

**#T34 – Byron III 345kV
Generation Interconnection**

Option 1:

Network Impacts

The T34 project was studied as a 1500MW (555MW Capacity) injection at the STA 6 Byron 345 kV substation in the ComEd area. Project T34 was evaluated for compliance with reliability criteria for summer peak conditions in 2012.

The initial feasibility studies performed on the 2012 RTEP model indicated significant overloads caused by the T33 and T34 projects 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 and T34 projects, 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. If Option 1 is chosen, the network impacts for the 765kV interconnection will be studied in the Impact Study phase.

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	T34	108.9	Byron to Cherry Valley Blue 345kV line 0621	94.50%	103.30%	Normal	1234	None
1b	T34	173.5	Byron to Cherry Valley Blue 345kV line 0621	91.10%	102.40%	Emergency	1530	Nelson to Lee County 345kV line 15501
1c	T34	87.5	Wempletown to Paddock Red 345kV line 17102	94.80%	101.00%	Emergency	1341	Wempletown to Rockdale Blue 345kV line 17101
1d	T34	258.3	Nelson to Lee County 345kV line 15501	92.70%	109.50%	Emergency	1530	Cherry Valley to Silver Lake 345kV line 15616
1e	T34	87.6	Walton Rd. (P20) to Electric Junction 345kV line 18402	94.60%	101.70%	Emergency	1234	Elwood Generation Units 1-9
1f	T34	43.4	Cherry Valley 345/138kV transformer #81	98.30%	107.60%	Emergency	465	Cherry Valley 345/138kV transformer #83
1g	T34	44.2	Cherry Valley 345/138kV transformer #83	96.80%	106.00%	Emergency	480	Cherry Valley 345/138kV transformer #81
1h	T34	29.0	H71 tap to Garden Plain portion of the Nelson-Rock Falls-H71-Garden Plain 138kV line 15518	97.20%	104.10%	Emergency	423	Belvidere to Woodstock Blue 138kV line 12205
1i	T34	42.9	Belvidere to Marengo Red Tap portion of Belvidere-Marengo-Pleasant Valley 138kV line 12204	91.50%	101.50%	Emergency	430	Cherry Valley to Silver Lake 345kV line 15616
1j	T34	123.0	Pleasant Valley to Crystal Lake red 138kV line 14101	96.90%	101.60%	Emergency	261	Silver Lake 345/138kV transformer #83
1k	T34	36.8	Cherry Valley to B465 (Daimler Chrysler) portion of the Cherry Valley-B465-Belvidere Blue 138kV line 15624	94.60%	102.90%	Emergency	445	Cherry Valley to Silver Lake 345kV line 15616
1l	T34	36.8	B465 (Daimler Chrysler) to Belvidere portion of the Cherry Valley-B465-Belvidere Blue 138kV line 15624	95.00%	103.60%	Emergency	430	Cherry Valley to Silver Lake 345kV line 15616
1m	T34	13.3	Sand Park to Harlem portion of T990-Sand Park-Harlem-Roscoe Bert-Wempletown 138kV line 17105	99.00%	106.50%	Emergency	178	Cherry Valley-Daimler Chrysler-Belvidere 138kV line 15624
1n	T34	35.6	W. DeKalb Tap to Glidden portion of Cherry Valley-W. DeKalb-Glidden 138kV line 15627	99.50%	114.70%	Emergency	652	Cherry Valley to Silver Lake 345kV line 15616
1o	T34	11.9	W DeKalb Tap to Waterman portion of Haumesser Rd. (Q57) to Waterman 138kV line 11323	95.30%	100.60%	Emergency	225	Walton Rd. (P20) to Electric Junction 345kV line 18402

