#W4-005 –Pontiac MidPoint – Latham 345kV
Generation Interconnection

General

The Interconnection Customer (IC) is proposing a 351MW (45.6MW Capacity) wind farm to be interconnected to the ComEd transmission system. The proposed in-service date for this project is December 31, 2013. **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.**

This Generation Interconnection Feasibility Study provides analysis results to aid the Interconnection Customer in assessing the practicality and cost of incorporating the facility into the PJM system. This study was limited to load flow analyses of probable contingencies. Preliminary estimates of the scope, cost, and lead time for construction of facilities are provided below. If the interconnection customer elects to pursue a System Impact Study, a more comprehensive analysis will be performed.

Direct Connection Cost Estimate

The total preliminary estimate for Direct Connection work performed by ComEd is given in the following table:

Description	Total Cost
Install new Hallsville 345kV three breaker ring bus (assuming ComEd engineers, procures and builds the substation)	$15,000,000
345kV transmission line tie-in (by ComEd)	$2,000,000
Total	**$17,000,000**

Table 1. Direct Connection Cost Estimate

Revenue Metering and SCADA Requirements

For PJM: The Interconnection Customer (IC) will install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

For ComEd: The Interconnection Customer (IC) will install equipment necessary to provide bi-directional Revenue Metering (KWH, KVARH) and real time data (KW, KVAR, circuit breaker status, and 138 kV voltage) for IC's generating Resource. See ComEd Applicable Standards available on the PJM website ("TO Standards") – "Exelon Energy Delivery Interconnection Guidelines (Generators Greater than 20 MW)".

Network Impacts

The Queue Project W4-005 was studied as a 351MW (45.6MW Capacity) injection into ComEd's system at the Blue Mound (Blue) - Latham Tap of Kincaid – Pontiac MidPoint Line. Project W4-005 was evaluated for compliance with reliability criteria for summer peak conditions in 2015. Potential network impacts were as follows:

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

No violations 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.)

No violations were identified.

Short Circuit
(Summary of impacted circuit breakers)

To be determined in the System Impact Study.

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)

Item 1a. The PONTI; B-LORET; B 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 107.88% to 109.33% (DC power flow) of its emergency rating (1234 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 17.98 MW to the thermal violation.

```
CONTINGENCY '345-L8014_T_-S'                                    / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1                / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1                / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1                / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1                / PONTI;2M 138 PONTI;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1               / PONTI; B 138 PONTI; R 138
END
```

Item 1b. The LORET; B-WILTO; B 345 kV line (from bus 270704 to bus 270926 ckt 1) loads from 111.73% to 113.14% (DC power flow) of its emergency rating (1280 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 17.97 MW to the thermal violation.

```
CONTINGENCY '345-L8014_T_-S'                                    / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1                / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1                / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1                / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1                / PONTI;2M 138 PONTI;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1               / PONTI; B 138 PONTI; R 138
END
```

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially cause by the addition of this project generation)

None.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project.)

For Item 1a, to mitigate the overload on PONTI; B-LORET; B 345 kV line 8012, ComEd has proposed to upgrade one 345kV circuit breaker at TSS 80 Pontiac MidPoint and modify transmission structures to increase line conductor clearance along 11.5 miles of line 8012. The upgrade is estimated to cost **$8,000,000**. This overload has been caused by a prior project. Cost allocations for this upgrade will be determined during the System Impact Study phase.

For Item 1b, to mitigate the overload on LORET; B-WILTO; B 345 kV line 11212, ComEd has proposed to upgrade two 345kV circuit breakers at TSS 112 Wilton Center and modify transmission structures to increase line conductor clearances along 40 miles of the 345kV line 11212. The upgrade is estimated to cost **$21,000,000**. This overload has been caused by a prior project. Cost allocations for this upgrade will be determined during the System Impact Study phase.

Potential Issues

None.

