



# Reliability Analysis Update

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Transmission Expansion Advisory Committee  
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- 2023 Window 2 updates
- 2023 Window 1 – Recommended Solutions (Second Read)
- 2023 Window 1 – Proposed Solutions (First Read / Change)
- Adjustments to Earlier Approved Projects



# 2023 Window 2 Updates

## Baseline Reliability Projects

- PJM proposing to pursue 30 day window, 2023 window 2, which would open in March, 2024.
  - AEP significant load increase due to new datacenter loads
  - Thermal issues in PSEG around Hinchmans area – require urgent action
  - 500kV line #588 EOL in Dominion
- Shortened window Immediate Need for project
- 2022 Window 3 selected solutions are included in the base cases
- AEP supplemental projects related to the data center load in the load forecast are included in the base cases
- Stakeholders are requested to ensure they are properly registered for the RTEP window which will allow them to participate in this additional 30 day window

# Recommended Solutions – 2023 Window 1

## Second Read

### Baseline Reliability Projects



# ComEd Transmission Zone: Baseline 2023 RTEP Window 1 Cluster 3

**Process Stage:** Recommended Solution – Second Read

**Criteria:** Winter Generator Deliverability

**Assumption Reference:** 2023 RTEP assumptions

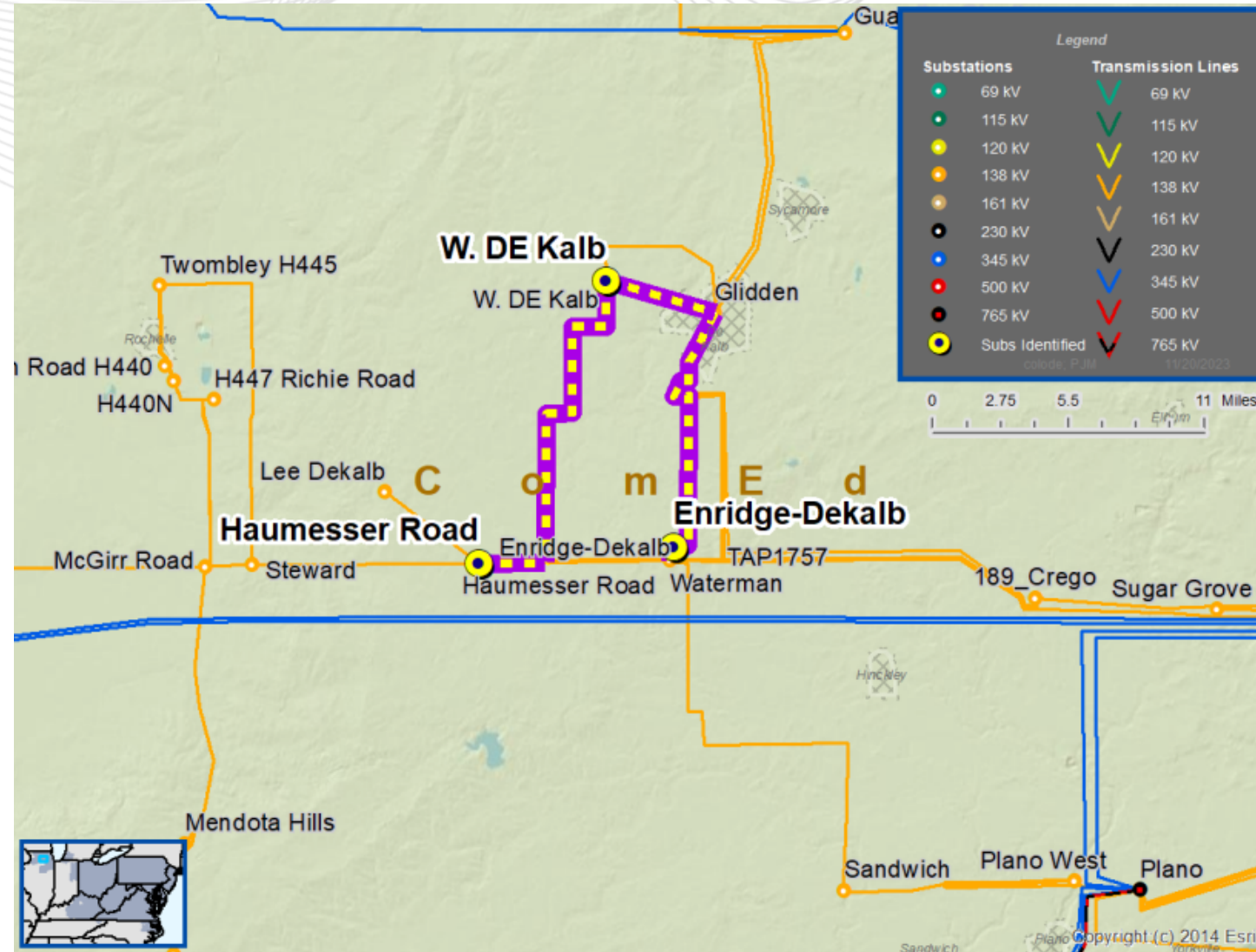
**Model Used for Analysis:** 2028 RTEP cases

