

Queue U2-095 Nelson 345kV Feasibility Study

Network Impacts

The queue U2-095 project was studied as a 600MW capacity injection into ComEd's system at the Nelson Blue 345kV substation. Project U2-095 was evaluated for compliance with reliability criteria for summer peak conditions in 2013. Potential network impacts were as follows:

Generator Deliverability

(Single or N-1 contingencies for the Capacity portion only of the interconnection)

No problems were identified.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)

No problems were identified.

Short Circuit

(Summary of impacted circuit breakers)

To be determined in the System Impact Study.

Contribution to Previously Identified Overloads

(U2-095 contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

Table 1 - Contribution to Previously Identified Overloads								
Item	Project	Contribution MW	Overloaded Element	Overload %		Rating		Contingency
				From	To	Type	MVA	
1a	U2-095	5.3	West Dekalb tap to Waterman tap 138kV line 11323	113.8%	115.0%	Applicable Load Dump Rating	440	Tower outage of Walton Rd. (P20) to Electric Junction 345kV Blue line 18402 and Plano to Electric Junction Red 345kV line 16703 ('345-L15502_B-R+_345-L16703_R-S_B')
1b	U2-095	107.7	Cherry Valley to Silver Lake Red 345kV line 15616	147.1%	152.3%	Applicable Load Dump Rating	2033	Tower outage of Wempletown to Rockdale Red 345kV line 17101 and Wempletown to Paddock Red 345kV line 17102 ('345-L17101_-R+_345-L17102_-RD')
1c	U2-095	195.1	Walton Rd. (P20) to Electric Junction 345kV line 18402	111.7%	121.0%	Applicable Load Dump Rating	1572	Tower outage of Silver Lake to Cherry Valley 345kV line 15616 and Glidden to Cherry Valley 138kV line 15627 ('345-L15616_-R+_138-L15627_R-R_U3-021A')
1d	U2-095	5.3	McGirr Rd. to H440 (Rochelle) Tap portion of McGirr Rd.-H440-Steward 138kV line 16914	110.7%	112.2%	Applicable Load Dump Rating	345	Tower outage of Walton Rd. (P20) to Electric Junction 345kV Blue line 18402 and Plano to Electric Junction Red 345kV line 16703 ('345-L15502_B-R+_345-L16703_R-S_B')
1e	U2-095	5.7	Marengo Red Tap to Pleasant Valley portion of Belvidere-Marengo-Pleasant Valley Red 138kV line 12204	126.8%	128.3%	Applicable Load Dump Rating	388	Tower outage of Silver Lake to Cherry Valley 345kV line 15616 and Glidden to Cherry Valley 138kV line 15627 ('345-L15616_-R+_138-L15627_R-R_U3-021A')
1f	U2-095	195.1	Nelson to Walton Road (P20) 345kV line 15502	100.58%	109.89%	Applicable Load Dump Rating	1572	Tower outage of Silver Lake to Cherry Valley 345kV line 15616 and Glidden to Cherry Valley 138kV line 15627 ('345-L15616_-R+_138-L15627_R-R_U3-021A')
1g	U2-095	5.0	Belvidere to Marengo Tap Blue portion of Belvidere-Marengo-Woodstock 138kV line 12205	114.3%	115.4%	Applicable Load Dump Rating	473	Tower outage of Silver Lake to Cherry Valley 345kV line 15616 and Glidden to Cherry Valley 138kV line 15627 ('345-L15616_-R+_138-L15627_R-R_U3-021A')
1h	U2-095	86.8	Byron to Cherry Valley Red 345kV line 0622	103.3%	109.2%	Emergency	1479	Byron to Cherry Valley Blue 345kV line 0621 ('345-L0621B-B')
1i	U2-095	83.2	Byron to Cherry Valley Blue 345kV line 0621	101.7%	107.5%	Emergency	1441	Byron to Cherry Valley Red 345kV line 0622 ('345-L0622R-R')
1j	U2-095	21.17	Dixon Red to O68 138kV line 15621	114.15%	116.03%	Emergency	182	Tower outage of Byron to Cherry Valley Blue 345kV line 0621 and Byron to Cherry Valley Red 345kV line 0622 ('L0621+_L0622_NEW')
1k	U2-095	31.45	Sabrooke Red to Cherry Valley Red 138kV line 15622	184.72%	185.58%	Applicable Load Dump Rating	589	Tower outage of Byron to Cherry Valley Blue 345kV line 0621 and Byron to Cherry Valley Red 345kV line 0622 ('L0621+_L0622_NEW')
1l	U2-095	24.74	Wempletown 345/138kV transformer 84	215.39%	216.22%	Emergency	480	Tower outage of Byron to Cherry Valley Blue 345kV line 0621 and Byron to Cherry Valley Red 345kV line 0622 ('L0621+_L0622_NEW')

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

To be determined in the System Impact Study.