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	T34	317.5	Wempletown to Cherry Valley Blue 345kV line 15615	85.80%	101.50%	Applicable Load Dump Rating	2024	Byron to Cherry Valley Red 345kV line 0622 & Byron to Cherry Valley Blue 345kV line 0621
2b	T34	253.6	Silver Lake to Libertyville Red 345kV line 13821	89.70%	102.30%	Applicable Load Dump Rating	2024	Wempletown to Rockdale Blue 345kV line 17101 & Wempletown to Paddock Road Red 345kV line 17102
2c	T34	75.8	Wempletown 345/138kV transformer #84	90.70%	103.10%	Applicable Load Dump Rating	610	Wempletown to Rockdale Blue 345kV line 17101 & Wempletown to Paddock Road Red 345kV line 17102
2d	T34	33.2	Silver Lake 345/138kV transformer #83	95.00%	103.10%	Applicable Load Dump Rating	610	Silver Lake-Crystal Lake-McHenry-Pleasant Valley 345kV line 13809 & Pleasant Valley to Crystal Lake Red 138kV line 14101
2e	T34	36.2	Sand Park to Harlem portion of T990-Sand Park-Harlem-Roscoe Bert-Wempletown 138kV line 17105	96.00%	101.50%	Applicable Load Dump Rating	236	Cherry Valley-Stillman Valley-O68/R54 138kV line 15621 & Cherry Valley-Daimler Chrysler-Belvidere Blue 138kV line 15624
2f	T34	43.5	Cherry Valley to E Rockford portion of the Cherry Valley-E Rockford-Alpine-Belvidere 138kV line 15623	90.00%	105.30%	Applicable Load Dump Rating	345	Cherry Valley-E Rockford-Alpine-Belvidere 138kV line 15623 & Cherry Valley-Alpine-E Rockford-Sand Park-Harlem-Roscoe Bert-Wempletown 138kV line 15625
2g	T34	66.6	Pleasant Valley to Crystal Lake Blue portion of the Pleasant Valley-Crystal Lake-McHenry-Pleasant Valley 345kV line 13809	88.00%	107.30%	Applicable Load Dump Rating	345	Silver Lake to Pleasant Valley 345kV line 13817 & Cherry Valley to Silver Lake 345kV line 15616
2h	T34	67.9	Pleasant Valley to Crystal Lake Red 138kV line 13809	91.80%	111.50%	Applicable Load Dump Rating	345	Silver Lake to Pleasant Valley 345kV line 13817 & Cherry Valley to Silver Lake 345kV line 15616
2i	T34	69.5	Sandwich to Plano 138kV line 10714	87.60%	100.50%	Applicable Load Dump Rating	537	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
2j	T34	69.5	Waterman to Sandwich 138kV line 11301	91.80%	103.60%	Applicable Load Dump Rating	588	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

(T34 contributes to the following contingency overloads, i.e. "Network Impacts", identified for earlier generation or transmission interconnection projects in the PJM Queue)