**Proposal Window Exclusion:** None

## Problem Statement:

2023W1-GD-W229, 2023W1-GD-W955, 2023W1-GD-W988,  
2023W1-GD-W945, 2023W1-GD-W993, 2023W1-GD-W268,  
2023W1-GD-W972, 2023W1-GD-W1397, 2023W1-GD-W1387,  
2023W1-GD-W946

In 2028 RTEP Winter case, the Haumesser Road-West DeKalb Tap-ESS H452 (Enridge-DeKalb) Tap 138 kV line is overloaded for N-1 and N-2 outages.





# ComEd Transmission Zone: Baseline 2023 RTEP Window 1 Cluster 3

- As part of the 2023 RTEP Window #1, projects listed in the table below were proposed to address the violations in cluster 3
- 1 Greenfield and 2 upgrades from incumbent TO

Proposal ID	Proposing Entity	Project Type	Upgrade Description	Upgrade Cost (\$M)
500	ComEd	Greenfield	Expand Haumesser Road substation. Extend the line 11323 West Dekalb tap 1.6 miles into Haumesser Road to create new line 9411 from Haumesser to West Dekalb. Expand West Dekalb to tie line 9411 from Haumesser Road to the existing line 8315 from Glidden. Reconductor/rebuild 10 miles of line 9411 and 6 miles of line 8315.	113.94
712	ComEd	Upgrade	Rebuild/reconductor 138 kV line 11323 from Haumesser Road to the H-452 tap.	10.22
972	ComEd	Upgrade	Rebuild 138 kV line 11323 as double circuit from Haumesser Road to the H-452 tap and string a second circuit. Expand Haumesser Road to a 4 circuit breaker ring bus. Add a circuit breaker at H-452 to create a second path between Haumesser Road and Waterman.	28.11





# ComEd Transmission Zone: Baseline 2023 RTEP Window 1 Cluster 3

## Proposed Solution: Proposal No. 2023-W1-972

- Expand Haumesser Road 138 kV substation as a 4 circuit breaker ring bus. **(b3811.1)**
- Add one 138 kV circuit breaker at H-452 to complete a three circuit breaker ring bus. **(b3811.2)**
- Rebuild 3 miles of 138 kV line 11323 from Haumesser Road to the H-452 tap with double circuit towers. Cut the H-452 tap over to the 2nd circuit from Haumesser Road. Both circuits to use twisted pair 556 ACSR Parakeet conductor. **(b3811.3)**

