Reliability Analysis Update

Aaron Berner, Senior Manager

Transmission Expansion Advisory Committee

July 13, 2021

Changes to Existing Projects

Baseline Reliability Projects

Baseline upgrade Cancelation

- The upgrades listed below were initially identified during the Beaver Valley 1 & 2 deactivation study. Subsequently, Beaver Valley 1 & 2 withdrew the deactivation requests and it was determined that the upgrades which follow were no longer needed to address base line reliability concerns. However, the base case used to perform New Services Queue studies included those upgrades, and as a result the status of the upgrades were put on hold. Per the latest study, these upgrades are no longer needed for New Services Queue and will be canceled

Baseline upgrade Cancelation

Upgrade Id	Description
b3012.2	Construct two new ties from a new First Energy substation to a new Duquesne substation by using two separate structures - Duquesne portion.
b3012.4	Establish the new tie line in place of the existing Elarama - Mitchell 138 kV line
b3015.1	Construct new Elrama 138 kV substation and connect 7 138 kV lines to new substation
b3015.3	Reconductor Dravosburg to West Mifflin 138 kV line. 3 miles
b3015.4	Run new conductor on existing tower to establish the new Dravosburg-Elrama (Z-75) circuit. 10 miles
b3015.7	Reconductor Wilson to West Mifflin 138 kV line. 2 miles. 795ACSS/TW 20/7
b3061	Reconductor the West Mifflin - Dravosburg (Z-73) and Dravosburg - Elrama (Z-75) 138 kV lines
b3062	Install 138 kV tie breaker at West Mifflin
b3063	Reconductor the Wilson - Dravosburg (Z-72) 138 kV line (~5 miles)
b3064	Expand Elrama 138 kV substation to loop in the existing USS Steel Clariton - Piney Fork 138 kV line
b3065	Install 138 kV tie breaker at Wilson

2021 RTEP

- 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

No change from June TEAC

- The Transource 9A Market Efficiency project construction schedule is being impacted due to siting process
- PJM is preparing for a retool of the 2021 RTEP to examine the impacts for the delay to the projected completion
- PJM working to update modeling to perform sensitivity study to determine reliability impacts associated with the removal of the 9A project from the case used to perform the 2021 RTEP

2021 RTEP Analysis Update

Window 1

March 12, 2021

- Preliminary 2026 results posted
  - Summer Baseline and N-1 Thermal
  - Summer Generator Deliverability

