PJM Generator Interconnection Request
Queue #AB2-093
Ormet 138 kV
Facilities Study

May 2019
Revised for Option to Build

AB2-093 Ormet 138 kV

Facilities Study Report

A. Facilities Study Summary

1. Project Description

Long Ridge Energy proposes to install PJM Project #AB2-093, a 485.0 MW (485.0 MW Capacity) 1x1 Single Shaft Combined Cycle Gas Turbine generating facility in Hannibal, OH (see Figures 2 and 3). The point of interconnection for the generating facility will be to construct a new eight (8) 138 kV circuit breaker switching station on the existing Ormet 138 kV station site (see Figure 1). There are two existing 138kV double-circuit tower lines that will terminate in the new switchyard.

The original requested backfeed date is May 1, 2019.

The original requested in-service date is February 15, 2020.

2. Amendments/Changes to the Impact Study Report

In the AB2-093 System Impact Study, the following needed upgrade was mentioned: *Reconductor 0.08 miles of the ACSR 1590 (54/19) Falcon conductor section 2* (in order to resolve system overload on AEP's Kammer-George Washington 138kV circuit). However, during the Facilities Study an engineering review was completed and it was determined that this upgrade is no longer required, due to the circuit ratings being higher than expected.

In addition, the Network Upgrade n5330 to retire the existing Ormet 138kV substation has now been excluded from the report and cost table, due to this being ORP's responsibility and cost.

3. Interconnection Customer Schedule

PJM and AEP understand that ORP has established the following schedule dates:

Receive back feed power from AEP: 9/1/2020
Commercial Operation Date: 7/1/2021

4. AEP's Scope of Work to Facilitate Interconnection

Assuming that the steps to assess and remediate the environmental conditions are followed as identified in Section 6: the following would be AEP's scope of work:

- To accommodate the interconnection at the existing Ormet 138 kV station site, the existing Ormet 138 kV substation will have to be retired and a new eight (8) circuit breaker 138 kV switching station physically configured in a breaker and half bus arrangement will be constructed (see Figure 1). The proposed station is to be called Hannibal station, and will be owned and operated by AEP. Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required. AEP reserves the right to specify the final acceptable configuration considering design practices, future expansion, and compliance requirements. This station will serve as the IPP interconnection station.

- 138kV Line protection and controls will need to be installed at the proposed Hannibal 138 kV switching station.
- Line protection and controls settings at AEP's Kammer 138 kV substation will need to be updated to coordinate with the proposed Hannibal 138 kV switching station due to the new generation being added.

- Long Ridge Energy is expected to provide, at its cost, a station site for the AEP facilities. Long Ridge Energy shall obtain all necessary permits and provisions for access to the station site. AEP preferred practice is for Fee Simple ownership of the site, transferred to AEP prior to the start of construction. Due to various concerns specific to this project and site, AEP has informed ORP that an exclusive easement may be acceptable, subject to AEP's approval of the easement language. AEP will also require a perpetual access easement from the station site to the nearest public road at a mutually agreed location. Note: Since Long Ridge Energy has indicated their preference to locate the new switching station on the existing Ormet grounds, an environmental assessment will need to be conducted and all environment issues identified in the assessment will have to be addressed prior to AEP's acceptance of the easement. Further, AEP will conduct title, survey and all customary due diligence before accepting the station property. In addition, for AEP to undertake ownership and operation of the Interconnection station, ownership of the existing non-AEP-owned portion of the transmission lines terminating at the existing station will need to be transferred to AEP. Station access will also be required. Also, provisions will have to be made to serve the other existing AEP customer load during construction of the new station.
- It is understood that Long Ridge Energy is responsible for all the connection costs associated with interconnecting the PJM project AB2-093 to the AEP transmission system. The cost of ORP's generating plant and the costs for the line connecting the generating plant to the proposed Hannibal 138 kV switching station are not included in this report; these are assumed to be Long Ridge Energy's responsibility. In addition, Long Ridge Energy will be responsible for constructing a fiber-optic connection from their telecom equipment to AEP's Hannibal station.

