Feasibility Study Report

For

PJM Generation Interconnection Request Queue Position AC1-204

Elwood

March 2017

Network Impacts

The Queue Project AC1-204 was evaluated as a 1230.0 MW (Capacity 1230.0 MW) injection at the Elwood 345kV substation in the ComEd area. Project AC1-204 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AC1-204 was studied with a commercial probability of 53%. Potential network impacts were as follows:

Summer Peak Analysis - 2020

Generator Deliverability

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

1. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 97.51% to 103.32% (**DC power flow**) of its emergency rating (1195 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 156.75 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

2. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 96.51% to 120.97% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 293.82 MW to the thermal violation.

3. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 91.79% to 116.63% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 298.37 MW to the thermal violation.

4. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 90.78% to 111.65% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L1223_TR-S'. This project contributes approximately 308.65 MW to the thermal violation.

```
CONTINGENCY '345-L1223_TR-S'
 TRIP BRANCH FROM BUS 270717 TO BUS 270731 CKT 1          / DRESD; R 345 ELECT;4R 345
 TRIP BRANCH FROM BUS 275180 TO BUS 270717 CKT 1          / DRESD;3M 138 DRESD; R 345
 TRIP BRANCH FROM BUS 275180 TO BUS 271336 CKT 1          / DRESD;3M 138 DRESD; B 138
 TRIP BRANCH FROM BUS 275180 TO BUS 275280 CKT 1          / DRESD;3M 138 DRESD;3C 34.5
 END
```

Multiple Facility Contingency

(Double Circuit Tower Line, Fault with a Stuck Breaker, and Bus Fault contingencies for the full energy output)

1. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 92.94% to 114.92% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '116-45-L11614_'. This project contributes approximately 397.55 MW to the thermal violation.

```
CONTINGENCY '116-45-L11614_'
 TRIP BRANCH FROM BUS 270667 TO BUS 270665 CKT 1          / B ISL;RT 345 B ISL; R 345
 TRIP BRANCH FROM BUS 270667 TO BUS 270927 CKT 1          / B ISL;RT 345 WILTO; R 345
 TRIP BRANCH FROM BUS 270769 TO BUS 270667 CKT 1          / GOODI;2R 345 B ISL;RT 345
 DISCONNECT BUS 270769                          / GOODI;2R 345
 END
```

2. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 90.84% to 112.84% (**DC power flow**) of its emergency rating (1768 MVA) for the bus fault outage of '116_GG-345R__2'. This project contributes approximately 397.89 MW to the thermal violation.

```
CONTINGENCY '116_GG-345R__2'
 DISCONNECT BUS 270769                          / GOODI;2R 345
 END
```

3. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 90.85% to 112.84% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '116-45-L0303__A'. This project contributes approximately 397.89 MW to the thermal violation.

```
CONTINGENCY '116-45-L0303__A'
 TRIP BRANCH FROM BUS 270855 TO BUS 920931 CKT 1          / POWERTON ; R 345 AA1-018 TAP 345
 DISCONNECT BUS 270769                          / GOODI;2R 345
 END
```

4. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 90.84% to 112.84% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '116-45-L11622_'. This project contributes approximately 397.89 MW to the thermal violation.

```
CONTINGENCY '116-45-L11622_'                      / CONTINGENCY # 458 (NOT IN PJM CONTINGENCY FILE)
 TRIP BRANCH FROM BUS 270737 TO BUS 270769 CKT 1          / ELWOOD ; R 345 GOODINGS ;1R 345
 DISCONNECT BUS 270769                          / GOODINGS ;2R 345
 END
```

5. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 91.21% to 113.29% (**DC power flow**) of its emergency rating (1768 MVA) for

the line fault with failed breaker contingency outage of '116-45-L11613_'. This project contributes approximately 408.17 MW to the thermal violation.

```
CONTINGENCY '116-45-L11613_'
 TRIP BRANCH FROM BUS 270666 TO BUS 270664 CKT 1          / B ISL;BT 345 B ISL; B 345
 TRIP BRANCH FROM BUS 270666 TO BUS 270926 CKT 1          / B ISL;BT 345 WILTO; B 345
 TRIP BRANCH FROM BUS 270770 TO BUS 270666 CKT 1          / GOODI;4B 345 B ISL;BT 345
 DISCONNECT BUS 270770                          / GOODI;4B 345
 END
```

6. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 89.99% to 112.09% (**DC power flow**) of its emergency rating (1768 MVA) for the bus fault outage of '116_GG-345B__4'. This project contributes approximately 408.57 MW to the thermal violation.

```
CONTINGENCY '116_GG-345B__4'
 DISCONNECT BUS 270770                          / GOODI;4B 345
 END
```

7. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 89.99% to 112.09% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '116-45-L11620_'. This project contributes approximately 408.57 MW to the thermal violation.

```
CONTINGENCY '116-45-L11620_'                        / CONTINGENCY # 457 (NOT IN PJM CONTINGENCY FILE)
 TRIP BRANCH FROM BUS 270736 TO BUS 270770 CKT 1          / ELWOOD ; B 345 GOODINGS ;3B 345
 DISCONNECT BUS 270770                          / GOODINGS ;4B 345
 END
```

8. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 89.99% to 112.09% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '116-45-TR84___'. This project contributes approximately 408.57 MW to the thermal violation.

```
CONTINGENCY '116-45-TR84___'
 TRIP BRANCH FROM BUS 270770 TO BUS 271564 TO BUS 275368 CKT 1    / GOODINGS ;4B 345 GOODINGS ; B 138 GOODINGS ;4C 34.5
 DISCONNECT BUS 270770                          / GOODINGS ;4B 345
 END
```

Contribution to Previously Identified Overloads

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

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.31% to 113.48% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 92.08 MW to the thermal violation.

```
CONTINGENCY '2978_C2_05DUMONT 765-B_A'
 OPEN BRANCH FROM BUS 243206 TO BUS 920251 CKT 1          / 243206 05DUMONT 765 920251 X1-020 TAP 765 1
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTON ; 765 1
 END
```

2. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 105.78% to 106.05% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 100.34 MW to the thermal violation.

```
CONTINGENCY '112-65-BT4-5__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1          / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1          / WILTO;4M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1          / WILTO;4M 345 WILTO; R 345
 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1          / WILTO;4M 345 WILTO;4C 33
 END
```

3. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 105.77% to 106.04% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 100.34 MW to the thermal violation.

```
CONTINGENCY '112-65-BT3-4__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1          / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1          / WILTO;3M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1          / WILTO;3M 345 WILTO; B 345
 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1          / WILTO;3M 345 WILTO;3C 33
 END
```

4. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 101.55% to 102.02% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 122.35 MW to the thermal violation.

```
CONTINGENCY '2978_C2_05DUMONT 765-B_A'
 OPEN BRANCH FROM BUS 243206 TO BUS 920251 CKT 1          / 243206 05DUMONT 765 920251 X1-020 TAP 765 1
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTON ; 765 1
 END
```

5. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 101.2% to 101.68% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 123.25 MW to the thermal violation.

```
CONTINGENCY '112-65-BT4-5__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1          / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1          / WILTO;4M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1          / WILTO;4M 345 WILTO; R 345
 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1          / WILTO;4M 345 WILTO;4C 33
```

```
END
```

6. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 101.16% to 101.65% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 123.24 MW to the thermal violation.

```
CONTINGENCY '112-65-BT3-4__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1          / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1          / WILTO;3M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1          / WILTO;3M 345 WILTO; B 345
 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1          / WILTO;3M 345 WILTO;3C 33
 END
```

7. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 155.78% to 157.28% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 186.58 MW to the thermal violation.

```
CONTINGENCY '2978_C2_05DUMONT 765-B_A'
 OPEN BRANCH FROM BUS 243206 TO BUS 920251 CKT 1          / 243206 05DUMONT 765 920251 X1-020 TAP 765 1
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTON ; 765 1
 END
```

8. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 124.57% to 130.7% (**DC power flow**) of its normal rating (1409 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 191.68 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

9. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 126.58% to 128.92% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 155.75 MW to the thermal violation.

```
CONTINGENCY '2978_C2_05DUMONT 765-B_A'
 OPEN BRANCH FROM BUS 243206 TO BUS 920251 CKT 1          / 243206 05DUMONT 765 920251 X1-020 TAP 765 1
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTON ; 765 1
 END
```

10. (CE - CE) The DRESDEN ; R 345/138 kV transformer (from bus 270717 to bus 275180 ckt 1) loads from 120.93% to 132.78% (**DC power flow**) of its emergency rating (530 MVA) for the line fault with failed breaker contingency outage of '900-45-BT4-5__'. This project contributes approximately 62.78 MW to the thermal violation.

```
CONTINGENCY '900-45-BT4-5__'                    / CONTINGENCY # 771
 TRIP BRANCH FROM BUS 270737 TO BUS 270769 CKT 1          / ELWOOD ; R 345 GOODINGS ;1R 345
 TRIP BRANCH FROM BUS 270736 TO BUS 270737 CKT 1          / ELWOOD ; B 345 ELWOOD ; R 345
 END
```

11. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 105.5% to 132.4% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L11622_R-S'. This project contributes approximately 397.81 MW to the thermal violation.

```
CONTINGENCY '345-L11622_R-S'                    / CONTINGENCY # 223
 TRIP BRANCH FROM BUS 270737 TO BUS 270769 CKT 1          / ELWOOD ; R 345 GOODINGS ;1R 345
 END
```

12. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 100.33% to 121.58% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L10805_B-S'. This project contributes approximately 314.36 MW to the thermal violation.

```
CONTINGENCY '345-L10805_B-S'
 TRIP BRANCH FROM BUS 270810 TO BUS 274702 CKT 1          / LOCKP; B 345 KENDA;BU 345
 END
```

13. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 104.95% to 131.99% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L11620_B-S'. This project contributes approximately 399.94 MW to the thermal violation.

```
CONTINGENCY '345-L11620_B-S'                    / CONTINGENCY # 222
 TRIP BRANCH FROM BUS 270736 TO BUS 270770 CKT 1          / ELWOOD ; B 345 GOODINGS ;3B 345
 END
```

14. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 101.55% to 102.02% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 122.35 MW to the thermal violation.

```
CONTINGENCY '2978_C2_05DUMONT 765-B_A'
 OPEN BRANCH FROM BUS 243206 TO BUS 920251 CKT 1          / 243206 05DUMONT 765 920251 X1-020 TAP 765 1
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTON ; 765 1
 END
```

15. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 101.19% to 101.67% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 123.25 MW to the thermal violation.

```
CONTINGENCY '112-65-BT4-5__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1          / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1          / WILTO;4M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1          / WILTO;4M 345 WILTO; R 345
 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1          / WILTO;4M 345 WILTO;4C 33
 END
```

16. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 101.16% to 101.64% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 123.24 MW to the thermal violation.

```
CONTINGENCY '112-65-BT3-4__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1          / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1          / WILTO;3M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1          / WILTO;3M 345 WILTO; B 345
 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1          / WILTO;3M 345 WILTO;3C 33
 END
```

17. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 124.6% to 125.46% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT5-6__'. This project contributes approximately 190.93 MW to the thermal violation.

```
CONTINGENCY '112-65-BT5-6__'
 TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1          / WILTO; 765 COLLI; 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1          / WILTO;4M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1          / WILTO;4M 345 WILTO; R 345
 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1          / WILTO;4M 345 WILTO;4C 33
 END
```

18. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 128.7% to 129.58% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT2-3__'. This project contributes approximately 195.0 MW to the thermal violation.

```
CONTINGENCY '112-65-BT2-3__'
 TRIP BRANCH FROM BUS 270644 TO BUS 270607 CKT 1          / WILTO; 765 COLLI; 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1          / WILTO;3M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1          / WILTO;3M 345 WILTO; B 345
 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1          / WILTO;3M 345 WILTO;3C 33
 END
```

19. (CE - CE) The KENDALL ;BU-LOCKPORT ; B 345 kV line (from bus 274702 to bus 270810 ckt 1) loads from 113.14% to 121.43% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L1221__B-S'. This project contributes approximately 122.54 MW to the thermal violation.

```
CONTINGENCY '345-L1221__B-S'
 TRIP BRANCH FROM BUS 270716 TO BUS 270928 CKT 1          / DRESD; B 345 WOLFS; B 345
```

```
END
```

20. (CE - CE) The KENDALL ;BU-LOCKPORT ; B 345 kV line (from bus 274702 to bus 270810 ckt 1) loads from 112.87% to 121.16% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L14321TB-N'. This project contributes approximately 122.61 MW to the thermal violation.

```
CONTINGENCY '345-L14321TB-N'
 TRIP BRANCH FROM BUS 270928 TO BUS 270730 CKT 1              / WOLFS; B 345 ELECT; B 345
 TRIP BRANCH FROM BUS 270928 TO BUS 272794 TO BUS 275334 CKT 1    / WOLFS; B 345 WOLFS; B 138 WOLFS;1C 34.5
 END
```

21. (CE - CE) The KENDALL ;BU-LOCKPORT ; B 345 kV line (from bus 274702 to bus 270810 ckt 1) loads from 112.22% to 119.6% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 88.57 MW to the thermal violation.

22. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.18% to 129.73% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 173.53 MW to the thermal violation.

```
CONTINGENCY '112-65-BT4-5__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1              / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1              / WILTO;4M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1              / WILTO;4M 345 WILTO; R 345
 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1              / WILTO;4M 345 WILTO;4C 33
 END
```

23. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.12% to 129.67% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 173.52 MW to the thermal violation.

```
CONTINGENCY '112-65-BT3-4__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1              / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1              / WILTO;3M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1              / WILTO;3M 345 WILTO; B 345
 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1              / WILTO;3M 345 WILTO;3C 33
 END
```

24. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.02% to 129.56% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 172.62 MW to the thermal violation.

```
CONTINGENCY '2978_C2_05DUMONT 765-B_A'
```

```
 OPEN BRANCH FROM BUS 243206 TO BUS 920251 CKT 1          / 243206 05DUMONT 765 920251 X1-020 TAP 765 1
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTON ; 765 1
 END
```

25. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 109.01% to 120.81% (**DC power flow**) of its emergency rating (1399 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 173.35 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

26. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 126.84% to 127.7% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 132.31 MW to the thermal violation.

```
CONTINGENCY '2978_C2_05DUMONT 765-B_A'
 OPEN BRANCH FROM BUS 243206 TO BUS 920251 CKT 1          / 243206 05DUMONT 765 920251 X1-020 TAP 765 1
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1          / 243206 05DUMONT 765 270644 WILTON ; 765 1
 END
```

27. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 126.27% to 127.16% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 133.41 MW to the thermal violation.

```
CONTINGENCY '112-65-BT4-5__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1          / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270644 CKT 1          / WILTO;4M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275233 TO BUS 270927 CKT 1          / WILTO;4M 345 WILTO; R 345
 TRIP BRANCH FROM BUS 275233 TO BUS 275333 CKT 1          / WILTO;4M 345 WILTO;4C 33
 END
```

28. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 126.25% to 127.13% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 133.41 MW to the thermal violation.

```
CONTINGENCY '112-65-BT3-4__'
 TRIP BRANCH FROM BUS 270644 TO BUS 243206 CKT 1          / WILTO; 765 05DUMONT 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270644 CKT 1          / WILTO;3M 345 WILTO; 765
 TRIP BRANCH FROM BUS 275232 TO BUS 270926 CKT 1          / WILTO;3M 345 WILTO; B 345
 TRIP BRANCH FROM BUS 275232 TO BUS 275332 CKT 1          / WILTO;3M 345 WILTO;3C 33
 END
```

29. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 107.48% to 113.67% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 133.32 MW to the thermal violation.

```
CONTINGENCY '695_B2'
 OPEN BRANCH FROM BUS 243206 TO BUS 270644 CKT 1              / 243206 05DUMONT 765 270644 WILTO; 765 1
 END
```

30. (CE - CE) The DRESDEN ;3M-DRESDEN ; B 138 kV line (from bus 275180 to bus 271336 ckt 1) loads from 120.89% to 132.74% (**DC power flow**) of its emergency rating (530 MVA) for the line fault with failed breaker contingency outage of '900-45-BT4-5__'. This project contributes approximately 62.78 MW to the thermal violation.

```
CONTINGENCY '900-45-BT4-5__'                          / CONTINGENCY # 771
 TRIP BRANCH FROM BUS 270737 TO BUS 270769 CKT 1              / ELWOOD ; R 345 GOODINGS ;1R 345
 TRIP BRANCH FROM BUS 270736 TO BUS 270737 CKT 1              / ELWOOD ; B 345 ELWOOD ; R 345
 END
```

Steady-State Voltage Requirements

(Results of the steady-state voltage studies should be inserted here)

To be determined

Short Circuit

(Summary of impacted circuit breakers)

No issues identified.

Affected System Analysis & Mitigation

MISO Impacts:

MISO Impacts to be determined during later study phases (as applicable).

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.
Only the most severely overloaded conditions are listed. 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 will study all overload conditions associated with the overloaded element(s) identified.

Not Applicable

Light Load Analysis - 2020

Light Load Studies to be conducted during later study phases (as required by PJM Manual 14B).

System Reinforcements

Short Circuit

(Summary form of Cost allocation for breakers will be inserted here if any)

None

Stability and Reactive Power Requirement

(Results of the dynamic studies should be inserted here)

To be determined

Summer Peak Load Flow Analysis Reinforcements

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

1. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 97.51% to 103.32% (**DC power flow**) of its emergency rating (1195 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 156.75 MW to the thermal violation.