Table 3: Contributions to Previously Identified Overloads

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
3a	T34	153.3	Cherry Valley to Silver Lake 345kV line 15616	115.20%	127.70%	Normal	1234	None
3b	T34	473.5	Byron to Cherry Valley Blue 345kV line 0621	141.10%	164.50%	Applicable Load Dump Rating	2024	Byron to Cherry Valley Red 345kV line 0622 & Cherry Valley to Dixon 138kV line 15621
3c	T34	186.2	Byron to Cherry Valley Red 345kV line 0622	130.40%	142.50%	Applicable Load Dump Rating	1530	Byron to Cherry Valley Blue 345kV line 0621
3d	T34	712.5	Byron to Wempletown 345kV line 0624	193.60%	224.90%	Applicable Load Dump Rating	2277	Byron to Cherry Valley Red 345kV line 0622 & Byron to Cherry Valley Blue 345kV line 0621
3e	T34	766.2	Byron to Lee County 345kV line 0627	108.20%	141.80%	Applicable Load Dump Rating	2277	Byron to Cherry Valley Red 345kV line 0622 & Byron to Cherry Valley Blue 345kV line 0621
3f	T34	760.6	Nelson to Lee County 345kV line 15501	164.10%	201.70%	Applicable Load Dump Rating	2024	Byron to Cherry Valley Red 345kV line 0622 & Byron to Cherry Valley Blue 345kV line 0621
3g	T34	293.1	Nelson to Walton Rd. (P20) 345kV line 15502	148.40%	167.10%	Applicable Load Dump Rating	1572	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3h	T34	293.1	Walton Rd. (P20) to Electric Junction 345kV line 18402	153.40%	172.00%	Applicable Load Dump Rating	1572	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3i	T34	96.4	Cherry Valley 345/138kV transformer #82	100.90%	116.70%	Applicable Load Dump Rating	610	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3j	T34	41.4	Cherry Valley 345/138kV transformer #82	109.00%	117.90%	Applicable Load Dump Rating	465	Cherry Valley to Silver Lake 345kV line 15616
3k	T34	109.4	Wempletown 345/138kV transformer #84	113.80%	131.70%	Applicable Load Dump Rating	610	Byron to Cherry Valley Red 345kV line 0622 & Byron to Cherry Valley Blue 345kV line 0621
3l	T34	68.5	Libertyville 345/138kV transformer #81	112.70%	123.90%	Applicable Load Dump Rating	610	Libertyville to Prospect Heights Red 345kV line 11723 & Libertyville to Prospect Heights Blue 345kV line 15424
3m	T34	110.6	Alpine Tap to Belvidere portion of the Cherry Valley-E Rockford-Alpine-Belvidere 138kV line 15623	137.80%	158.10%	Applicable Load Dump Rating	544	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3n	T34	110.6	Belvidere to Marengo Red Tap portion of Belvidere-Marengo-Pleasant Valley Red 138kV line 12204	123.70%	144.00%	Applicable Load Dump Rating	544	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3o	T34	153.9	Marengo Red Tap to Pleasant Valley portion of Belvidere-Marengo-Pleasant Valley Red 138kV line 12204	215.00%	254.60%	Applicable Load Dump Rating	388	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3p	T34	116.4	Belvidere to Marengo Tap Blue portion of Belvidere-Marengo-Woodstock 138kV line 12205	165.90%	190.50%	Applicable Load Dump Rating	473	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	
3q	T34	96.2	Marengo Tap to Woodstock Blue portion of Belvidere to Woodstock 138kV line 12205	186.10%	218.20%	Applicable Load Dump Rating	300	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3r	T34	96.2	Woodstock to Pleasant Valley Blue 138kV line 14106	134.80%	162.70%	Applicable Load Dump Rating	345	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3s	T34	90.2	Cherry Valley to B465 (Daimler Chrysler) portion of the Cherry Valley-B465-Belvidere Blue 138kV line 15624	117.40%	135.00%	Applicable Load Dump Rating	511	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3t	T34	90.2	B465 (Daimler Chrysler) to Belvidere portion of the Cherry Valley-B465-Belvidere Blue 138kV line 15624	107.90%	124.50%	Applicable Load Dump Rating	544	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3u	T34	105.6	Cherry Valley to E Rockford portion of the Cherry Valley-E Rockford-Alpine-Belvidere 138kV line 15623	103.50%	116.90%	Applicable Load Dump Rating	791	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3v	T34	13.3	Roscoe Bert Tap to Harlem Tap Blue portion of Wempletown to Belvidere 138kV line 17105	117.50%	125.20%	Emergency	178	Cherry Valley-Daimler Chrysler-Belvidere 138kV line 15624
3w	T34	36.2	T990 to Belvidere Blue 138kV line 17105	114.90%	130.30%	Applicable Load Dump Rating	236	Cherry Valley-Stillman Valley-O68/R54 138kV line 15621 & Cherry Valley-Daimler Chrysler-Belvidere 138kV line 15624
3x	T34	22.4	Waterman 138kV bus tie 2-3	117.40%	127.80%	Applicable Load Dump Rating	215	Walton Rd. (P20) to Electric Junction 345kV line 18402
3y	T34	48.4	Haumesser Rd. (Q57) to W. DeKalb Tap portion of Haumesser Rd. (Q57) to Waterman 138kV line 11323	194.70%	210.00%	Applicable Load Dump Rating	316	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3z	T34	48.4	Steward to Haumesser Rd. (Q57) 138kV line 18623	143.60%	158.70%	Applicable Load Dump Rating	321	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3aa	T34	45.7	H440 (Rochelle) Tap to Steward portion of McGirr Road-H440-Steward 138kV line 16914	133.10%	146.90%	Applicable Load Dump Rating	332	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3ab	T34	48.6	Dixon to McGirr Road 138kV line 10714	110.90%	126.30%	Applicable Load Dump Rating	316	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3ac	T34	48.5	McGirr Rd. to H440 (Rochelle) Tap portion of McGirr Rd.-H440-Steward 138kV line 16914	143.40%	157.40%	Applicable Load Dump Rating	345	Cherry Valley to Silver Lake 345kV line 15616 & Cherry Valley-W. DeKalb-Glidden 138kV line 15627
3ad	T34	9.4	H71 tap to Garden Plain portion of the Nelson-Rock Falls-H71-Garden Plain 138kV line 15518	102.60%	107.80%	Applicable Load Dump Rating	182	Quad Cities to Sub 91 345kV line 0401 & Quad Cities to Rock Creek 345kV line 0405 SPS
3ae	T34	21.6	R96 to Maryland 138kV line 12402	117.90%	126.70%	Applicable Load Dump Rating	247	Wempletown to Rockdale Blue 345kV line 17101 & Wempletown to Rockdale Red 345kV line 17102
3af	T34	16.1	Crescent Ridge to Hennepin 138kV line 7713	239.70%	253.60%	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
3ag	T34	15.2	P39 Option 2 to ED Edwards 138kV line 7423	122.40%	131.70%	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)

