



# Sub Regional RTEP Committee PJM West

January 17, 2020

- The following definitions explain the basis for excluding flowgates and/or projects from the competitive planning process and designating projects to the incumbent Transmission Owner.
- Flowgates/projects excluded from competition will include the underlined language on the corresponding slide.
  - Immediate Need Exclusion: Due to the immediate need of the violation (3 years or less), the timing required for an RTEP proposal window is infeasible. As a result, the local Transmission Owner will be the Designated Entity. - Operating Agreement, Schedule 6 § 1.5.8(m)
  - Below 200kV Exclusion: Due to the lower voltage level of the identified violation(s), the driver(s) for this project are excluded from the competitive proposal window process. As a result, the local Transmission Owner will be the Designated Entity - Operating Agreement, Schedule 6 § 1.5.8(n)
  - Substation Equipment Exclusion: Due to identification of the limiting element(s) as substation equipment, the driver(s) for this project are excluded from the competitive proposal window process. As a result, the local Transmission Owner will be the Designated Entity - Operating Agreement, Schedule 6 § 1.5.8(p)

# First Review



# DLC Duquesne Transmission Zone Baseline Dravosburg 138 kV Breaker “Z-78 Logans Ferry”

**Process Stage:** First Review

**Criteria:** over duty breaker

**Assumption Reference:** PJM Planning Criteria

**Model Used for Analysis:** 2024 Short Circuit Model

**Proposal Window Exclusion:** Below 200 kV

**Problem Statement:**

The Dravosburg 138 kV breaker “Z-78 Logans Ferry” becomes over duty due to the project b3011 (Construct new Route 51 substation and connect 10 138 kV lines to new substation)

**Existing Facility Rating:** 15000 MVA

**Proposed Solution:**

**B3011.8:** Replace the Dravosburg 138 kV breaker “Z-78 Logans Ferry” with a 63 kA breaker

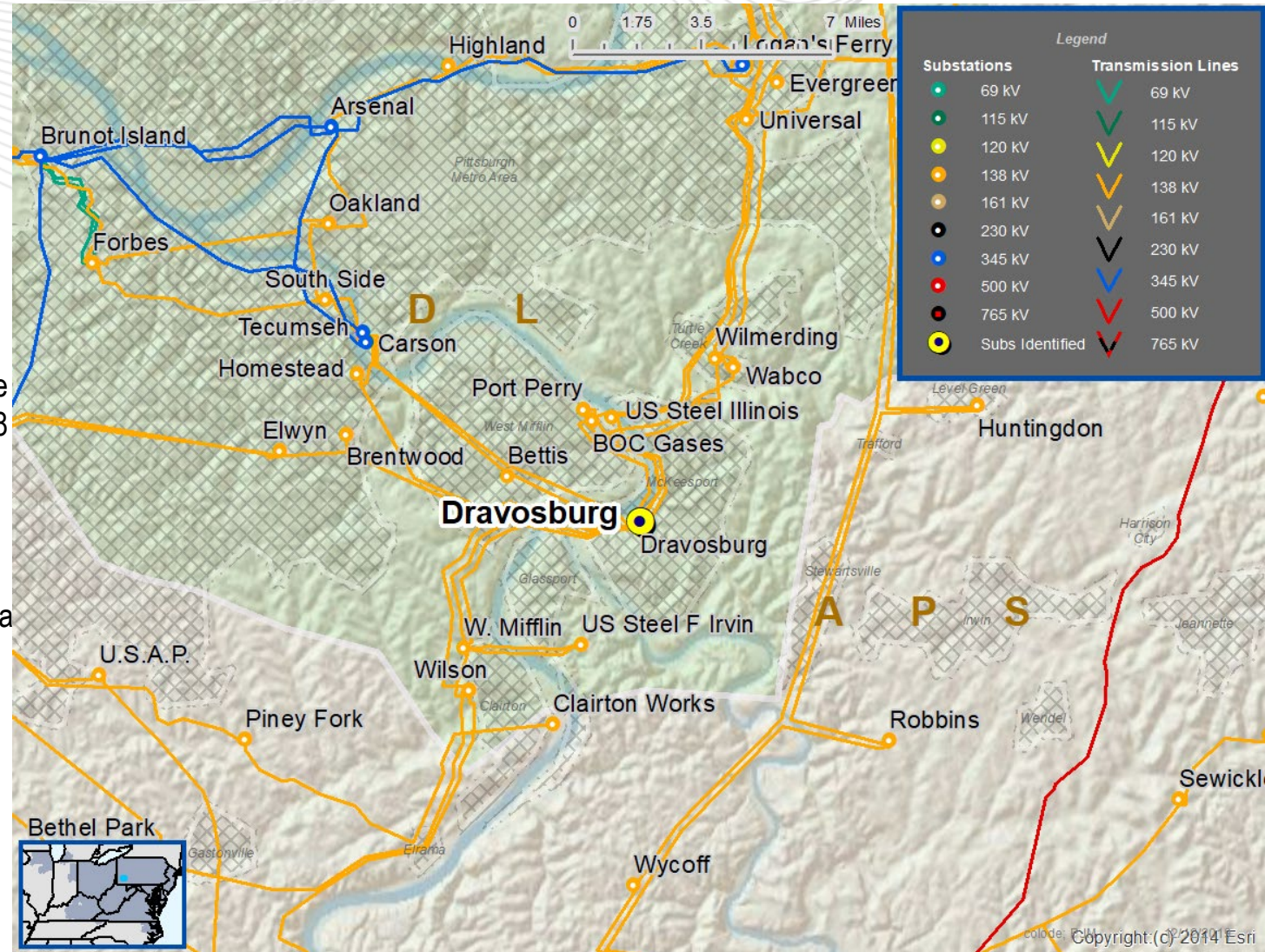
**Estimated Cost:** \$0.9 M

**Alternatives:**

None

**Estimated Cost:** NA

**Required In-Service:** 6/1/2021



# Recommended Solution



# AEP Transmission Zone: Baseline Niles Area

**Process Stage:** Recommended Solution

**Criteria:** TO Planning Criteria

**Assumption Reference:** FERC 715

**Model Used for Analysis:** 2024 RTEP Summer

**Proposal Window Exclusion:** FERC 715 and Below 200kV

**Problem Statement:**

For N-1-1 loss of the Pokagon - Lake Street and South Bend – Niles 69 kV lines:

- Pletcher – Buchanan 69kV line overloads to 117% of the 75MVA rating (336 ACSR)
- The area experiences voltage violations with voltages as low as .89 pu and voltage drops as high as 8.5% at the Niles and Lake Street 34.5 kV buses and affects the following load serving buses. Lakehead 69kV, Lake Street 69kV, Lake Street 34.5kV, National Standard 69kV, Simplicity 34.5kV, Niles 69kV, Niles 34.5kV.

For N-1 loss of the Niles 69/34 transformer, Niles 69kV bus or any of the Niles 69kV breakers the following overload occurs.

- Niles – Simplicity 34.5kV line overloads to up to 103% of the 68MVA rating (600A breaker)

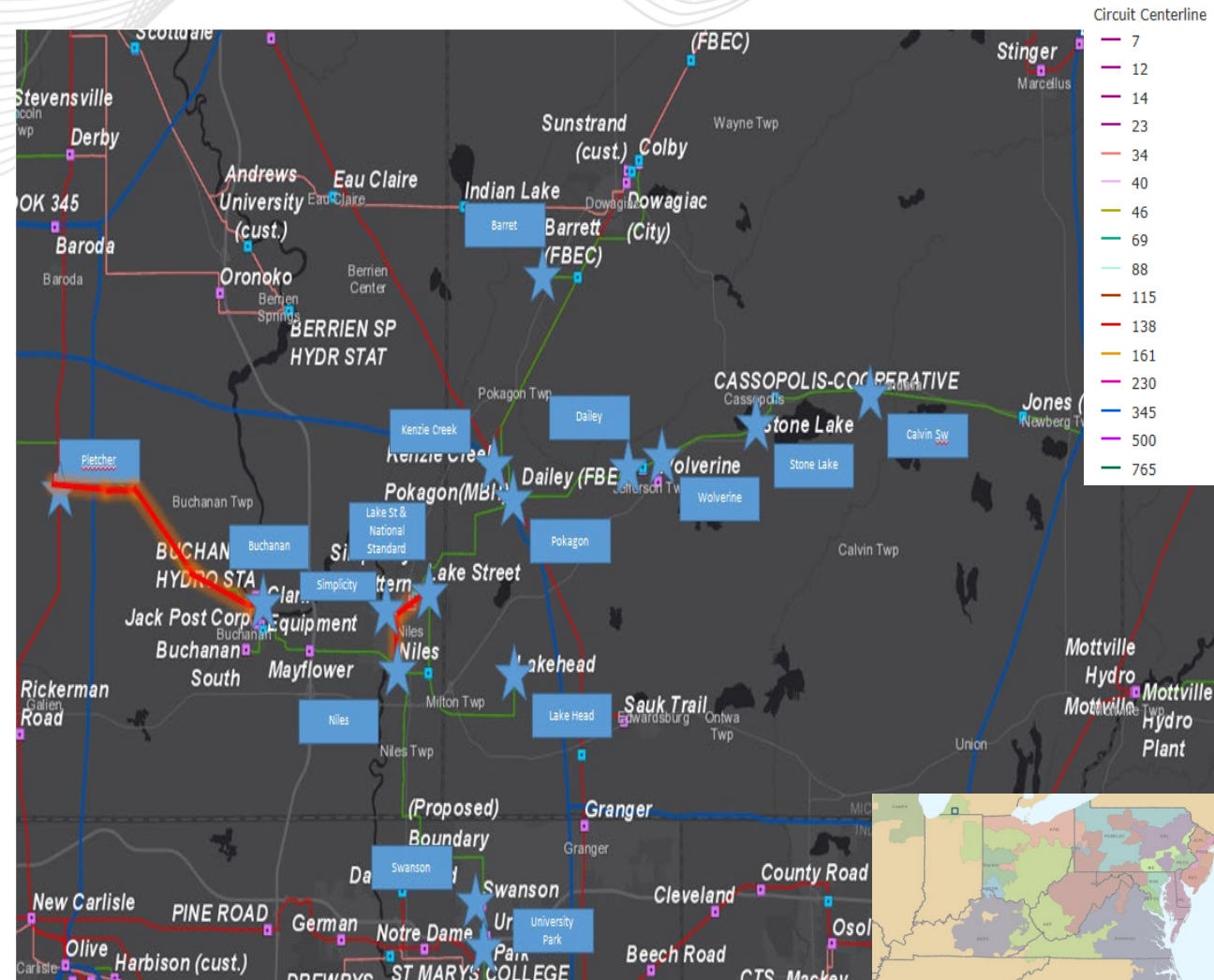
For N-1-1 loss of the Niles 69/34.5kV transformer (which takes out the 69kV bus) and the Pokagon 138/69kV transformer:

