

#T33 – Byron II 345kV Generation Interconnection

Option 1: Network Impacts

The T33 project was studied as a 1500 MW Energy (555 MW Capacity) injection into the Station 6 Byron 345kV substation in the ComEd area. Project T33 was evaluated for compliance with reliability criteria for summer peak conditions in 2012. Potential network impacts were as follows:

The initial feasibility studies performed on the 2012 RTEP model indicated significant overloads caused by the T33 project for both the no contingency configuration and for various contingencies. The magnitude and number of these overloads suggested that new 345kV circuits from west to east across the ComEd transmission system would be required. As part of the previous queue impact studies, there are several 345kV lines required to mitigate transient and voltage stability criteria violations. These new lines consist of two new 345kV lines from Byron to Wayne and an additional Byron to Nelson 345kV line. These three lines along with the projected addition of a fourth 345kV line from Cherry Valley to Pleasant Valley effectively create seven 345kV west to east circuits out of Byron. To accommodate the T33 project, additional west to east facilities would be required. It is not feasible to further expand the 345kV system in the greater Byron area, thus a “765kV backbone” would be required.

The following potential network impacts below are for the original Point of Interconnection at the 345kV level:

Generator Deliverability

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

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
1a	T33	121.9	Byron to Cherry Valley Red 345kV line 0622	95.60%	105.40%	Normal	1234	None
1b	T33	109.7	Byron to Wempletown 345kV line 0624	94.20%	102.30%	Normal	1356	None
1c	T33	224.6	Cherry Valley to Silver Lake 345kV line 15616	94.50%	109.10%	Emergency	1530	Nelson to Lee County 345kV line 15501
1d	T33	94.4	Nelson to Walton Rd. (P20) 345kV line 15502	94.00%	101.60%	Emergency	1234	Quad Cities to Sub 91 345kV line 0401 & Quad Cities to Rock Creek 345kV line 0405 SPS
1e	T33	94.4	Walton Rd. (P20) to Electric Junction 345kV line 18402	94.90%	102.50%	Emergency	1234	Quad Cities to Sub 91 345kV line 0401 & Quad Cities to Rock Creek 345kV line 0405 SPS
1f	T33	30.9	Cherry Valley 345/138kV transformer #82	94.20%	100.90%	Emergency	465	Byron to Wempletown 345kV line 0624
1g	T33	47.8	Belvidere to Marengo Tap Blue portion of Belvidere-Marengo-Woodstock 138kV line 12205	90.50%	101.70%	Emergency	430	Cherry Valley to Silver Lake 345kV line 15616
1h	T33	23.1	Waterman 138kV tie breaker 2-3	89.50%	100.30%	Emergency	215	Cherry Valley to Silver Lake 345kV line 15616
1i	T33	9.4	H71 tap to Garden Plain portion of the Nelson-Rock Falls-H71-Garden Plain 138kV line 15518	97.50%	102.60%	Emergency	182	Quad Cities to Sub 91 345kV line 0401 & Quad Cities to Rock Creek 345kV line 0405 SPS

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.)