Generator Deliverability Impacts

The T34 Generator Deliverability results indicate the overload of the Byron to Cherry Valley Blue 345 kV line #0621 (Item 1a) under normal conditions, and the overload of other 345 kV lines in the Byron area (Item 1b, and Item 1c) for Byron area 345 kV contingencies. These 345 kV Byron area overloads are in addition to earlier identified 345 kV Byron area overloads listed below. In addition, project T34 results indicate the overload of the P20 to Electric Junction 345 kV line #18402 for loss of the Elwood Generation Units 1-9 (Item 1e). T34 also overloads 138 kV facilities for loss of Cherry Valley to Silver Lake 345 kV (Item 1d, Item 1i, Item 1k, Item 1l, and Item 1n) and other 138 kV facilities in the Byron-Cherry Valley-Silver Lake area (Item 1f, Item 1g, Item 1h, Item 1j, Item 1m, and Item 1o). These overloads are also in addition to earlier identified 138 kV overloads in this same area.

Multiple Facility Contingency Impacts

The T34 Multiple Facility Contingency Impacts results indicate overloads of the Wempletown to Cherry Valley Blue 345 kV line #15615 for the multiple facility outage of the Byron to Cherry Valley Red and Blue 345 kV lines #0622 and #0621 (Item 2a) and the Silver Lake to Libertyville Red 345 kV line #13821 for the multiple facility outage of the Wempletown to Rockdale and the Wempletown to Paddock 345 kV lines #17101 and #17102 (Item 2b). T34 also overloads 138 kV facilities for loss of Cherry Valley to Silver Lake 345 kV (Item 2g, Item 2h and Item 2i) and other 138 kV facilities in the Byron-Cherry Valley-Silver Lake area (Item 2c, Item 2d, Item 2e, Item 2f, and Item 2j). These overloads are also in addition to earlier identified 138 kV overloads in this same area.

In both the Generator Deliverability results and the Multiple Facility Contingency Impacts results the overloaded facility is either in parallel with a facility that was previously overloaded (Item 1a and Item 3c) or a facility in series with a previously overloaded facility (Item 2b and Item 3a). This is a strong indication that the solution to previously identified overloads will also address these items (See Contribution to Previously Identified System Reinforcements below).