5. Description of Transmission Owner Facilities Included in the Facilities Study

Direct Connection Work

Under the Option to Build provisions of the PJM Tariff, Long Ridge Energy shall construct a new eight (8) circuit breaker 138 kV switching station physically configured in a breaker and half bus arrangement at or near the existing Ormet 138 kV station site. Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required (see Figure 1). This station shall be named Hannibal. AEP will perform oversite to Long Ridge Energy for engineering, procurement and construction.

AEP shall provide engineering and commissioning activities for the station and line settings at the new Hannibal 138 kV switching station.

The existing Kammer-Ormet 138kV transmission lines (two double-circuit tower lines) will need re-routed to enter the new Hannibal 138kV station. AEP will be required to own and operate these transmission facilities. Note that this includes the conductor, structures and ROW for slightly more than 1 mile of each of the existing DCT-lines, beginning after the second structure on the Ohio side of the river, and extending to the former Ormet site, which are presently owned by Ohio River Partners Shareholder LLC.

Long Ridge Energy shall install cellular equipment at Hannibal, for SCADA/Telecom functionality. Fiber-optic cable will be extended to the Hannibal/IPP point-of-interconnection. AEP will perform oversite to Long Ridge Energy for engineering, procurement and construction and will provide engineering and commissioning activities for the station and line settings

Network Upgrade Work

A. The Transmission Protection system in the surrounding area will need to be upgraded to accommodate the addition of the new generating station:

Line protection and controls settings at AEP's Kammer 138 kV substation will need to be updated to coordinate with the proposed Hannibal138 kV switching station due to the new generation being added.

B. Due to system overloads found during the PJM Study, the following Network reinforcements are required:

At AEP's George Washington station, on the George Washington-Kammer 138kV circuit, replace the 2000A line trap with a 3000A unit.

6. Total Cost of Transmission Owner Facilities Included in the Facilities Study:

Direct Connection facilities	$5,412,624
Network Upgrade facilities	$417,180
Total Cost	$5,829,804

The estimates do not include the impact that delays in obtaining ROW, permits or other approvals may have.

7. Summary of Schedule Milestones for Completion of Transmission Owner Work Included in Facilities Study:

Task	Dates
Engineering Start	June 24, 2019
Material Ordered	July 31, 2019
Construction Start (Grading & Below Grade)	January 06, 2020
Construction Start (Above Grade)	May 27, 2020
Outage requests made by	3rd Qtr 2019
Outage (Structure Foundations)	3rd Qtr 2020
Outage (Cut-In & Testing)	4th Qtr 2020
Ready for back feed	4th Qtr 2020
In-Service Date	March 05,2021

*****ORP indicated in a 11/4/2018 email that the present ORP target for Backfeed is 9/1/2020.

Assumptions

- ISA and ICSA executed by June 6, 2019
- AEP Customer Project Internal Funding Approval by June 21, 2019
- ORP has followed steps to assess and remediate the environmental conditions as identified in Section 6
- System conditions allow scheduled outages to occur.
- ORP will have their construction and required checkout completed prior to the start of the cut-in & testing outage.

B. Transmission Owner Facilities Study Results

1. Transmission Lines – New

None

2. Transmission Lines – Upgrades

AEP shall reconfigure approximately 0.1 mile of the existing Kammer-Ormet 138kV transmission lines near Ormet to connect to the new IPP interconnection station (Hannibal). Note this facility consist of 4- 138kV circuits (Kammer-Ormet #1, #2, #3, #4), presently built on two double-circuit lattice tower lines.

3. Substation Facilities – New

Under the Option to Build provisions of the PJM Tariff, Long Ridge Energy shall construct a new eight (8) circuit breaker 138 kV switching station physically configured in a breaker and half bus arrangement at or near the existing Ormet 138 kV station site. Installation of associated protection and control equipment, 138 kV line risers, SCADA, and 138 kV revenue metering will also be required (see Figure 1). This station shall be named Hannibal. AEP will perform oversite to Long Ridge Energy for engineering, procurement and construction

AEP shall provide engineering and commissioning activities for the station and line settings at the new Hannibal 138 kV switching station.

AEP shall provide engineering and commissioning activities for the station and line settings at Hannibal, for SCADA/Telecom functionality.