- The area experiences voltage violations with voltages as low as .79 pu and voltage drops as high as 18.2% at the Niles 34.5 kV bus and affects the following load serving buses. Barrett 69kV, Calvin 69kV, Dailey 69kV, Lakehead 69kV, Lake Street 69kV, Lake Street 34.5kV, National Standard 69kV, Simplicity 34.5kV, Niles 69kV, Niles 34.5kV, Pokagon 69kV, Stone Lake 69kV and Wolverine 69kV station.

For N-1-1 loss of the Lake Street 69/34kV XFR (takes out 69kV bus) and South Bend – Niles 69kV line:

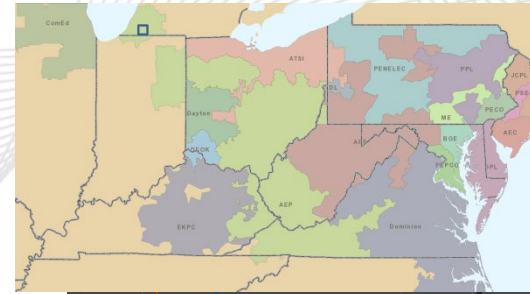
- The area experiences voltage violations with voltages as low as .85 pu and voltage drops as high as 9.0% at the Niles, Simplicity and Lake Street 34.5 kV buses

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# AEP Transmission Zone: Baseline Niles Area



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### Existing Facility Ratings:

