

#W1-041– Greenville 138kV Generation Interconnection

Option 1: Greenville 138kV

Network Impacts

Queue project W1-041 was studied as a 50.0MW (6.5MW Capacity) injection into Dayton's system with a direction connection into the Greenville 138kV substation. Project W1-041 was evaluated for compliance with reliability criteria for summer peak conditions in 2014. Potential network impacts were as follows:

Generator Deliverability

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

No problems were identified.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)

No problems were identified.

Short Circuit

(Summary of impacted circuit breakers)

No problems were 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)

No problems were identified.

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

To be determined in the System Impact Study.

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be determined in the System Impact Study.

New System Reinforcements

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

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)

None.

Dayton’s(DP&L) Analysis:

Dayton (DP&L) found the W1-041 project to contribute to the following overloads below in the Dayton area. Any cost allocations for W1-041, if any, will be assigned during the System Impact Study.

Circuit	Existing Emergency Rating	Required Emergency Rating	Upgrade Requirements	Length (Miles)	Cost	Timeframes
6643 Hursch Road - West Manchester	98	115	Reconductor 477 to 795	0.66	\$ 244,000	6 months
			R/P 800 Amp Line Trap with 1200 Amp Line Trap - West Manchester	NA	\$ 25,000	4 months
6626 Covington - Piqua 3	72	96	R/C 336.4 ACSR to 477 ACSR	6.51	\$ 2,449,000	18 months
			R/P 600 Amp Switchs 26X & 26Y at Covington	NA	\$ 50,000	4 months
			R/P 600 Amp Breaker & CT's at Covington	NA	\$ 100,000	4 months
6645 Kingscreek - Logan	72	128	R/C 477 ACSR to 795	10.9	\$ 4,033,000	24 months
			R/P 800 Amp Line Trap with 1200 Amp Line Trap - Kingscreek	NA	\$ 25,000	4 months
			R/P 800 Amp Line Trap with 1200 Amp Line Trap - Logan	NA	\$ 25,000	4 months
			R/P 300 Cu Bus at Logan	NA	\$ 100,000	4 months
			R/P 600 Amp Switchs 45X & 45Y at Logan	NA	\$ 50,000	4 months
			R/P 600 Amp Breaker & CT's at Logan	NA	\$ 100,000	4 months
Greenville 138/69kV Auto	165	297	Install 2nd 138/69kV auto at Greenville	NA	\$ 6,000,000	18 months
OHH E.- Yankee 69kV	117	134	Reconductor to 795	5.5	\$2,200,000	24 months

Note: The time frame shown is for doing that project individually. If all lines have to be reconducted at the same time, the time frame would be extended significantly due to the

coordination of outages required to complete the work. All of these outages cannot be scheduled at the same time. Expect a total construction time of at least 40 months.

Potential Congestion due to Local Energy Deliverability

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:

1. The 09WMILTN-09MIAMI 138 kV line (from bus 253089 to bus 253046 ckt 1) loads from 103.52% to 109.21% (DC power flow) of its emergency rating (330 MVA) for the single line contingency ('OUTAGE_20'). This project contributes approximately 18.8 MW to cause the thermal violation.
2. The V3-016 TAP-09WMILTN 138 kV line (from bus 293354 to bus 253089 ckt 1) loads from 95.6% to 110.77% (DC power flow) of its normal rating (222 MVA) for non-contingency condition. This project contributes approximately 33.67 MW to cause the thermal violation.
3. The 09CVNGTN-09PIQUA 69 kV line (from bus 253016 to bus 253064 ckt 1) loads from 113.14% to 124.26% (DC power flow) of its emergency rating (81 MVA) for the single line contingency ('OUTAGE_32A_V3-016A'). This project contributes approximately 9.01 MW to cause the thermal violation.
4. The V3-016 TAP-09WMILTN 138 kV line (from bus 293354 to bus 253089 ckt 1) loads from 109.45% to 127.7% (DC power flow) of its emergency rating (274 MVA) for the single line contingency ('899_B3'). This project contributes approximately 50 MW to cause the thermal violation.
5. The 09GRNVIL 138/69 kV transformer (from bus 253029 to bus 253028 ckt 1) loads from 181.76% to 212.06% (DC power flow) of its emergency rating (165 MVA) for the single line contingency ('OUTAGE_32A_V3-016A'). This project contributes approximately 50 MW to cause the thermal violation.

Option 2: Greenville – West Milton 138kV

Network Impacts

A sensitivity study was performed for the secondary point of interconnection as a 50.0MW (6.5MW Capacity) injection into Dayton's system with a tap of the Greenville – West Milton 138kV line. Project W1-041 was evaluated for compliance with reliability criteria for summer peak conditions in 2014. Potential network impacts were as follows:

Generator Deliverability

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

No problems were identified.

Multiple Facility Contingency

(Double Circuit Tower Line contingencies were studied for the full energy output. The contingencies of Line with Failed Breaker and Bus Fault will be performed for the Impact Study.)

No problems were identified.

Short Circuit

(Summary of impacted circuit breakers)

No problems were 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)

No problems were identified.

Steady-State Voltage Requirements

(Summary of the VAR requirements based upon the results of the steady-state voltage studies)

To be determined in the System Impact Study.

Stability and Reactive Power Requirement for Low Voltage Ride Through

(Summary of the VAR requirements based upon the results of the dynamic studies)

To be determined in the System Impact Study.

New System Reinforcements

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

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)

None.

Potential Congestion due to Local Energy Deliverability

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:

1. The 09WMILTN-09MIAMI 138 kV line (from bus 253089 to bus 253046 ckt 1) loads from 103.51% to 110.09% (DC power flow) of its emergency rating (330 MVA) for the single line contingency ('OUTAGE_20'). This project contributes approximately 21.69 MW to cause the thermal violation.
2. The W1-041TAP1-09WMILTN 138 kV line (from bus 901200 to bus 253089 ckt 1) loads from 95.56% to 113.84% (DC power flow) of its normal rating (222 MVA) for non-contingency condition. This project contributes approximately 40.59 MW to cause the thermal violation.
3. The 09CVNGTN-09PIQUA 69 kV line (from bus 253016 to bus 253064 ckt 1) loads from 113.12% to 124.25% (DC power flow) of its emergency rating (81 MVA) for the single line contingency ('OUTAGE_32A_V3-016A_W1-041_OP2A'). This project contributes approximately 9.01 MW to cause the thermal violation.
4. The W1-041TAP1-09WMILTN 138 kV line (from bus 901200 to bus 253089 ckt 1) loads from 109.42% to 127.67% (DC power flow) of its emergency rating (274 MVA) for the single line contingency ('OUTAGE_32A_V3-016B'). This project contributes approximately 50 MW to cause the thermal violation.

5. The V3-016 TAP-09GRNVIL 138 kV line (from bus 293354 to bus 253029 ckt 1) loads from 109.42% to 127.67% (DC power flow) of its emergency rating (274 MVA) for the single line contingency ('OUTAGE_32A_V3-016A_W1-041_OP2A'). This project contributes approximately 50 MW to cause the thermal violation.

6. The 09GRNVIL 138/69 kV transformer (from bus 253029 to bus 253028 ckt 1) loads from 181.7% to 212.01% (DC power flow) of its emergency rating (165 MVA) for the single line contingency ('OUTAGE_32A_V3-016A_W1-041_OP2A'). This project contributes approximately 50 MW to cause the thermal violation.