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)

The results of earlier projects in the PJM Queue 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 for the same areas. 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 new Byron to Nelson circuit and 1 new 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 the previous projects and T34, it is necessary to establish a 765 kV “backbone” transmission system. This 765kV “backbone” could consist of:

- Construction of a 765kV bus at Byron to interconnect with project T32, T33 and T34
- 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

With the addition of a 765 kV “backbone” system as described above, project T34 should not have any contributions to the 345 kV line additions required for earlier queue projects. Also, it is expected that the 765 kV “backbone” will address the overloads identified in Table 1 (See Generator Deliverability section) and Table 2 (See Multiple Facility Contingency section). Additional studies will be performed during the System Impact and Facilities Studies to determine the optimum plan to address these issues. Studies will also be performed regarding cost allocation among the various 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 T34 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:

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
4a	T34	480.6	Byron to Cherry Valley Blue 345kV line 0621	184.70%	216.10%	Emergency	1530	Byron to Cherry Valley Red 345kV line 0622
4b	T34	524.6	Byron to Cherry Valley Red 345kV line 0622	167.50%	201.80%	Emergency	1530	Nelson to Lee County 345kV line 15501
4c	T34	607	Cherry Valley to Silver Lake 345kV line 15616	203.60%	243.30%	Emergency	1530	Nelson to Lee County 345kV line 15501
4d	T34	703.8	Byron to Lee County Blue 345kV line 0627	122.40%	162.90%	Emergency	1739	Cherry Valley to Silver Lake 345kV line 15616
4e	T34	479.6	Byron to Wempletown 345kV line 0624	145.60%	173.10%	Emergency	1739	Nelson to Lee County 345kV line 15501
4f	T34	241.3	Wempletown to Rockdale Blue 345kV line 17101	161.00%	180.80%	Emergency	1214	Wempletown to Paddock Red 345kV line 17102
4g	T34	240.9	Wempletown to Paddock Red 345kV line 17102	145.40%	163.40%	Emergency	1341	Wempletown to Rockdale Blue 345kV line 17101
4h	T34	698.2	Nelson to Lee County 345kV line 15501	193.50%	239.10%	Emergency	1530	Cherry Valley to Silver Lake 345kV line 15616
4i	T34	277.9	Nelson to Walton Rd. (P20) 345kV line 15502	182.50%	205.00%	Emergency	1234	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	
4j	T34	277.9	Walton Rd. (P20) to Electric Junction 345kV line 18402	188.70%	211.20%	Emergency	1234	Cherry Valley to Silver Lake 345kV line 15616
4k	T34	115.1	Cherry Valley 345/138kV transformer #81	123.80%	148.60%	Emergency	465	Nelson to Lee County 345kV line 15501
4l	T34	95.1	Cherry Valley 345/138kV transformer #82	131.00%	151.50%	Emergency	465	Cherry Valley to Silver Lake 345kV line 15616
4m	T34	120.2	Cherry Valley 345/138kV transformer #83	125.10%	150.20%	Emergency	480	Nelson to Lee County 345kV line 15501
4n	T34	75.4	Wempletown 345/138kV transformer #84	87.90%	103.60%	Emergency	480	Nelson to Lee County 345kV line 15501
4o	T34	36.2	Silver Lake 345kV transformer #82	94.00%	101.80%	Emergency	465	Silver Lake to Libertyville Red 345kV line 13821
4p	T34	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
4q	T34	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	T34	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	T34	98.6	Alpine Tap to Belvidere portion of the Cherry Valley-E Rockford-Alpine-Belvidere 138kV line 15623	161.00%	184.30%	Emergency	423	Cherry Valley to Silver Lake 345kV line 15616