July 2, 2021

- Proposal Window No.1 opened

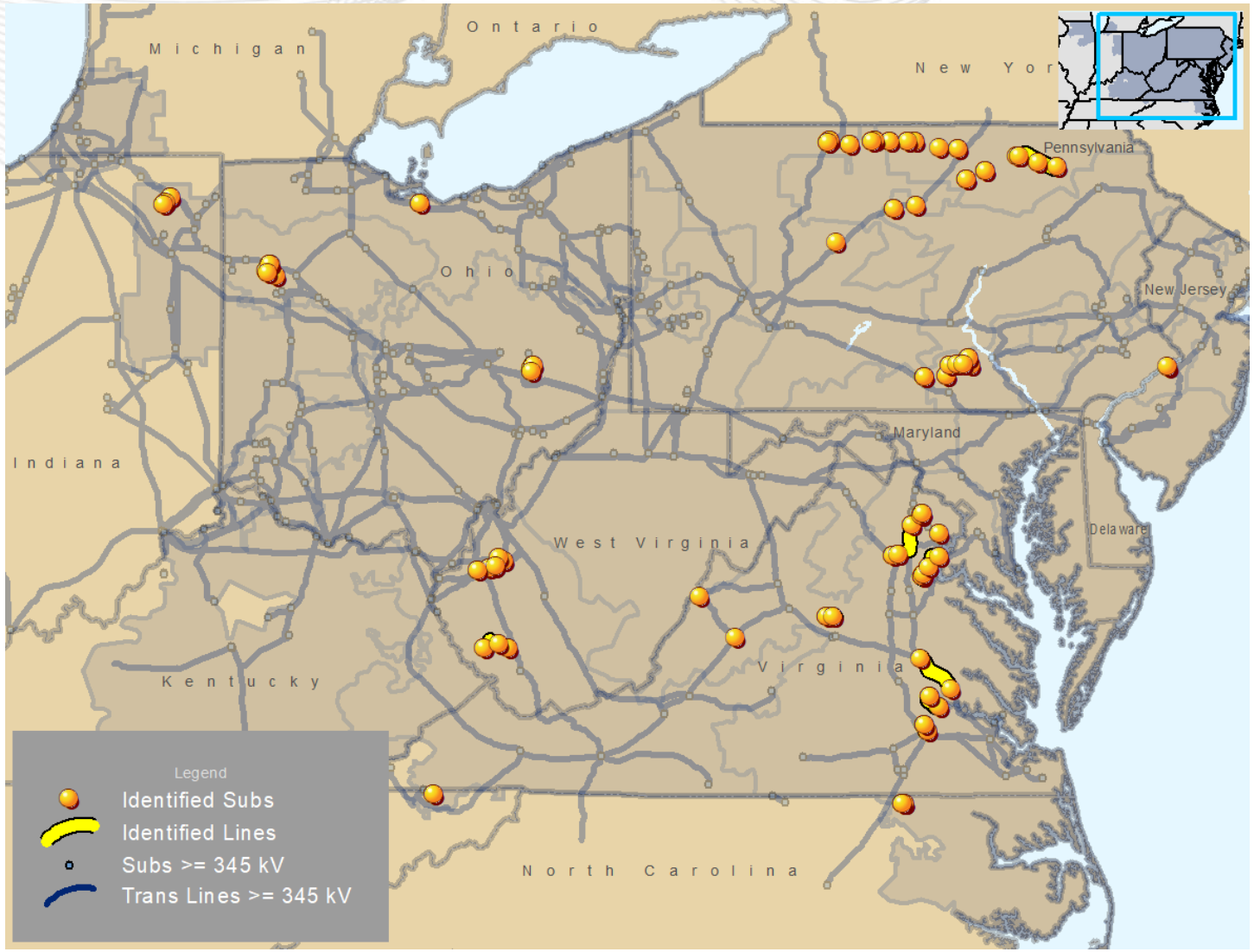
August 31, 2021

- Proposal Window No.1 closed

Analysis of 2026 – Violations

Overview of 2026 Results
Total of 402 flowgates identified

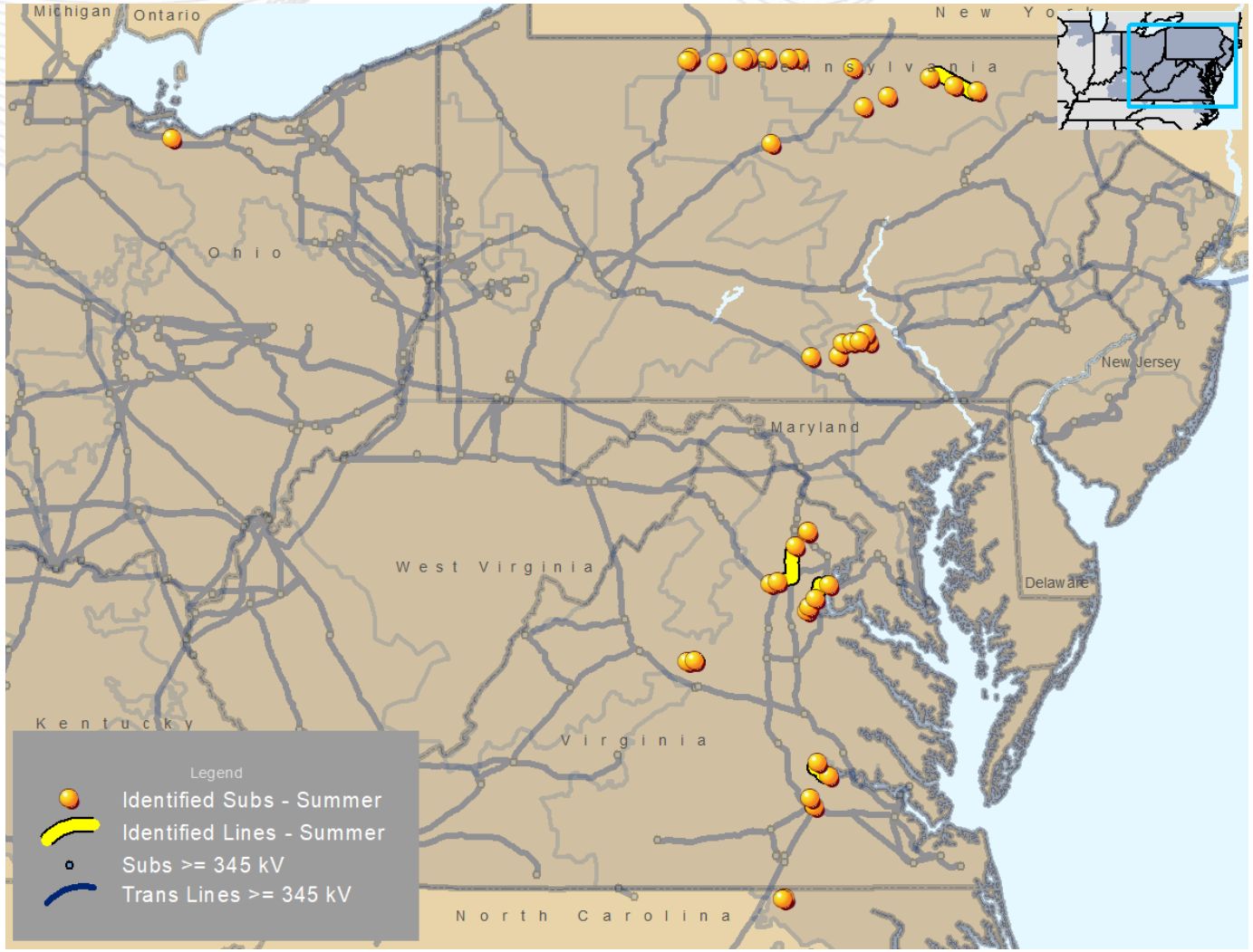
- 159 flowgates are eligible
  - 72 in the PJM Mid-Atlantic Region
  - 33 in the PJM Southern Region
  - 54 in the PJM Western Region
- 243 flowgates excluded
  - 195 due to the below 200kv exclusion
  - 7 due to Substation Equipment Exclusion
  - 32 existing baseline fixes
  - 7 Non PJM Facility
  - 2 Invalid due to recent Deactivation



Analysis of 2026 - Violations

2026 Summer Conditions

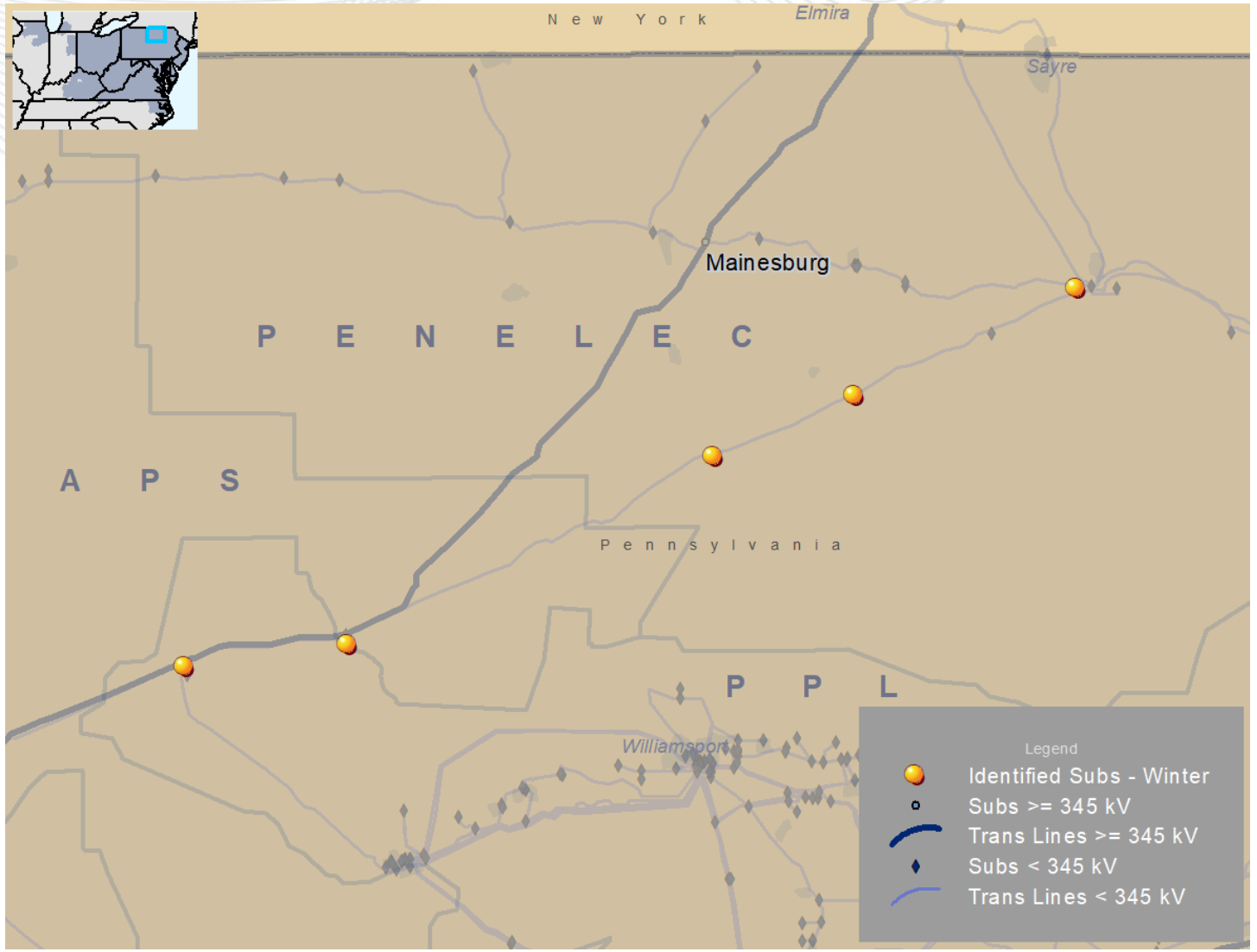
- 129 Violations
  - 6 N -1 Thermal
  - 2 N -1 Voltage Magnitude
  - 2 N -1 Load Drop
  - 5 N -1-1 Thermal
  - 29 N -1-1 Voltage Drop
  - 50 N -1-1 Voltage Magnitude
  - 35 Generation Deliverability