Pletcher – Buchanan 69kV line: 68/75/90/94 MVA for SN/SE/WN/WE

Sauk Trail – Pakagon 138kV line: 296/380/375/375 for SN/SE/WN/WE

### Preliminary Facility Ratings:

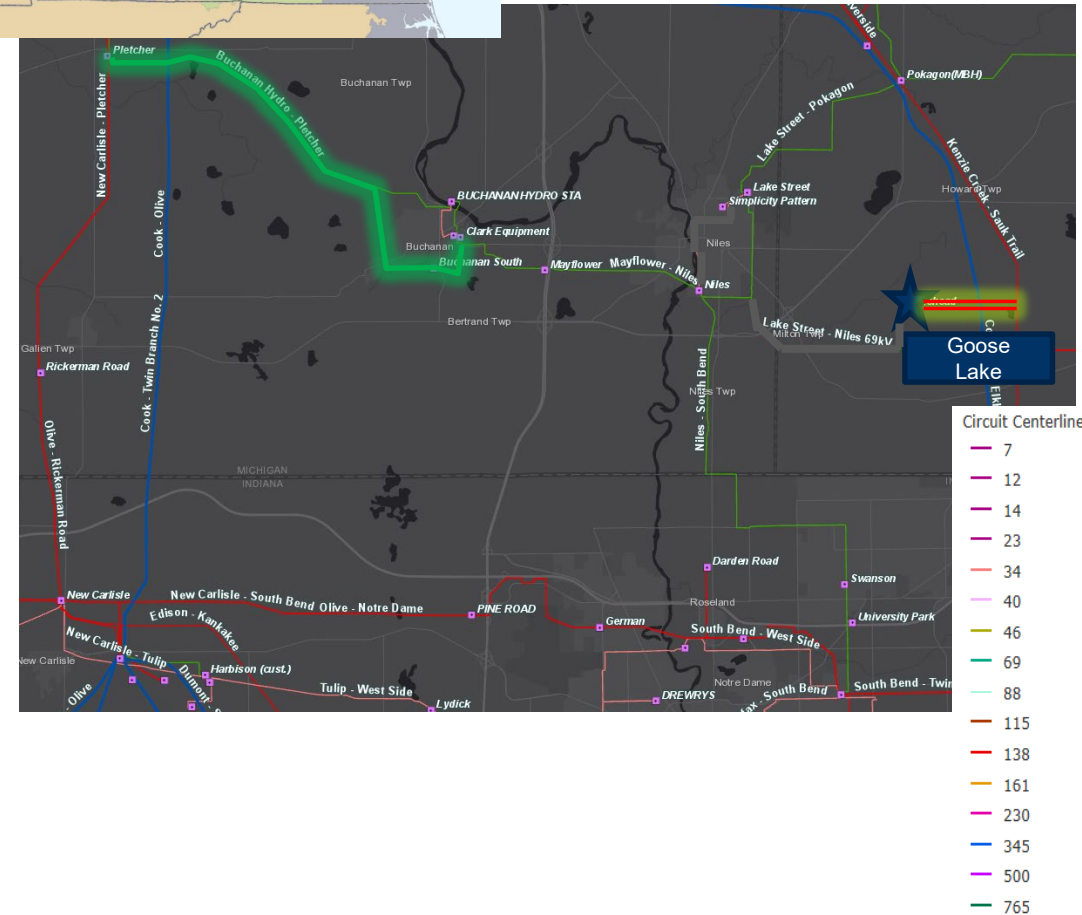
Pletcher – Buchanan South 69kV line: 128/128/162/162 MVA for SN/SE/WN/WE

Buchanan South – Buchanan 69kV line: 68/86/90/103 MVA for SN/SE/WN/WE

Sauk Trail – Lakehead 138kV line: 296/398/375/452 for SN/SE/WN/WE

Pokagon – Lakehead 138kV line: 296/398/375/452 for SN/SE/WN/WE

Lake Head 138/69kV transformer: 20/20/20/20 for SN/SE/WN/WE





# AEP Transmission Zone: Baseline Niles Area

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### Proposed Solution:

Construct a ~2.4 mile double circuit 138kV Extension using 1033 ACSR to connect Lake Head to the 138kV network. **(B3160.1)**

**Estimated Cost: \$6M**

Retire the ~2.5 mile 34.5kV Niles – Simplicity Tap line. **(B3160.2)**

**Estimated Cost: \$1.2M**

Retire the ~4.6 mile Lakehead 69kV Tap **(B3160.3)**

**Estimated Cost: \$1.4M**

Build new 138/69kV drop down station to feed Lakehead with a 138kV CB, 138kV Switcher, 138/69kV XFR and a 138kV MOAB **(B3160.4)**

**Estimated Cost: \$4M**

Rebuild the ~8.4 mile 69kV Pletcher – Buchanan Hydro line as the ~9 mile Pletcher – Buchanan South 69kV line using 795 ACSR. **(B3160.6)**

**Estimated Cost: \$20M**

Rebuild the ~1.2 mile Buchanan South 69kV Radial Tap using 795 ACSR **(B3160.5)**