4t	T34	93.0	Cherry Valley to E Rockford portion of the Cherry Valley-E Rockford-Alpine-Belvidere 138kV line 15623	124.00%	139.50%	Emergency	445	Cherry Valley to Silver Lake 345kV line 15616
4u	T34	93.0	E Rockford to Alpine Tap portion of the Cherry Valley-E Rockford-Alpine-Belvidere 138kV line 15623	103.00%	116.50%	Emergency	690	Cherry Valley to Silver Lake 345kV line 15616
4v	T34	98.6	Belvidere to Marengo Red Tap portion of Belvidere-Marengo-Pleasant Valley 138kV line 12204	140.50%	163.50%	Emergency	430	Cherry Valley to Silver Lake 345kV line 15616
4w	T34	119.9	Marengo Red Tap to Pleasant Valley portion of Belvidere-Marengo-Pleasant Valley Red 138kV line 12204	232.50%	273.40%	Emergency	293	Cherry Valley to Silver Lake 345kV line 15616
4x	T34	109.9	Belvidere to Marengo Tap Blue portion of Belvidere-Marengo-Woodstock 138kV line 12205	167.70%	193.20%	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	
4y	T34	88.6	Marengo Tap to Woodstock Blue portion of Belvidere to Woodstock 138kV line 12205	191.80%	225.70%	Emergency	261	Cherry Valley to Silver Lake 345kV line 15616
4z	T34	48.9	Marengo Blue to Marengo Red 138kV bus tie	96.60%	123.00%	Emergency	185	Woodstock to Pleasant Valley Blue 138kV line 14106
4aa	T34	88.6	Woodstock to Pleasant Valley Blue 138kV line 14106	156.10%	190.10%	Emergency	261	Cherry Valley to Silver Lake 345kV line 15616
4ab	T34	84.6	Cherry Valley to B465 (Daimler Chrysler) portion of the Cherry Valley-B465-Belvidere Blue 138kV line 15624	122.40%	141.40%	Emergency	445	Cherry Valley to Silver Lake 345kV line 15616
4ac	T34	84.6	B465 (Daimler Chrysler) to Belvidere portion of the Cherry Valley-B465-Belvidere Blue 138kV line 15624	123.70%	143.40%	Emergency	178	Cherry Valley-Daimler Chrysler-Belvidere Blue 138kV line 15624
4ad	T34	36.0	Roscoe Bert Tap to Harlem Tap Blue portion of Wempletown to Belvidere 138kV line 17105	137.80%	158.00%	Emergency	178	Cherry Valley-Daimler Chrysler-Belvidere 138kV line 15624
4ae	T34	36.0	T990 to Belvidere Blue 138kV line 17105	152.20%	172.40%	Emergency	178	Cherry Valley-Daimler Chrysler-Belvidere 138kV line 15624
4af	T34	36.0	Sand Park to Harlem portion of T990-Sand Park-Harlem-Roscoe Bert-Wempletown 138kV line 17105	119.10%	139.30%	Emergency	178	Cherry Valley-Daimler Chrysler-Belvidere 138kV line 15624
4ag	T34	60.5	Waterman 138kV bus tie 2-3	306.60%	334.80%	Emergency	215	Walton Rd. (P20) to Electric Junction 345kV line 18402
4ah	T34	24.4	Waterman to Glidden tap portion of the Electric Junction-N Aurora-Sugar Grove-Waterman-Glidden 138kV line 11106	129.80%	140.70%	Emergency	224	Waterman to Sandwich 138kV line 11301
4ai	T34	49.7	Sugar Grove to Glidden tap portion of the Electric Junction-N Aurora-Sugar Grove-Waterman-Glidden 138kV line 11106	109.50%	128.60%	Emergency	261	Waterman to Sandwich 138kV line 11301
4aj	T34	92.1	Cherry Valley to W. DeKalb Tap portion of Cherry Valley-W. DeKalb-Glidden 138kV line 15627	123.90%	151.20%	Emergency	338	Nelson to Lee County 345kV line 15501
4ak	T34	92.1	W. DeKalb Tap to Glidden portion of Cherry Valley-W. DeKalb-Glidden 138kV line 15627	161.30%	200.50%	Emergency	235	Nelson to Lee County 345kV line 15501
4al	T34	32.2	W DeKalb Tap to Waterman portion of Haumesser Rd. (Q57) to Waterman 138kV line 11323	254.30%	268.60%	Emergency	225	Walton Rd. (P20) to Electric Junction 345kV line 18402
4am	T34	32.2	Haumesser Rd. (Q57) to W. DeKalb Tap portion of Haumesser Rd. (Q57) to Waterman 138kV line 11323	226.70%	239.00%	Emergency	261	Walton Rd. (P20) to Electric Junction 345kV line 18402

