Reliability Analysis Update

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Transmission Expansion Advisory Committee

May 10, 2022

Second Review

Baseline Reliability Projects

MetEd Transmission Zone: Baseline

Process Stage: Second Review

Criteria: Summer N-1-1 Voltage

Assumption Reference: 2026 RTEP assumption

Model Used for Analysis: 2026 RTEP Summer case

Proposal Window Exclusion: None

Problem Statement:

Voltage magnitude and voltage drop violation at several 115 kV stations in the Allen (MetEd) vicinity for N-1-1 contingencies.

	# of Flowgates
Violations were posted as part of the 2021 Window 1	N2-SVM8, N2-SVM9, N2-SVM10, N2-SVM11, N2-SVM12, N2-SVM13, N2-SVM16, N2-SVM17, N2-SVM18, N2-SVM19, N2-SVM26, N2-SVM27, N2-SVD1, N2-SVD2, N2-SVD3, N2-SVD4, N2-SVD5, N2-SVD6, N2-SVD7, N2-SVD8, N2-SVD9, N2-SVD10, N2-SVD11, N2-SVD12, N2-SVD15, N2-SVD16

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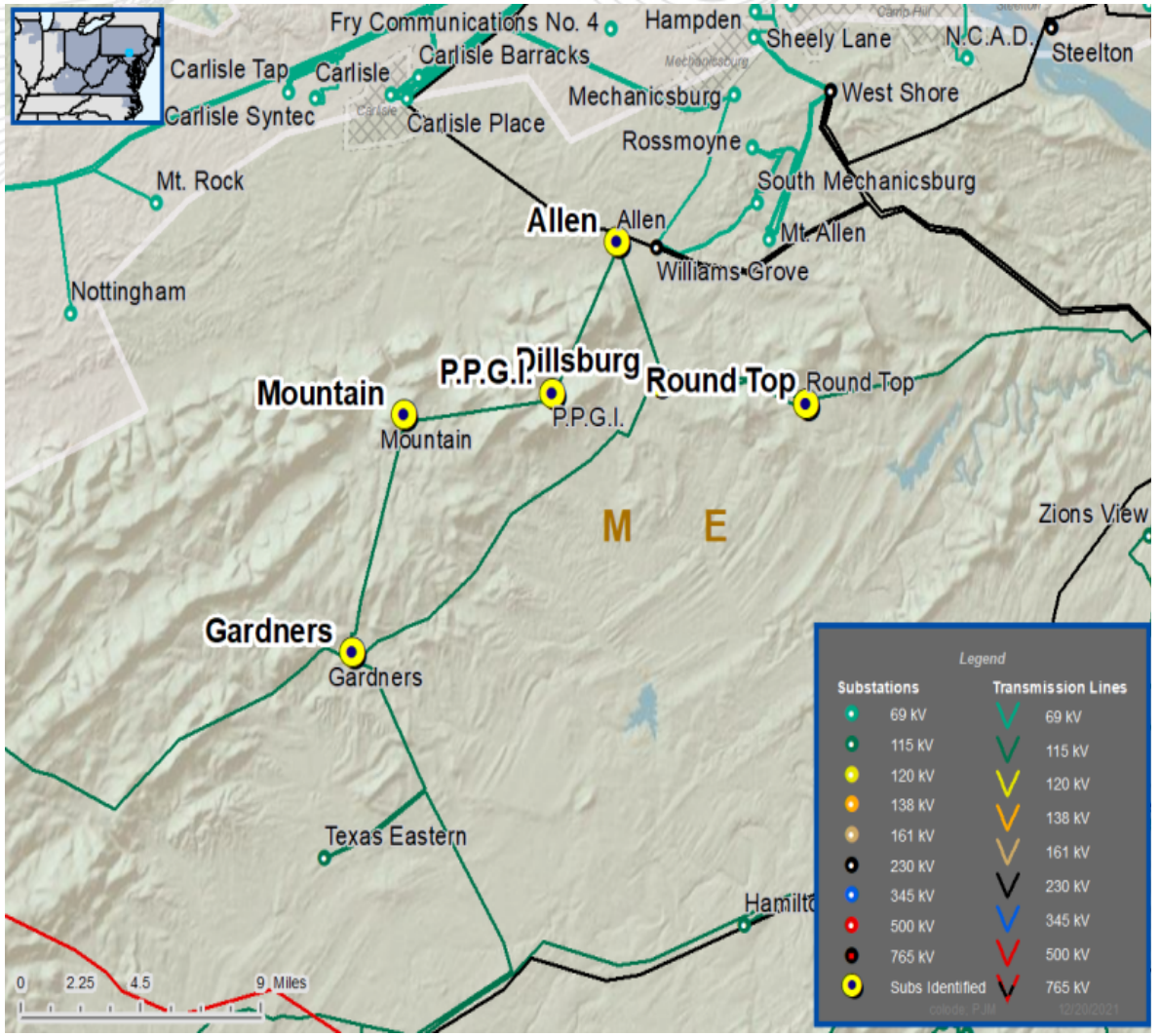