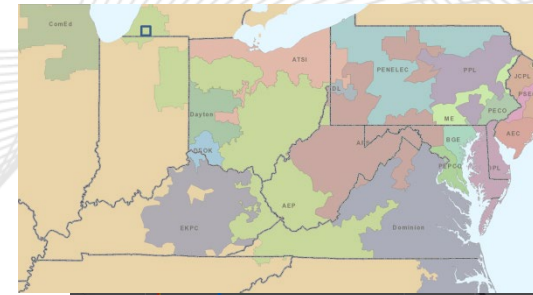
**Estimated Cost: \$3M**

Install a PoP switch at Buchanan South station with 2 line Moabs. **(B3160.7)**

**Estimated Cost: \$0.6M**

**Total Estimated Transmission Baseline Cost: \$36.2M**

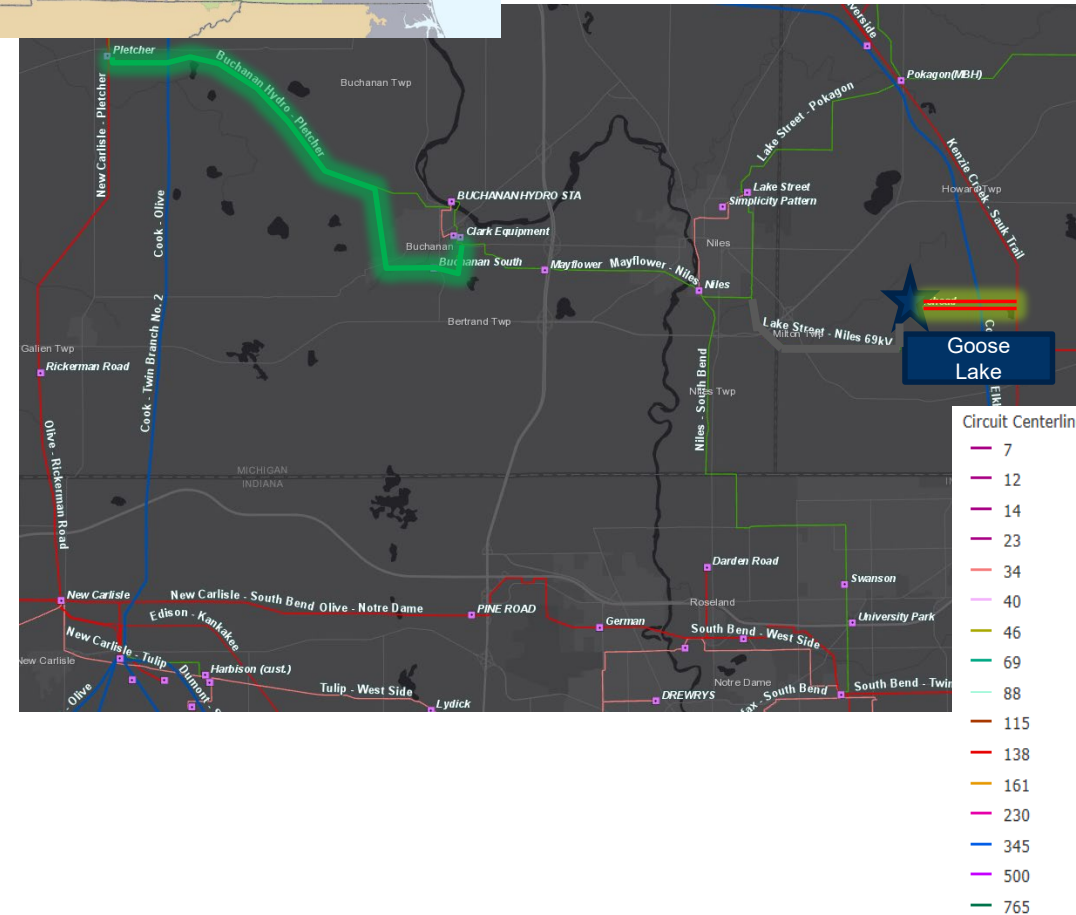
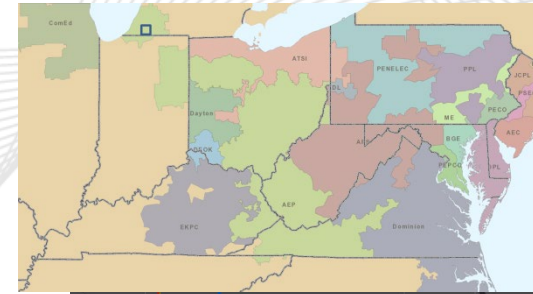
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# AEP Transmission Zone: Baseline Niles Area



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### Ancillary Benefits:

The proposed solution also addresses these supplemental needs:

Lake St – Niles 34.5kV line:

1965 Wood line with cap and pin insulators. Submitted in AEP-2018-IM002

Lakehead Pumping 69kV Tap:

1960's wood crossarm construction. Part of asset submitted in AEP-2018-IM002

Pletcher – Buchanan 69kV line:

1963 wood line. Submitted in AEP-2019-IM047

Buchanan South Side 69kV Tap:

1970 wood radial line. Submitted in AEP-2019-IM047

**Required IS Date:** 6/1/2024

**Proposed IS Date:** 6/1/2022

**Previously Presented:** 12/18/2019 SRRTEP



# APS Transmission Zone: Baseline Wylie Ridge

**Process Stage:** Recommended Solution

**Criteria:** N-1-1 Thermal

**Assumption Reference:** 2024 Baseline/Retool

**Model Used for Analysis:** 2024 Summer Baseline/Retool

**Proposal Window Exclusion:** Substation Equipment

**Problem Statement:**

For loss of Tidd – Collier 345kV and Wylie Ridge – Toronto 345 kV, the Wylie Ridge – Smith 138kV circuit overloads to 104% of its rating (229/229 SN/SE). (N2-ST1, N2-ST2)