Table 4: Potential Congestion Issues (Continued)

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
4an	T34	32.2	Steward to Haumesser Rd. (Q57) 138kV line 18623	162.40%	174.80%	Emergency	261	Walton Rd. (P20) to Electric Junction 345kV line 18402
4ao	T34	30.4	H440 (Rochelle) Tap to Steward portion of McGirr Road-H440-Steward 138kV line 16914	157.50%	169.20%	Emergency	261	Walton Rd. (P20) to Electric Junction 345kV line 18402
4ap	T34	32.4	Dixon to McGirr Road 138kV line 10714	117.70%	130.10%	Emergency	261	Walton Rd. (P20) to Electric Junction 345kV line 18402
4aq	T34	32.3	McGirr Rd. to H440 (Rochelle) Tap portion of McGirr Rd.-H440-Steward 138kV line 16914	175.30%	187.70%	Emergency	261	Walton Rd. (P20) to Electric Junction 345kV line 18402
4ar	T34	56.4	Maryland to R55 138kV line 12411	94.50%	110.20%	Emergency	359	Nelson to Lee County 345kV line 15501
4as	T34	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
4at	T34	78.8	Dixon to R65/O68 138kV line 10721	171.60%	214.90%	Emergency	182	Nelson to Lee County 345kV line 15501
4au	T34	25.3	H71 tap to Garden Plain portion of the Nelson-Rock Falls-H71-Garden Plain 138kV line 15518	121.90%	135.80%	Emergency	182	Quad Cities to Sub 91 345kV line 0401 & Quad Cities to Rock Creek 345kV line 0405 SPS
4av	T34	31.8	O09 (Schauff Road) to Normandy portion of the O09-Normandy-Kewanee 138kV line 7411	91.50%	114.20%	Normal	140	None
4aw	T34	15.0	Kewanee to Hennepin 138kV line 6101	125.50%	133.40%	Emergency	190	Crescent Ridge to Hennepin 138kV line 6101
4ax	T34	15.6	Crescent Ridge to Hennepin 138kV line 6101	250.90%	265.10%	Emergency	110	Nelson to Walton Rd. (P20) 345kV line 15502
4ay	T34	12.0	Hennepin to Oglesby Tap portion of Hennepin-Oglesby Tap-Mazon 138kV line 7713	216.50%	227.50%	Emergency	110	Hennepin to Hennepin Station 138kV line (Formerly line 6101)
4az	T34	12.4	P39 Option 2 to ED Edwards 138kV line 7423	112.70%	121.40%	Emergency	183	Powerton to Bension 345kV line 0302 & Powerton Unit #5 (Powerton SPOG 1-3-b)

OPTION 2:

Network Impacts

The T34 project was studied as a 1500 MW (555MW Capacity) injection at the STA 23 Collins 765kV substation in the ComEd area. Project T34 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)

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.)

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
5a	T34	800.5	Wilton Center to Dumont 765kV line 11215	95.60%	109.10%	Applicable Load Dump Rating	5906	Goodings Grove-Blue Island-Wilton Center Blue 345kV line 11613 & Goodings Grove-Blue Island-Wilton Center Red 345kV line 11614
5b	T34	230.4	Collins 765/345kV transformer TR 92	97.20%	109.70%	Applicable Load Dump Rating	1841	Goodings Grove-Blue Island-Wilton Center Blue 345kV line 11613 & Goodings Grove-Blue Island-Wilton Center Red 345kV line 11614
5c	T34	219.4	Collins 765/345kV transformer TR 92	88.50%	100.40%	Applicable Load Dump Rating	1841	Walton Road (P20) to Electric Junction 345kV line 18402 & Plano to Electric Junction Red 345kV line 16703