Comed: ComEd Transmission Planning Comments-ComEd 345kV L17703 SSTE rating is 1251 MVA. No upgrade is required.

NIPSCO (MISO) will have to evaluate this violation during the SIS phase.

2. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 96.51% to 120.97% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 293.82 MW to the thermal violation.

Reinforcement: ComEd 345kV L11620 SN rating is 1201 MVA. The post contingency flow for this event exceeds the applicable rating therefore an upgrade is required. The upgrade will consist of sag mitigation and re-conductoring on L11620. Upgrade station conductor at Goodings Grove and upgrade 1-345kV Bus Tie Circuit Breaker. Upon completion of this work the line ratings will be 1448/1535/1770 MVA (SN/SE/SLD) respectively.
Cost: $20.5M

Time: 30 months.

3. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 91.79% to 116.63% (**DC power flow**) of its normal rating (1201 MVA) for non-contingency condition. This project contributes approximately 298.37 MW to the thermal violation.

Same as Generator Deliverability #2

4. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 90.78% to 111.65% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L1223_TR-S'. This project contributes approximately 308.65 MW to the thermal violation.

Reinforcement: ComEd 345kV L11620 SSTE rating is 1568 MVA. The post contingency flow for this event exceeds the applicable rating therefore an upgrade is required. The upgrade will consist of re-conductoring L11620. Upon completion of this work the line ratings will be 1334/1726/1837/2084 MVA (SN/SLTE/SSTE/SLD) respectively.
Cost: $12.5M
Time: 30 months.

Multiple Facility Contingency

1. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 92.94% to 114.92% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '116-45-L11614_'. This project contributes approximately 397.55 MW to the thermal violation.

Reinforcement: ComEd 345kV L11620 SLD rating is 1768 MVA and the ALDR is 2033 MVA. The post contingency flow exceeds the applicale ratings therefore an upgrade is required. The upgrade will be to mitigate sag limitations and re-conductor the line. The post construction ratings will be 1`334/1726/1837/2084/2397 MVA (SN/SLTE/SSTE/SLD/ALDR) respectively.
Cost: $18M
Time: 24-30 months.

2. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 90.84% to 112.84% (**DC power flow**) of its emergency rating (1768 MVA) for the bus fault outage of '116_GG-345R__2'. This project contributes approximately 397.89 MW to the thermal violation.

Same as Multiple Facility #1

3. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 90.85% to 112.84% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '116-45-L0303__A'. This project contributes approximately 397.89 MW to the thermal violation.

Same as Multiple Facility #1

4. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 90.84% to 112.84% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '116-45-L11622_'. This project contributes approximately 397.89 MW to the thermal violation.

Same as Multiple Facility #1

5. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 91.21% to 113.29% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '116-45-L11613_'. This project contributes approximately 408.17 MW to the thermal violation.

Same as Multiple Facility #1

6. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 89.99% to 112.09% (**DC power flow**) of its emergency rating (1768 MVA) for the bus fault outage of '116_GG-345B__4'. This project contributes approximately 408.57 MW to the thermal violation.

Same as Multiple Facility #1

7. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 89.99% to 112.09% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '116-45-L11620_'. This project contributes approximately 408.57 MW to the thermal violation.

Same as Multiple Facility #1

8. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 89.99% to 112.09% (**DC power flow**) of its emergency rating (1768 MVA) for the line fault with failed breaker contingency outage of '116-45-TR84___'. This project contributes approximately 408.57 MW to the thermal violation.

Same as Multiple Facility #1

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)

(Summary form of Cost allocation for transmission lines and transformers will be inserted here if any)

1. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 113.31% to 113.48% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 92.08 MW to the thermal violation.

Reinforcement: A sag check will be required for the ACSR ~ 954 ~ 45/7 ~ RAIL Conductor Section 1 to determine if the line section can be operated above its emergency rating of 1409 MVA. The result could prove that no additional upgrades are necessary, that some upgrades on the circuit are necessary, or that the entire 14 mile section of line would need to be rebuilt. Estimated Cost for the Sag Study: $56,000. If deemed necessary to rebuild section of line, Estimated Cost: $28,000,000. S/N: 1409 MVA S/E: 1868 MVA
Cost: $28,056,000
Time: 6-12 months, sag study. 24-36 months, rebuild

Please refer to Appendix 1 for a table containing the generators having contribution to this flowgate.

2. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 105.78% to 106.05% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 100.34 MW to the thermal violation.