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
2a	T33	766.2	Byron to Lee County Blue 345kV line 0627	74.50%	108.20%	Applicable Load Dump Rating	2277	Byron to Cherry Valley Red 345kV line 0622 & Byron to Cherry Valley Blue 345kV line 0621
2b	T33	96.4	Cherry Valley 345/138kV transformer #82	85.10%	100.90%	Applicable Load Dump Rating	610	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
2c	T33	109.4	Wempletown 345/138kV transformer #84	95.80%	113.80%	Applicable Load Dump Rating	610	Byron to Cherry Valley Red 345kV line 0622 & Byron to Cherry Valley Blue 345kV line 0621
2d	T33	90.2	Cherry Valley to B465 (Daimler Chrysler) portion of the Cherry Valley-B465-Belvidere Blue 138kV line 15624	99.70%	117.40%	Applicable Load Dump Rating	511	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
2e	T33	90.2	B465 (Daimler Chrysler) to Belvidere portion of the Cherry Valley-B465-Belvidere Blue 138kV line 15624	91.40%	107.90%	Applicable Load Dump Rating	544	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
2f	T33	105.6	Cherry Valley to E Rockford portion of the Cherry Valley-E Rockford-Alpine-Belvidere 138kV line 15623	90.20%	103.50%	Applicable Load Dump Rating	791	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
2g	T33	36.2	Harlem to Roscoe Bert portion of T990-Sand Park-Harlem-Roscoe Bert-Wempletown 138kV line 17105	88.70%	104.10%	Applicable Load Dump Rating	236	Cherry Valley-Stillman Valley-O68/R54 138kV line 15621 & Cherry Valley-Daimler Chrysler-Belvidere 138kV line 15624
2h	T33	36.2	T990 to Belvidere Blue 138kV line 17105	99.60%	114.90%	Applicable Load Dump Rating	236	Cherry Valley-Stillman Valley-O68/R54 138kV line 15621 & Cherry Valley-Daimler Chrysler-Belvidere 138kV line 15624
2i	T33	48.6	Dixon to McGirr Road 138kV line 10714	95.60%	110.90%	Applicable Load Dump Rating	316	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
2j	T33	15.2	P39 Option 2 to ED Edwards 138kV line 7423	95.80%	105.00%	Applicable Load Dump Rating	164	Kewanee to Hennepin 138kV line 6101 & Kewanee to Crescent Ridge 138kV line 7413

Short Circuit

(Summary of impacted circuit breakers)

To be determined in the System Impact Study.