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 2a. The Z3-201 TAP-LATHA; T 345 kV line (from bus 905040 to bus 270804 ckt 1) loads from 74.47% to 100.77% (DC power flow) of its rating (1334 MVA) for the single line contingency ('345-L8002___-S'). This project contributes approximately 350.85 MW to the thermal violation.

```
CONTINGENCY '345-L8002___-S'                                    / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1               / PONTI; B 345 BLUEM; B 345
END
```

Item 2b. The WILTO; B-B ISL;BT 345 kV line (from bus 270926 to bus 270666 ckt 1) loads from 103.16% to 103.33% (DC power flow) of its emergency rating (1441 MVA) for the single line contingency ('345-L11614AR-S'). This project contributes approximately 18.69 MW to the thermal violation.

```
CONTINGENCY '345-L11614AR-S'                                    / CONTINGENCY # 452
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
END
```

Item 2c. The BLUEM; B-PONTI; B 345 kV line (from bus 270668 to bus 270852 ckt 1) loads from 94.51% to 104.95% (DC power flow) of its emergency rating (1528 MVA) for the single line contingency ('345-L2101___-S_U4-037B'). This project contributes approximately 159.42 MW to the thermal violation.

```
CONTINGENCY '345-L2101___-S_U4-037B'                            / CONTINGENCY # 641
TRIP BRANCH FROM BUS 891210 TO BUS 349700 CKT 1               / KINCA; R 345 7LANSVLAM 345
END
```

Item 2d. The DRESD; R-ELECT;4R 345 kV line (from bus 270717 to bus 270731 ckt 1) loads from 105.98% to 109.28% (DC power flow) of its emergency rating (1479 MVA) for the single line contingency ('345-L1222__R-S'). This project contributes approximately 48.85 MW to the thermal violation.

```
CONTINGENCY '345-L1222__R-S'                                    / CONTINGENCY # 487
TRIP BRANCH FROM BUS 270717 TO BUS 270737 CKT 1               / DRESD; R 345 ELWOO; R 345
END
```

Item 2e. The BLUEM; B-PONTI; B 345 kV line (from bus 270668 to bus 270852 ckt 1) loads from 97.77% to 109.65% (DC power flow) of its normal rating (1334 MVA) for non-contingency condition. This project contributes approximately 158.54 MW to the thermal violation.

Item 2f. The WILTO; R-B ISL;RT 345 kV line (from bus 270927 to bus 270667 ckt 1) loads from 110.79% to 110.98% (DC power flow) of its emergency rating (1441 MVA) for the single line contingency ('345-L11613AB-S'). This project contributes approximately 20.15 MW to the thermal violation.

```
CONTINGENCY '345-L11613AB-S'                                    / CONTINGENCY # 451
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
END
```

Item 2g. The 7BROKAW T1-W2-048 OPT1 345 kV line (from bus 348847 to bus 902392 ckt 1) loads from 116.06% to 124.15% (DC power flow) of its emergency rating (1441 MVA) for the single line contingency ('345-L8002___-S'). This project contributes approximately 116.6 MW to the thermal violation.

```
CONTINGENCY '345-L8002___-S'                                    / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1               / PONTI; B 345 BLUEM; B 345
END
```

Item 2h. The W2-048 OPT1-PONTI; R 345 kV line (from bus 902392 to bus 270853 ckt 1) loads from 118.51% to 126.6% (DC power flow) of its emergency rating (1441 MVA) for the single line contingency ('345-L8002___-S'). This project contributes approximately 116.6 MW to the thermal violation.

```
CONTINGENCY '345-L8002___-S'                                    / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1               / PONTI; B 345 BLUEM; B 345
END
```

Item 2i. The LATHA; T-7LATHAM 345 kV line (from bus 270804 to bus 348856 ckt 1) loads from 125.27% to 143.29% (DC power flow) of its emergency rating (1123 MVA) for the single line contingency ('345-L8002___-S'). This project contributes approximately 202.34 MW to the thermal violation.

```
CONTINGENCY '345-L8002___-S'                                    / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1               / PONTI; B 345 BLUEM; B 345
END
```

Item 2j. The PONTI; R-DRESD; R 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 141.74% to 148.7% (DC power flow) of its normal rating (1245 MVA) for non-contingency condition. This project contributes approximately 86.72 MW to the thermal violation.