Analysis of 2026 - Violations

2026 Winter Conditions

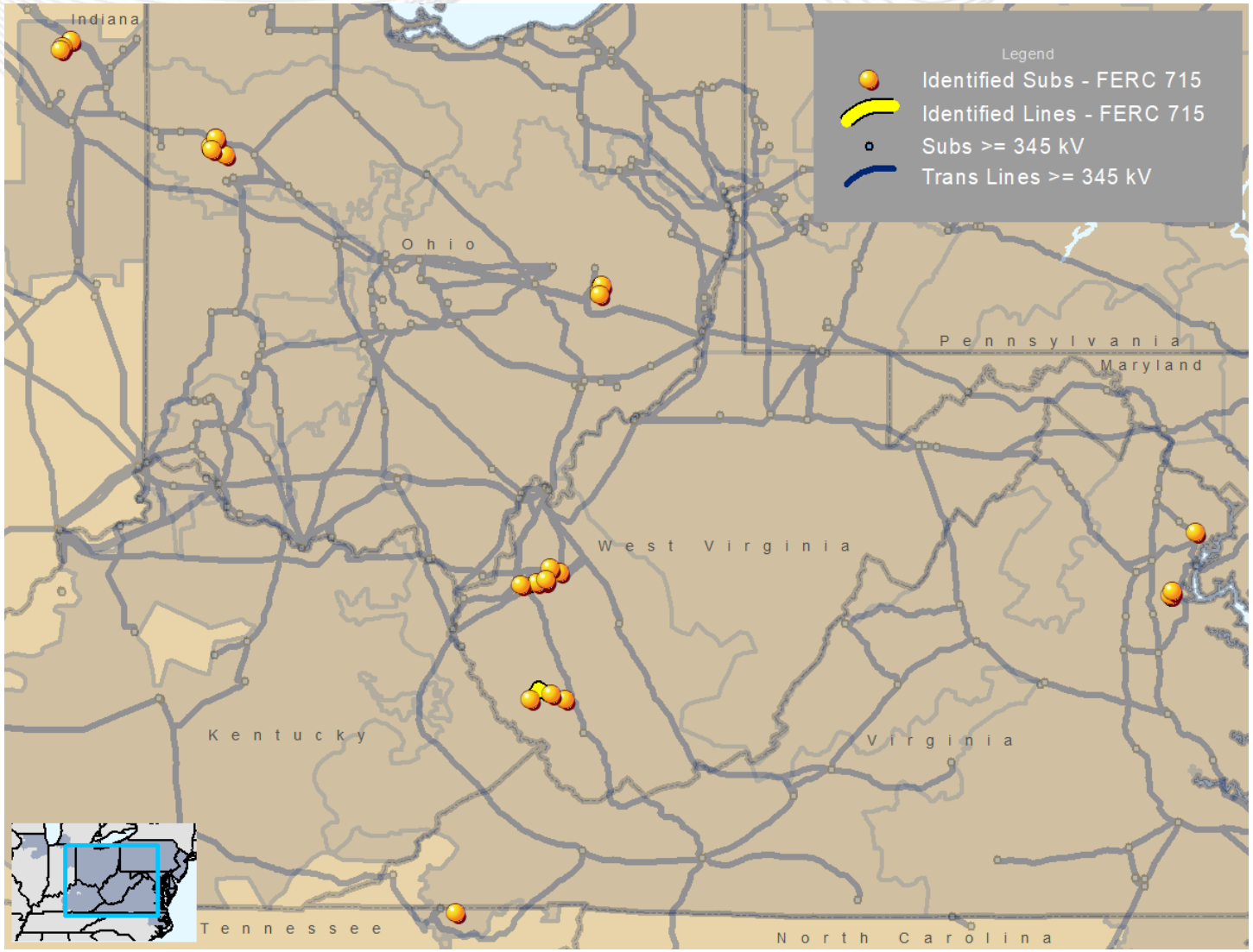
- 20 Violations
  - 1 Baseline Thermal
  - 4 Baseline Voltage Magnitude
  - 6 Generation Deliverability
  - 9 N -1-1 Voltage Magnitude