MetEd Transmission Zone: Baseline Reliability & Operational Flexibility Performance

PJM Proposal ID	Project Description	Proposer Cost Estimate ($M) Current-Year	Reliability Assessment		Operational Flexibility	Market Efficiency	Detailed Constructability Performed	Comments
			Addressed Identified Flowgates	Did the solution cause harm	Operational Flexibility Impact	Provides ME Benefit		
292	Dogwood Run 115/230kV Transmission Project	$15.10	Yes	No	Medium	Negligible	Yes	Does not enhance operational flexibility, as the Allen 115 kV configuration remains the same - The Allen substation will be dropped for faults on terminating lines (Tapped Sub)
582	Dogwood Sprint 115/500kV Transmission Project	$21.58	Yes	No	Medium	N/A	Yes	Does not enhance operational flexibility, as the Allen 115 kV configuration remains the same - The Allen substation will be dropped for faults on terminating lines (Tapped Sub)
561	Williams Grove - Allen 115 kV line upgrade sourced from Williams Grove 69 kV bus (PPL-Allen Switchyard)	$15.62	Yes	No	Medium	N/A		This project is similar to ID 457, with the exception of the new 115 kV substation will be constructed by PPL. The additional feed to Allen 115 kV is from 69 kV PPL system.
992	Williams Grove - Allen 115 kV line upgrade sourced from Williams Grove 230 kV bus (PPL-Allen Switchyard)	$18.57	Yes	No	High	N/A		The project is similar to ID 99, with the exception of the new 115 kV substation will be constructed by PPL (additional greenfield)
386	Multi-Driver Project: Allen-Williams Grove Greenfield Line & Reconductor	$20.25	Yes	No	Low	N/A		This project is similar to ID 113 (lacks operational flexibility), with additional work to solve Market Efficiency need. The ME need is already addressed independently.
113	Allen-Williams Grove Greenfield Line	$12.03	Yes	No	Low	N/A		The project doesn't enhance operational flexibility due to the proposed configuration (single breaker connection) at Allen 115 kV
789	New Allen 115 kV Source	$28.54	Yes	Yes	High	N/A		The project causes a new violation.
477	Northern Loop STATCOM	$32.16	Yes	No	Low	N/A		The project doesn't enhance operational flexibility.
457	Williams Grove - Allen 115 kV line upgrade sourced from Williams Grove 69 kV bus (FE-Allen Switchyard)	$15.27	Yes	No	Medium	N/A		The additional feed to Allen 115 kV is from 69 kV PPL system
99	Williams Grove - Allen 115 kV line upgrade sourced from Williams Grove 230 kV bus (FE-Allen Switchyard)	$17.82	Yes	No	High	Negligible	Yes	Provides the most operational flexibility due to the Allen 115 kV proposed configuration

MetEd Transmission Zone: Baseline Cost and Constructability Study Result

Independent Cost and Constructability review was performed for the following projects.