Contribution to Previously Identified Overloads

(T33 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 MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
3a	T33	153.3	Cherry Valley to Silver Lake 345kV line 15616	102.80%	115.20%	Normal	1234	None
3b	T33	473.5	Byron to Cherry Valley Blue 345kV line 0621	117.70%	141.10%	Applicable Load Dump Rating	2024	Byron to Cherry Valley Red 345kV line 0622 & Cherry Valley to Dixon 138kV line 15621
3c	T33	186.2	Byron to Cherry Valley Red 345kV line 0622	118.20%	130.40%	Applicable Load Dump Rating	1530	Byron to Cherry Valley Blue 345kV line 0621
3d	T33	1018.9	Byron to Wempletown 345kV line 0624	162.30%	193.60%	Applicable Load Dump Rating	2277	Byron to Cherry Valley Red 345kV line 0622 & Byron to Cherry Valley Blue 345kV line 0621
3e	T33	760.6	Nelson to Lee County 345kV line 15501	126.50%	164.10%	Applicable Load Dump Rating	2024	Byron to Cherry Valley Red 345kV line 0622 & Byron to Cherry Valley Blue 345kV line 0621
3f	T33	293.1	Nelson to Walton Rd. (P20) 345kV line 15502	129.80%	148.40%	Applicable Load Dump Rating	1572	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3g	T33	293.1	Walton Rd. (P20) to Electric Junction 345kV line 18402	134.70%	153.40%	Applicable Load Dump Rating	1572	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3h	T33	41.4	Cherry Valley 345/138kV transformer #82	100.10%	109.00%	Applicable Load Dump Rating	465	Cherry Valley to Silver Lake 345kV line 15616
3i	T33	68.5	Libertyville 345/138kV transformer #81	101.40%	112.70%	Applicable Load Dump Rating	610	Libertyville to Prospect Heights Red 345kV line 11723 & Libertyville to Prospect Heights Blue 345kV line 15424
3j	T33	110.6	Alpine Tap to Belvidere portion of the Cherry Valley-E Rockford-Alpine-Belvidere 138kV line 15623	117.50%	137.80%	Applicable Load Dump Rating	544	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3k	T33	110.6	Belvidere to Marengo Red Tap portion of Belvidere-Marengo-Pleasant Valley Red 138kV line 12204	103.40%	123.70%	Applicable Load Dump Rating	544	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3l	T33	153.9	Marengo Red Tap to Pleasant Valley portion of Belvidere-Marengo-Pleasant Valley Red 138kV line 12204	175.30%	215.00%	Applicable Load Dump Rating	388	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
3m	T33	116.4	Belvidere to Marengo Blue Tap portion of Belvidere-Marengo-Woodstock 138kV line 12205	141.30%	165.90%	Applicable Load Dump Rating	473	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3n	T33	96.2	Woodstock to Pleasant Valley Blue 138kV line 14106	106.90%	134.80%	Applicable Load Dump Rating	345	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3o	T33	96.2	Marengo to Woodstock Blue Tap portion of Belvidere-Marengo-Woodstock 138kV line 12205	154.00%	186.10%	Applicable Load Dump Rating	300	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3p	T33	133	Roscoe Bert Tap to Harlem Tap Blue portion of Wempletown to Belvidere 138kV line 17105	110.20%	117.70%	Applicable Load Dump Rating	178	Cherry Valley-Daimler Chrysler-Belvidere 138kV line 15624
3q	T33	48.4	Haumesser Rd. (Q57) to W DeKalb Tap portion of Haumesser Rd. (Q57) to Waterman 138kV line 11323	179.40%	194.70%	Applicable Load Dump Rating	316	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3r	T33	22.4	Waterman 138kV bus tie 2-3	107.00%	117.40%	Applicable Load Dump Rating	215	Walton Rd. (P20) to Electric Junction 345kV line 18402
3s	T33	48.4	Steward to Haumesser Rd. (Q57) 138kV line 18623	128.50%	143.60%	Applicable Load Dump Rating	321	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3t	T33	48.5	McGirr Rd. to H440 (Rochelle) Tap portion of McGirr Rd.-H440-Steward 138kV line 16914	129.30%	143.40%	Applicable Load Dump Rating	345	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3u	T33	45.7	H440 (Rochelle) Tap to Steward portion of McGirr Road-H440-Steward 138kV line 16914	119.40%	133.10%	Applicable Load Dump Rating	332	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3v	T33	21.6	R96 Tap to Maryland 138kV line 12402	109.20%	117.90%	Applicable Load Dump Rating	247	Wempletown to Rockdale Blue 345kV line 17101 & Wempletown to Paddock Red 345kV line 17102
3w	T33	20.4	Kewanee to Kewanee IP 138kV tie	194.20%	200.50%	Applicable Load Dump Rating	323	Kewanee to Hennepin 138kV line 6101 & Kewanee to Crescent Ridge 138kV line 7413
3x	T33	16.1	Crescent Ridge to Hennepin 138kV line 7713	225.80%	239.70%	Applicable Load Dump Rating	116	Electric Junction-N Aurora-Sugar Grove-Waterman-Glidden 138kV line 11106 & Walton Rd. (P20) to Electric Junction 345kV line 18402
3y	T33	12.9	Hennepin to Hennepin Station 138kV line (1 span owned by ComEd)	103.80%	109.90%	Applicable Load Dump Rating	212	Lasalle Co-LaSalle Co Pump-Mazon 138kV line 0108 & Hennepin-Oglesby Tap-Mazon 138kV line 7713
3z	T33	15.2	P39 Option 2 to ED Edwards 138kV line 7423	113.20%	122.40%	Applicable Load Dump Rating	164	Kewanee to Hennepin 138kV line 6101 & Crescent Ridge to Hennepin 138kV line 7713

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)

The T33 Generator Deliverability results show overloads on almost all of the 345 kV lines in the Byron area and the 345 kV lines to the East and South of Byron. There are also extensive overloads on the 138 kV system in the same areas. The T33 Multiple Facility Contingency results show similar overloads. Prior projects in the PJM Queue demonstrated the need to add four additional 345 kV lines in the Byron area (2- new Byron to Wayne circuits, 1 additional Byron to Nelson circuit and 1 additional Cherry Valley to Pleasant Valley circuit). The practical limit for expansion of the 345 kV system in the Byron area is reached with these additions. To accommodate project T33 connecting into Byron, it is necessary to establish a 765 kV “backbone” transmission system. A possible start to developing a 765kV “backbone” to meet the requirements of this project could consist of:

- Construction of a 765kV bus at Byron to interconnect with project T32 and T33
- Construction of two 765kV/345kV transformers between the Byron 765kV and existing 345kV systems
- Construction of two 765 kV circuits from Byron east and south to locations in AEP

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)

With the addition of a 765 kV “backbone” system as described above, project T33 should not have any contributions to the 345 kV line additions required for earlier queue projects. Additional studies will be performed during the System Impact and Facilities Studies to determine the optimum plan and whether any cost allocations exist for the 345kV projects required by earlier queued generator interconnection projects.