Item 2k. The DRESD; R-ELWOO; R 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 148.49% to 153.6% (DC power flow) of its emergency rating (1479 MVA) for the single line contingency ('345-L1223_TR-S'). This project contributes approximately 75.54 MW to the thermal violation.

```
CONTINGENCY '345-L1223_TR-S'                                    / CONTINGENCY # 488
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
```

Item 2l. The PONTI; B-LORET; B 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 192.11% to 203.33% (DC power flow) of its emergency rating (1234 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 138.42 MW to the thermal violation.

```
CONTINGENCY '345-L8014_T_-S'                                    / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1                / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1                / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1                / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1                / PONTI;2M 138 PONTI;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1               / PONTI; B 138 PONTI; R 138
END
```

Item 2m. The PONTI; R-DRESD; R 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 209.46% to 219.7% (DC power flow) of its emergency rating (1341 MVA) for the single line contingency ('345-L11212_B-S'). This project contributes approximately 137.26 MW to the thermal violation.

```
CONTINGENCY '345-L11212_B-S'                                    / CONTINGENCY # 425
TRIP BRANCH FROM BUS 270926 TO BUS 270704 CKT 1                / WILTO; B 345 LORET; B 345
END
```

Item 2n. The LORET; B-WILTO; B 345 kV line (from bus 270704 to bus 270926 ckt 1) loads from 223.6% to 234.4% (DC power flow) of its emergency rating (1280 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 138.3 MW to the thermal violation.

```
CONTINGENCY '345-L8014_T_-S'                                    / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1                / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1                / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1                / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1                / PONTI;2M 138 PONTI;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1               / PONTI; B 138 PONTI; R 138
END
```

#W4-005 –Pontiac MidPoint – Latham 345kV
Generation Interconnection

General

The Interconnection Customer (IC) is proposing a 351MW (45.6MW Capacity) wind farm to be interconnected to the ComEd transmission system. The proposed in-service date for this project is December 31, 2013. **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.**

This Generation Interconnection Feasibility Study provides analysis results to aid the Interconnection Customer in assessing the practicality and cost of incorporating the facility into the PJM system. This study was limited to load flow analyses of probable contingencies. Preliminary estimates of the scope, cost, and lead time for construction of facilities are provided below. If the interconnection customer elects to pursue a System Impact Study, a more comprehensive analysis will be performed.

Direct Connection Cost Estimate

The total preliminary estimate for Direct Connection work performed by ComEd is given in the following table:

Description	Total Cost
Install new Hallsville 345kV three breaker ring bus (assuming ComEd engineers, procures and builds the substation)	$15,000,000
345kV transmission line tie-in (by ComEd)	$2,000,000
Total	**$17,000,000**

Table 1. Direct Connection Cost Estimate

Revenue Metering and SCADA Requirements

For PJM: The Interconnection Customer (IC) will install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Sections 24.1 and 24.2.

For ComEd: The Interconnection Customer (IC) will install equipment necessary to provide bi-directional Revenue Metering (KWH, KVARH) and real time data (KW, KVAR, circuit breaker status, and 138 kV voltage) for IC's generating Resource. See ComEd Applicable Standards available on the PJM website ("TO Standards") – "Exelon Energy Delivery Interconnection Guidelines (Generators Greater than 20 MW)".

Network Impacts

The Queue Project W4-005 was studied as a 351MW (45.6MW Capacity) injection into ComEd's system at the Blue Mound (Blue) - Latham Tap of Kincaid – Pontiac MidPoint Line. Project W4-005 was evaluated for compliance with reliability criteria for summer peak conditions in 2015. Potential network impacts were as follows:

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

No violations 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.)

No violations were identified.

Short Circuit
(Summary of impacted circuit breakers)

To be determined in the System Impact Study.

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)

Item 1a. The PONTI; B-LORET; B 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 107.88% to 109.33% (DC power flow) of its normal rating (1234 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 17.98 MW to the thermal violation.

```
CONTINGENCY '345-L8014_T_-S'                                  / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1              / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1              / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1              / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1              / PONTI;2M 138 PONTI;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1             / PONTI; B 138 PONTI; R 138
END
```

Item 1b. The LORET; B-WILTO; B 345 kV line (from bus 270704 to bus 270926 ckt 1) loads from 111.73% to 113.14% (DC power flow) of its normal rating (1280 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 17.97 MW to the thermal violation.

```
CONTINGENCY '345-L8014_T_-S'                                    / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1                / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1                / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1                / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1                / PONTI;2M 138 PONTI;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1               / PONTI; B 138 PONTI; R 138
END
```

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially cause by the addition of this project generation)

None.