Analysis of 2026 - Violations

2026 FERC Form 715

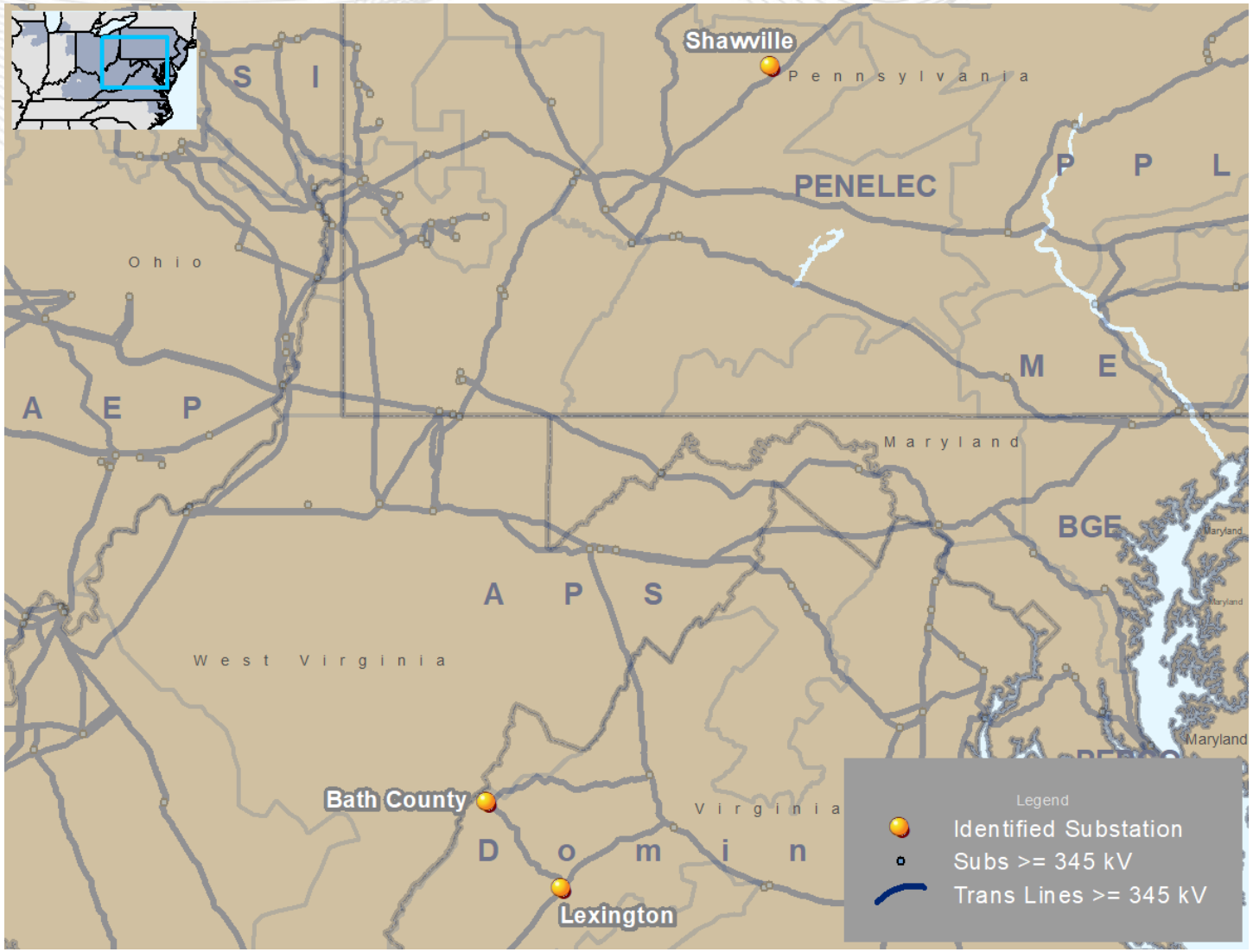
- 230 Violations
  - 96 Thermal
  - 54 Voltage Drop
  - 79 Voltage Magnitude
  - 1 Other



