PJM Generator Interconnection Request
Queues #AB2-067 & AC1-044
Kammer-Vassell 765 kV
Facilities Study

October 2018 (revised)

AB2-067 & AC1-044 Kammer-Vassell 765 kV Facilities Study Report

A. Facilities Study Summary

1. Project Description

Guernsey Power Station, LLC (GPS LLC) proposes to install PJM Project #AB2-067, an 1100 MW capacity two power block Combined Cycle Gas Turbine (CCGT) generating facility south of Cambridge, Ohio in Guernsey County. The AC1-044 queue position adds a third similar CCGT power block, to bring the total nominal output of the generating facility to 1650 MW (see Figure 2). The point of interconnection for the generating facility will be a new three (3) circuit breaker 765 kV transmission switching station, to be called the Guernsey switching station, which will be constructed near the existing Kammer-Vassell 765 kV circuit (see Figure 1).

The requested backfeed date is December 1, 2021.

The requested in-service date is December 31, 2022.

2. Amendments/Changes to the Impact Study Report

During refinement of the Facilities Study, several parts of the project had minor changes. The remote-end 765kV protection upgrade scopes have been significantly reduced.

In addition, a 69kV connection will be required at the site for station service power. This wasn't previously identified, but has a minor impact overall.

3. Interconnection Customer Schedule

PJM and AEP, the Interconnected Transmission Owner, understand that GPS LLC has proposed the following schedule dates:

Receive back feed power from AEP: December 1, 2021
Commercial Operation Date: December 31, 2022

4. Site Issues

GPS LLC has proposed to construct the Guernsey switching station on a site that is located (a) in a flood plain and (b) over an abandoned underground coal mine. AEP has indicated that these site conditions pose risks to the transmission system.

5. AEP's Scope of Work to Facilitate Interconnection

a) To accommodate the interconnection of AB2-067 and AC1-044, a new three (3) circuit breaker 765 kV transmission switching station (the Guernsey switching station) will need to be constructed (see Figure 1). The Guernsey switching station would be owned and operated by AEP subject to and in accordance with the terms and conditions of the Interconnection Construction Service Agreement (ICSA). Installation of associated protection and control equipment, 765 kV line risers, SCADA, and 765 kV

revenue metering will also be required. The Guernsey switching station will serve as the generating facility's interconnection station.

b) 765 kV line protection and controls will need to be installed at the Guernsey switching station.
c) Line protection and controls settings at AEP's Kammer 765 kV substation will need to be updated to coordinate with the Guernsey switching station due to the new generation being added.
d) Line protection and controls settings at AEP's Vassell 765 kV substation will need to be updated to coordinate with the Guernsey switching station due to the new generation being added.
e) AEP's Kammer-Vassell 765kV transmission line will need to be cut to loop into the new Guernsey switching station.
f) New right-of-way will be required for the associated 765kV transmission line route modifications.
g) AEP contracted with S&ME to conduct an independent study of the Guernsey switching station site, to examine flood plain and mine subsidence mitigation requirements. Because the S&ME study was not concluded prior to issuance of this Facilities Study report, this Facilities Study report does not include data from that study. Instead, to provide indicative good faith estimates of scope and costs, and to help facilitate the project schedule at this point in time, PJM uses preliminary data that are currently available, including data from GPS LLC based on prior studies.

It is understood that GPS LLC is responsible for all connection and site mitigation costs associated with interconnecting PJM projects AB2-067 and AC1-044 to the AEP transmission system, including any necessary environmental remediation, flood plain mitigation, and mine subsidence mitigation for the Guernsey switching station. The costs for GPS LLC's generating facility and the costs for the tie-line connecting the generating facility to the Guernsey switching station are GPS LLC's responsibility, and are not included in this report. In addition, GPS LLC will be responsible for constructing a fiber-optic connection from their telecom equipment to a telecom point-of-interconnection with the Guernsey switching station.

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

Direct Connection Work

The following transmission facilities will be required for the project. AEP would own and operate the facilities, subject to and in accordance with the terms and conditions of the ICSA.

A. New Guernsey switching station south of the AB2-067/AC1-044 generation site. Installation of associated protection and control equipment, 765 kV line risers, SCADA, and 765 kV revenue metering will also be required (see Figure 1).

B. AEP will install line protection and controls at the new Guernsey switching station.

C. The existing Kammer-Vassell 765kV transmission line will be re-routed to enter the new Guernsey switching station.

D. AEP will install fiber-optic telecom equipment at the Guernsey switching station for SCADA functionality. Fiber-optic cable will be extended to the telecom point-of-interconnection for the generating facility and Guernsey switching station.

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 facility:*

Line protection and controls settings at AEP's Kammer 765 kV and Vassell 765kV substations will need to be updated to coordinate with the Guernsey 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:*

None

7. Total Cost of Transmission Owner Facilities Included in the Facilities

Complete cost estimates for the Guernsey switching station cannot be provided at this time because the S&ME study commissioned by AEP has not been completed. Therefore, certain scope and cost estimates provided herein are indicative, based in part on GPS LLC assessments from prior studies. These indicative estimates are provided here in good faith, but are subject to change.

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

Task	Dates
Engineering Start	April 15, 2019
Procurement Start	May 1, 2019
Construction Start (Below Grade)	September 13, 2019
Construction Start (Above Grade)	November 13, 2019
Outage requests made by	December 13, 2019
Outage (Structure Foundations)	March 17, 2020
Outage (Cut-In & Testing)	March 14, 2021
Ready for back feed	December 1, 2021
Generation In-Service Date	December 31, 2022

Scheduling Assumptions

- ISA issued in October 2018.
- ICSA issued in December 2018.
- AEP Internal Funding Approval in 2019
- System conditions allow scheduled outages to occur.
- GPS LLC has its construction and required checkout completed prior to the start of the cut-in and testing outage.

B. Facilities Study Results

1. Transmission Lines New

None

2. Transmission Lines – Upgrades

AEP will need to reconfigure approximately 0.25 mile of the existing Kammer-Vassell 765kV transmission line near the site to connect to the new Guernsey switching station. Approximately 0.2 mile of new 765kV transmission line will need to be installed on the east and west sides, in order to reach the Guernsey switching station.

In addition, for station service needs, the adjacent Derwent-South Cumberland 69kV circuit will need to be tapped, with a 0.1 mile radial 69kV line extension.

3. Substation Facilities – New

The new Guernsey switching station will need to be constructed near the AB2-067/AC1-044 project site. Installation of associated protection and control equipment, 765 kV line risers, SCADA, and 765 kV revenue metering will also be required (see Figure 1).

AEP will need to install line protection and controls at the new Guernsey switching station.

AEP will need to install fiber-optic Telecom equipment for SCADA functionality.

AEP will need to install a 69kV 3-way line switch (Capers Switch) connected to the Derwent-South Cumberland 69kV circuit, to be used for primary station service power. This was deemed a more cost-effective and space-saving solution compared to installing 765kV bus potential transformers for station service.

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 facility:

Seven (7) line protection and controls settings at AEP's Kammer and Vassell 765kV substations will need to be updated to coordinate with the Guernsey 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:

None

5. Metering & Communications

Standard 765 kV metering will need to be installed at the new Guernsey switching station. A standard station communication scheme will be used. All metering equipment to be installed at the Guernsey switching station and the generating facility will need to 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 Interconnection Service Agreement (ISA) does not in or by itself establish a requirement for AEP to provide power for consumption at the GPS LLC 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 described above, and estimated costs indicated below, do not include potential work or costs to address metering requirements of the local service provider. It is the responsibility of GPS LLC to contact the local service provider to determine if a local service agreement is required.

6. Environmental, Real Estate and Permitting Issues

GPS LLC is expected to obtain, at its cost, a site for the Guernsey switching station. GPS LLC shall obtain all necessary permits and provisions for access to the Guernsey switching station site. 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 any access easement.

A direct drive path to the Guernsey switching station will need to be provided by GPS LLC. AEP would also require a perpetual access easement for this drive path, from the Guernsey switching station site to the nearest public road at a mutually agreed location. Drainage easements for the Guernsey switching station run offs will also be provided by GPS LLC.

7. Summary of Results of Study

Cost Estimates

Task	Network Upgrade Number	Engineering	Material	Construction	Other	Total
3 Circuit Breaker Guernsey 765kV Interconnection Station	**n5352 and n5495**	$771,000	$12,564,000	$12,850,000	$3,372,000	$29,557,000
Subsidence Mitigation*	**n5352**	$236,366	$3,851,756	$3,939,435	$972,443	$9,000,000
Flood Plain Mitigation*	**n5352**	$577,703	$506,757	$101,351	$314,189	$1,500,000
765 kV Revenue Metering at Guernsey station Upgrade	**n5353 and n5494**	$57,000	$50,000	$10,000	$131,000	$248,000
Kammer-Vassell 765kV T-Line cut-in	**n5355**	$376,000	$1,905,000	$2,090,000	$428,000	$4,799,000
Kammer 765kV remote-end protection upgrades	**n5356**	$50,000	$0	$0	$0	$50,000
Vassell 765kV remote end Protection upgrades	**n5357**	$50,000	$0	$0	$0	$50,000
Provide station service to Guernsey 765 kV station from Derwent-S Cumberland 69 kV	**n5793**	$262,000	$255,000	$494,000	$93,000	$1,104,000
Total		**$2,380,069**	**$19,132,513**	**$19,484,787**	**$5,310,632**	**$46,308,000**

*Subsidence Mitigation and Flood Plain Mitigation estimates are indicative good faith estimates based on data from GPS LLC, subject to change upon completion of the pending S&ME study commissioned by AEP. The breakout of the individual Engineering, Material, Construction, and Other costs is based on the breakout of network upgrade n5352.