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be determined in the System Impact Study.

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused by the addition of this project generation)

No problems were identified.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project. This project may have a % allocation cost responsibility which will be calculated and reported for the Impact Study)

1. In Item 1a of the Contribution to Previously Identified Overloads section, the overload of the West Dekalb tap to Waterman tap 138kV line 11323 is caused by the tower outage of Walton Rd. (P20) to Electric Junction 345kV Blue line 18402 and Plano to Electric Junction Red 345kV line 16703. This overload was first caused by Q57, and has contributions from U2-095. It can be relieved by rebuilding 3.9 miles of 138kV line 11323. The cost of this upgrade is estimated to be **\$7,800,000**. The allocations for this reinforcement will be reviewed and assigned in the System Impact Study phase.
2. In Item 1b of the Contribution to Previously Identified Overloads section, the overload of the Cherry Valley to Silver Lake Red 345kV line 15616 is caused by the tower outage of Wempletown to Rockdale Red 345kV line 17101 and Wempletown to Paddock Red 345kV line 17102. It can be relieved by constructing a new 31 mile 345kV Cherry Valley to Pleasant Valley line. One 345kV breaker at Cherry Valley substation and a three breaker 345kV ring bus at Pleasant Valley will be required to terminate the proposed line. This line will provide a second 345kV path between Cherry Valley and Silver Lake. The cost of this upgrade is estimated to be **\$126,000,000**. The allocations for this reinforcement will be reviewed and assigned in the System Impact Study phase.
3. In Item 1c of the Contribution to Previously Identified Overloads section, the overload of the Walton Rd. (P20) to Electric Junction 345kV line 18402 is caused by the tower outage of Silver Lake to Cherry Valley 345kV line 15616 and Glidden to Cherry Valley 138kV line 15627. It can be relieved by eliminating the clearance limitations over a 13.5 mile portion of line 18402 to achieve a higher thermal rating. The cost of this upgrade is estimated to be **\$14,000,000**. The allocations for this reinforcement will be reviewed and assigned in the System Impact Study phase.

The new 345kV line from Cherry Valley to Pleasant Valley described in #2 (Item 1b) of this section may alleviate the need for this reinforcement. This will be reviewed during the System Impact Study phase.

4. In Item 1d of the Contribution to Previously Identified Overloads section, the overload of the McGirr Rd. to H440 (Rochelle) Tap portion of McGirr Rd.-H440-Steward 138kV line 16914 is caused by the tower outage of Walton Rd. (P20) to Electric Junction 345kV Blue line 18402 and Plano to Electric Junction Red 345kV line 16703. It can be relieved by the new 31 mile 345kV Cherry Valley to Pleasant Valley line described in #2 (Item 1b) of this section. The allocations for

this reinforcement will be reviewed and assigned in the System Impact Study phase.

5. In Item 1e of the Contribution to Previously Identified Overloads section, the overload of the Marengo Red Tap to Pleasant Valley portion of Belvidere-Marengo-Pleasant Valley Red 138kV line 12204 is caused by the tower outage of Silver Lake to Cherry Valley 345kV line 15616 and Glidden to Cherry Valley 138kV line 15627. This overload was first caused by R96, and has contributions from U2-095. It can be relieved by upgrading 10.7 miles of 138kV line 12204 overhead conductor. The cost of this upgrade is estimated to be **\$15,500,000**. The allocations for this reinforcement will be reviewed and assigned in the System Impact Study phase.
6. In Item 1f of the Contribution to Previously Identified Overloads section, the overload of the Nelson to Walton Road (P20) 345kV line 15502 is caused by the tower outage of Silver Lake to Cherry Valley 345kV line 15616 and Glidden to Cherry Valley 138kV line 15627. It can be relieved by the new 31 mile 345kV Cherry Valley to Pleasant Valley line described in #2 (Item 1b) of this section. The allocations for this reinforcement will be reviewed and assigned in the System Impact Study phase.
7. In Item 1g of the Contribution to Previously Identified Overloads section, the overload of the Belvidere to Marengo Tap Blue portion of Belvidere-Marengo-Woodstock 138kV line 12205 is caused by the tower outage of Silver Lake to Cherry Valley 345kV line 15616 and Glidden to Cherry Valley 138kV line 15627. It can be relieved by upgrading TSS 122 Belvidere station conductor. The cost of this upgrade is estimated to be **\$500,000**. The allocations for this reinforcement will be reviewed and assigned in the System Impact Study phase.