Contribution to Previously Identified System Reinforcements

(Overloads initially caused by prior Queue positions with additional contribution to overloading by this project.)

For Item 1a, to mitigate the overload on PONTI; B-LORET; B 345 kV line 8012, ComEd has proposed to upgrade one 345kV circuit breaker at TSS 80 Pontiac MidPoint and modify transmission structures to increase line conductor clearance along 11.5 miles of line 8012. The upgrade is estimated to cost **$8,000,000**. This overload has been caused by a prior project. Cost allocations for this upgrade will be determined during the System Impact Study phase.

For Item 1b, to mitigate the overload on LORET; B-WILTO; B 345 kV line 11212, ComEd has proposed to upgrade two 345kV circuit breakers at TSS 112 Wilton Center and modify transmission structures to increase line conductor clearances along 40 miles of the 345kV line 11212. The upgrade is estimated to cost **$21,000,000**. This overload has been caused by a prior project. Cost allocations for this upgrade will be determined during the System Impact Study phase.

Potential Issues

None.

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 2a. The Z3-201 TAP-LATHA; T 345 kV line (from bus 905040 to bus 270804 ckt 1) loads from 74.47% to 100.77% (DC power flow) of its rating (1334 MVA) for the single line contingency ('345-L8002___-S'). This project contributes approximately 350.85 MW to the thermal violation.

```
CONTINGENCY '345-L8002___-S'                                    / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1               / PONTI; B 345 BLUEM; B 345
END
```

Item 2b. The WILTO; B-B ISL;BT 345 kV line (from bus 270926 to bus 270666 ckt 1) loads from 103.16% to 103.33% (DC power flow) of its rating (1441 MVA) for the single line contingency ('345-L11614AR-S'). This project contributes approximately 18.69 MW to the thermal violation.

```
CONTINGENCY '345-L11614AR-S'                                    / CONTINGENCY # 452
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
END
```

Item 2c. The BLUEM; B-PONTI; B 345 kV line (from bus 270668 to bus 270852 ckt 1) loads from 94.51% to 104.95% (DC power flow) of its rating (1528 MVA) for the single line contingency ('345-L2101___-S_U4-037B'). This project contributes approximately 159.42 MW to the thermal violation.

```
CONTINGENCY '345-L2101___-S_U4-037B'                            / CONTINGENCY # 641
TRIP BRANCH FROM BUS 891210 TO BUS 349700 CKT 1               / KINCA; R 345 7LANSVLAM 345
END
```

Item 2d. The DRESD; R-ELECT;4R 345 kV line (from bus 270717 to bus 270731 ckt 1) loads from 105.98% to 109.28% (DC power flow) of its rating (1479 MVA) for the single line contingency ('345-L1222__R-S'). This project contributes approximately 48.85 MW to the thermal violation.

```
CONTINGENCY '345-L1222__R-S'                                    / CONTINGENCY # 487
TRIP BRANCH FROM BUS 270717 TO BUS 270737 CKT 1               / DRESD; R 345 ELWOO; R 345
END
```

Item 2e. The BLUEM; B-PONTI; B 345 kV line (from bus 270668 to bus 270852 ckt 1) loads from 97.77% to 109.65% (DC power flow) of its normal rating (1334 MVA) for non-contingency condition. This project contributes approximately 158.54 MW to the thermal violation.

