

#P37 - Normandy 138 kV  
(212 MW Energy and 42.4 MW Capacity)

## **PJM Generator Interconnection**

### **Feasibility Study**

## ***Network Impacts***

### **Network Impacts**

The #P37 project was studied as a 212 MW (42.4 MW of Capacity) injection into the Normandy 138 kV substation. Project #P37 was evaluated for compliance with PJM reliability criteria for summer peak conditions in 2010. Potential network impacts were as follows:

### **Generator Deliverability**

No problems were identified.

### **Multiple Facility Contingency**

No problems were identified.

### **Contribution to Previously Identified Overloads**

1. There is a potential overload on the Byron to Wempletown 345 kV line 0624, for which project #P37 contributes approximately 21 MW to the loading on the facility. PJM and ComEd are continuing to review the cause of and solution to the overload. The Impact Study for this project will define the cost allocation, if any, for this generation project. Rough estimates to eliminate the overload are around \$20 million. The P37 cost allocation, if any, for this upgrade will be determined in the P37 Impact Study.
2. Contribution of 13 MW further overloads the 138kV station equipment and current transformers in series with the Bus Tie 2-3 Circuit Breaker at Waterman from 154% to 159% of its load-dump rating (247 MVA) for the tower outage of 345kV lines 18402 (formerly 15502) & 16703. The violation was originally caused by the #P14 project. The solution for this overload is still being developed, and P37 may share an allocation for this upgrade. The allocation cost, if any, will be determined during the P37 Impact Study.
3. Contribution of approximately 11 MW further overloads the Tower Road to West DeKalb Tap portion of 138kV line 11323 from 140% to 144% of its load-dump rating (300 MVA) for the tower outage of 345kV lines 18402 (formerly 15502) & 16703. The thermal violation from the Tower Road to West DeKalb Tap portion of 138kV line 11323 was originally caused by the #P14 project for the tower outage of 345kV line 15616 & 138kV line 15627. The thermal violation on the same portion of 138kV line 11323 from Tower Road to West DeKalb Tap was caused again by the #P14 project for the different tower contingency of 345kV lines 18402 (formerly 15502) & 16703. The solution for this overload is still being developed, and P37 may share an allocation for this upgrade. The allocation cost, if any, will be determined during the P37 Impact Study.

4. Contribution of 11 MW further overloads the Waterman to West DeKalb Tap portion of 138 kV line 11323 from 155% to 160% of its load-dump rating (259 MVA) for the tower outage of 345kV lines 18402 (formerly 15502) & 16703. The violation was originally caused by the #P14 project. The solution for this overload is still being developed, and P37 may share an allocation for this upgrade. The allocation cost, if any, will be determined during the P37 Impact Study.
5. Contribution of 11 MW further overloads the Tower Road to Steward 138 kV line 11323 (future 18623) from 126% to 129% of its load-dump rating (279 MVA) for the tower outage of 345kV lines 18402 (formerly 15502) & 16703. The thermal violation from the TSS 984 Tower Road to TSS 186 Steward portion of 138kV line 11323 (future 18623) was originally caused by the #P14 project for the tower outage of 345kV line 15616 & 138kV line 15627. The solution for this overload is still being developed, and P37 may share an allocation for this upgrade. The allocation cost, if any, will be determined during the P37 Impact Study.
6. Contribution of approximately 19 MW to further overload the Kammer 765/500 kV transformer from 131% to 133% of its emergency rating (1434 MVA) for the Beverly-Tidd-W. Bellair and Kammer-W. Bellair 345 kV tower outage. This violation was first identified for the #N42 project. APS is currently studying the associated network reinforcements to mitigate this condition. The necessary reinforcements and associated cost estimates will be available at the Impact Study phase for this project. The replacement cost for the Kammer 765/500 kV transformer is estimated in the \$18,000,000 range, and P37 may share an allocation cost for this upgrade. The allocation cost, if any, will be determined during the P37 Impact Study.

### **New System Reinforcements**

To be determined at the System Impact Study.

### **Contribution to Previously Identified System Reinforcements**

To be determined at the System Impact Study.

### **Short Circuit**

There were no overdutied circuit breakers due to #P37 identified at this time. The short circuit study for #P37 considers overdutied breakers to be upgraded for projects ahead of #P37 in the PJM queue. If projects ahead of #P37 drop out, the short-circuit analysis will be repeated and #P37 may ultimately be responsible for breaker upgrades.

### **Potential Issues**

During certain maintenance outages the P37 project may be required to be taken off-line.

**Impacts on the MISO member transmission systems is 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**

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.

As a result of the aggregate energy resources in the area, the following violations were identified:

1. Contribution of 120 MW to further overload the Rock Falls-#O09 138 kV line 13311 from 238% to 304% of its emergency rating (184 MVA) for the outage of 138kV line 15508. The violation was first caused by the #O29 project.
2. Contribution of 120 MW to further overload the Rock Falls-Nelson 138 kV line 15509 from 220% to 285% of its emergency rating (184 MVA) for the outage of 138kV line 15508. The violation was first caused by the #O09 project.
3. Contribution of 116 MW to further overload the Nelson-#O29 138 kV line 15508 from 165% to 208% of its emergency rating (265 MVA) for the outage of 138kV line 7411, which was originally caused by the #O29 project.
4. The Normandy-#O09 138 kV line 12511 (formerly 7411) loads from 42% to 113% of its normal rating (209 MVA).
5. The Nelson to Nelson Red Tap portion of 138kV line 15508 loads from 84% to 113% of its emergency rating (280 MVA) for the outage of 138kV line 7411. The #P37 contributes approximately 81 MW to cause this thermal violation.
6. Contribution of 13 MW to further overload the #P21-McGirr Road 138 kV line 19914 (formerly 10714) from 102% to 107% of its emergency rating (261 MVA) for loss of 345kV line 15502.