PJM Proposal ID	Project Description	Proposer Total * Project Cost ($M)	Proposer Project * Cost Cap ($M)	Cost Cap Exclusions	Independent Total* Project Cost ($M)	Independent Cost* Overrun Scenario ($M)	Quality of Proposal	Proposal Completeness	Environmental & Siting / Permitting Risks	Project Development Risk	Independent Constructability Findings
292	Dogwood Run 115/230kV Transmission Project	$17.08[1]	$19.00	1. Scope of Work change 2. Uncontrollable Force 3. O&M costs 4. Capital upgrades occurring after Project is initially placed in service	$18.80	$21.20	Low	No	Medium	Medium	> Line: Uses Greenfield > Substation: Greenfield > Didn't include remote end relay and interconnection metering consideration. > Proposal Deficiency: >No High side transformer protection (breaker)
582	Dogwood Sprint 115/500kV Transmission Project	$24.44[2]	$27.30	1. Scope of Work change 2. Uncontrollable Force 3. O&M costs 4. Capital upgrades occurring after Project is initially placed in service	$33.52	$33.40	Low	Yes	Medium	High	> Line: Uses Greenfield > Substation: Greenfield > Didn't include remote end relay and interconnection metering consideration. > Project utilizes First Energy ROW for substation siting. > Least detailed proposal
99	Williams Grove - Allen 115 kV line upgrade sourced from Williams Grove 230 kV bus (FE-Allen Switchyard)	$19.76[3]	$12.65	1. Change in law. 2. Change in ISO req'ts 3. Force Majeure 4. Legal Fees & Expenses 5. Charges associated with acceleration of work before commercial ops.	$21.81	$23.30	High	Yes	Low	Low	> Line: Uses Greenfield > Substation: Upgrade Construction > Most detailed proposal and accounts for existing substation design/expansion requirements

Notes: *All costs in In-Service Year $

1. Project 292 Capped Component Costs are $15.07M
2. Project 582 Capped Component Costs are $22.60M
3. Project 99 Capped Component Costs are $12.65M

