potential Solution:

Construct a new 500/138 kV substation as a four-breaker ring bus with expansion plans for double-breaker-double-bus on the 500 kV bus and breaker-and-a-half on the 138 kV bus to provide EHV source to the Marcellus shale load growth area. Projected load growth of additional 160 MVA to current plan of 280 MVA, for a total load of 440 MVA served from Waldo Run substation. Construct additional three-breaker string at Waldo Run 138 kV bus. Relocate the Sherwood #2 138 kV line terminal to the new string. Construct two single circuit Flint Run - Waldo Run 138 kV lines using 795 ACSR (approximately **3.7 miles**). After terminal relocation on new 3-breaker string at Waldo Run, terminate new Flint Run 138 kV lines onto the two open terminals.(b2996.1) **\$125.3M**

Loop the Belmont-Harrison 500 kV line into and out of the new Flint Run 500 kV substation (less than 1 mile). Replace primary relaying and carrier sets on Belmont and Harrison 500 kV Remote End Substations.(b2996.2) **\$16.6M**

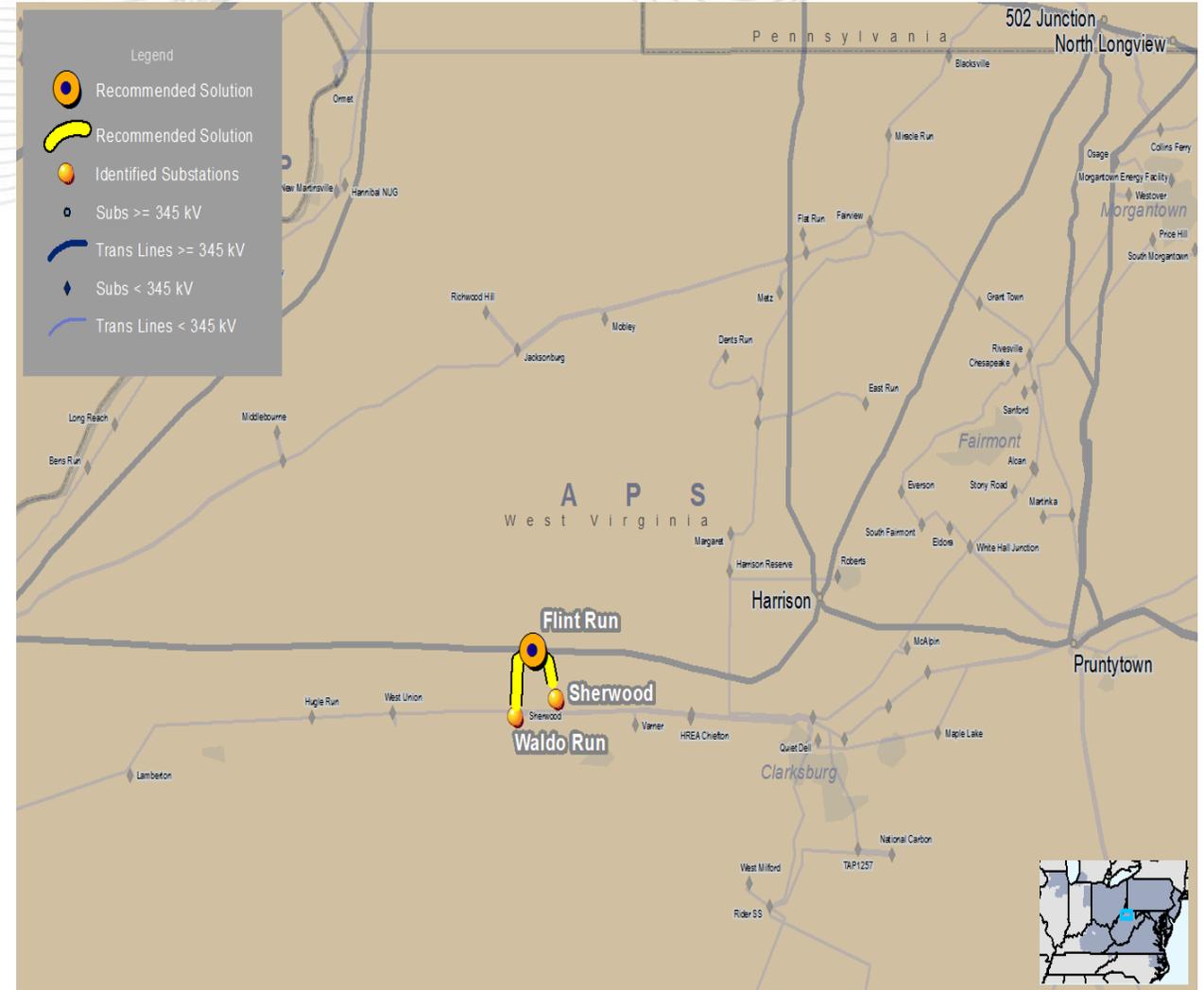
Upgrade two (2) existing 138 kV breakers (Rider 50 and #1/4 transformer breaker) at Glen Falls with 63 kA, 3000 A units. (B2996.3) **\$1.5M**