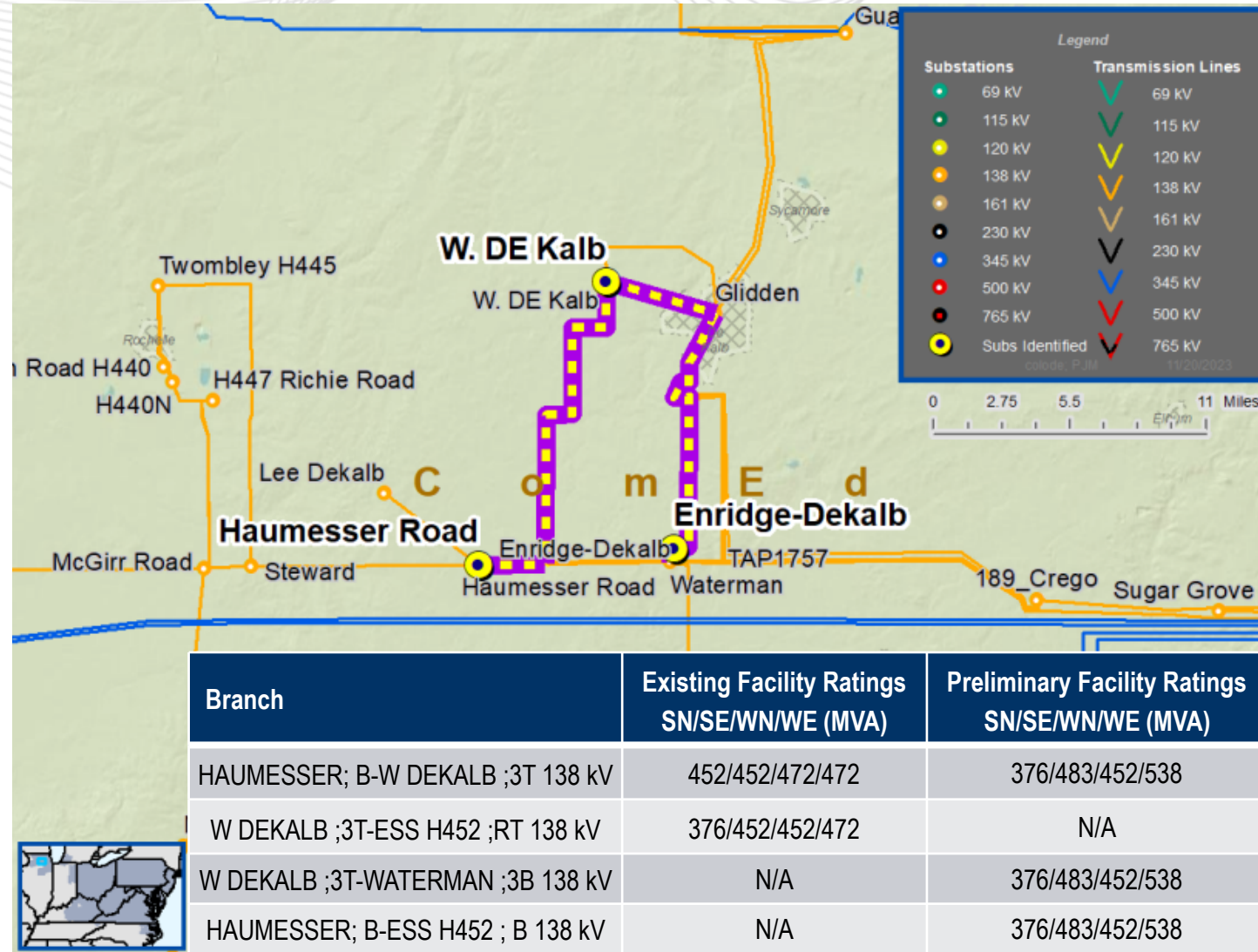
**Estimated Cost:** \$28.11 M

**Additional Benefits:** Provides more efficient and cost effective capacity for the longer term and addresses congestion in the area. This solution also provides an additional outlet to accommodate increased flows in the area west of Haumesser Road. Ring busses at Haumesser Road and H-452 increase reliability and resilience.

**Required IS Date:** 12/1/2028

**Projected IS Date:** 12/1/2028

**Previously Presented:** 1/9/2024







# 2023 Window 1 First Read Baseline Reliability Projects



# ComEd Transmission Zone: Baseline 2023 RTEP Window 1 Cluster 2

**Process Stage:** Proposed Solution – First Read

**Criteria:** Summer Generator Deliverability

**Assumption Reference:** 2023 RTEP assumptions

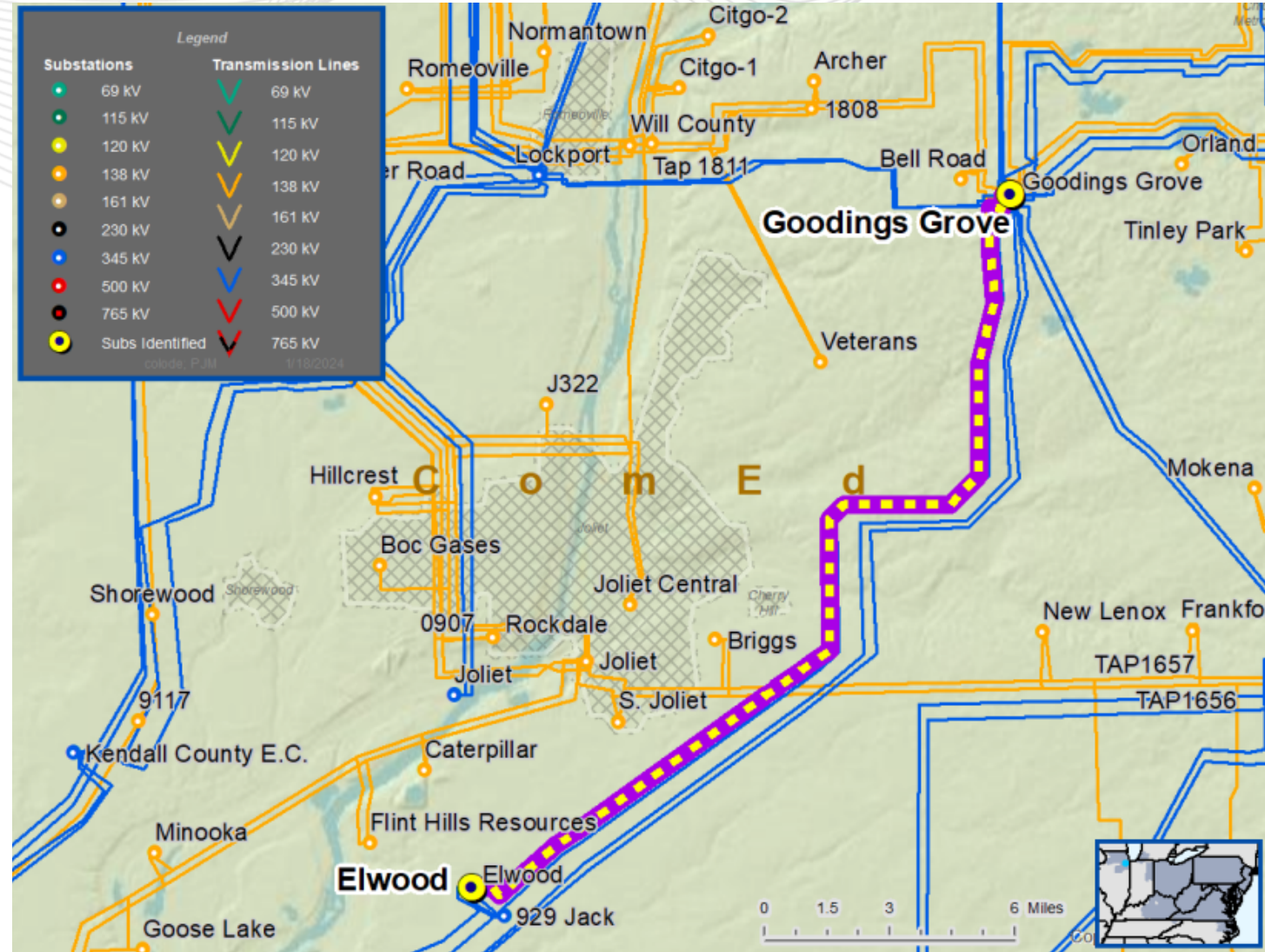
**Model Used for Analysis:** 2028 RTEP cases