Analysis of 2026 - Violations

2026 Light Load

- 16 Violations
  - 15 Eligible Flowgates
  - 1 Excluded



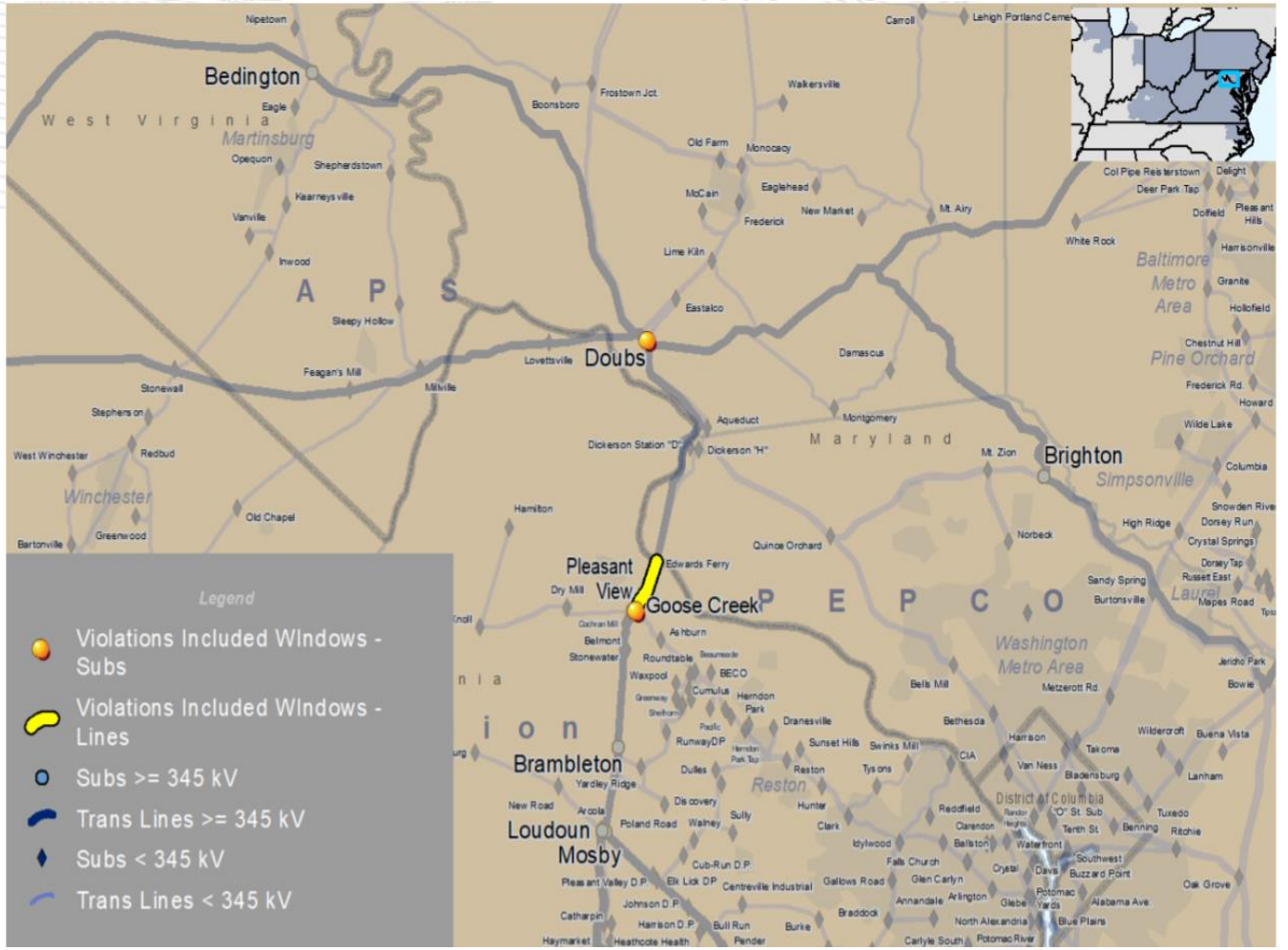
Analysis of 2026 - Violations

2026 Short Circuit

- 6 Violations Excluded

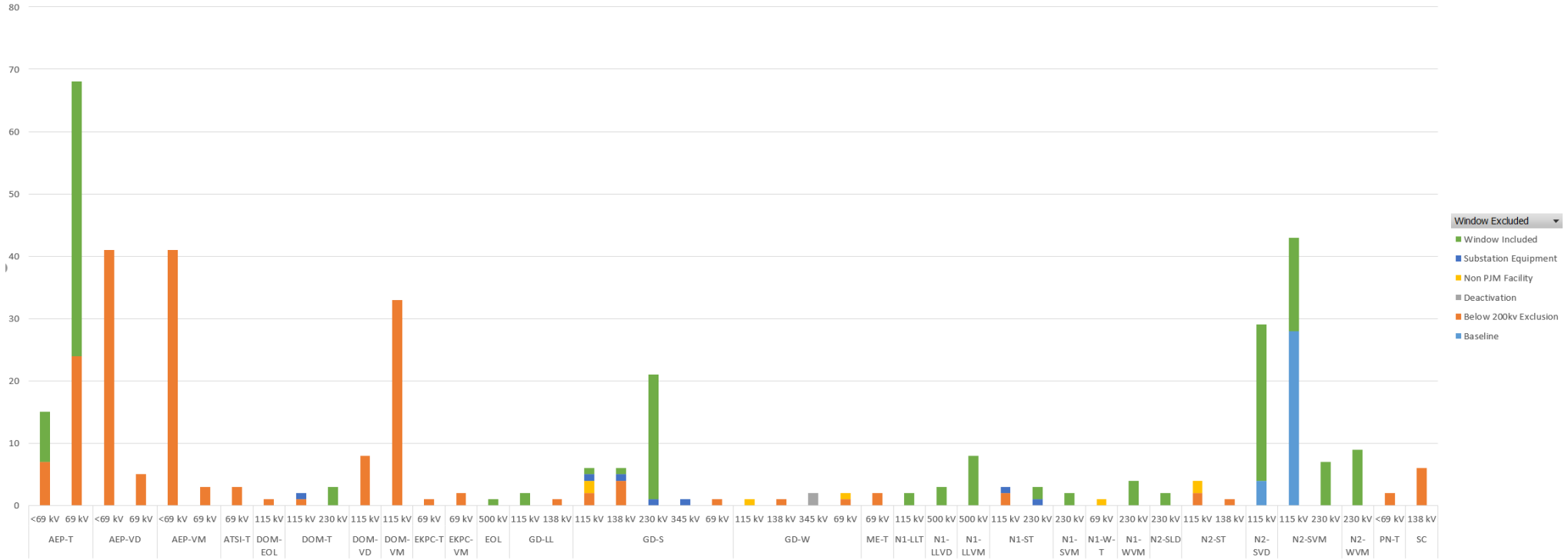
Analysis of 2026 - Violations

- 2026 Dominion Local TO Criterion for End of Life
  - 1 End of Life Criteria



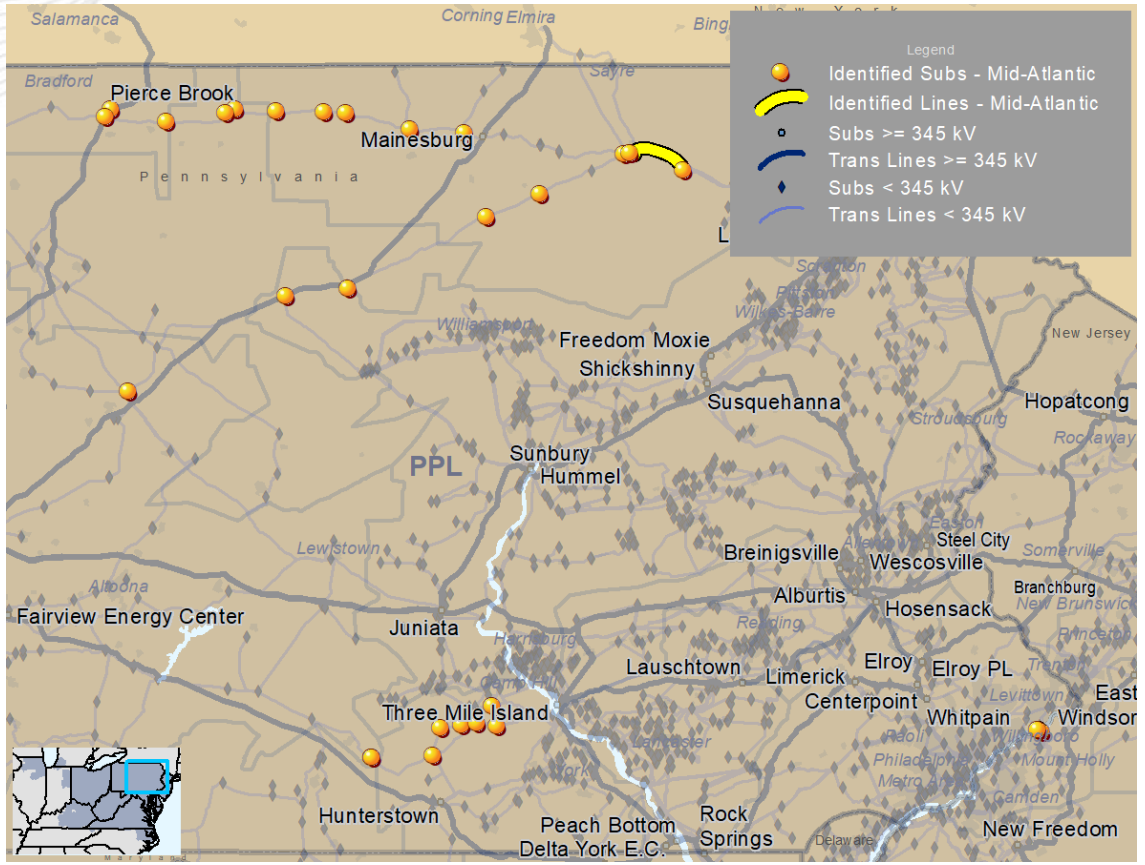
2026 Analysis Violations

Voltage	Window Excluded					Window Included	Grand Total
	Baseline	Below 200kv Exclusion	Deactivation	Non PJM Facility	Substation Equipment		
<69 kV		91				8	99
69 kV		42		2		44	88
115 kV	32	49		5	3	45	134
138 kV		13			1	1	15
230 kV					2	49	51
345 kV			2		1		3
500 kV						12	12
Grand Total	**32**	**195**	**2**	**7**	**7**	**159**	**402**