Total Cost: \$143.4

Required IS Date: ~~12/1/2021~~ 06/01/2019

Projected IS Date: 12/1/2021

Project Status: Under Construction



Increased cost of ~\$102M primarily due to:

- 138 kV line work increased **\$43M**
 - Design changed to steel poles
 - Line length increased 0.7 mile
 - Access roads
 - Vegetation control
- Substation location change increased **\$41M**
 - Additional civil and environmental engineering/construction
 - Real estate costs
- Other cost increases **~\$10M**
 - Retaining wall at Waldo Run Substation
 - Additional Engineering, Project Management, etc.

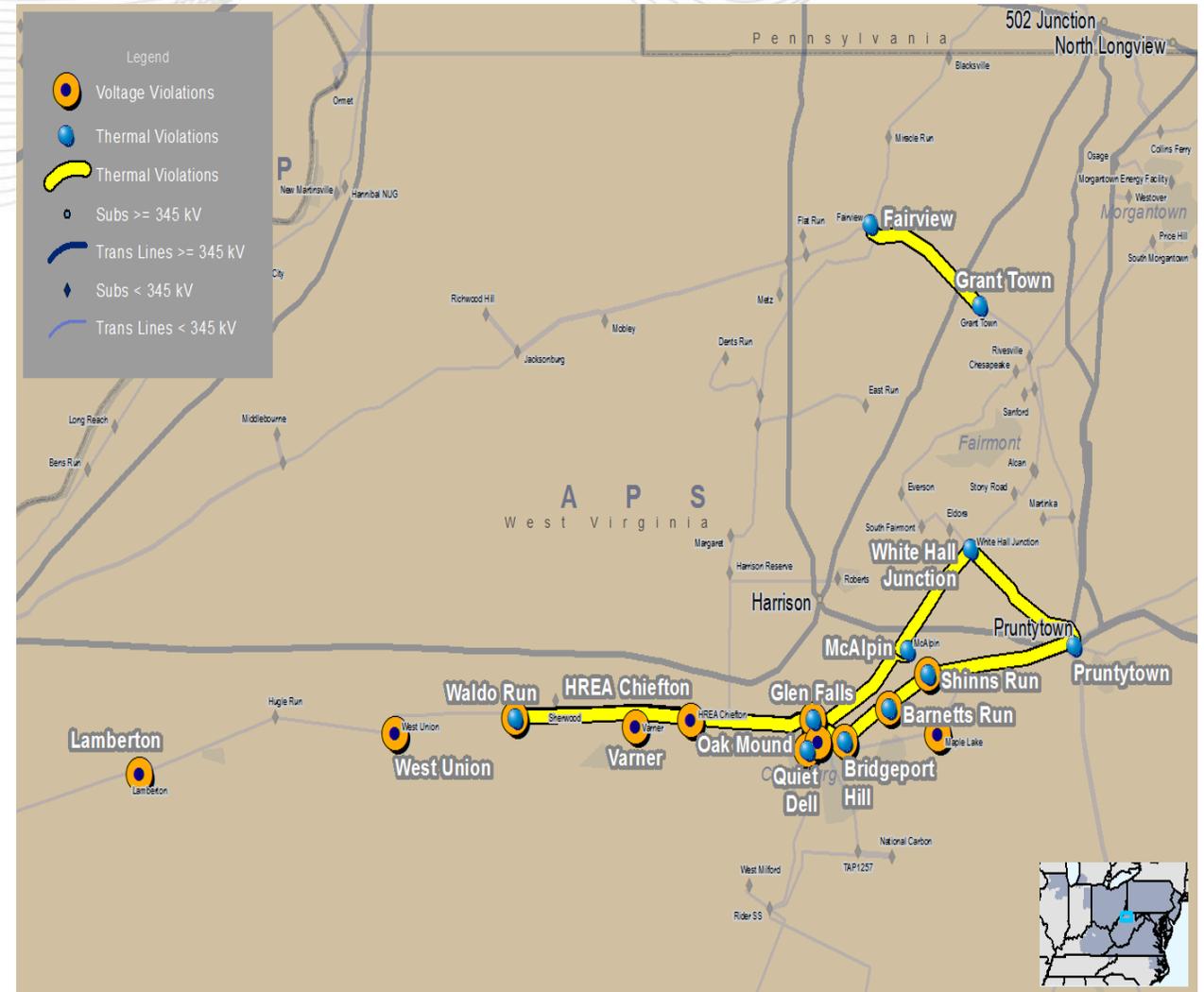


Terrain of 138 kV double circuit



Increased cost of alternatives primarily due to:

1. Reconducting alternative was a desktop estimate. No detail from original estimate.
 - More refined estimate prepared for this update
 - Increased cost of \$104M based on present estimating information for reconducting