4. Substation Facilities – Upgrades

A. The Transmission Protection system in the surrounding area will need to be upgraded to accommodate the addition of the new generating station:

Line protection and controls settings at AEP's Kammer 138 kV substation will need to be updated to coordinate with the proposed Hannibal138 kV switching station due to the new generation being added.

B. Due to system overloads found during the PJM Study, the following Network reinforcements are required:

At AEP's George Washington station, on the George Washington-Kammer 138kV circuit, replace the 2000A line trap with a 3000A unit.

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5. Metering & Communications

Standard 138 kV metering will be installed at the new switching station. A standard station communication scheme will be used. All metering equipment to be installed at the AEP Interconnect Station and the Long Ridge Energy generation station shall meet the requirements as specified by AEP in the "AEP Metering and Telemetering Requirements for AEP Transmission Customers" document (SS-490011). Communication requirements are published in the "AEP SCADA RTU Requirements at Transmission Interconnection Facilities" (document SS-500000).

The Generation Interconnection Agreement does not in or by itself establish a requirement for American Electric Power to provide power for consumption at the developer's facilities. A separate agreement may be reached with the local utility that provides service in the area to ensure that infrastructure is in place to meet this demand and proper metering equipment is installed. The metering work above and cost indicated below does not include any potential work or cost to address metering requirements of the local service provider. It is the responsibility of the developer to contact the local service provider to determine if a local service agreement is required.

6. Environmental, Real Estate and Permitting Issues

Long Ridge Energy is expected to provide, at its cost, a station site for the AEP facilities. ORP shall obtain all necessary permits and provisions for access to the station site. Further, AEP will conduct title, survey and all customary due diligence before accepting the station property.

Since Long Ridge Energy has indicated its intention to locate the new switching station on the existing Ormet grounds in the vicinity of the original Ormet switchyard, AEP is concerned about legacy environmental contamination. Preliminary surveys indicated the presence of some contamination, but sampling on the scale required by AEP to adequately evaluate the site cannot occur until after the de-energization and removal of Ormet switchyard facilities. An environmental assessment will need to be conducted and a plan developed to the satisfaction of AEP to address all environment issues. All such environmental issues will have to be addressed to the satisfaction of AEP prior to transfer of any property or facilities to AEP. Should the environmental mitigation plan lead to other presently unforeseen facility impacts or re-design, the associated costs will be the responsibility of Long Ridge Energy.

A direct drive path to the new in-line switching station will be provided by Long Ridge Energy. AEP will also require a perpetual access easement for this drive path, from the station site to the nearest public road at a mutually agreed location. Drainage easements for the station run offs will also be provided by Long Ridge Energy.

