Generation Interconnection Facility Study Report For PJM Generation Interconnection Request Queue Position AC1-189 Chinquapin – Everetts 230 kV 53.4 MW Capacity / 80 MW Energy

Revision 1/ December 2021

August, 2020

General

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff §207, as well as the Facilities Study Agreement between Pitt Solar, LLC, the Interconnection Customer (IC) and PJM Interconnection, LLC (PJM), Transmission Provider (TP). The Interconnected Transmission Owner (ITO) is Virginia Electric and Power Company (VEPCO).

The IC has proposed a solar generating facility located near Bethel, NC (Pitt County). The installed facilities will have a total capability of 80 MW with 53.4 MW of this output being recognized by PJM as capacity. The proposed in-service date for this project is 12/31/2020. **This study does not imply an ITO commitment to this in-service date.**

Revision 1 Summary

This revision 1 is being issued to incorporate changes following a re-tool performed in September of 2021. Required system reinforcements were updated to reflect that of the latest re-tool and System Impact Study. Additionally, changes were made to reflect the customer electing Option to Build for the Attachment Facilities and the Direct Connect Upgrade (three breaker ring bus).

Point of Interconnection

AC1-189 will interconnect with the ITO transmission system via a new three breaker ring bus switching station that connects on the Chinquapin – Everetts 230kV line.

Cost Summary

The AC1-189 project will be responsible for the following costs:

Description	Total Cost
Oversight for Attachment Facilities	$ 115,129
Oversight for Direct Connection Oversight	$ 1,060,134
Non Direct Connection Network Upgrades	$ 1,747,000
Allocation for New System Upgrades	$ 0
Contribution for Previously Identified Upgrades	$ 8,530
Total Costs	**$ 2,930,793**

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A. Transmission Owner Facilities Study Summary

1. Description of Project

Queue AC1-189 is a request to interconnect an 80 MW new solar generating facility to be located near Bethel, NC (Pitt County). AC1-189 will interconnect with the ITO transmission system via a new three breaker ring bus switching station that connects on the Chinquapin-Everetts 230 kV line #2160. Attachment Facility and Network Upgrade construction is estimated to be 14-24 months.

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

None

3. Interconnection Customer's Milestone Schedule

- Plan to break ground July 15, 2023
- Permits – state level Permit By Rule and county level final site plan approval complete February 15, 2022
- Substantial site work completed February 15, 2024
- Delivery of major electrical equipment January 15, 2024
- Back Feed Power April 15, 2024
- Commercial Operation September 1, 2024

4. Scope of Customer's Work

Generator Interconnection Request AC1-189 is for an 80 MW Maximum Facility Output (MFO) solar generation plant. AC1-189 consists of 40 x SMA SC2200-US, 2 MW Inverters and 40 x 34.5/0.385 kV 2.2 MVA GSU transformers connected to the Point of Interconnection (POI) on the Chinquapin – Everetts 230 kV circuit by a 230/34.5/13.8 kV 48/64/80 MVA collector transformer and a 2 mile transmission line.

5. Description of Facilities Included in the Facilities Study

The ITO will connect the proposed generator lead via Attachment Facilities to a new AC1-189 three-breaker ring bus switching station adjacent to the #2160 line between the existing Chinquapin and Everetts substations. The cut line will consume two of the positions in the ring bus. The third position will be for the 230 kV feed from the IC's Collector Station for the new 80 MW Solar Farm.

The new 230 kV Three Breaker Ring Substation will share a common footprint and fence line with the IC's Collector Station. The demarcation point between the two stations will be the 230kV Disconnect Switch 4-hole pad in the IC's Collector Station by the common fence.

Dominion Energy will bring its bus to the demarcation point. The grounding systems for each station will be tied together.

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Transmission line engineering to renumber the existing line segment between the new Three Breaker Ring Substation and Chinquapin Substation will occur. The existing line segment between the new Three Breaker Ring Substation and Everetts Substation shall remain Line 2160.