3. (AEP - AEP) The X2-052 TAP-05DUMONT 345 kV line (from bus 247610 to bus 243219 ckt 2) loads from 105.77% to 106.04% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 100.34 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #1

4. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 101.55% to 102.02% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 122.35 MW to the thermal violation.

Comed: ComEd Transmission Planning Comments-ComEd 345kV L6617rating is 1237 MVA and the ALDR is 1423 MVA. No upgrade is required.

NIPSCO (MISO) will have to evaluate this violation during the SIS phase.

Please refer to Appendix 2 for a table containing the generators having contribution to this flowgate.

5. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 101.2% to 101.68% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 123.25 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #4

6. (MISO NIPS - CE) The 17STJOHN-ST JOHN ; T 345 kV line (from bus 255112 to bus 270886 ckt 1) loads from 101.16% to 101.65% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 123.24 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #4

7. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 155.78% to 157.28% (**DC power flow**) of its emergency rating (1409 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 186.58 MW to the thermal violation.

Please refer to Appendix 3 for a table containing the generators having contribution to this flowgate.

8. (MISO NIPS - AEP) The 17STILLWELL-05DUMONT 345 kV line (from bus 255113 to bus 243219 ckt 1) loads from 124.57% to 130.7% (**DC power flow**) of its normal rating (1409 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 191.68 MW to the thermal violation.

NIPSCO (MISO) will have to evaluate this violation during the SIS phase.

AEP
Reinforcement: Reconductor/Rebuild 9 mile section of line. Estimated Cost: $18,000,000. Replace the Dumont Wavetrap (2500 A): Estimated cost: $500,000. Replace the Dumont Line Riser (2500 A): Estimated cost: $100,000. S/N: 2387 MVA S/E: 2387 MVA
Cost: $18,600,000
Time: 24-36 months

9. (CE - MISO NIPS) The BURNHAM ;0R-17MUNSTER 345 kV line (from bus 270677 to bus 255109 ckt 1) loads from 126.58% to 128.92% (**DC power flow**) of its emergency rating (1195 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 155.75 MW to the thermal violation.

Comed: ComEd Transmission Planning Comments-ComEd 345kV L17703 SSTE rating is 1251 MVA. No upgrade is required.

NIPSCO (MISO) will have to evaluate this violation during the SIS phase.

Please refer to Appendix 4 for a table containing the generators having contribution to this flowgate.

10. (CE - CE) The DRESDEN ; R 345/138 kV transformer (from bus 270717 to bus 275180 ckt 1) loads from 120.93% to 132.78% (**DC power flow**) of its emergency rating (530 MVA) for the line fault with failed breaker contingency outage of '900-45-BT4-5__'. This project contributes approximately 62.78 MW to the thermal violation.

Reinforcement: ComEd Tr. @ Dresden Station SLD is 530 MVA and the ALDR is 610 MVA. The new CB will be in the future BT 5-7 position. By installing this CB the contingency file for this event will be revised by removing the trip branch of bus 270736 – 270737. This will allow post contingency flow into the blue bus at Elwood
Cost: $25.3M
Time: 36 months

Please refer to Appendix 5 for a table containing the generators having contribution to this flowgate.

11. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 105.5% to 132.4% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L11622_R-S'. This project contributes approximately 397.81 MW to the thermal violation.

Please refer to Appendix 6 for a table containing the generators having contribution to this flowgate.

12. (CE - CE) The ELWOOD ; B-GOODINGS ;4B 345 kV line (from bus 270736 to bus 270770 ckt 1) loads from 100.33% to 121.58% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L10805_B-S'. This project contributes approximately 314.36 MW to the thermal violation.

Reinforcement: ComEd 345kV L11620 SSTE rating is 1568 MVA. The post contingency flow for this event exceeds the applicable rating therefore an upgrade is required. The upgrade will be to re-conductor a portion of the line, upgrade the station conductor at both terminal stations and upgrade 1-345kV Circuit Breaker at Goodings Grove. Upon completion of this work the new line ratings will be 1560/1802/2083/2477 MVA (SN/SLTE/SSTE/SLD) respectively.
Cost: $22M
Time: 30 months.

13. (CE - CE) The ELWOOD ; R-GOODINGS ;2R 345 kV line (from bus 270737 to bus 270769 ckt 1) loads from 104.95% to 131.99% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L11620_B-S'. This project contributes approximately 399.94 MW to the thermal violation.