7. Summary of Results of Study

Cost Estimates for AEP

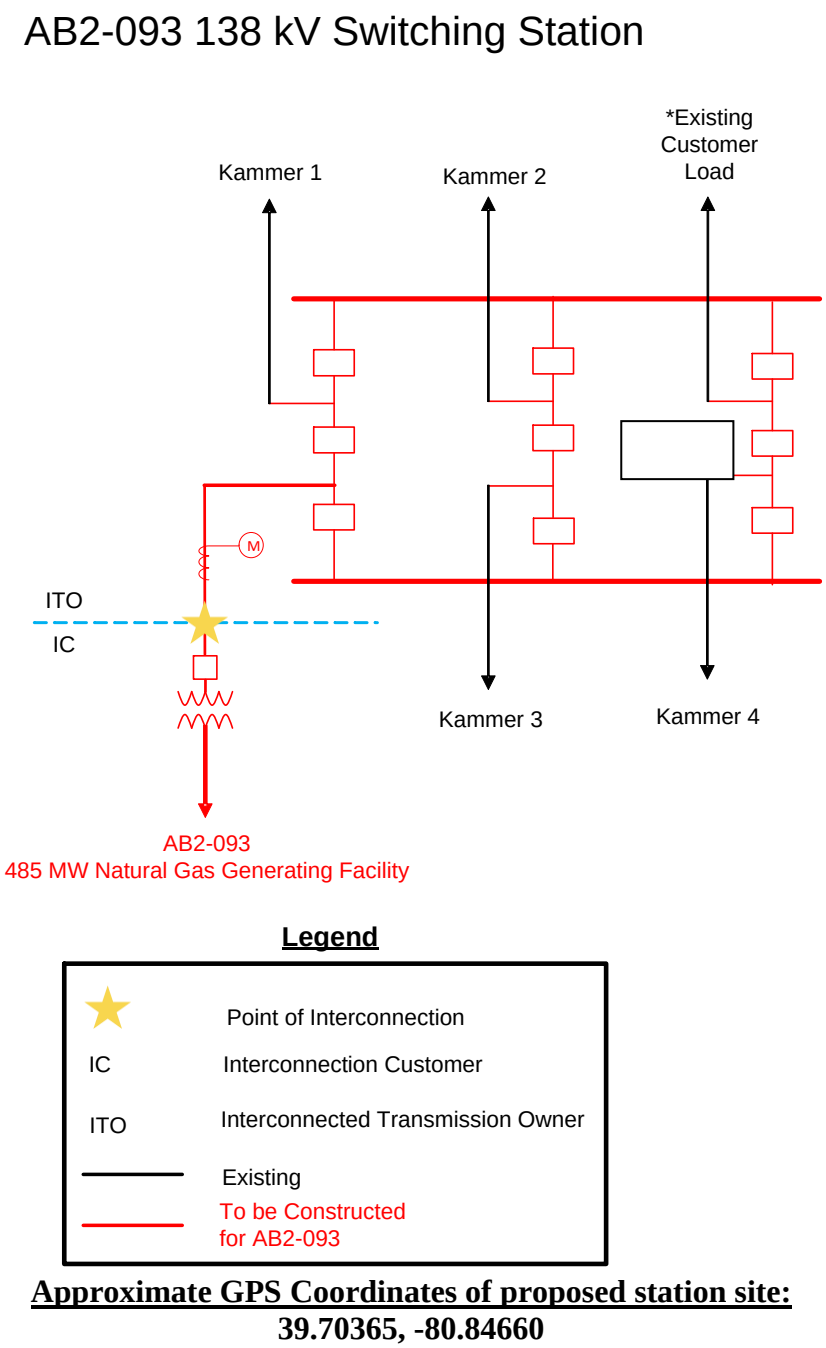
Task	Network Upgrade Number	Engineering	Material	Construction	Other	Total
Eight (8) Circuit Breaker Hannibal 138kV interconnection station (Station/Line Engineering Oversight/Commissioning)	**n5327**	$71,405	$40,854	$784,000	$167,264	**$1,063,523**
Metering at Hannibal station	**n5329**	$10,866	$1,718	$24,790	$24,695	**$62,068**
Kammer-Ormet #1 138 kV T-Line (Circuits 1 & 2) modifications	**n5560**	$137,039	$621,841	$1,335,734	$543,403	**$2,638,016**
Kammer-Ormet #2 138 kV T-Line (Circuits 3 & 4) modifications	**n5561**	$108,251	$231,859	$837,977	$368,276	**$1,546,363**
Kammer 138kV remote-end protection upgrades	**n5331**	$37,140	$12,884	$66,874	$75,495	**$192,393**
Kammer 138kV line trap upgrade (to George Washington)	**n5304**	$24,880	$25,430	$93,949	$80,529	**$224,787**
George Washington 138kV line trap upgrade (to Kammer)	**n5304.1**	$0	$0	$0	$0	**$0**
Hannibal Fiber-Optic Transition Cable	**n5562**	$4,001	$10,727	$34,429	$11,049	**$60,207**
Hannibal to IPP Fiber Interconnection	**n5563**	$3,722	$7,588	$23,970	$7,167	**$42,447**
TOTAL		**$397,303**	**$952,900**	**$3,201,722**	**$1,277,878**	**$5,829,804**

8. Information Required for Interconnection Service Agreement

Category	Direct Interconnection Costs	Network Upgrades	Total
Direct Material	$914,586.67	$ 38,313.67	$952,900.33
Direct Labor	$3,376,183.33	$222,842.33	$3,599,025.67
Indirect Material	$246,515.65	$22,516.32	$269,031.97
Indirect Labor	$875,338.35	$ 133,507.68	$1,008,846.03
TOTAL	$5,412,624.00	$417,180.00	$5,829,804.00