2. New Pruntytown-Oak Mound line increased \$156M
 - Additional reconducting project identified on double circuit 138 kV line (\$78M)
 - Access road costs (\$48M)
 - Change in line design (\$16M)





Dominion Transmission Zone: Baseline Possum Point 2nd 500-230 kV Tx

Existing Baseline b2443.6

Date Project Last Presented: 12/11/2013, 01/09/2014, 11/11/2014, 06/08/2017 & 01/10/2019

Problem Statement: Based on recent generation retirements (Possum Point Units #3 & #4) and the PJM 2018 Load Forecast updates indicates that for a NERC Category P1 – single contingency that Possum Point 500/230 kV Tx #1 overloads for a loss of the Possum Point – Ox 500 kV Line #571 under Dominion’s critical stress case criteria.

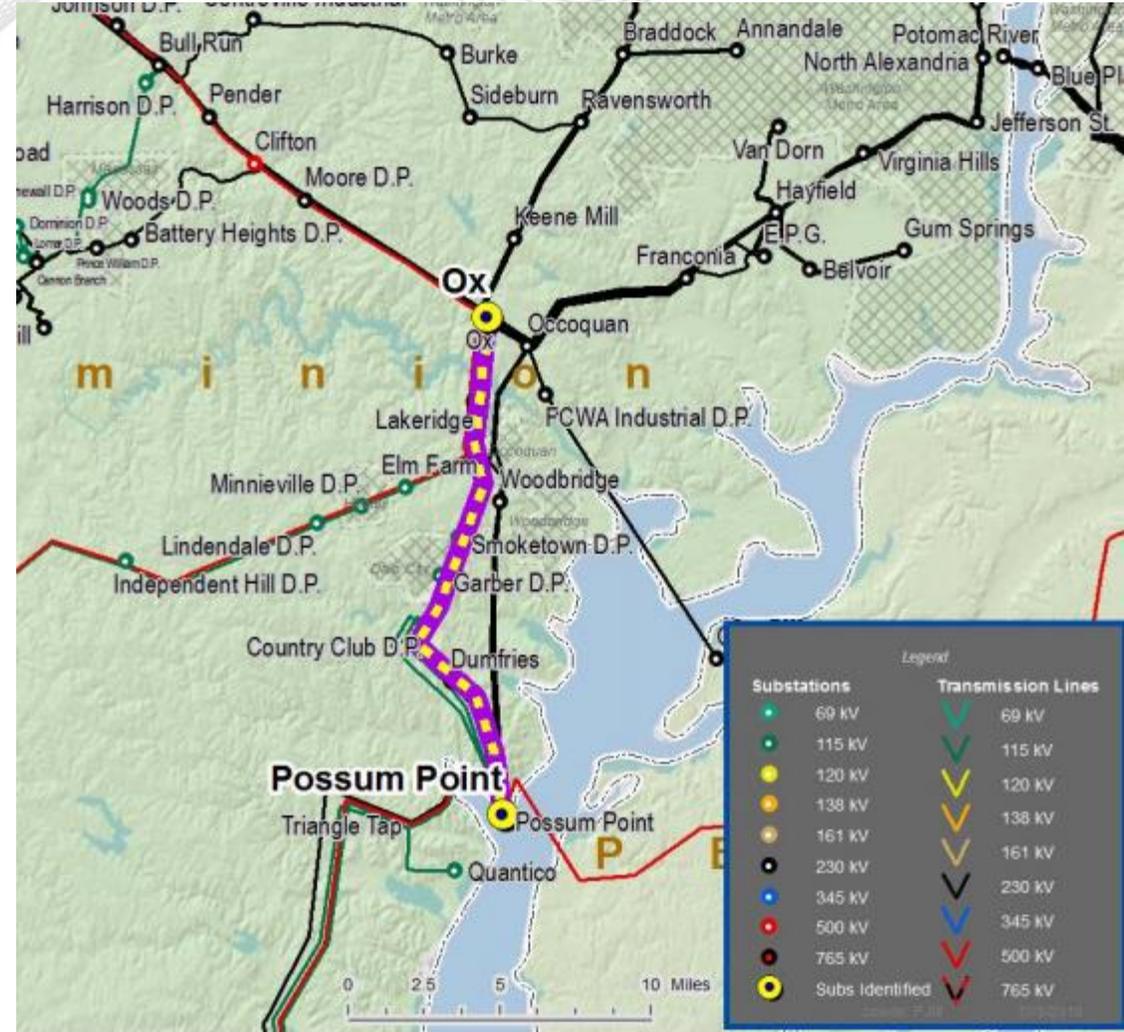
Updated criteria evaluation: Updated Summer 2023 & 2025 RTEP Models indicated deficiencies are no longer present.