Reinforcement: ComEd 345kV L11620 SSTE rating is 1568 MVA. The post contingency flow for this event exceeds the applicable rating therefore an upgrade is required. The upgrade will be to re-conductor a portion of the line, upgrade the station conductor at both terminal stations and upgrade 1-345kV Circuit Breaker at Goodings Grove. Upon completion of this work the new line ratings will be 1560/1802/2083/2477 MVA (SN/SLTE/SSTE/SLD) respectively.

Cost: $22M
Time: 30 months.

Please refer to Appendix 7 for a table containing the generators having contribution to this flowgate.

14. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 101.55% to 102.02% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 122.35 MW to the thermal violation.

Comed: ComEd 345kV L6617 SLD rating is 1237 MVA & the ALDR rating is 1423MVA. No upgrade required.

NIPSCO (MISO) will have to evaluate this violation during the SIS phase.

Please refer to Appendix 8 for a table containing the generators having contribution to this flowgate.

15. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 101.19% to 101.67% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 123.25 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #14

16. (CE - MISO NIPS) The ST JOHN ; T-17GREEN_ACRE 345 kV line (from bus 270886 to bus 255104 ckt 1) loads from 101.16% to 101.64% (**DC power flow**) of its emergency rating (1091 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 123.24 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #14

17. (CE - CE) The WILTON ; B-WILTON ;3M 345 kV line (from bus 270926 to bus 275232 ckt 1) loads from 124.6% to 125.46% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT5-6__'. This project contributes approximately 190.93 MW to the thermal violation.

Reinforcement: ComEd Tr, 94 at Wilton Center SLD rating is 1601 MVA & the ALDR is 1841 MVA. The post contingency flow for this event exceeds the applicable ratings. The upgrade will be to build out the 765kV bus at Wilton Center. Relocate L11216 to the future bus 8 position at Wilton Center. Install 2-765kV Circuit Breakers (Bus Tie CB’s 6-8 & 8-2). Upon completion of this work, Tr. 94 will no longer be tripped in the contingency above and it is expected that Tr. 93 will no longer experience an overload for this event.
Cost: $15M
Time: 36 months

Please refer to Appendix 9 for a table containing the generators having contribution to this flowgate.

18. (CE - CE) The WILTON ; R-WILTON ;4M 345 kV line (from bus 270927 to bus 275233 ckt 1) loads from 128.7% to 129.58% (**DC power flow**) of its emergency rating (1601 MVA) for the line fault with failed breaker contingency outage of '112-65-BT2-3__'. This project contributes approximately 195.0 MW to the thermal violation.

Reinforcement: ComEd Tr, 94 at Wilton Center SLD rating is 1601 MVA & the ALDR is 1841 MVA. The post contingency flow for this event exceeds the applicable ratings. The upgrade will be to build out the 765kV bus at Wilton Center. Relocate L11216 to the future bus 8 position at Wilton Center. Install 2-765kV Circuit Breakers (Bus Tie CB's 6-8 & 8-2). Upon completion of this work, Tr. 94 will no longer be tripped in the contingency above and it is expected that Tr. 93 will no longer experience an overload for this event.
Cost: $15M
Time: 36 months

Please refer to Appendix 10 for a table containing the generators having contribution to this flowgate.

19. (CE - CE) The KENDALL ;BU-LOCKPORT ; B 345 kV line (from bus 274702 to bus 270810 ckt 1) loads from 113.14% to 121.43% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L1221__B-S'. This project contributes approximately 122.54 MW to the thermal violation.

Reinforcement: ComEd 345kV L10805 SSTE rating is 1568 MVA. The post contingency flow for this event exceeds the applicable rating therefore an upgrade is required. The upgrade will be to re-conductor the line. Upon completion the new ratings will be 1334/1726/1837/2084 MVA (SN/SLTE/SSTE/SLD) respectively.
Cost: $8.5M
Time: 30 months

Please refer to Appendix 11 for a table containing the generators having contribution to this flowgate.

20. (CE - CE) The KENDALL ;BU-LOCKPORT ; B 345 kV line (from bus 274702 to bus 270810 ckt 1) loads from 112.87% to 121.16% (**DC power flow**) of its emergency rating (1479 MVA) for the single line contingency outage of '345-L14321TB-N'. This project contributes approximately 122.61 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #19

21. (CE - CE) The KENDALL ;BU-LOCKPORT ; B 345 kV line (from bus 274702 to bus 270810 ckt 1) loads from 112.22% to 119.6% (**DC power flow**) of its normal rating (1201

MVA) for non-contingency condition. This project contributes approximately 88.57 MW to the thermal violation.

