

**#U4-027– Normandy – Kewanee 138kV
Generation Interconnection**

Network Impacts

The queue U4-027 project was studied as a 100MW Capacity injection into ComEd’s system. The point of interconnection was modeled as a tap of the Normandy – Kewanee 138kV line. Project U4-027 was evaluated for compliance with reliability criteria for summer peak conditions in 2013.

IN THE DELIVERY OF ENERGY PORTION OF INTERCONNECTION REQUEST SECTION THERE ARE SEVERAL SITUATIONS THAT WILL LIKELY CAUSE CURTAILMENT OF THIS PROJECT. SOME MAY LIMIT THE AGGREGATE TOTAL OF THE ENERGY OUTPUT OF THIS PROJECT AND ADJACENT GENERATING FACILITIES WELL BELOW THEIR FULL ENERGY OUTPUT ON A FREQUENT, IF NOT CONTINUOUS, BASIS. FACTORS THAT CAN AFFECT THE AMOUNT OF CURTAILMENT ARE SEASONAL VARIATIONS IN LINE RATINGS, ACTUAL LOAD FLOWS, AND ACTUAL DISPATCH OF OTHER LOCAL GENERATION. UNDER LIGHT LOAD CONDITIONS FOR WIND FARMS, CURTAILMENT MAY BE EVEN MORE SEVERE. PLEASE NOTE THAT ANY REQUIRED UPGRADES LISTED BELOW WILL NOT ELIMINATE THIS CONGESTION. SEE THIS SECTION AT THE END OF THE REPORT FOR FURTHER DETAILS.

Potential network impacts were as follows:

Generator Deliverability

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

Table 1 - Generator Deliverability Impacts								
Item	Project	Contribution MW	Overloaded Element	Overload %		Rating		Contingency
				From	To	Type	MVA	
1a	U4-027	18.6	Kewanee 138kV Main Bus to AmerenIP-owned Kewanee 138kV circuit breaker #105 and series equipment	92.2%	102.0%	Normal	189	None

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

(U4-027 contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

Item	Project	Contribution MW	Overloaded Element	Overload %		Rating		Contingency
				From	To	Type	MVA	
2a	U4-027	14.5	Walton Rd.(P20) to Electric Junction Blue 345kV line 18402	128.0%	129.2%	Emergency	1201	U3-021 to Silver Lake Red 345kV line 15616 (345-L15616__-R_U3-021B')
2b	U4-027	14.5	Nelson to Walton Rd.(P20) 345kV line 15502	116.8%	118.0%	Emergency	1201	U3-021 to Silver Lake Red 345kV line 15616 (345-L15616__-R_U3-021B')
2c	U4-027	34.2	Kewanee 138kV Main Bus to AmerenIP-owned Kewanee 138kV circuit breaker #105 and series equipment	167.6%	178.2%	Applicable Load Dump Rating	323	Tower outage of Kewanee to Normandy 138kV line 7411 and Kewanee to Normandy 138kV line 15508 ('138-L7411__R-R_+138-L15508_R-R')

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)

In Item 1a from the Generator Deliverability section, there is an overload of Kewanee 138kV Main Bus to AmerenIP-owned Kewanee 138kV circuit breaker #105 and series equipment with no contingency. This means that this overload is caused any time the U4-027 project is supplying MW, even if no contingency occurs. This overload can be relieved on the ComEd portion by upgrading the station conductor between the ComEd-owned main bus and the demarcation point with AmerenIP. There may be additional upgrades required for the AmerenIP system to relieve this overload, which will be jointly reviewed by PJM and MISO during the System Impact Study by. The cost for the ComEd portion of this upgrade is estimated to be **\$90,000**.

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 2a from the Contribution to Previously Identified Overloads section, the overload of Walton Rd. (P20) to Electric Junction Blue 345kV line 18402 is caused by the outage of U3-021 to Silver Lake Red 345kV line 15616. This overload can be relieved by eliminating the clearance violations over a 13.5 mile portion of the 18402 line to achieve a higher thermal rating. The cost of this upgrade is estimated to be **\$14,000,000**. Project

U4-027 will have a cost allocation to this upgrade. Cost allocations for this reinforcement will be assigned in the System Impact Study.

2. In Item 2b from the Contribution to Previously Identified Overloads section, the overload of Nelson to Walton Rd. (P20) 345kV line 15502 is caused by the outage of U3-021 to Silver Lake Red 345kV line 15616. This overload can be relieved by constructing a new 31 mile 345kV line from Cherry Valley to Pleasant Valley. One 345kV breaker at Cherry Valley substation and a three breaker 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**. Project U4-027 will have a cost allocation to this upgrade. Cost allocations for this reinforcement will be assigned in the System Impact Study.
3. In Item 2c from the Contribution to Previously Identified Overloads section, the overload of Kewanee 138kV Main Bus to AmerenIP-owned Kewanee 138kV circuit breaker #105 and series equipment is caused by the tower outage of Kewanee to Normandy 138kV line 7411 and Kewanee to Normandy 138kV line 15508. This overload was first caused by queue project P11. This overload can be relieved by upgrading the TSS 74 Kewanee station conductor. The cost of this upgrade is estimated to be **\$90,000**. Project U4-027 will have a cost allocation to this upgrade. Cost allocations for this reinforcement will be assigned in the System Impact Study.

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.

Delivery of Energy Portion of Interconnection Request (Potential Congestion)

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, the following violations were identified: