

X1-020 Dumont-Greentown 765kV

Generation Interconnection

Local Network Impacts

The impact of the proposed transmission facility on the AEP transmission system was assessed according to applicable reliability criteria and AEP planning criteria. The transmission system must meet contingency performance in accordance with AEP FERC Form 715 criteria.

Normal System – Capacity Output (2015 Summer Conditions)

- No problems identified.

Single Contingency – Capacity Output (2015 Summer Conditions)

- No problems identified.

Multiple Contingency – Full Output (2015 Summer Conditions)

- No problems identified.

Short Circuit Analysis

- No problems identified.

Stability Analysis

- Not completed as part of the Feasibility assessment.

Contributions to Previously Identified Overloads:

- No problems identified.

Network Upgrades

- No problems identified.

Additional Limitations of Concern

- No problems identified.

Network Impacts

Queue project X1-040 was studied as a(n) 360.0 MW (46.8 MW of which was Capacity) injection into AEP's system at the 50.0% tap between Collingwood and Forrest G. Hipple Substation 345kV Bus345.0 kV line. Project X1-040 was evaluated for compliance with reliability criteria for summer peak conditions in 2015.

Potential transmission network impacts are as follows:

Generator Deliverability

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

No problems identified

Multiple Facility Contingency

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

No problems identified

Short Circuit

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

No problems identified.

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) The S-073A-North Delphos 138 kV line (from bus 290794 to bus 243051 ckt 1) loads from 103.21% to 104.15% (DC power flow) of its emergency rating (192 MVA) for the tower contingency '6664' loss of the East Lima-Haviland and East Lima-Northwest Lima 138kV circuits. This project contributes approximately 11.10 MW to the thermal violation.
2. (AEP) The Selma Parker 138/69 kV transformer (from bus 243373 to bus 246901 ckt 1) loads from 146.52% to 148.74% (DC power flow) of its emergency rating (81 MVA) for the tower contingency '444', loss of the Desoto-Keystone, Desoto-Sorenson and Desoto-Tanners Creek 345kV circuits. This project contributes approximately 11.13 MW to the thermal violation.
3. (AEP/FE) The Howard-Brookside 138 kV line (from bus 243024 to bus 238586 ckt 1) loads from 221.45% to 222.56% (DC power flow) of its emergency rating (173 MVA) for the tower contingency 'C5-TWL-SR063'. This project contributes approximately 11.94 MW to the thermal violation.

New System Reinforcements

(Upgrades required to mitigate reliability criteria violations, i.e. Network Impacts, initially caused 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. 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. The overload on the North Delphos-S73 138kV circuit may be alleviated by a sag check to determine if the line can be operated above its normal rating. PJM estimates the cost of the sag study at **\$50,000**.
2. The Selma Parker transformer doesn't exist presently, so when the engineering and construction of the Selma Parker station (in-service date of 2014) is done, the size will be sufficient to accommodate the need of the X1-020 project. The incremental cost of the larger transformer will be borne by project X1-020.
3. The overload on the Howard-Brookside line can be mitigated by reconductoring the 21.73 mile line. The estimated cost of this upgrade is **\$21 million**.

Energy Portion of Interconnection Request

PJM also studied the delivery of the energy portion of the surrounding generation. Any potential 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 Transmission Interconnection request.

Note: 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 analyzes 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.

4. (AEP) The S-073A-North Delphos 138 kV line (from bus 290794 to bus 243051 ckt 1) loads from 103.09% to 104.02% (DC power flow) of its emergency rating (192 MVA) for the operational contingency '5227_B2_TOR2062', loss of the East Lima-Haviland circuit. This project contributes approximately 11.10 MW to the thermal violation.

5. (AEP) The S-073A-North Delphos 138 kV line (from bus 290794 to bus 243051 ckt 1) loads from 106.81% to 107.73% (DC power flow) of its normal rating (148 MVA) for non

contingency condition. This project contributes approximately 8.38 MW to the thermal violation.

6. (AEP) The Grant Tap-Deer Creek 138 kV line (from bus 243303 to bus 243274 ckt 1) loads from 117.58% to 119.1% (DC power flow) of its emergency rating (223 MVA) for the operational contingency '6123_B2_TOR1744A_MOAB_U3-002A', loss of the Mullin-Pipe Creek 138kV circuit. This project contributes approximately 20.97 MW to the thermal violation.

7. (AEP) The Reusens-Monroe 69 kV line (from bus 242882 to bus 242876 ckt 1) loads from 99.21% to 100.13% (DC power flow) of its emergency rating (53 MVA) for the operational contingency '5401_B2_TOR94A_MOAB', loss of the Boxwood-Reusens 138kV circuit. This project contributes approximately 3.04 MW to the thermal violation.

8. (PENELEC) The Roxbury-Roxbury 138/115 kV transformer (from bus 200532 to bus 200520 ckt 1) loads from 148.66% to 150.03% (DC power flow) of its emergency rating (138 MVA) for the operational contingency 'PP1EB', loss of the Brighton-Conastone 500kV circuit. This project contributes approximately 11.72 MW to the thermal violation.

9. (PENELEC) The Roxbury-Roxbury 138/115 kV transformer (from bus 200532 to bus 200520 ckt 1) loads from 101.51% to 102.46% (DC power flow) of its normal rating (124 MVA) for non contingency condition. This project contributes approximately 7.29 MW to the thermal violation.

10. (AEP) The S-073B-Haviland 138 kV line (from bus 290795 to bus 243017 ckt 1) loads from 155.40% to 156.74% (DC power flow) of its emergency rating (167 MVA) for the operational contingency '6628_B2_TOR4500770C_MOAB', loss of the North Delphi-S-73 138kV circuit . This project contributes approximately 13.86 MW to the thermal violation.

11. (PL) The Safe Harbor Units 3-4 Tap-Manor Substation 230 kV line (from bus 208071 to bus 208019 ckt 1) loads from 99.29% to 100.14% (DC power flow) of its emergency rating (579 MVA) for the operational contingency 'PJM17', loss of the Conastone-Peach Bottom 500kV circuit. This project contributes approximately 30.55 MW to the thermal violation.

12. (AEP) The T-130_TAP-East Lima 345 kV line (from bus 292438 to bus 242935 ckt 1) loads from 97.23% to 98.16% (DC power flow) of its emergency rating (878 MVA) for the operational contingency '676_B3_05ROB PK 345-5_MOAB', loss of the Robison Park 345/138kV transformer. This project contributes approximately 50.67 MW to the thermal violation.

13. (AEP) The Selma Parker 138/69 kV transformer (from bus 243373 to bus 246901 ckt 1) loads from 139.28% to 141.63% (DC power flow) of its emergency rating (81 MVA) for the operational contingency '05CULLOD_05WYOMIN_098'. This project contributes approximately 11.77 MW to the thermal violation.

14. (AEP) The Selma Parker 138/69 kV transformer (from bus 243373 to bus 246901 ckt 1) loads from 145.91% to 148.44% (DC power flow) of its normal rating (73 MVA) for non contingency condition. This project contributes approximately 11.46 MW to the thermal violation.
15. (AP) The Nettie-Crupperneck 138 kV line (from bus 235376 to bus 235318 ckt 1) loads from 121.41% to 122.41% (DC power flow) of its emergency rating (126 MVA) for the operational contingency 'APS_B_G425', loss of the Enon-Powell Mountain 138kV circuit. This project contributes approximately 7.85 MW to the thermal violation.
16. (BG&E/PL) The Conastone-Otter Creek Switchyard 230 kV line (from bus 220963 to bus 208048 ckt 1) loads from 131.71% to 133.01% (DC power flow) of its emergency rating (531 MVA) for the operational contingency 'PJM17', loss of the Conastone-Peach Bottom 500kV circuit. This project contributes approximately 42.77 MW to the thermal violation.
17. (AP/PENELEC) The Greene-Roxbury 138 kV line (from bus 235188 to bus 200532 ckt 1) loads from 97.94% to 98.94% (DC power flow) of its emergency rating (189 MVA) for the operational contingency 'PP1EB', loss of the Brighton-Conastone 500kV circuit. This project contributes approximately 11.72 MW to the thermal violation.
18. (AP) The Collins Ferry-West Run 138 kV line (from bus 235800 to bus 235424 ckt 1) loads from 105.78% to 106.68% (DC power flow) of its emergency rating (214 MVA) for the operational contingency '01HATFLD_01RONCO_059', loss of the Hatfield-Ronco 500kV circuit. This project contributes approximately 11.95 MW to the thermal violation.
19. (NYISO/PENELEC) The North Waverly-East Sayre 115 kV line (from bus 130836 to bus 200676 ckt 1) loads from 141.11% to 141.98% (DC power flow) of its emergency rating (128 MVA) for the operational contingency 'B_PN230-SX-#8', loss of the East Towanda-Hillside 230kV circuit. This project contributes approximately 6.90 MW to the thermal violation.
20. (PECO) The Cooper-Peach Bottom 230 kV line (from bus 214089 to bus 213869 ckt 1) loads from 122.94% to 124.34% (DC power flow) of its emergency rating (485 MVA) for the operational contingency 'PJM17', loss of the Conastone-Peach Bottom 500kV circuit'. This project contributes approximately 42.00 MW to the thermal violation.
21. (AP) The West Run-Lake Lynn 138 kV line (from bus 235424 to bus 235122 ckt 1) loads from 107.66% to 108.75% (DC power flow) of its emergency rating (176 MVA) for the operational contingency '01HATFLD_01RONCO_059', loss of the Hatfield-Ronco 500kV circuit. This project contributes approximately 11.95 MW to the thermal violation.
22. (BG&E/PECO) The Graceton-Cooper 230 kV line (from bus 220964 to bus 214089 ckt 1) loads from 124.98% to 126.38% (DC power flow) of its emergency rating (485 MVA) for the operational contingency 'PJM17', loss of the Conastone-Peach Bottom 500kV circuit. This project contributes approximately 42.00 MW to the thermal violation.

23. (AEP/FE) The Howard-Brookside 138 kV line (from bus 243024 to bus 238586 ckt 1) loads from 252.38% to 253.49% (DC power flow) of its normal rating (133 MVA) for non contingency condition. This project contributes approximately 9.12 MW to the thermal violation.