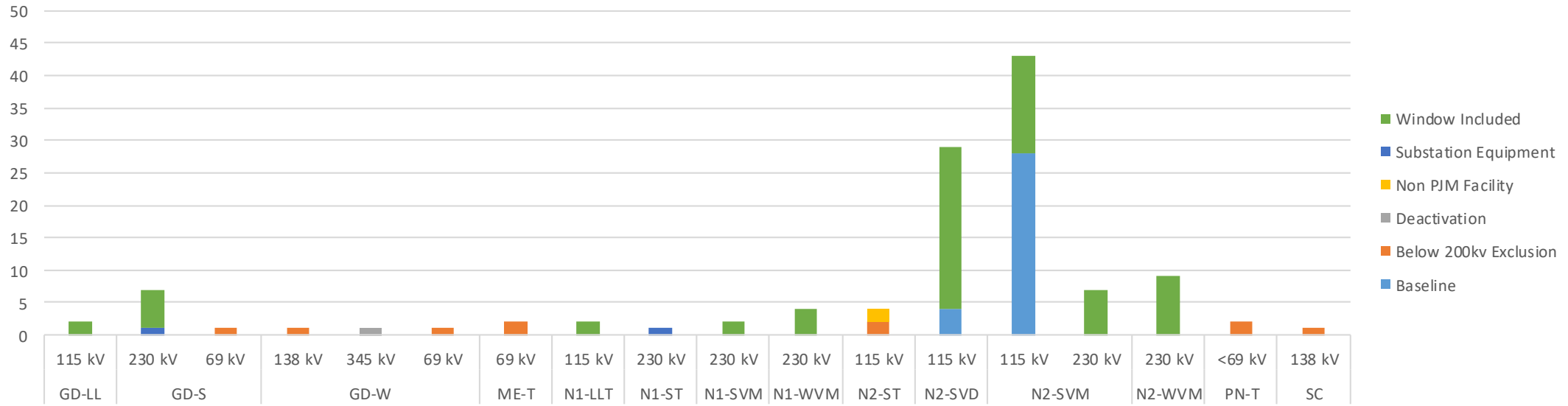
2021 RTEP Proposal Window 1 – Mid-Atlantic Results

- 72 Eligible Flowgates
  - 2 SummerN-1 Voltage Magnitude
  - 25 Summer N-1-1 Voltage Drop
  - 22 Summer N-1-1 Voltage Magnitude
  - 9 Winter N-1-1 Voltage Magnitude
  - 4 Winter Baseline Voltage Magnitude
  - 6 Generation Deliverability
  - 2 Light Load
  - 2 Thermal
- 47 Flowgates Excluded from Window
  - 9 below 200kv
  - 2 Substation Equipment Exclusions
  - 32 Existing Baseline Fixes
  - 2 Non PJM Facilities
  - 1 Deactivation
  - 1 Short Circuit



2021 RTEP Proposal Window 1 – Mid-Atlantic Results

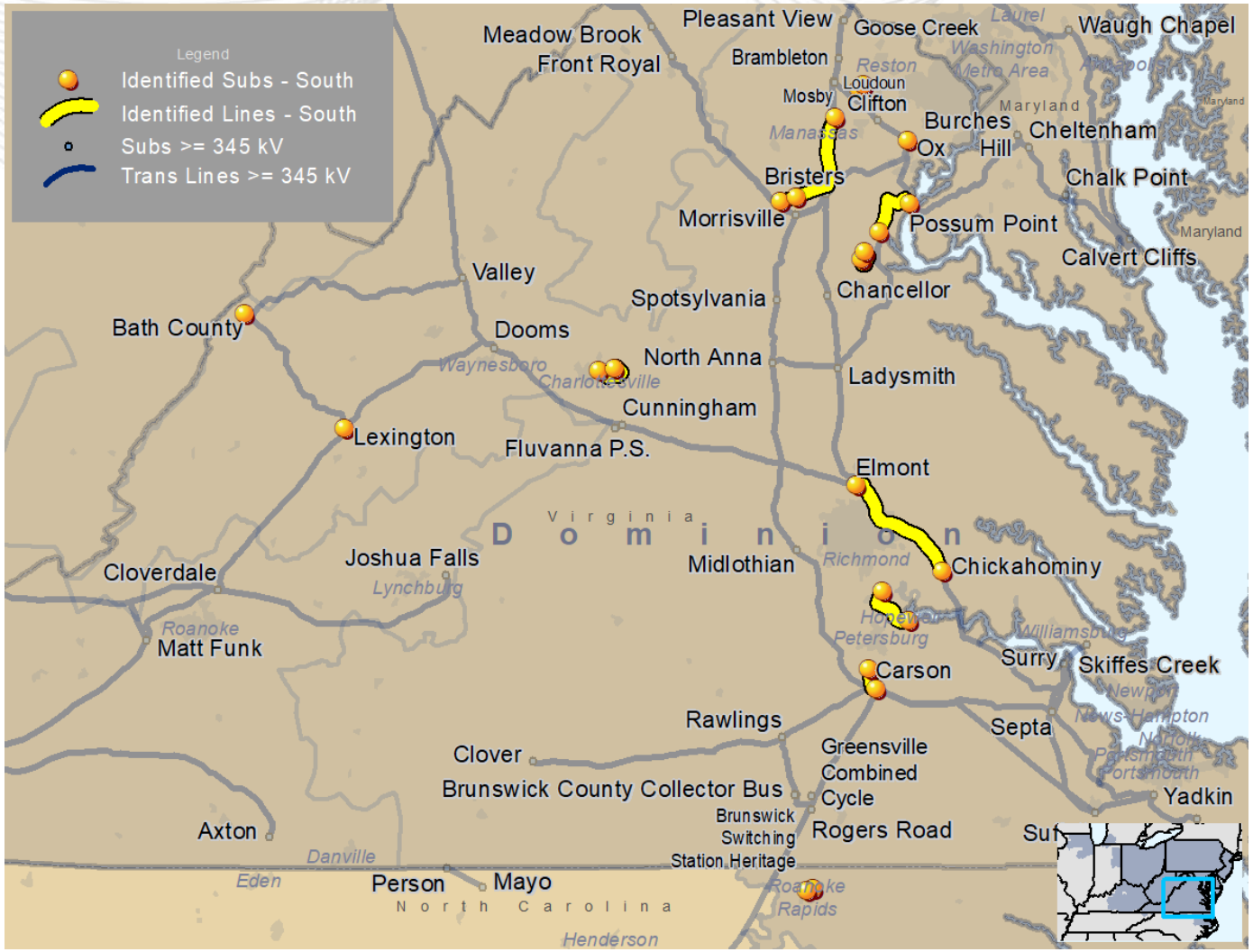
Voltage	Window Excluded					Window Included	Grand Total
	Baseline	Below 200kv Exclusion	Deactivation	Non PJM Facility	Substation Equipment		
<69 kV		2					2
69 kV		4					4
115 kV	32	2		2		44	80
138 kV		2					2
230 kV					2	28	30
345 kV			1				1
Grand Total	**32**	**9**	**1**	**2**	**2**	**72**	**119**