Reinforcement: ComEd 345kV L10805 SN rating is 1201 MVA. The post contingency flow for this event exceeds the applicable rating therefore an upgrade is required. The upgrade will be to re-conductor the line. Upon completion the new ratings will be 1868/2011/2404/2878 MVA (SN/SLTE/SSTE/SLD) respectively.
Cost: $9.5M
Time: 30 months.

22. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.18% to 129.73% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 173.53 MW to the thermal violation.

Comed: ComEd Comments- ComEd 345kV L94507 SLD is 1674 MVA & ALDR is 1925 MVA. No upgrade required.

NIPSCO (MISO) will have to evaluate this violation during the SIS phase.

Please refer to Appendix 12 for a table containing the generators having contribution to this flowgate.

23. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.12% to 129.67% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 173.52 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #22

24. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 129.02% to 129.56% (**DC power flow**) of its emergency rating (1399 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 172.62 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #22

25. (CE - MISO NIPS) The CRETE EC ;BP-17STJOHN 345 kV line (from bus 274750 to bus 255112 ckt 1) loads from 109.01% to 120.81% (**DC power flow**) of its emergency rating (1399 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 173.35 MW to the thermal violation.

Comed: ComEd Comments- ComEd 345kV L94507 SSTE is 1483 MVA. No upgrade required.

NIPSCO (MISO) will have to evaluate this violation during the SIS phase.

26. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 126.84% to 127.7% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '2978_C2_05DUMONT 765-B_A'. This project contributes approximately 132.31 MW to the thermal violation.

Comed: ComEd 345kV L97008 SLD is 1237 MVA and the ALDR is 1423 MVA. No upgrade required.

AEP
Reinforcement: A sag check will be required for the AEP owned section of the Olive - University Park (CE) 345 kV line to determine if the line section can be operated above its emergency rating of 971 MVA. The result could prove that no additional upgrades are necessary, that some upgrades on the circuit are necessary, or that the entire 40.61 mile section of line would need to be rebuilt. Estimated Cost for the Sag Study: $162,440. Estimated Cost to reconductor/rebuild AEP section of line: $81,220,000. S/N: 971 MVA S/E: 1318 MVA
Cost: $81,362,440
Time: 6-12 montsh, sag study. 36-48 months, Reconductor/rebuild

Please refer to Appendix 13 for a table containing the generators having contribution to this flowgate.

27. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 126.27% to 127.16% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT4-5__'. This project contributes approximately 133.41 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #26

28. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 126.25% to 127.13% (**DC power flow**) of its emergency rating (971 MVA) for the line fault with failed breaker contingency outage of '112-65-BT3-4__'. This project contributes approximately 133.41 MW to the thermal violation.

Same as Contribution to Previously Identified Overload #26

29. (CE - AEP) The UNIV PK N;RP-05OLIVE 345 kV line (from bus 274804 to bus 243229 ckt 1) loads from 107.48% to 113.67% (**DC power flow**) of its normal rating (971 MVA) for the single line contingency outage of '695_B2'. This project contributes approximately 133.32 MW to the thermal violation.

Comed: The ComEd SSTE rating is 1134 MVA. No ComEd upgrade is rqeuired

AEP
Reinforcement: A sag check will be required for the AEP owned section of the Olive - University Park (CE) 345 kV line to determine if the line section can be operated above its emergency rating of 971 MVA. The result could prove that no additional upgrades are necessary,

that some upgrades on the circuit are necessary, or that the entire 40.61 mile section of line would need to be rebuilt. Estimated Cost for the Sag Study: $162,440. Estimated Cost to reconductor/rebuild AEP section of line: $81,220,000. S/N: 971 MVA S/E: 1318 MVA
Cost: $81,362,440
Time: 6-12 months, sag study. 36-48 months, Reconductor/rebuild

30. (CE - CE) The DRESDEN ;3M-DRESDEN ; B 138 kV line (from bus 275180 to bus 271336 ckt 1) loads from 120.89% to 132.74% (**DC power flow**) of its emergency rating (530 MVA) for the line fault with failed breaker contingency outage of '900-45-BT4-5__'. This project contributes approximately 62.78 MW to the thermal violation.

Reinforcement: ComEd Tr. @ Dresden Station SLD is 530 MVA and the ALDR is 610 MVA. Install a new 345kV Circuit Breaker at Elwood. The new CB will be in the future BT 5-7 position. By installing this CB the contingency file for this event will be revised by removing the trip branch of bus 270736 – 270737. This will allow post contingency flow into the blue bus at Elwood.
Cost: $25.3M
Time: 36 months