Additional work will be required at Everetts and Chinquapin Substations.

There will be drawing updates, transmission line protection and anti-islanding work required at the remote line terminals at the Chinquapin and Everetts substations. Site plan (Attachment 2) was developed by the ITO during PJM's generation queue process. The single line is shown in Attachment 1

6. Total Costs of Transmission Owner Facilities included in Facilities Study

Work Description	Direct		Indirect		Total Cost
	Labor	Material	Labor	Material	
Trans line #2160 (n6796)	$1,116,210	$348,699	$166,659	$40,725	$1,672,293
Total Remote Changes (n6797)	$44,431	$17,354	$10,255	$2,667	$74,707
Battleboro terminal upgrade (n6118)	$3,823	$3,175	$1,049	$483	$8,530
Total Network Upgrades	$1,164,464	$369,228	$177,963	$43,875	$1,755,530
Option to Build Oversight for Attachment Facilities	$90,903	$0	$24,225	$0	$115,129
Option to Build Oversight for New Switching Station (n6795)	$632,183	$272,360	$140,459	$15,133	$1,060,134
Total Option to Build Oversight	$723,086	$272,360	$164,684	$15,133	$1,175,263
Total Project Costs	**$1,887,550**	**$641,588**	**$342,647**	**$59,008**	**$2,930,793**

7. Summary of Milestone Schedules for Completion of Work Included in Facilities Study:

Facilities are estimated to take 14-24 months from ISA execution and is based on the ability to obtain outages to construct and test the proposed facilities.

Proposed Schedule

- Detailed design: 6-12 months
- Permitting: 6-12 months (Timeline runs concurrent with design)
- Construction 8-12 months

ITO requires the site to be fully graded and permitted site so they can start construction by July 15, 2023.

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B. Transmission Owner Facilities Study Results

1. Attachment Facilities

Please note: Customer has elected Option to Build for the Attachment Facilities

The Attachment Facilities include the portion of the interconnecting switching station which is associated solely with the single feed to the generating facilities collector station. The equipmentassociated with the Attachment Facilities include the metering accuracy CCVT's, metering accuracy CT's, disconnect switch, conductors and connectors.

Option to Build, Attachment Facilities Physical Facilities & Oversight – Virginia Electric Power Company:

1. All physical engineering related oversight and approvals of activities related to equipment procurement, design, construction, and energization of switching station
2. All construction and methods oversight and approval of activities related to construction and energization of switching station
3. All project management oversight activities related to construction and energization of switching station

Option to Build, Attachment Facilities Physical Facilities– Interconnection Customer:

1. One (1), 230kV, 3000A, 3-phase center break gang operated switch.
2. Three (3), 230kV, metering accuracy CCVT's.
3. Three (3), 230kV,500:5 metering accuracy CT's.
4. Conductor, connectors, conduits, control cables, foundations, steel structures and grounding material as per engineering standards.

Option to Build, Attachment Facilities Relay Protection Equipment – Virginia Electric Power Company:

1. All protection & controls engineering oversight and approval of activities related to equipment procurement, design, construction, and energization of switching station
2. All relay panel installation methods oversight and approval of activities related to construction and energization of switching station
3. All relay, communications, security settings related to the connection of the switching station to the Bulk Electric Transmission System

Option to Build, Attachment Facilities Relay Protection Equipment – Interconnection Customer:

1. One (1), 1109 – 28" Dual SEL-587Z transmission bus panel
2. One (1), 4200_W1 – Bus differential C.T. make-up (M.U.) box
3. One (1), 1425 – 28" Dual SEL-735 transmission & generator interconnect metering panel.