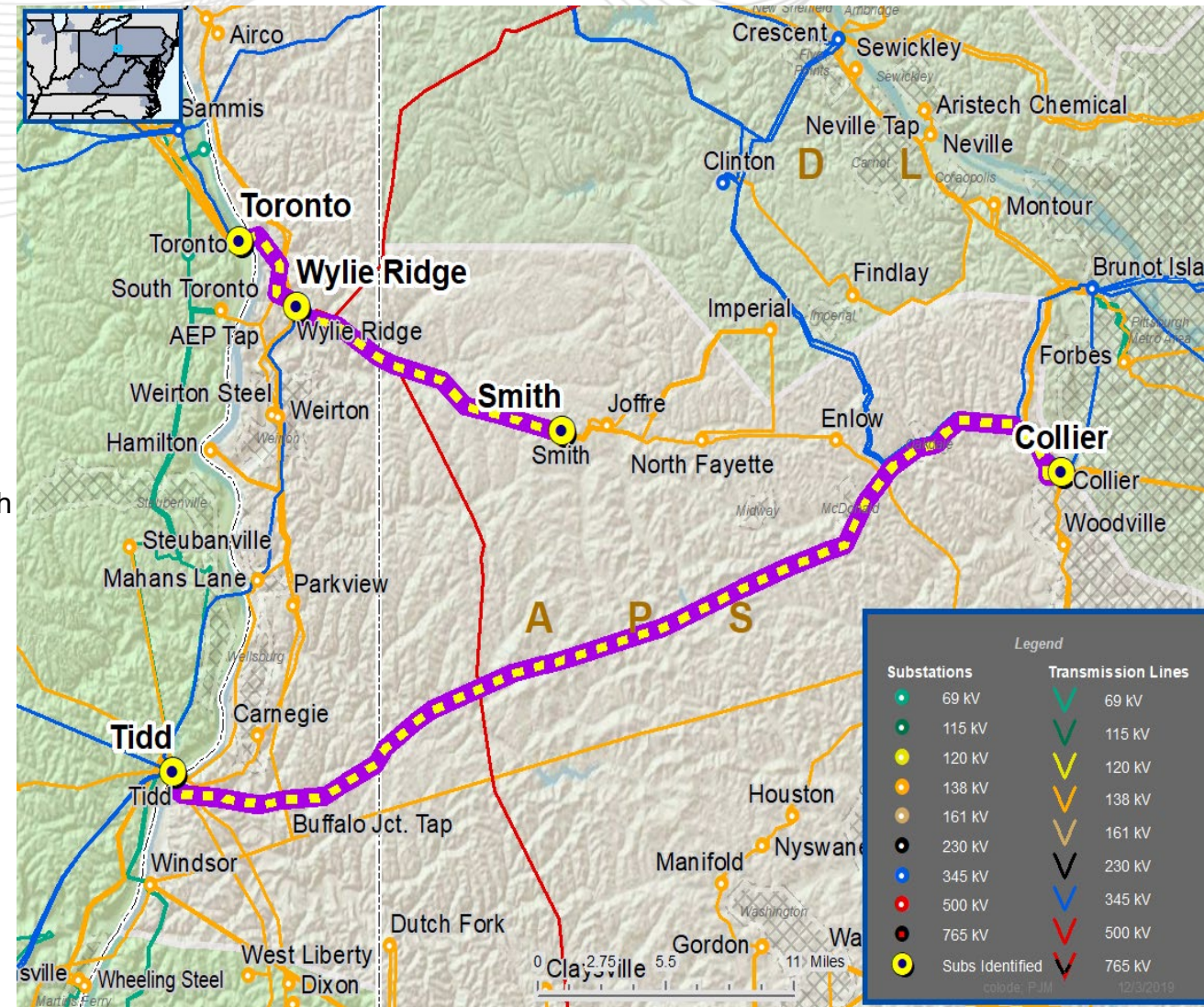
**Proposed Solution (B3156):**

Replace line relaying and fault detector on the Wylie Ridge terminal at Smith 138 kV Substation (New Rating: 234/297 SN/SE).

**Total Estimated Transmission Baseline Cost:** \$0.85M

**Required IS Date:** 6/1/2024

**Previously Presented:** 12/18/2019 SRRTEP



**Process Stage:** Recommended Solution

**Criteria:** Winter Generator Deliverability

**Assumption Reference:** 2024 Winter Baseline/Retool

**Model Used for Analysis:** 2024 Winter Baseline/Retool

**Proposal Window Exclusion:** Substation Equipment

**Problem Statement:**

For loss of Bedington - Black Oak 500 kV circuit, the Messick Rd. – Morgan 138 kV line is overloaded to 106% of its rating (229/229 WN/WE). (GD-W255, GD-W256)

**Proposed Solution(B3157):**

Replace line relaying and fault detector relaying at Messick Rd. and Morgan 138 kV Substations; Replace Wave Trap at Morgan 138 kV (New Rating: 250/317 WN/WE).