Recommended Solution: Cancel the Project.

Project Status: Engineering

Estimated Cost: \$550K to date

Original Estimated Project Cost: \$21M (b2443.6)





Dominion Transmission Zone: Baseline Possum Point 230kV Breaker Replacements

Process Stage: Cancellation

Criteria: Over Duty Breaker

Assumption Reference: none

Model Used for Analysis: 2025 short circuit model

Proposal Window Exclusion: Station Equipment

Problem Statement:

Nineteen (19) Possum Point 230kV breakers are over duty:
H892, H8T2078, H992, H9T237, 23792, G6BTGT, GT92, 202292,
252T2022, 21592, G5T215, 25292, G492, G592, G6A92, G6B92,
G4T2001, 200192, 207892

Significant Driver:

b2443.6: Install 2nd Possum Point 500/230 kV transformer.

Existing Facility Rating: 63kA interrupting rating

Solution Cancellation Driver: Possum Point 5 Retirement

Recommended Solution Cancellation:

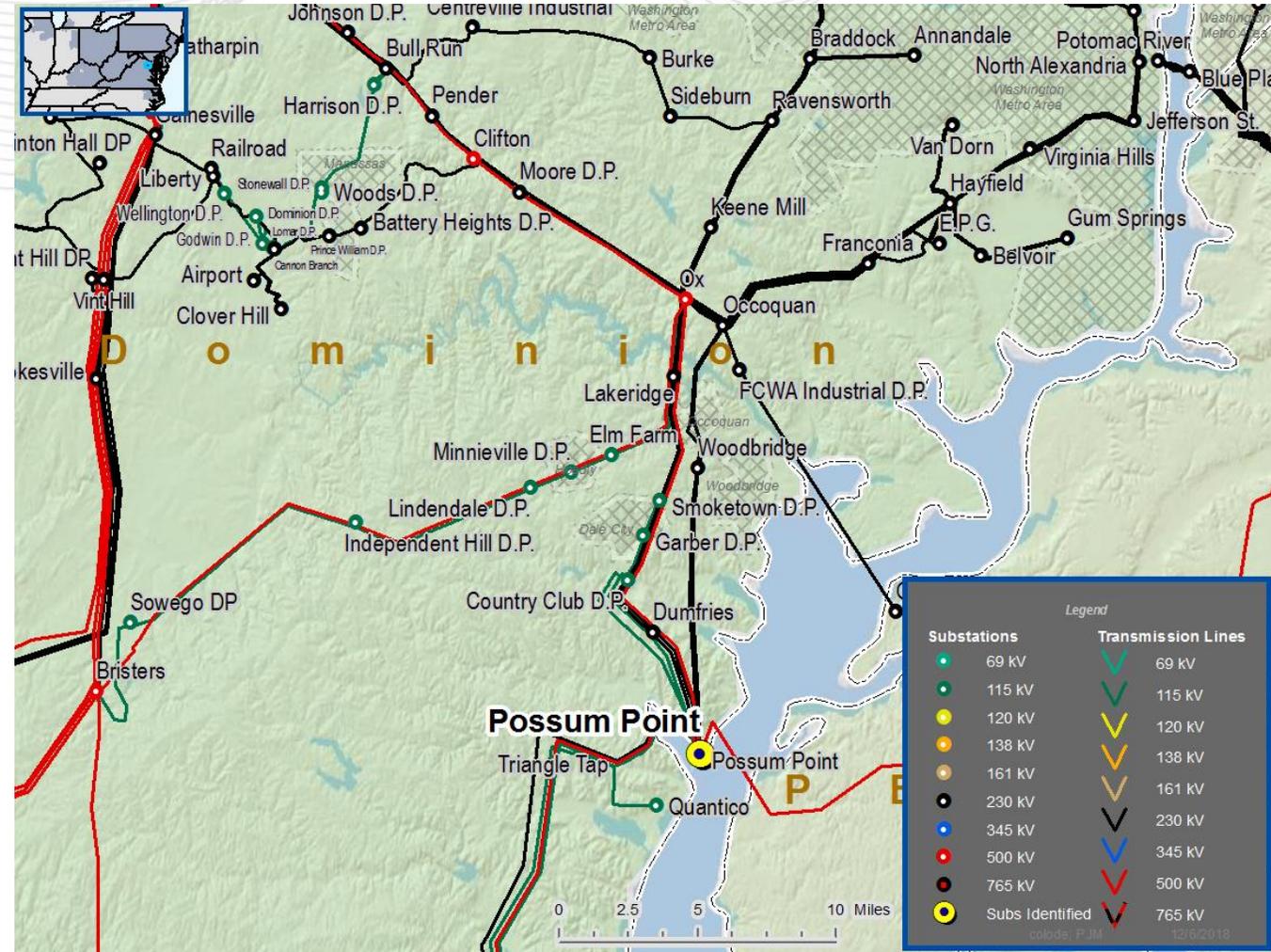
b2443.7: Replace the nineteen (19) Possum Point 230kV breakers with 80kA breakers:

H892, H8T2078, H992, H9T237, 23792, G6BTGT, GT92, 202292,
252T2022, 21592, G5T215, 25292, G492, G592, G6A92, G6B92,
G4T2001, 200192, 207892

- Estimated Cost:** \$19M Replace the nineteen breakers with 80kA breakers (\$1M each)

Required In-Service: 6/1/2023

Previously Presented: 1/10/2019





EKPC Transmission Zone Baseline Reliability

B2907 Cancellation

Criteria: EKPC FERC 715 Criteria

Previously Presented: 5/31/2017 & 6/30/2017 SRRTEP-W

Problem Statement:

Overload of Clay Village-KU Clay Village 69 kV Tap during an N-1 outage.

Recommended Solution:

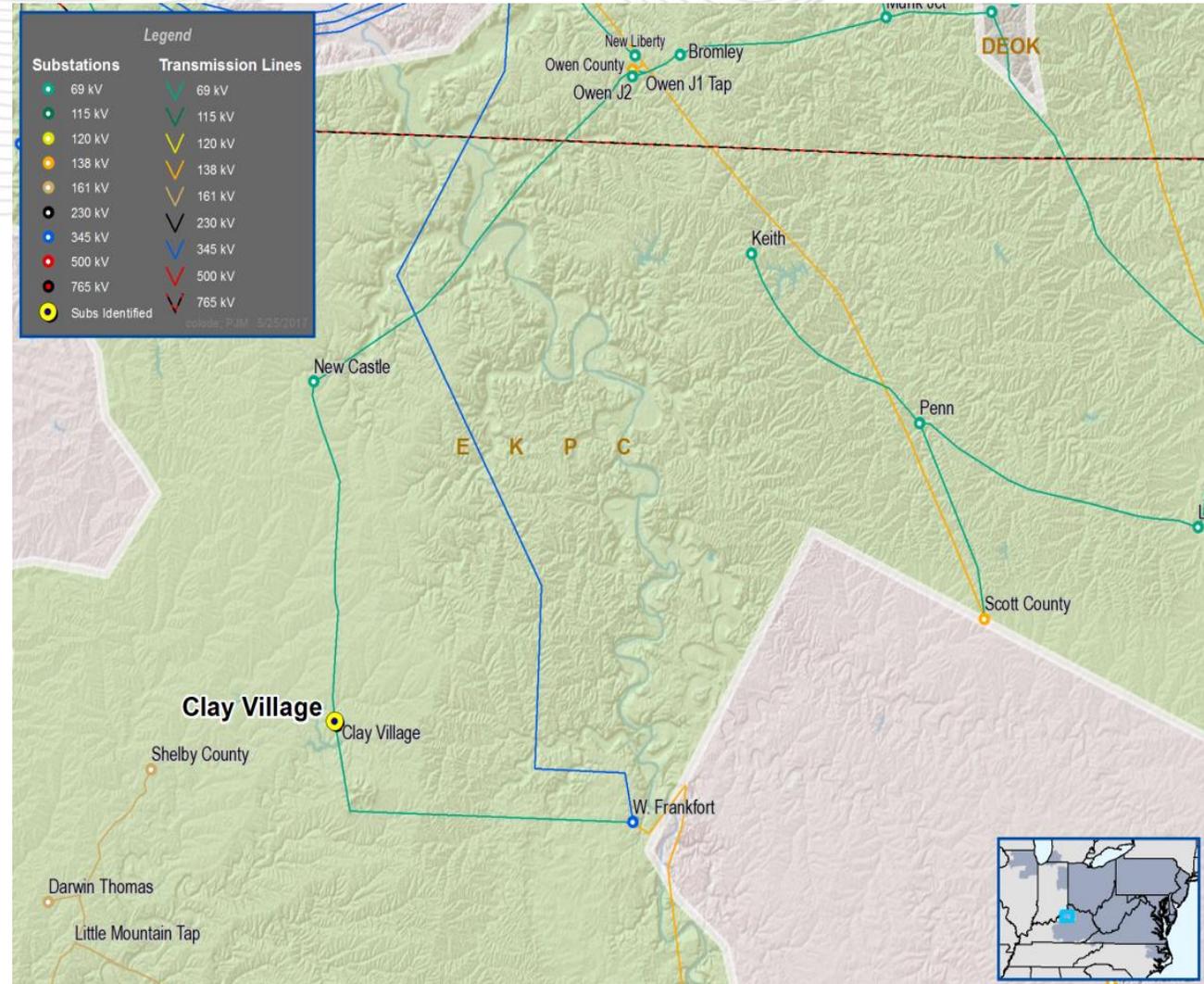
Upgrade the metering CT associated with the Clay Village-KU Clay Village 69 kV Tap line section to 600 A; at least 64 MVA Winter LTE; Upgrade the distance relay associated with the Clay Village-KU Clay Village 69 kV Tap line section to at least 64 MVA Winter LTE. **(b2907)**

Estimated Cost: \$0.125M

Required In-Service: 12/1/2024

Reason for cancellation:

The upgrade was not modeled in the 2020 RTEP case, and the same issue was identified in 2020 window. This resulted in the recommendation of baseline project b3266 (required in-service date of 12/1/2021) which has the same scope. This is an administrative update to remove the duplicate project from the RTEP.



Recommended Solution

Baseline Reliability Projects



ComEd Transmission Zone: Baseline Waukegan 138kV Substation

Process Stage: Recommended Solution

Criteria: ComEd FERC 715 Stability Criteria 4.3.2

Additional Benefits: N/A

Assumption Reference: 2023 RTEP assumption

Model Used for Analysis: 2023 RTEP cases

Proposal Window Exclusion: Below 200 kV

Problem Statement:

Waukegan 138kV Substation:

Mitigate existing instabilities at 138kV STA16 Waukegan for close-in three-phase faults with breaker failure. ComEd has been using out-step-relay as a temporary solution. A permanent solution is needed.