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4. One (1), 4524 – Revenue metering C.T. make-up (M.U.) box
5. One (1), 4506 – CCVT potential make-up (M.U.) box
6. One (1), 1323 – 28" SEL-487E/735 PMU & PQ monitoring panel
7. Two (2), 4541 - control cable make-up (M.U.) box

2. Transmission Line – Upgrades

PJM Network Upgrade #n6796 - Re-arrange line #2160 to loop into and out of the newthree breaker AC1-189 230 kV switching station

Project AC1-189 will tap into Dominion's Line #2160 between Chinquapin and Everetts substations. The new substation will be located off the main line between structures 2160/124and 2160/125 in Bethel, NC (Pitt County).

The project work summary is described below:

INSTALLATION:

1. Install one (1) single circuit steel backbone (2160/124) with no switches inside the proposed substation. Transfer the existing 3#6 alumoweld and existing 1033 ACSR toeach side of the proposed backbone.
2. Install two (2) static poles within the proposed substation.
3. Install two (2) single circuit DOM H-frame anchor structures (2160/123 & 2160/215) on either side of the proposed substation.
4. Install 3 spans of 7#7 alumoweld between the proposed backbone and the proposedstatic poles within the substation.

REMOVAL:

1. Remove two (2) single circuit tangent H-frame suspension structures.

MISCELLANEOUS:

1. This estimate assumes that no fiber is needed for the installation of the substation

3. New Substation/Switchyard Facilities

Please note: Customer has elected Option to Build for this Upgrade

PJM Network Upgrade #n6795 - Build a three breaker AC1-189 230 kV switching station.

The facilities identified provides for the initial construction of a new 230 kV three breaker ring substation between transmission structures 2160/124 and 2160/125.

The objective of this project is to build a 230kV, 3-breaker ring bus to support the new 80MW Solar Farm built by Pitt Solar, LLC. The site is located along Dominion Energy's existing 230kV, 2160 Line from Chinquapin Substation to Everetts Substation. The cutline will consume two of the positions in the ring bus. The third position will be for the 230kV feed from the IC's Collector Station for the new 80MW Solar Farm.

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The new 230kV three breaker ring substation will share a common footprint and fence line with the IC's Collector Station. The demarcation point between the two stations will be the 230kV disconnect switch 4-hole pad in the IC's collector station by the common fence.

Dominion Energy will bring its bus to the demarcation point. The grounding systems for eachstation will be tied together.

Transmission line engineering to renumber the existing line segment between the new three breaker ring substation and Chinquapin substation. The existing line segment between the new three breaker ring substation and Everetts substation shall remain Line 2160.

Additional work to be required at Everetts and Chinquapin 230 kV

Substations.Security and fence type – design level 4.

Note: Currently, the scope and estimate assume DVP standard spread footer foundations. Oncethe soil information is received and if it is decided to change that to "pile foundations" then DVP team should be informed at the earliest to adjust the project estimate.

The work required is as follows:

Option to Build, Direct Network Physical Facilities & Oversight – Virginia Electric Power Company

1. All Physical Engineering related oversight and approvals of activities related to equipment procurement, design, construction, and energization of switching station
2. All Real Estate related oversight and approval of activities related to construction of switching station
3. All Permitting related oversight and approval of activities related to construction of switching station
4. All Survey related oversight and approval of activities related to construction of switching station
5. All Construction and Methods oversight and approval of activities related to construction and energization of switching station
6. All Project Management oversight activities related to construction and energization of switching station
7. All riser conductor, connectors, spacers, and bolts related to connection of the switching station to the Bulk Electric Transmission System
8. All material related to the integration of the security fence software package back to the Corporate Security Fusion Center

Option to Build, Direct Network Physical Facilities – Interconnection Customer:

1. Approximate station fence line dimensions of 358' x 275'. At a minimum, site preparation and grading will be required to extend 10' beyond these dimensions for station grounding. Additional property and site prep may be required for proper grading and stormwater management, etc.