2021 RTEP Proposal Window 1 – South Results

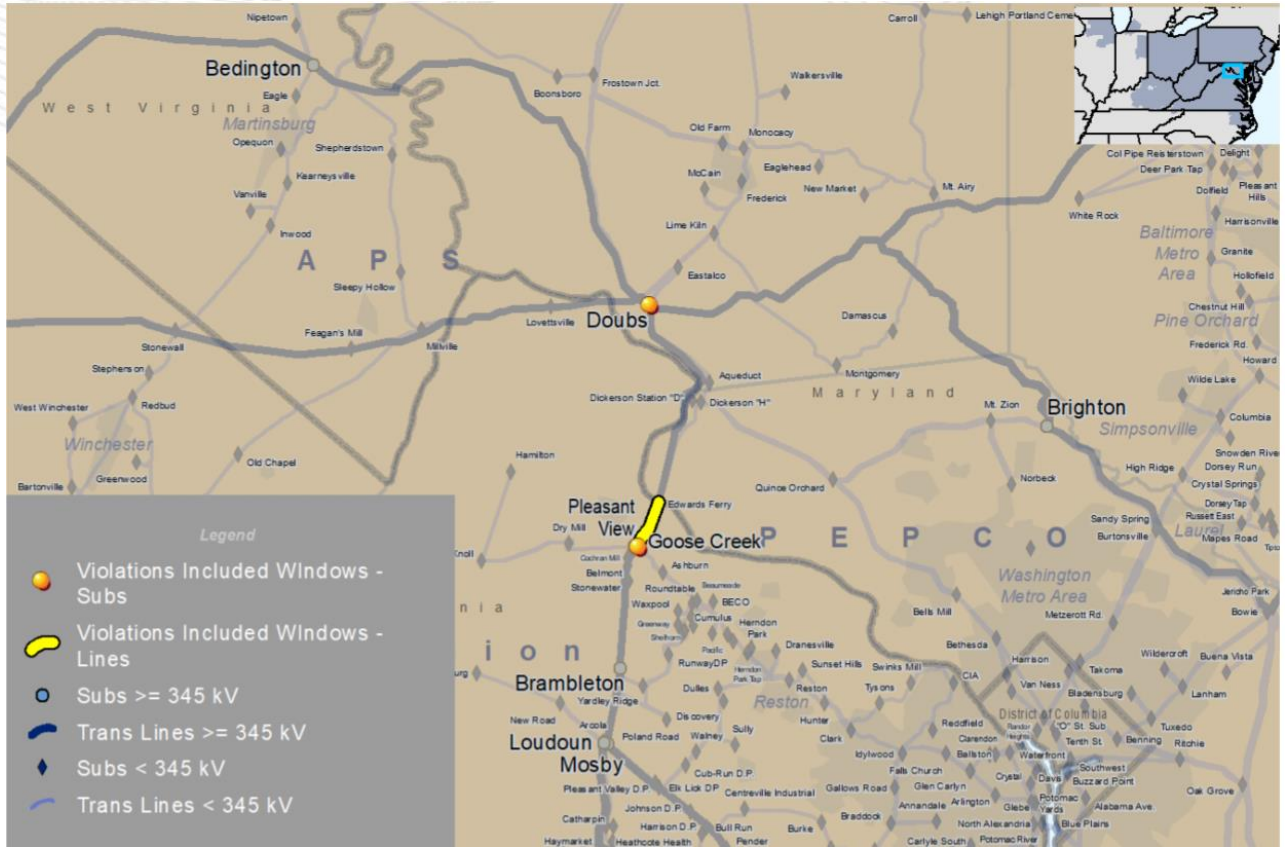
- 33 Eligible Flowgates
  - 3 FERC 715 Thermal
  - 14 Generation Deliverability
  - 8 Voltage Magnitude Light Load
  - 3 Voltage Drop Light Load
  - 2 N-1 Thermal
  - 2 N-1-1 Load Drop
  - 1 End of Life

- 52 Flowgates Excluded from Window
  - 46 below 200kv
  - 3 Substation Equipment Exclusions
  - 3 Non PJM Facilities



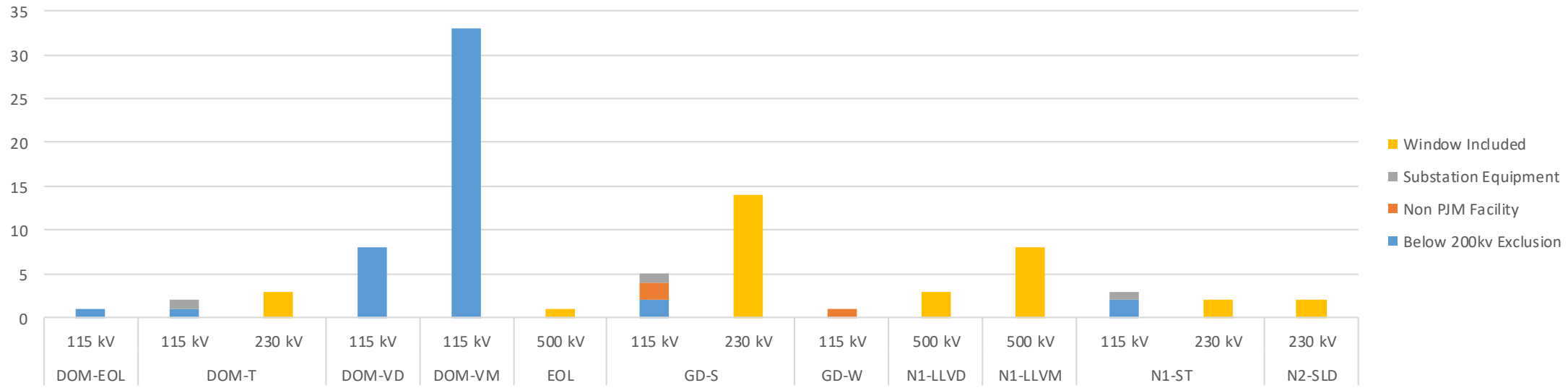
2021 RTEP Proposal Window 1 – South Results