**Proposal Window Exclusion:** None

**Problem Statement:**

2023W1-GD-S554, 2023W1-GD-S1259, 2023W1-GD-S571,  
2023W1-GD-S563, 2023W1-GD-S1260, 2023W1-GD-S570,  
2023W1-GD-S190, 2023W1-GD-S548

In 2028 RTEP Summer case, the Elwood-Goodings Grove 345 kV double circuit is overloaded in the base case and for N-2 outages.





# ComEd Transmission Zone: Baseline 2023 RTEP Window 1 Cluster 2

- As part of the 2023 RTEP Window #1, projects listed in the table below were proposed to address the violations in cluster 2
- 4 total proposals submitted from 2 different entities
  - 2 Greenfields
  - 2 Upgrades
- 1 proposal identified with cost containment

Proposal ID	Proposing Entity	Project Type	Upgrade Description	Upgrade Cost (\$M)
35	COMED	UPGRADE	Reconductor 18.7 miles of 345 kV lines 11620 & 11622 from Elwood to Goodings Grove with two conductor bundled 1033.5 ACSS conductor. Modify and replace towers as necessary to accommodate the higher mechanical loads of the bundled conductor.	61.84
138	COMED	GREENFIELD	Install two new 345 kV circuits from Elwood to Joliet for a distance of approximately 8 miles.	97.50
663	CNTLTM	GREENFIELD	The Elwood - Joliet 345kV transmission project consists of an approximately 4 mile double circuit 345kV transmission line from the Elwood Substation to the Joliet Substation.	29.37
937	COMED	UPGRADE	Apply conductor coating to lines 11620 & 11622 from Elwood to Goodings Grove. The coating increases emissivity and reduces absorptivity of the conductor, allowing for increased ratings. This technology was presented at PJM's Emerging Technology Forum on 3/17/21.	8.52

- PJM's steady state reliability analysis showed that all 4 proposals solve the posted/intended reliability criteria violations. However proposal 937 only just brought the loading below the required 100% threshold, and so was not considered further.
- PJM's short circuit analysis showed additional overdutied breakers for the remaining 3 proposals (proposals 35, 138 and 663).
- PJM conducted an independent review of the remaining 3 proposal components and costs, and made adjustments based on the following:
  - Where more accurate scope and costs were known from the incumbent TO
  - Additional scope and cost required to address the identified overdutied breakers



# ComEd Transmission Zone: Baseline 2023 RTEP Window 1 Cluster 2

- Additional scope considered in PJM’s independent review is marked in **red** under the Project Description.

Proposal ID	Proposing Entity	Project Type	Project Description	Proposal Cost (\$M)	Independent Cost (\$M)	Independent Cost Adjustment Reasoning
35	COMED	UPGRADE	Reconductor 18.7 miles of 345 kV lines 11620 & 11622 from Elwood to Goodings Grove with two conductor bundled 1033.5 ACSS conductor. Modify and replace towers as necessary to accommodate the higher mechanical loads of the bundled conductor. <b>Adjust reclosing cycle on for Goodings Grove 345 kV circuit breaker ‘116 9806’ to eliminate the reclosing derating (zero cost).</b>	61.84	61.84	Include scope to adjust reclosing for one of the breakers at Goodings Grove 345 kV at no additional cost.
138	COMED	GREENFIELD	Install two new 345 kV circuits from Elwood to Joliet for a distance of approximately 8 miles. <b>Inclusion of additional breaker replacements at Lockport 345 kV.</b>	97.5	102.7	Cost adjusted to account for 2 additional breaker replacements at Lockport 345 kV (\$5.2 M).
663	CNTLTM	GREENFIELD	The Elwood - Joliet 345kV transmission project consists of an approximately 4 mile double circuit 345kV transmission line from the Elwood Substation to the Joliet Substation. <b>Inclusion of ComEd substation scope of work from proposal 138 and additional breaker replacements at Lockport 345 kV.</b>	29.37	58.02	The substation components were replaced with those from proposal 138 as ComEd identified the work required at their substations. Cost also adjusted to account for 2 additional breaker replacements at Lockport 345 kV (\$5.2 M).