Potential Issues

The impacts on the AEP system due to the expansion of the 765kV system in ComEd and the new 765kV tie lines to AEP have not been studied. Additional system reinforcements may be required due to Project T33 and these line additions.

The Byron/Nelson area of the ComEd transmission system has historically been limited by transient and dynamic stability concerns and previous studies for new generator interconnections have identified severe limitations. Stability studies for this project will be performed during the System Impact Study. It is possible that significant cost contributions may be required of this project for new or previously identified stability upgrades.

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

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:

Table 4: Potential Congestion Issues

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
4a	T33	480.6	Byron to Cherry Valley Blue 345kV line 0621	153.30%	184.70%	Emergency	1530	Byron to Cherry Valley Red 345kV line 0622
4b	T33	524.6	Byron to Cherry Valley Red 345kV line 0622	133.20%	167.50%	Emergency	1530	Nelson to Lee County 345kV line 15501
4c	T33	607.0	Cherry Valley to Silver Lake 345kV line 15616	163.90%	203.60%	Emergency	1530	Nelson to Lee County 345kV line 15501
4d	T33	703.8	Byron to Lee County Blue 345kV line 0627	82.00%	122.40%	Emergency	1739	Cherry Valley to Silver Lake 345kV line 15616
4e	T33	479.6	Byron to Wempletown 345kV line 0624	118.00%	145.60%	Emergency	1739	Nelson to Lee County 345kV line 15501
4f	T33	241.3	Wempletown to Rockdale Blue 345kV line 17101	141.10%	161.00%	Emergency	1214	Wempletown to Paddock Red 345kV line 17102
4g	T33	240.9	Wempletown to Paddock Red 345kV line 17102	127.50%	145.40%	Emergency	1341	Wempletown to Rockdale Blue 345kV line 17101
4h	T33	698.2	Nelson to Lee County 345kV line 15501	147.90%	193.50%	Emergency	1530	Cherry Valley to Silver Lake 345kV line 15616
4i	T33	277.9	Nelson to Walton Rd. (P20) 345kV line 15502	160.00%	182.50%	Emergency	1234	Cherry Valley to Silver Lake 345kV line 15616
4j	T33	277.9	Walton Rd. (P20) to Electric Junction 345kV line 18402	166.20%	188.70%	Emergency	1234	Cherry Valley to Silver Lake 345kV line 15616
4k	T33	115.1	Cherry Valley 345/138kV transformer #81	99.10%	123.80%	Emergency	465	Nelson to Lee County 345kV line 15501
4l	T33	95.1	Cherry Valley 345/138kV transformer #82	110.60%	131.00%	Emergency	465	Cherry Valley to Silver Lake 345kV line 15616
4m	T33	120.2	Cherry Valley 345/138kV transformer #83	100.10%	125.10%	Emergency	480	Nelson to Lee County 345kV line 15501
4n	T33	98.6	Alpine Tap to Belvidere portion of the Cherry Valley-E Rockford-Alpine-Belvidere 138kV line 15623	137.70%	161.00%	Emergency	423	Cherry Valley to Silver Lake 345kV line 15616
4o	T33	93.0	E Rockford to Alpine Tap portion of the Cherry Valley-E Rockford-Alpine-Belvidere 138kV line 15623	89.50%	103.00%	Emergency	690	Cherry Valley to Silver Lake 345kV line 15616
4p	T33	98.6	Belvidere to Marengo Red Tap portion of Belvidere-Marengo-Pleasant Valley 138kV line 12204	117.60%	140.50%	Emergency	430	Cherry Valley to Silver Lake 345kV line 15616

Table 4: Potential Congestion Issues (Continued)