Recommended Solution:

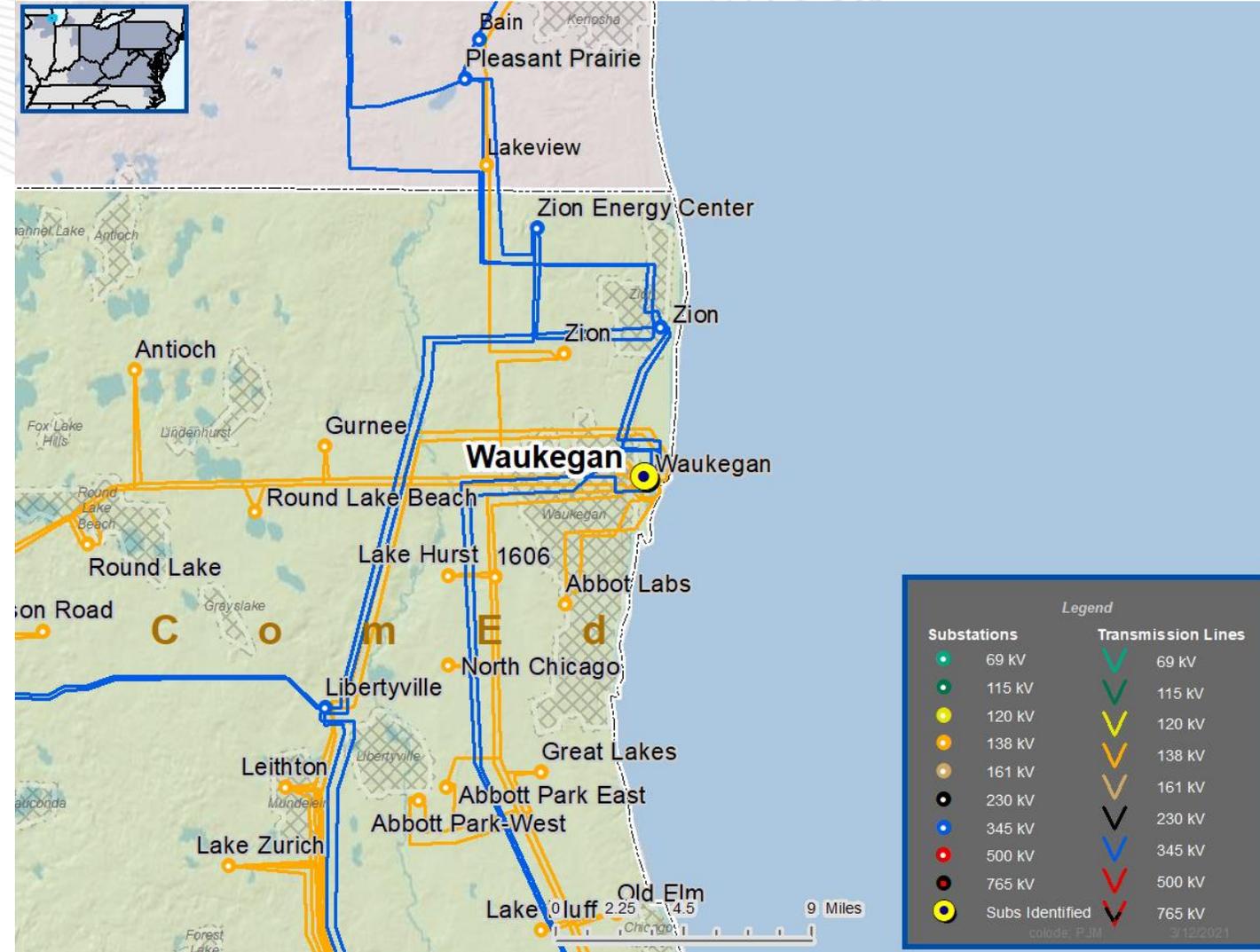
Modify backup relay clearing times at the 138kV STA16 Waukegan station. (B3317)

Estimated Cost: \$0.255 M

Required In-Service: 6/1/2023

Projected In-Service: 6/1/2023

Previously Presented: 4/16/2021





Dayton Transmission Zone: Baseline Greene 138kV Breaker "GJ-138C" Replacement

Process Stage: Recommended Solution

Criteria: Over Duty Breaker

Assumption Reference: 2025 RTEP assumption

Model Used for Analysis: 2025 short circuit model

Proposal Window Exclusion: Below 200kV

Problem Statement:

In 2025 RTEP short circuit model, One (1) Greene 138kV breaker is over duty: "GJ-138C"

Existing Facility Rating: 40kA interrupting rating

Recommended Solution:

Replace the one (1) Greene 138kV breaker with 63kA breaker:

"GJ-138C" (B3316)

Estimated Cost: \$0.28M

Required In-Service: 6/1/2025

Projected In-Service: 6/1/2022

Previously Presented: 4/16/2021