# ComEd Transmission Zone: Baseline 2023 RTEP Window 1 Cluster 2

PJM Risk Assessment Criteria						
Risk Assessment	Cost Estimate Risks	Cost Containment Risk	Schedule Risks	Constructability Risks	Use of Existing ROW/Brownfield	Outage Coordination Risks
Low	Greater than or within 10% of Independent Estimate	Hard cost cap	Ratings assessed based on independent assessment of proposed in-service dates, and assessment of significant schedule risks such as such as permitting and constraint mitigation, long-lead material procurement, land/ROW acquisition, construction complexity.	Ratings assessed based on independent assessment of the number and severity of constructability risks assessed for the proposed project scope, such as permitting and constraint mitigation, land/ROW acquisition, construction complexity.	Rebuild/Reconductor Upgrades or Pure Brownfield	Minimal existing facility outages required, beyond short outages to cut-in to existing facilities
Medium	Within 10-30% of Independent Estimate	Soft cost containment (e.g. ROE caps)			Mostly Brownfield (i.e. Uses/Overlaps existing ROW but requires expansion)	Significant existing facility outages required, with reasonable outage coordination plan proposed
Medium-High	Within 30-50% of Independent Estimate	Less than comprehensive cost containment/Problematic Exclusions			Greenfield paralleling existing ROW	Significant existing facility outages required, with no coordination plan proposed
High	Less than 50% of Independent Estimate	No cost containment			Pure Greenfield	Significant existing facility outages required, with known operational concerns and no coordination plan proposed.

**NOTE:**

- PJM conducted its constructability evaluation of the project data submitted by proposers to evaluate the constructability, cost estimation, and cost containment risks of the projects.
- This risk assessment is not intended as a pass/fail or quantitative test, but rather as qualitative information on potential risks PJM has considered along with the reliability performance in selection of the finalist scenarios, and ultimately the recommended solution.





# ComEd Transmission Zone: Baseline 2023 RTEP Window 1 Cluster 2

- PJM’s risk assessment of the 3 proposals under consideration is provided below:
  - **Proposal 35:** Considerations include lack of cost containment and potential outage coordination concerns with planned reconductor of Elwood-Goodings Grove 345 kV double circuit. However, it is a Brownfield solution utilizing existing ROW, and is most likely to be constructed by the required in-service date.
  - **Proposal 138:** Considerations include lack of cost containment, and general constructability and schedule risks associated with a Greenfield solution.
  - **Proposal 663:** While the proposal includes cost containment provisions, there is risk for incremental cost increase should the route deviate from proposed. The route proposed has more potential Right-of-Way (ROW) concerns than alternate longer route proposed by proposal 138. A higher schedule risk is assigned taking into consideration that the proposing entity would need to apply for public utility status in the state of IL.

Proposal ID	Proposing Entity	Project Type	Proposal Cost (\$M)	Independent Cost (\$M)	Cost Estimate Risks	Cost Containment Risks	Schedule Risk	Constructability Risks	Use of Existing ROW & Brownfield	Outage Coordination Risks
35	COMED	UPGRADE	61.84	61.84	Low	High	Low	Low	Low	Medium
138	COMED	GREENFIELD	97.5	102.7	Low	High	Medium	Medium	High	Low
663	CNTLTM	GREENFIELD	29.37	58.02	Medium-High	Medium-High	Medium-High	Medium-High	High	Low



# ComEd Transmission Zone: Baseline 2023 RTEP Window 1 Cluster 2

## Proposed Solution: Proposal No. 2023-W1-35

- Reconductor 345 kV lines 11620 & 11622 from Elwood to Goodings Grove.
- Upgrade Goodings Grove 345 kV circuit breakers, disconnects, and associated equipment.
- Upgrade station conductor at Elwood 345 kV.
- Adjust reclosing cycle on for Goodings Grove 345 kV circuit breaker '116 9806' to eliminate the reclosing derating.