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2. Approximately 1,266 linear FT of 5/8" chain link, 12 FT tall, perimeter fence around the station (design 4 standard)
3. Three (3), 230 kV, 3000A, 63kAIC, SF-6 circuit breakers.
4. Six (6), 230 kV, 3000A, 3-phase center break gang operated switches.
5. Six (6), 230kV, relay accuracy CCVTs.
6. Two (2), 230 kV, 3000 A wave traps.
7. Two (2), line tuners.
8. Nine (9), 180 kV, 144 kV MCOV surge arresters.
9. Two (2), 230kV, 3000A, 2-phase center break switches (for PVT's).
10. Two (2), 230kV, 100KVA power PT's for station service.
11. One (1), 230kV, Heavy Duty Steel Backbone (by Virginia Electric Power Company)
12. Two (2) shield wire poles and three spans of shield wires (by Virginia Electric Power Company)
13. One (1), 24' x 40' control enclosure, CE1.
14. One (1), 125 VDC, 400 Ah station battery and 75 Amp charger (size to be verified during detail engineering).
15. Approximately 240 FT of cable trough, with a 20FT road crossing section.
16. Station stone as required.
17. Station lighting as required.
18. Steel structures as required including switch stands, bus supports, station service transformers, CCVT and wave trap supports.
19. Foundations as required including control house, equipment, and bus support stands.
20. Conductors, connectors, conduits, control cables, cable trough, and grounding materials as per Dominion Substation engineering standards.

Option to Build, Direct Network Relay Protection Equipment – Virginia Electric Power Company

1. All Protection & Controls Engineering oversight and approval of activities related to equipment procurement, design, construction, and energization of switching station
2. All relay panel installation methods oversight and approval of activities related to construction and energization of switching station
3. All relay, communications, security settings related to the connection of the switching station to the Bulk Electric Transmission System
4. One (1), 5616 – Station Security Panel
5. One (1), 5616 – Station Security Fence Panel
6. One (1), 5603 Network Panel 1
7. One (1), 5603 Network Panel 2
8. One (1), High Voltage Protection (HVP) Box (Provided by IT)
9. One (1), Telephone Interface Box

Option to Build, Direct Network Relay Protection Equipment – Interconnection Customer:

1. Three (3), 1510 – 28" Dual SEL-351-7 transmission breaker w/ reclosing panel
2. Three (3), 4510 - SEL-2411 breaker annunciator

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3. Two (2), 1340 – 28" Dual SEL 411L DCB line panel
4. Two (2), 4506 – 3 phase CCVT potential make-up (M.U.) box
5. One (1), 1603 – 28" SEL-451 islanding control scheme panel
6. Two (2), 4000 – Station service potential make-up (M.U.) box
7. Two (2), 4018 – 500A station service AC distribution panel
8. Two (2), 4007 – 225A outdoor transmission yard AC NQOD
9. Two (2), 4019 – 225A three phase throw over switch
10. Two (2), 4016 – 600A PVT disconnect switch
11. One (1), 4153c – Wall mount station battery monitor
12. One (1), 5618 - SEL-3555 data concentrator panel
13. One (1), 1255 – Station annunciator panel
14. One (1), 5021 – SEL-2411 RTU panel
15. One (1), 5609 – Fiber optic management panel
16. Three (3), 4526_A – Circuit breaker fiber optic make-up (M.U.) box
17. One (1), 5202 – 26" APP 601 digital fault recorder
18. Two (2), 4018 – 225A station service AC distribution panel branch breaker

4. Upgrades to Substation / Switchyard Facilities

PJM Network Upgrade #n6797 - Remote protection and communication work.

Additional work to be required at Chinquapin and Everetts 230 kV Substations. These costs include the following:

Chinquapin 230 kV Substation

Project Summary
AC1-189 provides for the drawing work, relay resets, and field support necessary to change the Line 2160 destination at Chinquapin Substation. The line number may or may not be changed. Consult the Construction One Line. Modify existing Line 2160 Islanding Transfer Trip scheme by replacing the CR-51C Receiver with a ULPC II Transceiver to transmit and receive Islanding Transfer Trip with AC1-189. This project is the Non-Direct Connect for the AC1-189 Generator Interconnect project.