- 1 Eligible Flowgate
  - End of Life Criteria



2021 RTEP Proposal Window 1 – South Results

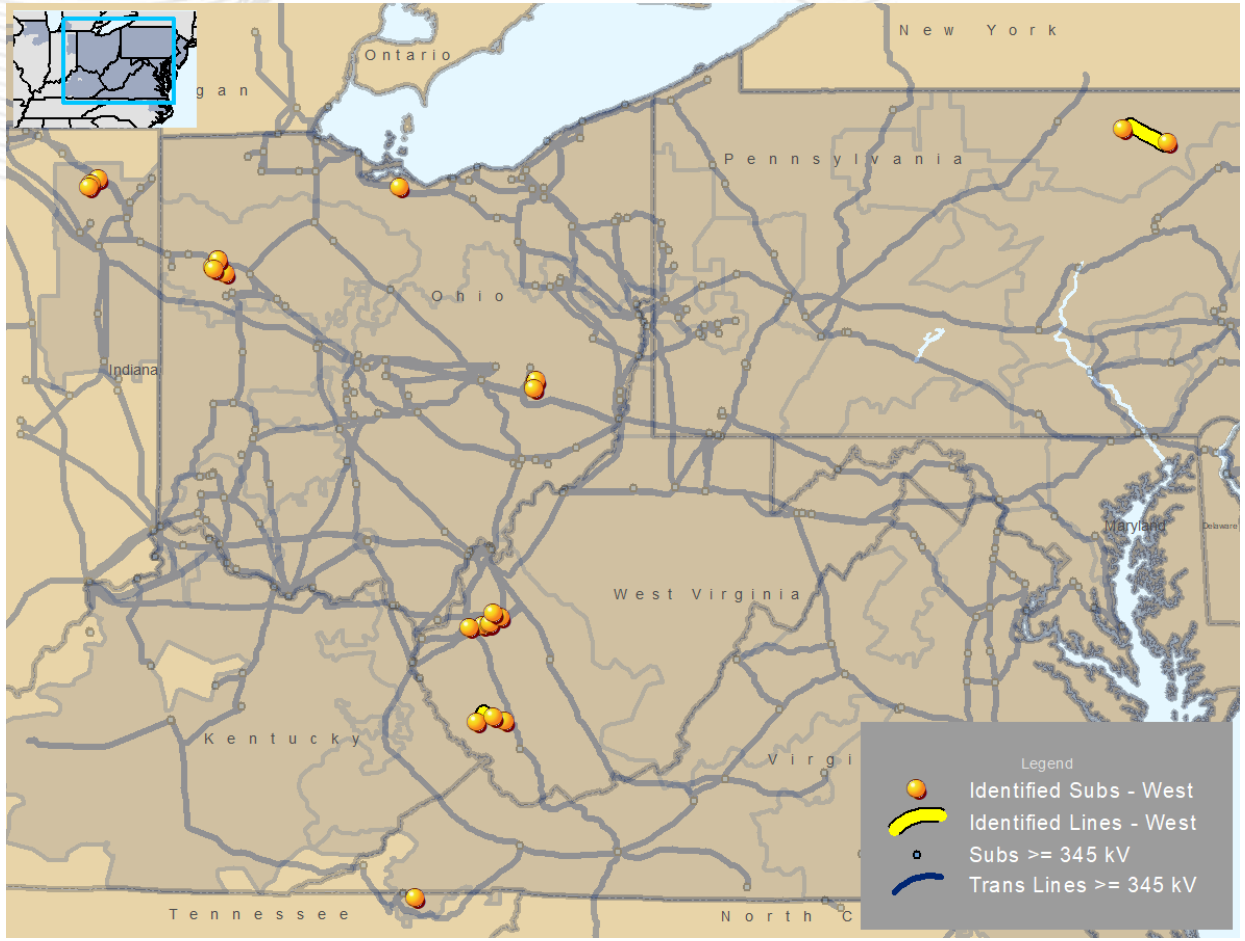
Voltage	Window Excluded			Window Included	Grand Total
	Below 200kv Exclusion	Non PJM Facility	Substation Equipment		
115 kV	46	3	3		53
230 kV				21	21
500 kV				12	12
Grand Total	**46**	**3**	**3**	**33**	**86**



2021 RTEP Proposal Window 1 – West Results

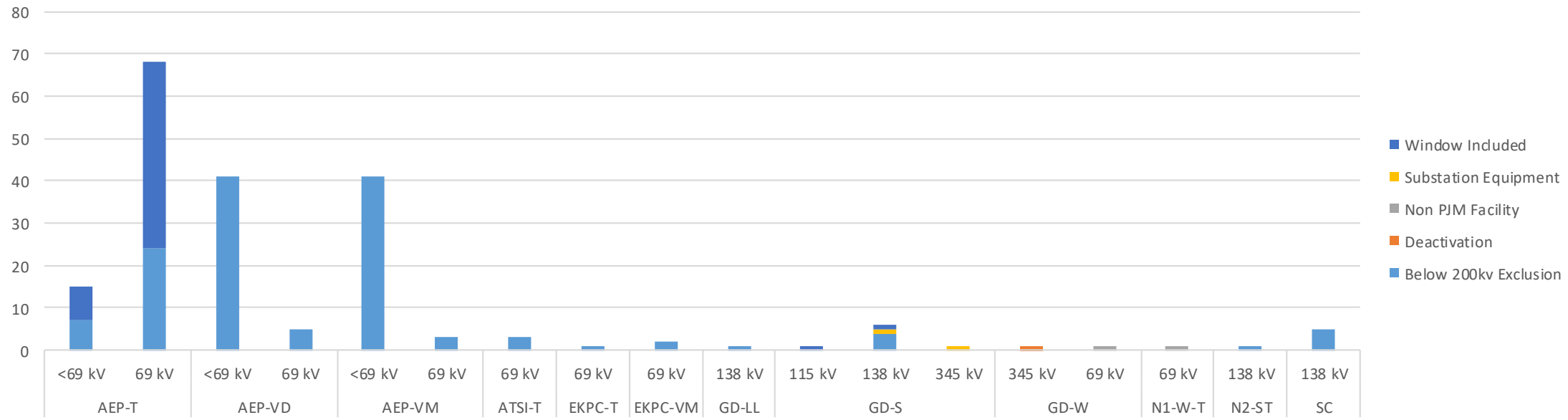
- 54 Eligible Flowgates
  - 52 FERC 715 Thermal
  - 2 Generation Deliverability

- 143 Flowgates Excluded from Window
  - 132 below 200kv
  - 2 Substation Equipment Exclusions
  - 2 Non PJM Facilities
  - 1 Deactivation
  - 1 Light Load
  - 5 Short Circuit



2021 RTEP Proposal Window 1 – West Results

Voltage	Window Excluded				Window Included	Grand Total
	Below 200kv Exclusion	Deactivation	Non PJM Facility	Substation Equipment		
<69 kV	89				8	97
69 kV	38		2		44	84
115 kV					1	1
138 kV	11			1	1	13
345 kV		1		1		2
Grand Total	**132**	**1**	**2**	**2**	**54**	**197**



2021 SAA Proposal Window to Support NJ OSW

2021 SAA Proposal Window Scope

- 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 August 31 (updated)

General RTEP Requirements for All Baseline and Supplemental Upgrades

Synchrophasor Requirements

Stakeholders interested in providing proposals are reminded that beginning on June 1, 2021, new Regional Transmission Expansion Plan (RTEP) projects, other than network upgrades for the purpose of interconnecting a new generator, should incorporate provisions with providing synchrophasor data per Section 3 of PJM Manual 1.

- Additional details are provided in PJM Manual 1 and proposing entities should reference this information
- PJM will provide list of applicable facilities

Contact

Facilitator:
Sue Glatz,
Suzanne.Glatz@pjm.com

Secretary:
Mike Zhang,
Michael.Zhang@pjm.com

SME/Presenter:
Aaron Berner,
Aaron.Berner@pjm.com

Reliability Analysis Update

Member Hotline

(610) 666 – 8980

(866) 400 – 8980

custsvc@pjm.com

Revision History

Version No.	Date	Description
1	7/6/2021	• Original slides posted
2	7/9/2021	• Added slides 10-24 for the 2021 RTEP Window 1
3	7/12/2021	• Adjusted order of slides • Added note indicating slides to be updated with maps
4	7/13/2021	• Added Maps for Window slides • Updated 2021 SAA for NJ OSW window closing date
5	7/16/2021	• Added slide 14 to show map for Light Load • Added Short Circuit and Light Load information to slides 15, 18, 20, & 23