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
4q	T33	119.9	Marengo Red Tap to Pleasant Valley portion of Belvidere-Marengo-Pleasant Valley Red 138kV line 12204	191.60%	232.50%	Emergency	293	Cherry Valley to Silver Lake 345kV line 15616
4r	T33	109.9	Belvidere to Marengo Tap Blue portion of Belvidere-Marengo-Woodstock 138kV line 12205	142.10%	167.70%	Emergency	430	Cherry Valley to Silver Lake 345kV line 15616
4s	T33	88.6	Marengo Tap to Woodstock Blue portion of Belvidere to Woodstock 138kV line 12205	157.80%	191.80%	Emergency	261	Cherry Valley to Silver Lake 345kV line 15616
4t	T33	88.6	Woodstock to Pleasant Valley Blue 138kV line 14106	122.10%	156.10%	Emergency	261	Cherry Valley to Silver Lake 345kV line 15616
4u	T33	84.6	Cherry Valley to B465 (Daimler Chrysler) portion of the Cherry Valley-B465-Belvidere Blue 138kV line 15624	103.40%	122.40%	Emergency	445	Cherry Valley to Silver Lake 345kV line 15616
4v	T33	84.6	B465 (Daimler Chrysler) to Belvidere portion of the Cherry Valley-B465-Belvidere Blue 138kV line 15624	104.00%	123.70%	Emergency	430	Cherry Valley to Silver Lake 345kV line 15616
4w	T33	36.0	Roscoe Bert Tap to Harlem Tap Blue portion of Wempletown to Belvidere 138kV line 17105	117.50%	137.80%	Emergency	178	Cherry Valley-Daimler Chrysler-Belvidere 138kV line 15624
4x	T33	36.0	T990 to Belvidere Blue 138kV line 17105	132.00%	152.20%	Emergency	178	Cherry Valley-Daimler Chrysler-Belvidere 138kV line 15624
4y	T33	24.4	Waterman to Glidden Tap portion of Electric Junction-N Aurora-Sugar Grove-Waterman-Glidden 138kV line 11106	118.90%	129.80%	Emergency	224	Waterman to Sandwich 138kV line 11301
4z	T33	60.5	Waterman 138kV bus tie 2-3	278.50%	306.60%	Emergency	215	Walton Rd. (P20) to Electric Junction 345kV line 18402
4aa	T33	92.1	Cherry Valley to W. DeKalb Tap portion of Cherry Valley-W. DeKalb-Glidden 138kV line 15627	96.60%	123.90%	Emergency	338	Nelson to Lee County 345kV line 15501
4ab	T33	92.1	W. DeKalb Tap to Glidden portion of Cherry Valley-W. DeKalb-Glidden 138kV line 15627	122.10%	161.30%	Emergency	235	Nelson to Lee County 345kV line 15501
4ac	T33	32.2	W DeKalb Tap to Waterman portion of Haumesser Rd. (Q57) to Waterman 138kV line 11323	240.00%	254.30%	Emergency	225	Walton Rd. (P20) to Electric Junction 345kV line 18402
4ad	T33	32.2	Haumesser Rd. (Q57) to W. DeKalb Tap portion of Haumesser Rd. (Q57) to Waterman 138kV line 11323	214.40%	226.70%	Emergency	261	Walton Rd. (P20) to Electric Junction 345kV line 18402
4ae	T33	32.2	Steward to Haumesser Rd. (Q57) 138kV line 18623	150.10%	162.40%	Emergency	261	Walton Rd. (P20) to Electric Junction 345kV line 18402
4af	T33	30.4	H440 (Rochelle) Tap to Steward portion of McGirr Road-H440-Steward 138kV line 16914	145.90%	157.50%	Emergency	261	Walton Rd. (P20) to Electric Junction 345kV line 18402

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
4ag	T33	32.4	Dixon to McGirr Road 138kv line 10714	105.30%	117.70%	Emergency	261	Walton Rd. (P20) to Electric Junction 345kV line 18402
4ah	T33	32.3	McGirr Rd. to H440 (Rochelle) Tap portion of McGirr Rd.-H440-Steward 138kV line 16914	162.90%	175.30%	Emergency	261	Walton Rd. (P20) to Electric Junction 345kV line 18402
4ai	T33	56.4	R55 (Mount Morris Wind Farm) to Dixon Tap portion of the R55-Dixon-Sterling 138kV line 37211	95.40%	111.10%	Emergency	359	Nelson to Lee County 345kV line 15501
4aj	T33	78.8	Dixon to R65/O68 138kv line 10721	171.60%	214.90%	Emergency	182	Nelson to Lee County 345kV line 15501
4ak	T33	13.2	R96 to Maryland 138kV line 12402	133.70%	139.40%	Emergency	232	Lancaster to Freeport 138kv line 11901
4al	T33	15.0	Kewanee to Hennepin 138kV line 6101	117.60%	125.50%	Emergency	190	Crescent Ridge to Hennepin 138kV line 7713
4am	T33	15.6	Crescent Ridge to Hennepin 138kV line 7713	236.70%	250.90%	Emergency	110	Nelson to Walton Rd. (P20) 345kV line 15502
4an	T33	12.0	Hennepin to Oglesby Tap portion of Hennepin-Oglesby Tap-Mazon 138kV line 7713	205.50%	216.50%	Emergency	110	Hennepin to Hennepin Station 138kV line (formerly line 6101)
4ao	T33	12.4	P39 Option 2 to ED Edwards 138kV line 7423	104.00%	112.70%	Emergency	143	Powerton to Benson 345kV line 0302 and Powerton Unit #5 (Powerton SPOG 1-3-b)