Estimate Assumptions

GPS LLC would be responsible for Clean Water Act permit updates due to any design and/or construction changes. Any such updates must be reviewed and accepted by AEP prior to construction.

GPS LLC would retain responsibility for the maintenance and reporting requirements established by these permits, because the developer has been granted a single Corps of Engineers (LRH-2017-00244-MUS-Willis Creek) permit and Ohio EPA (ID#175544) permit.

8. Information Required for Interconnection Service Agreement

	Direct Interconnection Costs	Network Upgrades	Total
Direct Material	$19,255,129	$0	$19,255,129
Direct Labor	$22,116,599	$120,000	$22,236,599
Indirect Material	$2,367,488	$0	$2,367,488
Indirect Labor	$2,368,784	$80,000	$2,448,784
Total	$46,108,000	$200,000	$46,308,000

Figure 1: Point of Interconnection
(Guernsey Switching Station, served via AEP's Kammer-Vassell 765 kV Circuit)
Single Line Diagram

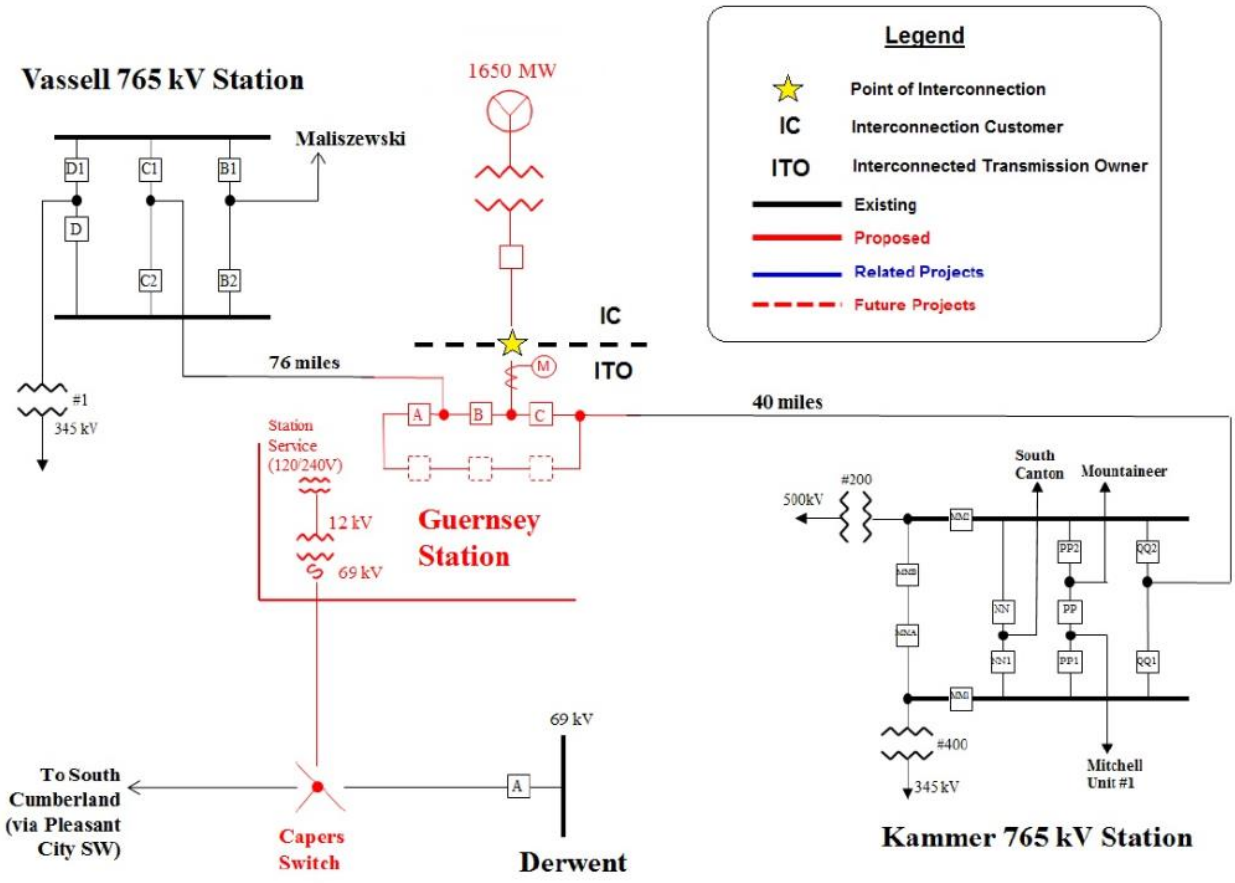

Figure 2: Point of Interconnection
(Guernsey 765 kV, served via AEP Kammer-Vassell 765kV circuit)