

***Generation Interconnection Facilities Study
Report***

For

***PJM Generation Interconnection Request
Queue Position W2-039***

“Clayville 69kV”

October 2012

A. Transmission Owner Facilities Study Summary

1. Description of Project

The Vineland Municipal Electric Utility (VMEU), the Interconnection Customer (IC) has proposed a 63 MWE (63 MWC; 63 MW MFO) oil and natural gas fueled simple cycle combustion turbine generating facility. The facility will be located at 4087 South Lincoln Ave., Vineland, NJ near Vineland's Clayville Substation and ACE's Lincoln Substation and will be known as Clayville Unit #1. W2-039 was studied as a 23 MW injection into the Atlantic City Electric's (ACE) system at a tap of the South Millville-Butler 69kV circuit and evaluated for compliance with reliability criteria for summer peak conditions in 2014. The Interconnection Customer is claiming 40 MW's of Capacity Injection Rights (CIRs) from the deactivation of their Vineland Units 9 and 10. The planned in-service date was originally June 1, 2014, but Vineland Municipal Electric has informed ACE that the current in-service date is June 1, 2015, however they will need an earlier back-feed date of approximately February 28, 2015.

2. Amendments to the System Impact Study or System Impact Study Results

The scope of the project has remained relatively unchanged from the System Impact Study. The estimates have been refined based on current material and construction costs. It has also been modified to reflect the installation of OPGW and ADSS fiber between the new 69kV three breaker ring bus substation and ACE's South Millville Substation. Vineland has indicated that they have one pair of fiber available for use between the new 69kV station and Butler Substation, and the cost estimates contained in this study reflects this fact.

The schedule has been adjusted to meet a standard construction schedule. The ACE portion of the project is projected to be completed approximately 24-30 months following an executed Interconnection Service Agreement (ISA) and Construction Service Agreement (CSA). This is assuming a normal land use and environmental permitting and approval process.

3. Interconnection Customer's Milestone Schedule

The planned in-service date, as stated in the Attachment N was June 1, 2014. Vineland has indicated the current in-service date is June 1, 2015 with back-feed required by February 28, 2015.

4. Customer's Scope of Work

The Interconnection Customer assumes full responsibility for design and construction of all facilities associated with the W2-039 generating station and the 69kV connection on the IC side of the Point of Interconnection (POI). Site preparation including grading and an access road, as necessary, is assumed to be by the IC. The developer shall supply adequate, buildable high land with access roads for the installation of the substation at no cost to the Company. All applicable permitting, zoning and land use approvals will be obtained by the developer (VMEU) for ACE's proposed substation. ACE will apply for its own DCA permit, however there will be an attempt made to coordinate the DCA application with Vineland Municipal Electric Utility.

The IC currently plans to interconnect W2-039 with the ACE system via a 69kV bus from their substation to the newly constructed ACE 69kV ring bus substation. The IC is required to construct a 69kV breaker, which it will own, no more than 500 feet from this tap point. Information detailing the interconnection to ACE facilities is outlined in the “Technical Considerations Covering Parallel Operations of Customer Owned Generation Of One (1) Megawatt or Greater And Interconnected with the PHI Power Delivery System.” The costs outlined in this study do not include construction of the 69kV equipment from the generating facility to the tap structure.

The IC is responsible for construction of single mode fiber optic cable from the generating site to the POI.

The IC will be required to install metering and telemetry equipment to provide revenue metering and real-time telemetry data to PJM at the POI. The requirements for this equipment are listed in Appendix 2, Section 8 of Attachment O to the PJM Tariff, as well as PJM Manuals 01 and 14D. Protective relaying and metering design and installation must comply with the ACE/PHI Applicable Standards. See Section B.5 of this report for further details. The IC will purchase and install all metering instrument transformers as well as construct a metering structure per PHI standards.

The IC is responsible for obtaining all rights necessary for their facilities, up to and including any usage of property in which Pepco Holdings, Inc may have real property interests. As part of this process, the IC shall provide, for PHI review, surveyed site plans that delineate their intended facilities, and clearly define the facilities relationship to existing rights of way and the electrical facilities contained therein. Upon review, subsequent approval, if acceptable, and associated compensation, PHI will provide the IC with the appropriate legal instrument affording the IC the right to use PHI real property, if necessary.

The IC has agreed to supply one pair, two strands of single mode fiber between ACE’s new three breaker ring bus substation at the generation site and the IC’s Butler Substation for the relay scheme associated with this project.

5. Description of Facilities Included in the Facilities Study (ACE’s Scope of Work)

This report describes the electrical interconnection facilities and upgrades to existing ACE facilities necessary at the new three breaker ring bus substation, ACE’s Second Street Substation, ACE’s South Millville Substation and on the Butler to South Millville 69kV circuit on the ACE system to support the IC’s generation. The IC’s interconnection circuit construction and the IC’s generation facilities are not included in this study.

