Generator Interconnection System Impact Study Report

For

PJM Generation Interconnection Request Queue Position #AB1-058

Gavin Unit #1

September 2017

General

Gavin Power, LLC proposes to increase the generation at Gavin Unit #1 (Figure 1) by 11 MW (Capacity 11 MW). The 11 MW increase is as a result of improvements being made to the intermediate steam turbine. PJM project AB1-058 was studied as an 11 MW (11 MW Capacity) injection at the Gavin #1 generating unit. The location of the generating facility is in Cheshire, Ohio along the Ohio River.

The requested in service date is December 4, 2016.

The objective of this Feasibility/System Impact Study is to determine budgetary cost estimates and approximate construction timelines for identified transmission facilities required to connect the proposed generating facilities to the AEP transmission system. These reinforcements include the Attachment Facilities, Local Upgrades, and Network Upgrades required to maintain the reliability of the AEP transmission system.

Attachment Facilities

Not required for an existing facility.

Local and Network Impacts

The impact of the proposed 11 MW generation increase on the AEP System was assessed for adherence with applicable reliability criteria. AEP planning criteria require that the transmission system meet performance parameters prescribed in the AEP FERC Form 715[1] and Connection Requirements for AEP Transmission System[2]. Therefore, these criteria were used to assess the impact of the proposed facility on the AEP System. AEPSC project AB1-058 was studied as an 11 MW (11 MW capacity) increase at the Gavin #1 generating unit consistent with the interconnection application. Project #AB1-058 was evaluated for compliance with reliability criteria for summer peak conditions in 2019.

1 http://www.aep.com/about/codeofconduct/OASIS/TransmissionStudies/GuideLines/2015_AEP_PJM_FERC_715_Final_Part_4.pdf

2 http://www.aep.com/about/codeofconduct/OASIS/TransmissionStudies/Requirements/AEP_Interconnection_Requirements_Rev1.pdf

Network Impacts

The Queue Project AB1-058 was evaluated as an 11.0 MW (Capacity 11.0 MW) uprate to the Gavin 1 unit in the AEP area. Project AB1-058 was evaluated for compliance with applicable reliability planning criteria (PJM, NERC, NERC Regional Reliability Councils, and Transmission Owners). Project AB1-058 was studied with a commercial probability of 100%. Potential network impacts were as follows:

Summer Peak Analysis - 2019

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

None

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

None

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)

None

Steady-State Voltage Requirements
(Results of the steady-state voltage studies should be inserted here)

None

Short Circuit
(Summary of impacted circuit breakers)

Not required

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 - 2019

None

Stability and Reactive Power Requirement

1. Description of Project

Generator Interconnection Request AB1-058 is for an increase in energy injection capability of the Gavin coal fueled facility. The uprate increases the Maximum Facility Output (MFO) of the plant from 1320 MW to 1331 MW. AB1-058 has a Point of Interconnection (POI) at the existing Gavin 765 kV Substation in the American Electric Power (AEP) transmission system, Gallia County, OH.
Figure 1 shows the simplified one-line diagram of the AB1-058 loadflow model. Table 1 lists the parameters given in the impact study data and the corresponding parameters of the AB1-058 loadflow model.

The dynamic models for AB1-058 plant are based on standard PSS/E models supplied by PJM, as indicated by the Developer in the System Impact Study Data Form.

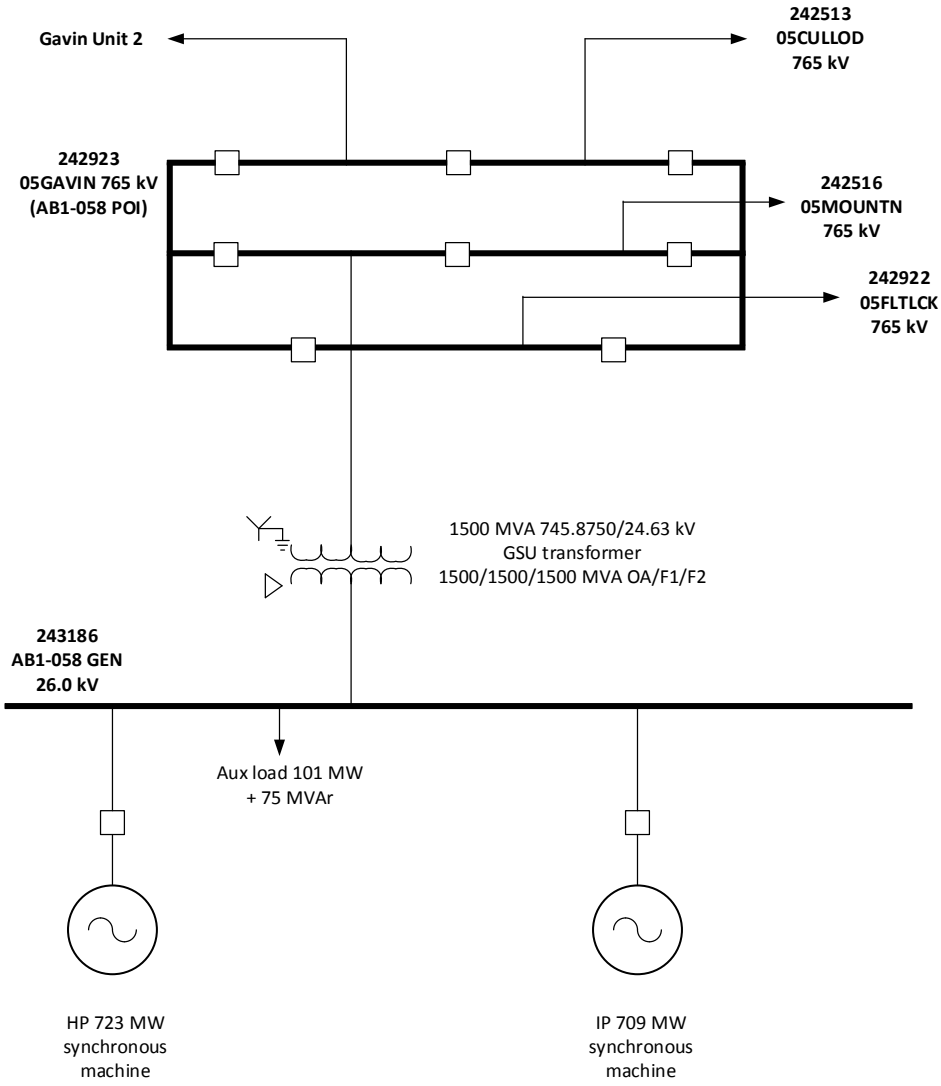

Figure 1: AB1-058 Plant Model

Table 1: AB1-058 Plant Model

	Impact Study Data	Model
generator	HP unit = 723 MW generator MVA base = 722.22 MVA Vt = 26 kV Unsaturated sub-transient reactance = 0.260 pu @ MVA base IP unit = 709 MW generator MVA base = 722.22 MVA Vt = 26 kV Unsaturated sub-transient reactance = 0.260 pu @ MVA base	HP unit = 723 MW generator Pgen 723 MW Pmax 723 MW Pmin 0 MW Qgen 0 MVAr Qmax 0 MVAr Qmin -0 MVAr Mbase 722.22 MVA Zsorce j0.260 pu @ Mbase IP unit = 709 MW generator Pgen 709 MW Pmax 709 MW Pmin 0 MW Qgen -7.9 MVAr Qmax 140 MVAr Qmin -140 MVAr Mbase 722.22 MVA Zsorce j0.260 pu @ Mbase
GSU transformers	1 x 745.8750/24.63 kV transformer Rating = 1500/1500/1500 MVA Transformer base = 1500 MVA Impedance = 0.00219 + j0.15386 pu @ MVA base Number of taps = 4 Tap step size = 2.5 %	1 x 745.8750/24.63 kV transformer Rating = 1500/1500/1500 MVA Transformer base = 1500 MVA Impedance = 0.00219 + j0.15386 pu @ MVA base Number of taps = 4 Tap step size = 2.5 %
Auxiliary load	101 MW + 75 MVAr	101 MW + 75 MVAr at LV side of GSU
Station load	1 MW + 0.5 MVAr	Modeled out of service to ensure correct MFO.

2. Reactive Power Assessment

AB1-058 was assessed for compliance with reactive power capability requirements. The following applies when increasing the MFO of existing generation:

- The existing MW portion of the existing generation shall retain its existing grandfathered power factor of at least 0.99 leading to 0.99 lagging measured at the generator(s) terminal(s).
- The increased MW portion of the Queue Project shall have the ability to maintain a power factor of at least 1.0 (unity) to 0.90 lagging measured at the generator(s) terminal(s).
- Increase in generator hydrogen pressure from 60 PSIG to 75 PSIG is assumed for the reactive assessment

		Required PF range		Required MVAr	
HP Unit	MW (Gross)	Lagging	Leading	Maximum	Minimum
Existing Generator Facility Output	717.5	0.99	0.99	102.24	-102.24
AB1-058 Increase	5.5	0.9	1	2.66	0
Total Required				104.9	-102.24
Total Available (at 723 MW)				308.33	-308.33
Total surplus/deficiency in MVAR				**203.43**	**-206.09**

		Required PF range		Required MVAr	
IP Unit	MW (Gross)	Lagging	Leading	Maximum	Minimum
Existing Generator Facility Output	703.5	0.99	0.99	103.02	-103.02
AB1-058 Increase	5.5	0.9	1	2.66	0
Total Required				105.68	-103.02
Total Available (at 709 MW)				339.29	-339.29
Total surplus/deficiency in MVAR				**236.38**	**239.04**

AB1-058 units meet the necessary reactive power requirements. Additional dynamic reactive support is not required to meet the reactive requirement.

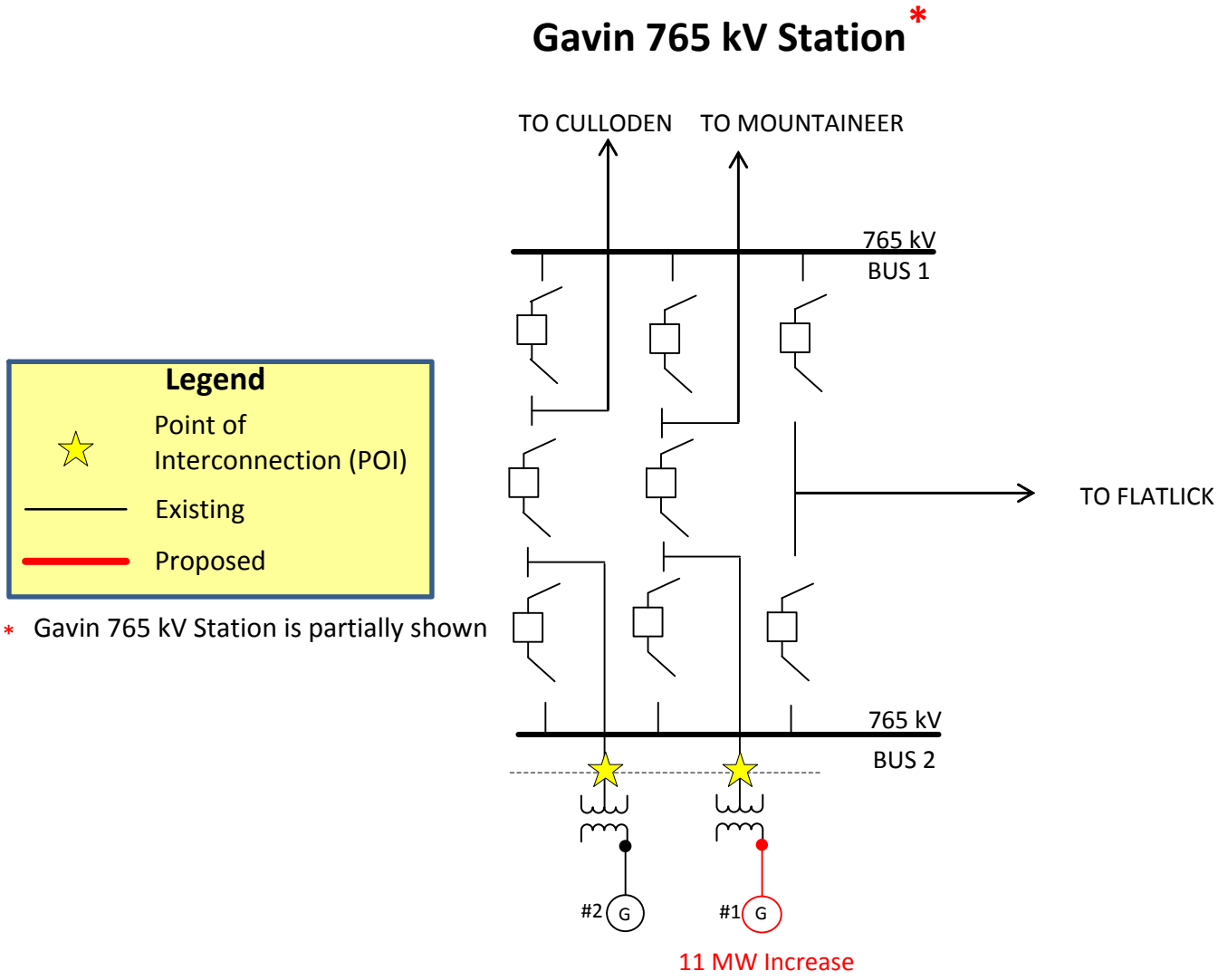

Figure 1 – Single Line Diagram

Figure 2: PJM Project AB1-058 POI