The new 345kV line from Cherry Valley to Pleasant Valley described in #2 (Item 1b) of this section may alleviate the need for this reinforcement. This will be reviewed during the System Impact Study phase.
8. In Item 1h of the Contribution to Previously Identified Overloads section, the overload of the Byron to Cherry Valley Red 345kV line 0622 is caused by the outage of the Byron to Cherry Valley Blue 345kV line 0621. This overload can be relieved by installing a second Byron to Wempletown 345kV transmission line. This project involves installing two new 345kV circuit breakers and installing 14.7 miles of new 345kV transmission line on existing structures. The cost of this upgrade is estimated to be **\$40,000,000**. The allocations for this reinforcement will be reviewed and assigned in the System Impact Study.
9. In Item 1i of the Contribution to Previously Identified Overloads section, the overload of the Byron to Cherry Valley Blue 345kV line 0621 is caused by the outage of the Byron to Cherry Valley Red 345kV line 0622. This overload can be relieved by installing a second Byron to Wempletown 345kV transmission line described in #8 (Item 1h) of this section. This reinforcement will be reviewed again in the System Impact Study.
10. In Item 1j of the Contribution to Previously Identified Overloads section, the overload of the Dixon Red to O68 138kV line 15621 is caused by the tower

outage of the Byron to Cherry Valley Blue 345kV line 0621 and Byron to Cherry Valley Red 345kV line 0622. This overload will be reviewed again in the System Impact Study. The allocations for this reinforcement, if any, will be assigned at that time.

11. In Item 1k of the Contribution to Previously Identified Overloads section, the overload of the Sabrooke Red to Cherry Valley Red 138kV line 15622 is caused by the tower outage of the Byron to Cherry Valley Blue 345kV line 0621 and Byron to Cherry Valley Red 345kV line 0622. This overload will be reviewed again in the System Impact Study. The allocations for this reinforcement, if any, will be assigned at that time.

12. In Item 1l of the Contribution to Previously Identified Overloads section, the overload of the Wempletown 345/138kV transformer 84 is caused by the tower outage of the Byron to Cherry Valley Blue 345kV line 0621 and Byron to Cherry Valley Red 345kV line 0622. This overload may be relieved by the installing a second Byron to Wempletown 345kV transmission line described in #8 (Item 1h) of this section and will be reviewed again in the System Impact Study. The allocations for this reinforcement, if any, will be assigned at that time.

Potential Issues

In the previous queue, multiple projects were studied with more than one option. The U queue was studied with the primary Point of Interconnection (POI) from the prior queue. U queue primary POI selections were studied with only other U queue primary POI selections and the prior queue constraints listed above. U queue secondary POI selections were studied with only other U queue secondary POI selections and the prior queue constraints listed above. Depending on which POI selection the prior queue projects choose, results may significantly change between the Feasibility and Impact Studies.

Since the results of this analysis have been completed, prior projects may have been withdrawn from the queue. This may change which projects are responsible for certain upgrades. These changes will be reflected in the System Impact Study report.

Impacts on the MISO member transmission systems are not included in this analysis, but they will be included in the Impact Study, which may reveal upgrades needed in the MISO system not identified in this Feasibility Study.

A transient stability study for U2-095 will be conducted as part of the System Impact Study, which may reveal upgrades not identified in this Feasibility Study.

Delivery of Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of this interconnection request. Any problems identified below are likely to result in operational restrictions to the project under study. The developer can proceed with network upgrades to eliminate the

operational restriction at their discretion by submitting a Merchant Transmission Interconnection request.

Note: Only the most severely overloaded conditions are listed below. There is no guarantee of full delivery of energy for this project by fixing only the conditions listed in this section. With a Transmission Interconnection Request, a subsequent analysis will be performed which shall study all overload conditions associated with the overloaded element(s) identified.

As a result of the aggregate energy resources in the area, no violations were identified.