Contribution to Previously Identified Overloads

(T34 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	
6a	T34	237.4	Collins 765/345kV transformer TR 92	102.80%	115.70%	Applicable Load Dump Rating	1841	Plano to Electric Junction Red 345kV line 16703 & Plano to Electric Junction Blue 345kV line 16704

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 T34 Multiple Facility results show the Wilton Center to Dumont 765 kV line #12215 overloads for loss of the Goodings Grove – Blue Island – Wilton Center Red and Blue 345 kV lines (Item 5a). Additionally the Collins 765/345 kV transformer overloads for the loss of either the Goodings Grove – Blue Island – Wilton Center Red and Blue 345 kV lines (Item 5b) or the P20 to Electric Junction & the Plano to Electric Junction Red 345 kV lines #18402 & #16703 (Item 5c). The addition of a second 765/345 kV transformer at Collins does not address this problem since there are only two 345 kV circuits at Collins. Prior projects in the PJM Queue demonstrated the need to extend a 765 kV line from Collins easterly to a tie with the AEP system. It is expected that this 765 kV backbone will also address the overload caused by the loss of either of the two Goodings Grove 345 kV lines or the two Electric Junction 345 kV lines.

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)

Prior projects in the PJM Queue for Option 2 demonstrated the need to construct a new 765 kV line from Collins Station 23 to the AEP system. It is expected that the 765 kV “backbone” will also address the overloads identified in Table 5 (See Multiple Facility Contingency section). This project may have a cost allocation for the following previously identified system reinforcements:

- 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

Additional studies will be performed during the System Impact and Facilities Studies to determine the optimum plan to address these issues. Studies will also be performed regarding cost allocation among the various projects.

Potential Issues

A baseline overload for a Plano 345/138kV transformer with T34 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 T34 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 T34 and this line addition.

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. However, these upgrades are not required.

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:

Item #	Project	Contribution MVA	Overloaded Element	Overload %		Rating		Contingent Element
				From	To	Type	MVA	
7a	T34	1192.8	Wilton Center to Collins 765kV line 11216	104.40%	124.40%	Emergency	1739	Collins to Plano 765kV line 2315
7b	T34	852.6	Wilton Center to Dumont 765kV line 11215	135.10%	156.50%	Emergency	3975	Collins to Plano 765kV line 2315
7c	T34	602.9	Collins 765/345kV transformer TR 92	213.70%	257.40%	Emergency	1380	Wilton Center to Collins 765kV line 11216
7d	T34	450.0	Plano 765/345kV transformer TR 93	171.00%	203.60%	Emergency	1380	Wilton Center to Collins 765kV line 11216
7e	T34	447.0	Plano 765/345kV transformer TR 94	160.70%	193.10%	Emergency	1380	Wilton Center to Collins 765kV line 11216
7f	T34	290.3	Wilton Center 765/345kV transformer TR 93	94.80%	115.80%	Emergency	1380	Wilton Center to Dumont 765kV line 11215
7g	T34	289.8	Wilton Center 765/345kV transformer TR 94	94.60%	115.60%	Emergency	1380	Wilton Center to Dumont 765kV line 11215
7h	T34	378.7	Collins to Dresden 345kV line 2311	101.80%	126.40%	Emergency	1542	Wilton Center to Collins 765kV line 11216
7i	T34	196.9	Blue Island-Wilton Center portion of Goodings Grove-Blue Island-Wilton Center Blue 345kV line 11613	114.40%	127.70%	Emergency	1470	Wilton Center to Dumont 765kV line 11215
7j	T34	219.2	Kendall County to Lockport Red 345kV line 10806	112.50%	125.10%	Emergency	1739	Wilton Center to Collins 765kV line 11216
7k	T34	274.0	Plano to Electric Junction Red 345kV line 16703	135.00%	150.70%	Emergency	1739	Wilton Center to Collins 765kV line 11216
7l	T34	246.1	Plano to Electric Junction Blue 345kV line 16704	133.40%	148.80%	Emergency	1596	Wilton Center to Collins 765kV line 11216