OPTION 2:
Network Impacts

The T33 project was studied as a 1500MW (555MW Capacity) injection at the STA 23 Collins 765kV substation in the ComEd area. Project T33 was evaluated for compliance with reliability criteria for summer peak conditions in 2012. Potential network impacts were as follows:

Generator Deliverability

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

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.)

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
5a	T33	237.4	Collins 765/345kV transformer TR 92	89.90%	102.80%	Applicable Load Dump Rating	1841	Plano to Electric Junction Red 345kV line 16703 and Plano to Electric Junction Blue 345kV line 16704

Short Circuit

(Summary of impacted circuit breakers)

To be determined in the System Impact Study.

Contribution to Previously Identified Overloads

(T33 contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

No problems were identified.

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 Requirements 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)

The Collins 765/345 kV transformer is overloaded for the loss of the Plano to Electric Junction Red and Blue tower line (Item 5a). Addition of a second 765/345 kV transformer does not address this problem since there are only two 345 kV circuits at Collins. To address this overload and provide system capability to deliver energy from this generation:

- Expansion of the 765kV bus at Collins to interconnect with project T33
- Expansion of the 765 kV bus at Collins to accommodate an additional circuit
- Construction of a new 765 kV circuit from Collins east to a location in AEP
- Relocation of existing 765kV line 11216

Potential Issues

A baseline overload for a Plano 345/138kV transformer with T33 contributions appeared in the results for this study. After the T queue 2012 study case was locked, another Plano 345/138kV transformer was added to the baseline upgrades, which should relieve this overload. No allocations will be made to the T33 project at this time. This overload will be reviewed again during the System Impact Study.

The impacts on the AEP system caused by the construction of a new 765kV tie line to AEP have not been studied. Additional system reinforcements may be required due to Project T33 and this line addition.

Previous projects in the PJM queue contribute significantly to the flows across the ComEd system. In reviewing the section on Delivery of Energy it is noted that prior projects in the PJM queue result in large loadings on several facilities. For example, without any output from T33, the Plano 765/345 kV transformer TR 93 for an intact system is loaded above 90% of its normal rating. Additionally, without any output from T33, the Collins 765/345 kV transformer is loaded above 170% of its emergency rating for loss of the 765kV line from Wilton Center to Collins. Also, without any output from T33, the Plano 765/345 kV transformers are loaded from 125% to 135% of their emergency ratings for loss of this same 765 kV line. A major 765 kV line from the Collins area to the East or Southeast may be needed to allow for additional energy to be exported from the Collins area.

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

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 determined:

Table 6: Potential Congestion Issues

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
6a	T33	159.2	Plano 765/345kV transformer TR 93	93.70%	108.00%	Normal	1120	None
6b	T33	602.9	Collins 765/345kV transformer TR 92	170.00%	213.70%	Emergency	1380	Wilton Center to Collins 765kV line 11216
6c	T33	450.0	Plano 765/345kV transformer TR 93	138.40%	171.00%	Emergency	1380	Wilton Center to Collins 765kV line 11216
6d	T33	447.0	Plano 765/345kV transformer TR 94	128.30%	160.70%	Emergency	1380	Wilton Center to Collins 765kV line 11216
6e	T33	274.0	Plano to Electric Junction Red 345kV line 16703	119.20%	135.00%	Emergency	1739	Wilton Center to Collins 765kV line 11216