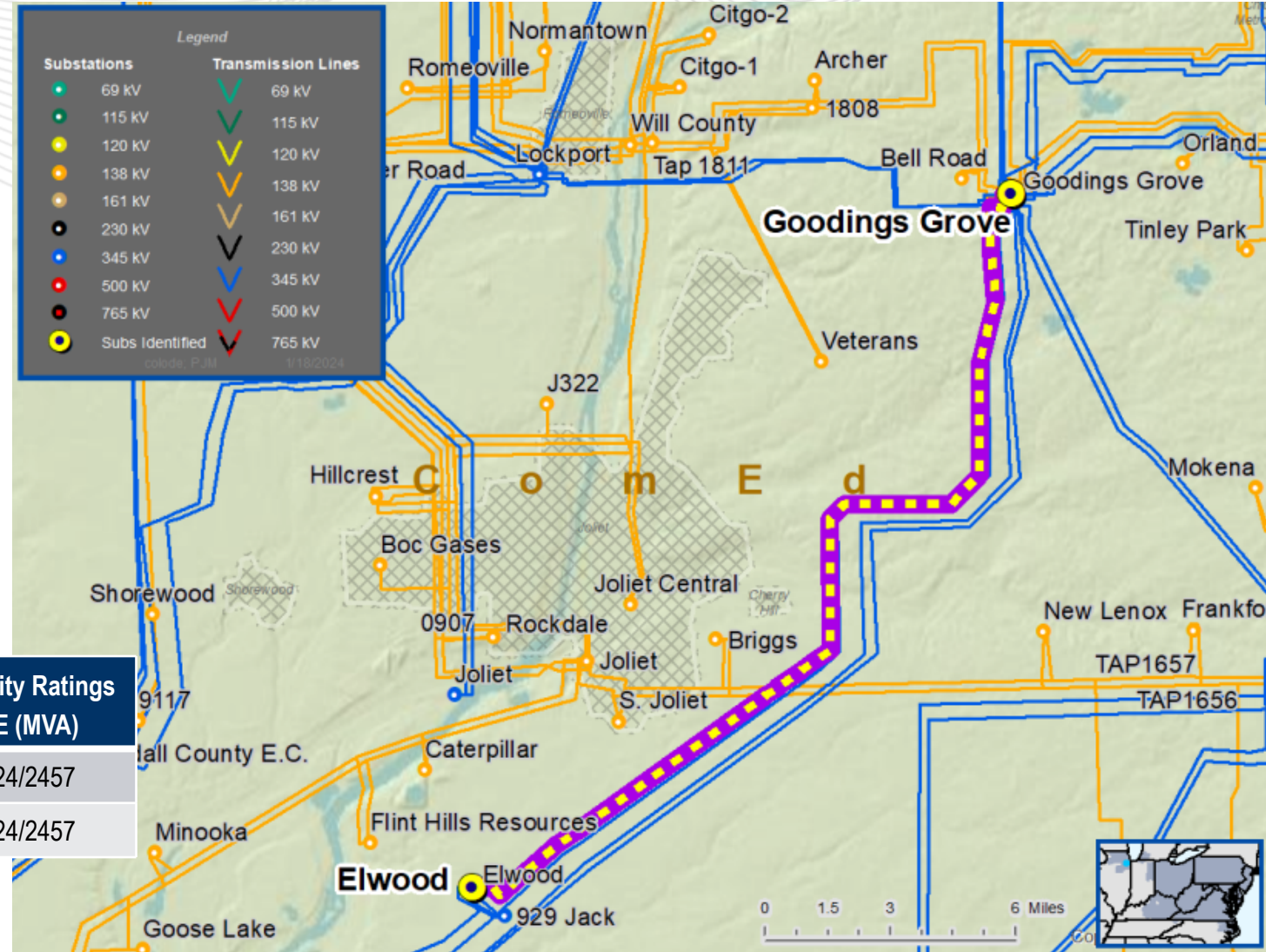
**Estimated Cost:** \$61.84 M

**Required IS Date:** 6/1/2028

**Projected IS Date:** 6/1/2028

## Facility Ratings:

Branch	Existing Facility Ratings SN/SE/WN/WE (MVA)	Preliminary Facility Ratings SN/SE/WN/WE (MVA)
ELWOOD;B-GOODINGS;4B 345 kV	1334/1528/1590/1781	1961/2112/2324/2457
ELWOOD;R-GOODINGS;2R 345 kV	1334/1528/1590/1781	1961/2112/2324/2457



# Adjustments to Earlier Approved Projects

## Baseline Reliability Projects

## Scope and Cost Update:

Exelon in their detail review of the upgrade identified additional requirement to increase the Hope Creek – Red Lion 500 kV rating. The initial scope was to replace two 500 kV breakers, however, the detail review identified the need to replace four 500 kV circuit breakers.

Upgrade Id	Previous Scope	New Scope	Designated Entity	Previous Cost Estimate (\$M)	New Cost Estimate (\$M)
B3800.39	Red Lion - Hope Creek 500 kV - Replace terminal equipment at Red Lion	Red Lion - Hope Creek 500 kV - Replace four 500kV breakers and the stranded bus at Red Lion 500 kV substation	DPL	4.0	6.0

# Baseline Upgrade Cancellations

- The upgrades listed below were identified part of the 2022 Window 1. The recently approved 2022 Window 3 upgrades in the b3800 series, specifically the scope related to the Conastone – Peach Bottom 500 kV will amend those upgrades scope. The b3728.1 and b3728.2 upgrades will be replaced with part of the b3800 scope and will be cancelled.

Upgrade Id	Description	Transmission Owner	Projected In Service Date	Cost Estimate (\$M)
B3728.1	Upgrade two Breaker bushings on the 500 kV Line 5012 (Conastone-Peach Bottom) at Conastone substation.	BGE	12/1/2027	2.0