**Total Estimated Transmission Baseline Cost:** \$0.23M

**Required IS Date:** 12/1/2024

**Previously Presented:** 12/18/2019 SRRTEP



**Process Stage:** Recommended Solution

**Criteria:** Winter Generator Deliverability

**Assumption Reference:** 2024 Winter Baseline/Retool

**Model Used for Analysis:** 2024 Winter Baseline/Retool

**Proposal Window Exclusion:** Substation Equipment

**Problem Statement:**

For loss of Beddington - Black Oak 500 kV circuit, the Messick Rd. – Ridgeley 138 kV line is overloaded to 114% of its rating (229/229 WN/WE (GD-W11, GD-W249, GD-W250)

**Proposed Solution(B3158):**

Replace line relays on the Ridgeley Terminal at Messick Rd. 138 kV Substation(New Rating: 250/317 MVA WN/WE).

**Total Estimated Transmission Baseline Cost:** \$0.14M

**Required IS Date:** 12/1/2024

**Previously Presented:** 12/18/2019 SRRTEP



**Process Stage:** Recommended Solution

**Criteria:** TO Planning Criteria

**Assumption Reference:** AMPT FERC 715

**Model Used for Analysis:** RTEP 2024 Summer

**Proposal Window Exclusion:** FERC 715 (TO Criteria), Below 100kV

**Problem Statement:**

The transmission system in and around the area of Bowling Green OH, is currently arranged as a three source network. The sources are Midway – Grand Rapids 69kV, Brim - Bowling Green Sub 5 69kV, and Maclean – Pemberville 69kV. Thermal overloads and voltage violations (see next slide) have been identified on the 69kV in the area of bowling green and Pemberville during the N-1-1 loss of Brim – Bowling Green Substation #5 69kV line, combined with either the loss of the Midway – Grand Rapids 69kV or Maclean – Pemberville 69kV line.