Attachment Facilities – PJM Network Upgrade Number (n3246)

- Design and construct a new 69kV three breaker ring bus substation at the generation site. This substation will be built to the Company’s (the “Company” referring to ACE, DPL, or PEPCO) specifications for a transmission substation and be owned and operated by the Company. The substation will consist of a three breaker ring bus and associated relaying, communications equipment and a control house. The Interconnection Customer shall supply adequate, buildable high land with access roads for the installation of the substation at no cost to the Company. All applicable permitting will be obtained by the developer for the proposed substation.
- Create a transmission loop by cutting the Butler to South Millville 69kV line into and out of the newly constructed 69kV substation at the generation site.
- Replace the existing static wire on the Butler to South Millville 69kV line on the portion of the line beginning at the point where the line intersects Hance Bridge Road to South Millville Substation with OPGW, a distance of approximately 2.6 miles.
- Install new ADSS communications cable on the Butler to South Millville 69kV line on the portion from Hance Bridge Road to the location of the proposed 69kV ring bus substation, a distance of approximately 1.1 miles.
- Install necessary protection and communication upgrades at the South Millville substation to coordinate and communicate with the new substation and coordinate with IC upgrades at Butler Substation.
- ACE reserves the right to review the electrical protection design and relay settings for interconnecting customer facilities to ensure that the protective relaying equipment will be compatible with that installed at the remote substations. ACE personnel must be present at the time of commissioning to witness proper function of the protection scheme and related coordination.
- A three phase 69kV revenue metering point needs to be established on the generation side of the IC facility just inside the disconnect switch at the POI. See Section B.5 of this report for IC’s scope of work.

Local Network Upgrades - PJM Network Upgrade Number (n3247)

- To mitigate the overload of the first section of the Second Street-South Millville 69kV line (bus 228228-228215), an upgrade to the 69kV strand bus and current transformer will be required at Second Street Substation.

Local Network Upgrades – PJM Network Upgrade Number (n3248)

- The “G” 69kV breaker at the ACE Second Street Substation was identified as being overstressed. To mitigate the overstressed breaker will require the replacement of the “G” breaker at Second Street.

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

Attachment Facilities-PJM Upgrade n3246	\$6,498,727
Local Network Upgrade PJM Upgrade n3247	\$117,111
Local Network Upgrade PJM Upgrade n3248	\$ 355,821
Total Project Cost	\$6,971,659

7. Summary of the Schedule for Completion of Work for the Facilities Study

The overall estimated timeline for this project is approximately 24-30 months from the date of the PJM release for design/construction. This timeline may be able to be improved with preferred system outages. Since the IC owns the land for the substation and will be performing the land use and environmental permitting for the generator and substation site, the timeline may also be able to be improved with favorable permitting timelines.

Attachment Facility

Substation Design, Procurement and Construction	24-30 months
Transmission Design, Procurement and Construction	24 months
Environmental Permitting	6-14 months
Outside Plant Comm. Design, Procurement and Construction	12 months

Network Upgrades

Substation Design, Procurement and Construction	12-18 months
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ACE should be able to meet the in-service date of June 1, 2015 providing the environmental and land use permitting proceeds normally. The back-feed date of February 28th, 2015 will be more difficult to meet and will require close coordination between ACE and Vineland Municipal Electric Utility.

B. Transmission Owner Facilities Study Results

This section describes facilities identified to be installed, replaced, and/or upgraded by ACE to accommodate the project. During detailed design and analysis other components may be indentified for installation or replacement due to this interconnection.

1. Transmission Lines - New

Not applicable

2. Transmission Line – Upgrades

The existing South Millville to Butler 69kV circuit TSOM 0764 will be cut and taken into and out of the new 69kV three breaker ring bus substation. South Millville to Butler is currently double circuited with a 138kV line. Two to four new poles will be installed and the 69kV will be deadended on the poles and new spans of 795 kcmil ACSR and OPGW will be run into the new substation. Vineland has agreed to make available one pair, two strands, of single mode fiber between Butler and the new 69kV substation. ACE will need to install new fiber between the new 69kV substation and ACE's South Millville Substation. The new fiber installation will consist of the installation of ADSS and OPGW from the new 69kV substation to South Millville Substation.

The Tap scope of work listed above on the South Millville to Butler 69kV line includes the following major equipment:

- Install (4) wood transmission poles, approximately 75'
- Install 795 ACSR 24/7 conductor for the two taps into the station
- Install OPGW into the station on each tap
- Install insulators and other associated hardware for the tap

The fiber installation scope of work above on the portion of the Butler to South Millville line includes the following major equipment:

- Install approximately 1.1 miles of ADSS on existing transmission poles between the new 69kV substation and Hance Bridge Road
- From the intersection with Hance Bridge Road, remove the existing static wire and install 0.638" outside diameter OPGW to South Millville Substation, a distance of approximately 2.6 miles

All transmission line construction will be designed according to "PJM Transmission and Substation Design Subcommittee Technical Requirements".