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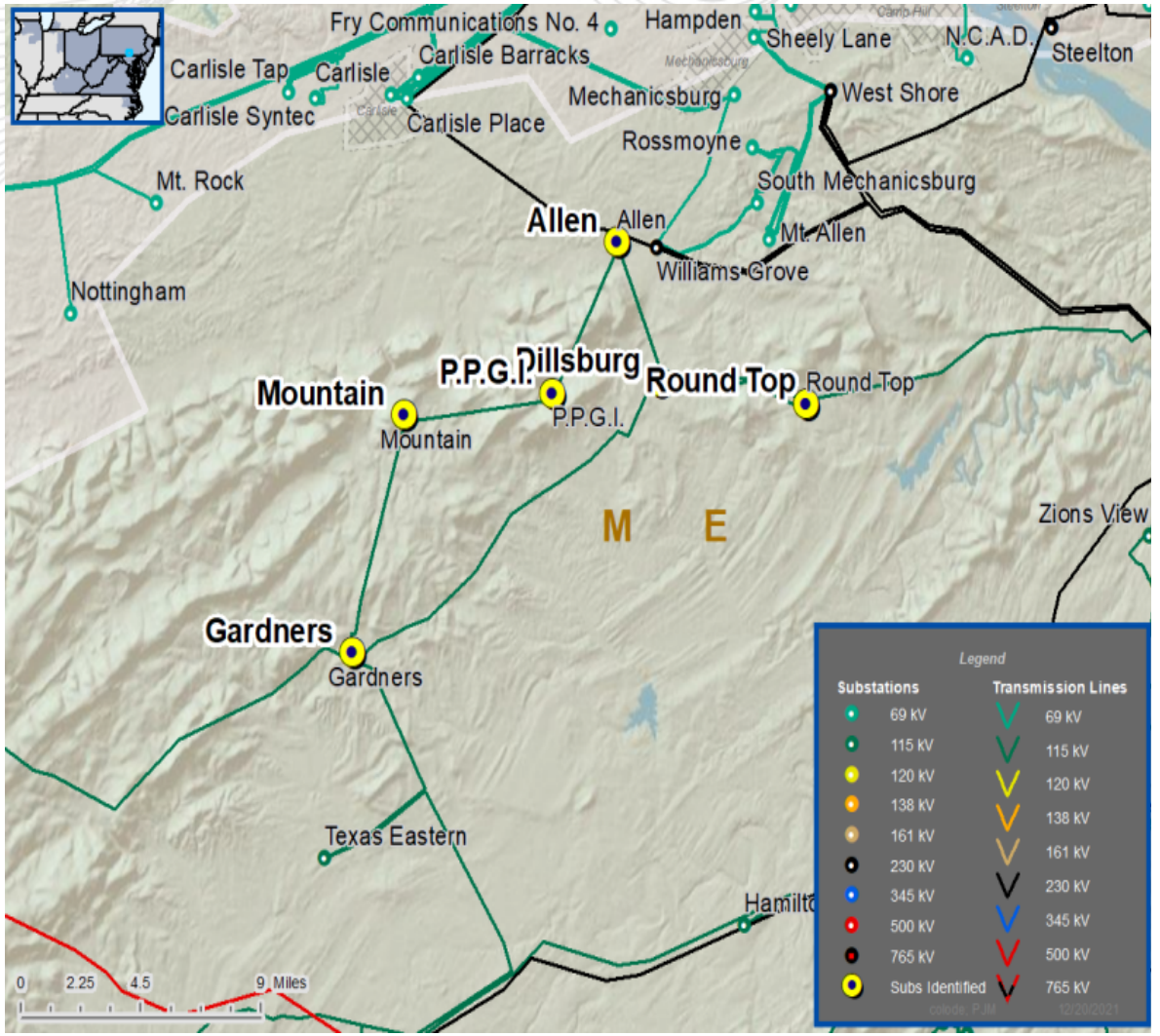
MetEd Transmission Zone: Baseline

Recommended Solution:

Proposal ID 99 : At the existing PPL Williams Grove Substation, install a new 300 MVA 230/115 kV transformer. Construct a new ~3.4 mile 115 kV single circuit transmission line from Williams Grove to Allen Substation. Install a new Allen four breaker ring bus Switchyard near the existing METED Allen Substation on adjacent property presently owned by FE. Terminate the Round Top - Allen and the Allen-PPGI 115 kV lines into the new switchyard. (B3715)

Estimated Cost: $17.82 M

Required In-Service: 6/1/2026



Crete-St. John Area Needs

Reliability & Market Efficiency Considerations

- PJM opened 2021 Window 2 to address the Crete-St. John reliability overload:
  - Opened November 3, 2021; Closed January 12, 2022
- Preliminary 2027 (2022 RTEP) winter generator deliverability is showing additional reliability overloads in the area
- Congestion identified in the area was posted as part of the 2021 mid-cycle update in the 2020/21 long-term market efficiency window
- PJM plans to open a 30 or 45 day multi-driver window to address the reliability and market efficiency needs
  - Window tentatively scheduled to open later in May
  - Additional communication will be provided prior to window opening

2022 RTEP

- Model review in final stage
- Current schedule (currently targeting the schedule below)
  - Preliminary models posted on March 22, April 1, April 26
  - Continue to post updates to the models on needed basis
  - Post draft PJM analysis releases starting from the 1st week of May
  - Requesting FERC Form 715 analysis results from transmission owners by the 3rd week of May
  - Targeting open 2022 RTEP proposal window between the last week of June and first week of July

Contact

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Reliability Analysis Update

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Revision History

Version No.	Date	Description
1	5/5/2022	• Original slides posted

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Report suspicious email activity to PJM.

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