Figure 1: Point of Interconnection (Ormet 138 kV, served via AEP Kammer station) Single Line Diagram

**Note that 9th breaker and service to customer load are for illustration purposes only. The IPP interconnection will require 8- breakers, as discussed in the report.*



Approximate GPS Coordinates of proposed station site:
39.70365, -80.84660

Figure 2: Point of Interconnection (Ormet 138 kV, served via AEP Kammer 138kV station)

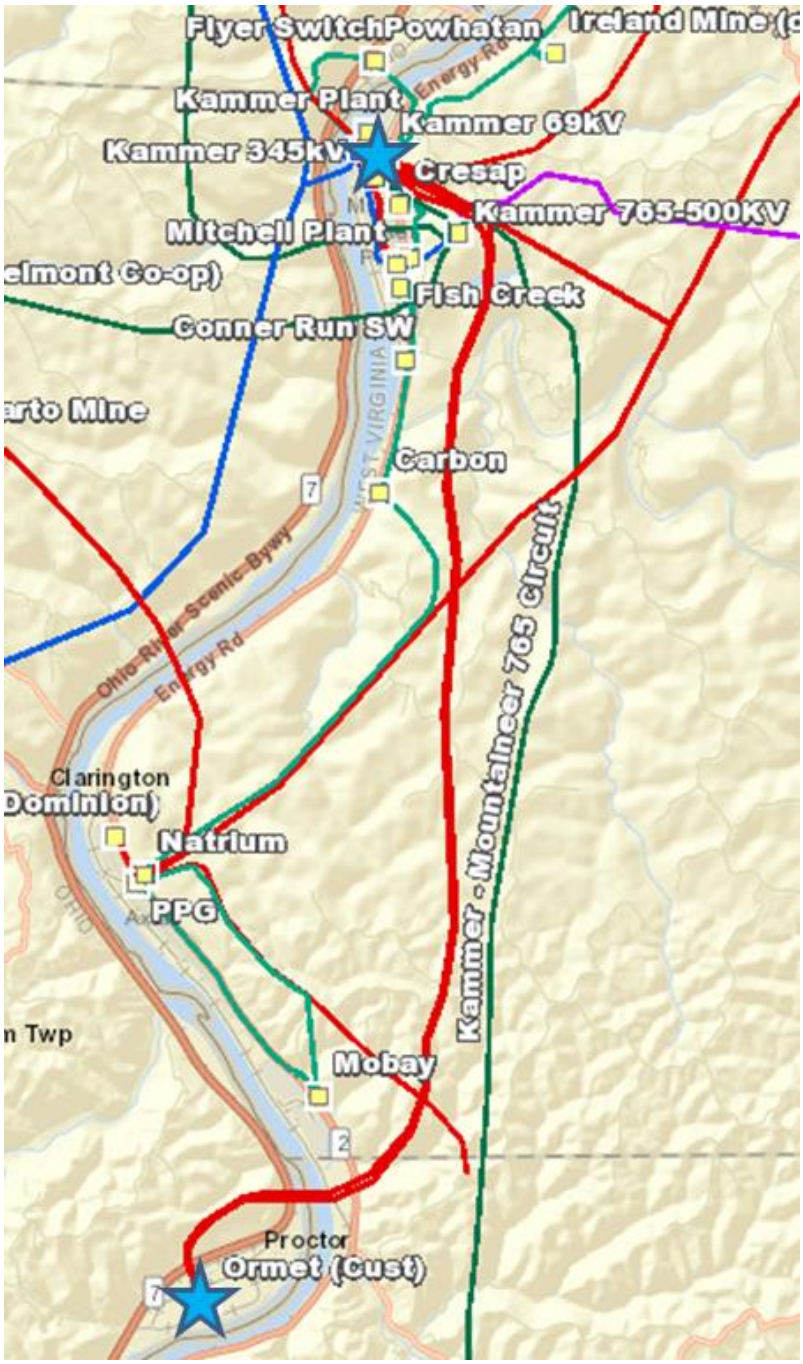


Figure 3: Proposed Site plan for AB2-093