3. New Substation/Switchyard Facilities

A new 69kV three breaker ring bus substation will be designed and constructed by ACE at the project site. The substation will consist of a three breaker ring bus and a control house. At the new substation, the following major equipment items will be installed:

- 8 – 69kV 2000A side break switches
- 3- 69kV 2000A vertical break switches
- 3 – motor mechanisms for associated 69kV switches
- 3- 69kV 2000A 40kA gas circuit breakers
- 9 – 48kV MCOV Las
- 9 – 69kV PT's
- 12 – 69kV CCVTs

- 1- Control Building (includes relaying and communications equipment)
- Lot – bus, conductor, and connectors
- Lot – control cable
- Lot – station ground conductor and connectors
- Lot – foundations and structures for above mentioned equipment

Design and approval will be required from DCA (Approx. 6 months). Outages are available to cut the substation in from fall to spring. It is assumed that all applicable permitting for this substation will be obtained by the IC.

Drawing Review and Relay test:

ACE will review the IPR cabinet drawing PRIOR TO THE PURCHASE OF EQUIPMENT then test for proper relay operation after installation of the required protection equipment at IC site.

4. Upgrades to Substation/Switchyard Facilities

Attachment Facilities – PJM Upgrade (n3246) – South Millville Substation:

Work activities include the installation and expansion of existing equipment and protective relaying at South Millville Substation.

At South Millville Substation:

New equipment is required to provide the primary and backup protection for the South Millville line to the new substation. Relays capable of remote access will be multiplexed through a Novatech Orion LX communications processor. A new ethernet switch will be provided in the control house to communicate with the ethernet enabled relays. The primary and backup line relays will be in independent current circuits. Primary protection will be provided by a Schweitzer SEL-421 relay and backup protection will be provided by a Schweitzer SEL-311C. A new RTU data circuit will be required to the Orion LX.

Local Network Upgrades - PJM Upgrade (n3247) – Second St. Strand Bus

- To mitigate the overload of the first section of the Second Street-South Millville 69kV line (bus 228228-228215), an upgrade to the 69kV strand bus and current transformer will be required at Second Street Substation. The existing strand bus will be removed and replaced with 1590 ACSR conductors.

Local Network Upgrades - PJM Upgrade (n3248) – Second St. “G” Breaker

- The “G” 69kV breaker at the ACE Second Street Substation was identified as being overstressed. To mitigate the overstressed breaker will require the replacement of the “G” breaker at Second Street with a new 2000amp 40kA gas circuit breaker and associated equipment.

5. Metering & Communications

Metering

A three phase 69kV revenue metering point needs to be established on the generation side of the IC facility just inside the disconnect switch on the IC side of the POI.

The metering instrument transformers will be specified by ACE but all equipment and labor will be supplied by the IC. The ACE scope would include the programming and installation of the meters, both primary and backup, and all required wiring work needed to connect the secondary wiring conductors at the metering enclosure. The materials that the Meter Department provides would be the meter enclosures, control cable, the meters, the output devices, and miscellaneous material at the cabinet.

The IC will purchase and install all metering instrument transformers as well as construct a metering structure per ACE's specifications. The secondary wiring connections at the instrument transformers will be completed by the interconnection customer's contractors and inspected by ACE, while the secondary wiring work at the metering enclosure will be completed by ACE's Meter technicians. The metering control cable and meter cabinets will be supplied by ACE and installed by the interconnection customer's contractors. ACE's meter technicians will program and install two solid state multi function meters (Primary & Backup) for the new metering position. Each meter will be equipped with load profile, telemetry, and form-c pulse outputs. The IC will be provided with one meter form-c output.

The IC will be required to make provisions for a voice quality phone line within approximately 3 feet of each Company metering position to facilitate remote interrogation and data collection.

Telemetry

It is the IC's responsibility to send the data, that PJM and the Company requires, to PJM directly. The IC will grant its permission to PJM for PJM to send the Company the following telemetry data that the Interconnection Customer sends to PJM: real time megawatts, megavars, volts, amperes, and status, and interval megawatt-hours, and megavar-hours.

6. Environmental, Real Estate and Permitting Issues

Environmental

This estimate assumes that Vineland Municipal Electric Utility will procure all necessary permits for their facilities and the new ACE substation, except for the DCA permit, which each utility will apply for individually, but at the same time. The developer is to provide easements into the facility for ACE facilities at no expense to ACE prior to construction.

Environmental consultation letters will be prepared and sent to various permitting agencies to determine what permits, if any, are necessary to install the new ADSS and OPGW on the existing South Millville to Butler 69kV line for a distance of 3.7 miles. ACE will obtain any necessary permits. This process will include some of the activities on the following list, they will all not be necessary.