Item 2f. The WILTO; R-B ISL;RT 345 kV line (from bus 270927 to bus 270667 ckt 1) loads from 110.79% to 110.98% (DC power flow) of its normal rating (1441 MVA) for the single line contingency ('345-L11613AB-S'). This project contributes approximately 20.15 MW to the thermal violation.

```
CONTINGENCY '345-L11613AB-S'                                    / CONTINGENCY # 451
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
END
```

Item 2g. The 7BROKAW T1-W2-048 OPT1 345 kV line (from bus 348847 to bus 902392 ckt 1) loads from 116.06% to 124.15% (DC power flow) of its normal rating (1441 MVA) for the single line contingency ('345-L8002___-S'). This project contributes approximately 116.6 MW to the thermal violation.

```
CONTINGENCY '345-L8002___-S'                                    / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1               / PONTI; B 345 BLUEM; B 345
END
```

Item 2h. The W2-048 OPT1-PONTI; R 345 kV line (from bus 902392 to bus 270853 ckt 1) loads from 118.51% to 126.6% (DC power flow) of its normal rating (1441 MVA) for the single line contingency ('345-L8002___-S'). This project contributes approximately 116.6 MW to the thermal violation.

```
CONTINGENCY '345-L8002___-S'                                    / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1               / PONTI; B 345 BLUEM; B 345
END
```

Item 2i. The LATHA; T-7LATHAM 345 kV line (from bus 270804 to bus 348856 ckt 1) loads from 125.27% to 143.29% (DC power flow) of its normal rating (1123 MVA) for the single line contingency ('345-L8002___-S'). This project contributes approximately 202.34 MW to the thermal violation.

```
CONTINGENCY '345-L8002___-S'                                    / CONTINGENCY # 735
TRIP BRANCH FROM BUS 270852 TO BUS 270668 CKT 1               / PONTI; B 345 BLUEM; B 345
END
```

Item 2j. The PONTI; R-DRESD; R 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 141.74% to 148.7% (DC power flow) of its normal rating (1245 MVA) for non-contingency condition. This project contributes approximately 86.72 MW to the thermal violation.

Item 2k. The DRESD; R-ELWOO; R 345 kV line (from bus 270717 to bus 270737 ckt 1) loads from 148.49% to 153.6% (DC power flow) of its normal rating (1479 MVA) for the single line contingency ('345-L1223_TR-S'). This project contributes approximately 75.54 MW to the thermal violation.

```
CONTINGENCY '345-L1223_TR-S'                                    / CONTINGENCY # 488
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
```

Item 2l. The PONTI; B-LORET; B 345 kV line (from bus 270852 to bus 270704 ckt 1) loads from 192.11% to 203.33% (DC power flow) of its normal rating (1234 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 138.42 MW to the thermal violation.

```
CONTINGENCY '345-L8014_T_-S'                                    / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1                / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1                / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1                / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1                / PONTI;2M 138 PONTI;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1               / PONTI; B 138 PONTI; R 138
END
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Item 2m. The PONTI; R-DRESD; R 345 kV line (from bus 270853 to bus 270717 ckt 1) loads from 209.46% to 219.7% (DC power flow) of its normal rating (1341 MVA) for the single line contingency ('345-L11212_B-S'). This project contributes approximately 137.26 MW to the thermal violation.

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CONTINGENCY '345-L11212_B-S'                                    / CONTINGENCY # 425
TRIP BRANCH FROM BUS 270926 TO BUS 270704 CKT 1                / WILTO; B 345 LORET; B 345
END
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Item 2n. The LORET; B-WILTO; B 345 kV line (from bus 270704 to bus 270926 ckt 1) loads from 223.6% to 234.4% (DC power flow) of its normal rating (1280 MVA) for the single line contingency ('345-L8014_T_-S'). This project contributes approximately 138.3 MW to the thermal violation.

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CONTINGENCY '345-L8014_T_-S'                                    / CONTINGENCY # 738
TRIP BRANCH FROM BUS 270853 TO BUS 270717 CKT 1                / PONTI; R 345 DRESD; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 270853 CKT 1                / PONTI;2M 138 PONTI; R 345
TRIP BRANCH FROM BUS 275210 TO BUS 272261 CKT 1                / PONTI;2M 138 PONTI; R 138
TRIP BRANCH FROM BUS 275210 TO BUS 275310 CKT 1                / PONTI;2M 138 PONTI;2C 34.5
CLOSE BRANCH FROM BUS 272260 TO BUS 272261 CKT 1               / PONTI; B 138 PONTI; R 138
END
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