B3728.2	Replace 4 meters and bus work inside Peach Bottom substation on the 500 kV Line 5012 (Conastone-Peach Bottom).	PECO	12/1/2027	3.8



- The upgrades listed below initially were identified during the Beaver Valley 1 & 2 retirement study. As the Beaver Valley 1 & 2 withdrawn the deactivation request, those upgrades were no longer needed to address reliability issue. However, the basecase used to perform interconnection queue studies included those upgrades, as a result the status of the upgrades were put on hold. Per the latest study, those upgrades are no longer needed for Interconnect queue and will be canceled.

Upgrade Id	Description
b3007.1	Reconductor the Blairsville East to Social Hall 138 kV line and upgrade terminal equipment - AP portion. 4.8 miles total. The new conductor will be 636 ACSS replacing the existing 636 ACSR conductor. At Social Hall, meters, relays, bus conductor, a wavetrap, circuit breaker and disconnects will be replaced.
b3007.2	Reconductor the Blairsville East to Social Hall 138 kV line and upgrade terminal equipment - PENELEC portion. 4.8 miles total. The new conductor will be 636 ACSS replacing the existing 636 ACSR conductor. At Blairsville East, the wave trap and breaker disconnects will be replaced.

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## Reliability Analysis Update



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Version No.	Date	Description
1	Feb 1 <sup>st</sup> , 2024	<ul style="list-style-type: none"><li>• Original slides posted</li></ul>
2	Feb 5th, 2024	<ul style="list-style-type: none"><li>• Grammar Updates</li></ul>

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