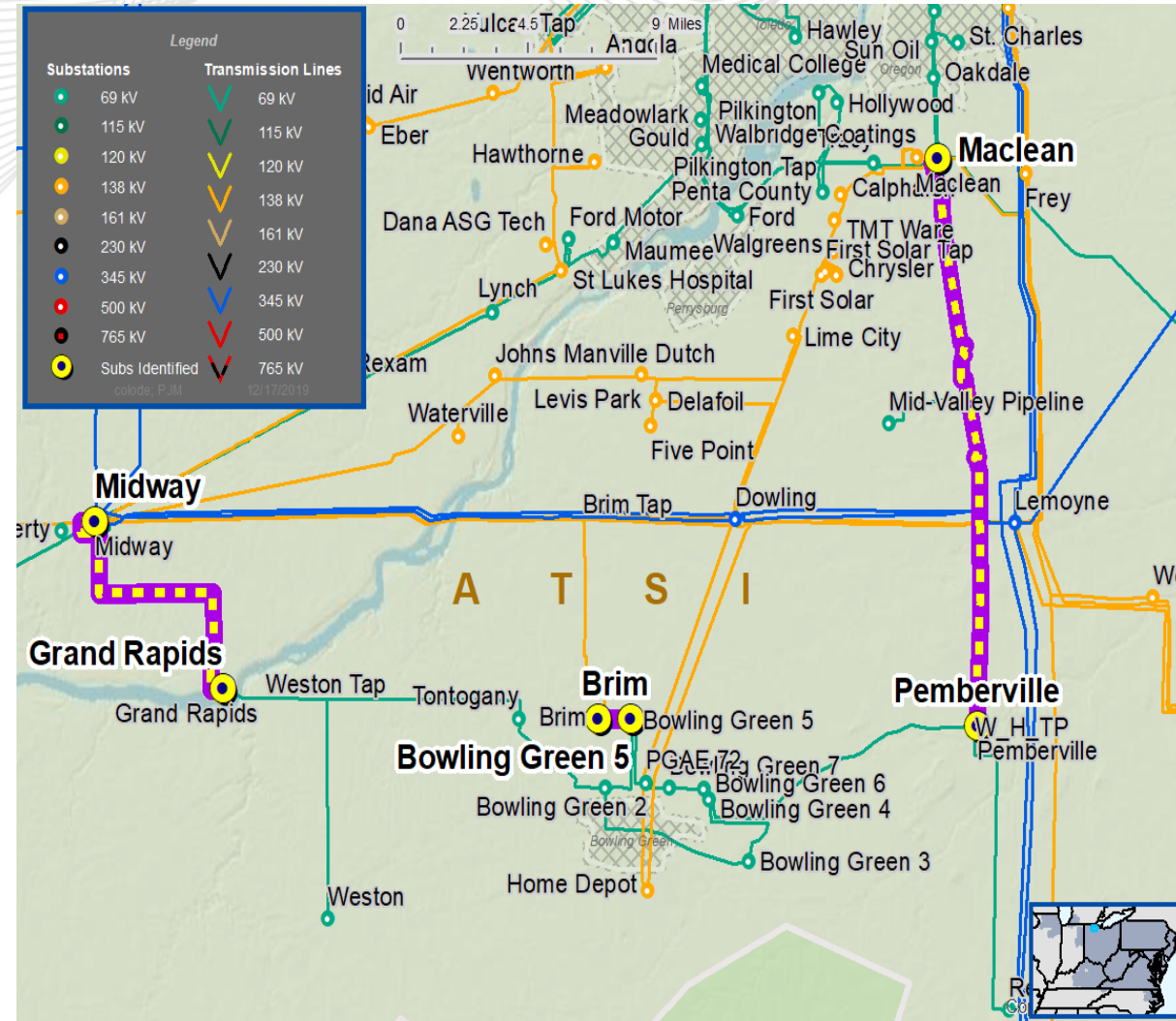
**Proposed Solution (B3159):**

Establish a new 138/69kV substation. Install one 138kV circuit breaker, one 138/69kV 130 MVA Transformer, three 69kV circuit breakers. Construct a 0.15 mile 138kV 795 ACSR transmission line between the FE Brim 138/69kV substation and the newly proposed AMPT substation (three steel poles). Loop the Bowling Green Sub #5 – Bowling Green Sub #2 69kV line in and out of the newly established substation.

**Total Estimated Transmission Baseline Cost:** \$5.7M

**Required IS Date:** 6/1/2024

**Previously Presented:** 12/18/2019 SRRTEP





**N-1-1 violations in Bowling Green Area:**

- Loss of Midway – Grand Rapids 69kV and Loss of Brim – Bowling Green Substation #5 results in:
  - Thermal Overloads
    - Bowling Green Substation #4 – Bowling Green Hancock Wood 69kV Line - 138%
    - Bowling Green Hancock Wood – Pemberville 69kV Line – 100%
    - Pemberville 69/34.5kV Transformer – 167%
    - Maclean – Mid Valley Pipe 2 69kV Line - 105%
  - Voltage Magnitude Violations

Bus	PEMB M	W-H TP	BG4	B10	BG6	BG7	PGE	BG5	BG3	BG2	TNTGON	WESTON	GRNDRP
Voltage (PU)	0.91	0.85	0.84	0.83	0.83	0.82	0.82	0.82	0.82	0.81	0.81	0.80	0.80

- Loss of Pemberville – Bowling Green Hancock Wood 69kV Line and Loss of Brim – Bowling Green Substation #5 results in:
  - Thermal Overloads
    - Bowling Green Substation #2 – Tontogany 69kV Line – 136%
    - Midway – Grand Rapids 69kV Line - 119
  - Voltage Magnitude Violations

Bus	W-H TP	BG4	B10	BG6	BG7	PGE	BG5	BG3	BG2	TNTGON	WESTON	GRNDRP
Voltage (PU)	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.76	0.79	0.86	0.890

- Loss of Pemberville - Maclean 69kV Line and Loss of Brim – Bowling Green Substation #5 results in:
  - Thermal Overloads
    - Bowling Green Substation #2 – Tontogany 69kV Line – 119%
    - Pemberville 69/34.5kV transformer – 221%
  - Voltage Magnitude Violations

Bus	W-H TP	BG4	B10	BG6	BG7	PGE	BG5	BG3	BG2	TNTGON	WESTON	GRNDRP
Voltage (PU)	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.76	0.79	0.86	0.890

- Loss of Weston - Tontogany 69kV Line and Loss of Brim – Bowling Green Substation #5 Line results in:
  - Thermal Overloads
    - Bowling Green Substation #4 – Bowling Green Hancock Wood 69kV Line - 138%
    - Bowling Green Hancock Wood – Pemberville 69kV Line – 100%
    - Pemberville 69/34.5kV Transformer – 167%
  - Voltage Magnitude Violations

Bus	W-H TP	BG4	B10	BG6	BG7	PGE	BG5	BG3	BG2	TNTGON
Voltage (PU)	0.91	0.90	0.90	0.89	0.89	0.89	0.89	0.89	0.89	0.89

# Next Steps

# Questions?







# Revision History

1/10/2020 – V1 – Original version posted to pjm.com

1/14/2020 – V2 – Slide #8, Corrected Baseline sub IDs

1/29/2020 – V3 – Slide #14, Corrected contingency description