- Task 1 – Preparation and Submittal of Consultation Letters
- Task 2 – Pinelands Commission Development Application
- Task 3 – Wetlands Delineation
- Task 4 – T&E Species Habitat Assessment and Survey Protocol
- Task 5 – T&E Plant Species Survey and Report
- Task 6 – T&E Wildlife Species Surveys and Report
- Task 7 – Cultural Site Survey
- Task 8 – Data Collection and GIS Delivery
- Task 9 – Preparation of Mapping for Permits
- Task 10 – Permit Application Preparation
- Task 11 – Permit Application Submittal
- Task 12 – Regulatory Agency Coordination
- Task 13 – Public Relations Plan Support
- Task 14 – Preparation of Wetlands Restoration Plan
- Task 15 – Construction Environmental Monitoring Manual
- Task 16 – Construction Environmental Monitoring (24 MH / 3 Weeks)
- Task 17 – Health & Safety Plan
- Task 18 – Phase I ESA
- Task 19 – PHI Oversight

Real Estate

ACE has all necessary right of way to perform its work that is included in this estimate. A new railroad crossing permit and highway crossing permit for Route 55 may be necessary. Real Estate will also notify property owners along the route of the upcoming construction.

7. Summary of Results of Study

Project Name: W2-039 – Clayville 69kV Attachment Facilities – PJM Upgrade n3246 – Three breaker ring bus substation and taps, new OPGW	Indirect		Direct		TOTAL (\$)
	Material	Labor	Material	Labor	
System Planning				3,000	3,000
Project Management & Special Billing				15,000	15,000
Outside Plant Communications			32,110	103,012	135,122
System Protection				8,000	8,000
Interconnection Arrangements				4,000	4,000
System Operations				4,000	4,000
Real Estate				5,000	5,000
Metering			5,600	4,500	10,100
Environmental Permitting				15,000	15,000
Transmission Engineering & Construction	15,010	83,120	97,870	547,540	743,540
Substation Engineering & Construction	322,295	291,832	2,148,632	1,945,546	4,708,305
TOTAL COST	337,305	374,952	2,284,212	2,654,598	5,651,067
15% Contingency	50,596	56,243	342,632	398,189	847,660
GRAND TOTAL	387,901	431,195	2,626,844	3,052,787	6,498,727

Project Name: W2-039 – Clayville 69kV Local Network Upgrade – PJM Upgrade n3247 – 69kV Strand Bus Upgrade Second Street Substation	Indirect		Direct		TOTAL (\$)
	Material	Labor	Material	Labor	
Project Management & Special Billing					
Outside Plant Communications					
System Protection				2,000	2,000
Substation Engineering & Construction	355	12,667	2,369	84,445	99,836
TOTAL COST	355	12,667	2,369	86,445	101,836
15% Contingency	53	1,900	355	12,967	15,275
GRAND TOTAL	408	14,567	2,724	99,412	117,111

Project Name: W2-039 – Clayville 69kV Local Network Upgrade – PJM Upgrade n3248 – Replace Breaker “G” - Second Street Substation	Indirect		Direct		TOTAL (\$)
	Material	Labor	Material	Labor	
Project Management & Special Billing					
Outside Plant Communications					
System Protection				3,000	3,000
Substation Engineering & Construction	8,766	31,202	58,435	208,007	306,410
TOTAL COST	8,766	31,202	58,435	211,007	309,410
15% Contingency	1,315	4,680	8,765	31,651	46,411
GRAND TOTAL	10,081	35,882	67,200	242,658	355,821

Generation projects meeting IRS "Safe Harbor" provisions generally do not incur "CIAC"(Contribution in Aid to Construction), a tax collected by the utility for the state or federal government. ACE does not expect to collect CIAC for this project. If for any reason, "CIAC" would be required for this project, it would be the responsibility of the party owning the generator to pay this cost.

ACE reserves the right to charge the Interconnection Customer operation and maintenance expenses to maintain the Interconnection Customer attachment facilities, including metering facilities, owned by ACE.

Schedules and Assumptions

The ACE schedule is based on a 24-30 month lead-time from start of engineering to in-service date, including the assumption that it would not be impacted by storm damage and restoration, time of year limitations, permitting issues, outage scheduling, system emergencies, and contractor and equipment availability.

It is important to note that this project will be incorporated into the existing project work load at ACE at the time of contract execution. If the workload of existing projects is extensive, resource constraints may cause this project to be delayed beyond the projected in-service date.

Construction schedule is dependent upon obtaining an outage on the South Millville to Butler 69 kV line. Line outage on the 69 kV line will not be granted during summer months.

W2 - 039

South Millville to Butler

New 69kV Ring Bus