Purchase and install relay material:
1. One (1), UPLC II Transceiver

Everetts 230 kV Substation

Project Summary
AC1-189 provides for the drawing work, relay resets, and field support necessary to change the Line 2160 destination at Everett Substation. The line number may or may not be changed. Consult the Construction One Line. This project is the Non-Direct Connect for the AC1-189 Generator Interconnect project.

Purchase and install substation material:
1. No Relay Material

Work Description	Direct		Indirect		Total Cost
	Labor	Material	Labor	Material	
Chinquapin Change Line 2160	$28,313	$17,354	$6,289	$2,667	$54,623
Everetts Change Line 2160	$16,118	$0	$3,966	$0	$20,084
Total Remote Relay Upgrades	$44,431	$17,354	$10,255	$2,667	$74,707

PJM Network Upgrade #n6118- Battleboro – Rocky Mt 115kV: Replace

Battleboro substation terminal equipment. Upgrading the breaker leads at Battleboro will bring the rating to 239/239/239 MVA.

Purchase and install at Battleboro substation:

1. Install- 2-795 AAC conductors and connectors as required

2. Remove- existing 1-795 AAC conductors and connectors

5. Metering & Communications

PJM Requirements

The IC will be required to install equipment necessary to provide Revenue Metering (KWH, KVARH) and real time data (KW, KVAR) for IC's generating Resource. See PJM Manuals M-01 and M-14D, and PJM Tariff Section 8 of Attachment O Appendix 2.

ITO Requirements

Metering and SCADA/Communication equipment must meet the requirements outlined in section 3.1.6 Metering and Telecommunications of ITO's Facility Interconnection Connection Requirement NERC Standard FAC-001 which is publicly available at www.dom.com.

At the IC's expense, the ITO will supply and own at the Point of Interconnection bi-directional revenue metering equipment that will provide the following data:

a. Hourly compensated MWh received from the Customer Facility to the ITO;
b. Hourly compensated MVARh received from the Customer Facility to the ITO;
c. Hourly compensated MWh delivered from the ITO to the Customer Facility; and
d. Hourly compensated MVARh delivered from the ITO to the Customer Facility.

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The IC will supply and own metering equipment that will provide Instantaneous net MW and MVar per unit values in accordance with PJM Manuals M-01 and M-14D, and Sections 8.1 through 8.5 of Appendix 2 to the ISA.

The IC will access revenue meter via wireless transceivers or fiber cabling to meter with RS-485 or Ethernet communication port for dial-up reads. IC must provide revenue and real time data to PJM from Interconnection Customer Market Operations Center per "PJM Telemetry Data Exchange Summary" document available at PJM.com.

6. Environmental, Real Estate and Permitting Issues

The IC would be responsible for the following expectations in the area of Environmental, Real Estate and Permitting:

- Suitable Access Road from Substation to a North Carolina State Maintained Roadway.
- Any additional land needed for Storm Water Management, Landscaping, and Wetlands/Wetlands Mitigation.
- Conditional Use Permit for Substation.
- Any other Land/Permitting requirements required by the Substation.

ITO Real Estate Needs:

- The substation layout is complete and ITO requires a 358' x 275' piece of property (title in fee) to build the substation. The property includes the piece of property between the substation and collector station for the strain bus.
    - ITO requires ownership transfer of the substation site before they start construction. Target for the deed by July 15, 2023.
    - The size of the station assumes ITO will not need a separate storm water management system for the substation. If the county rules differently than the ITO will need to revisit the land requirements.
- ITO will need a letter similar to the zoning letter from the county stating that if the solar farm is retired and / or decommissioned the substation will remain.

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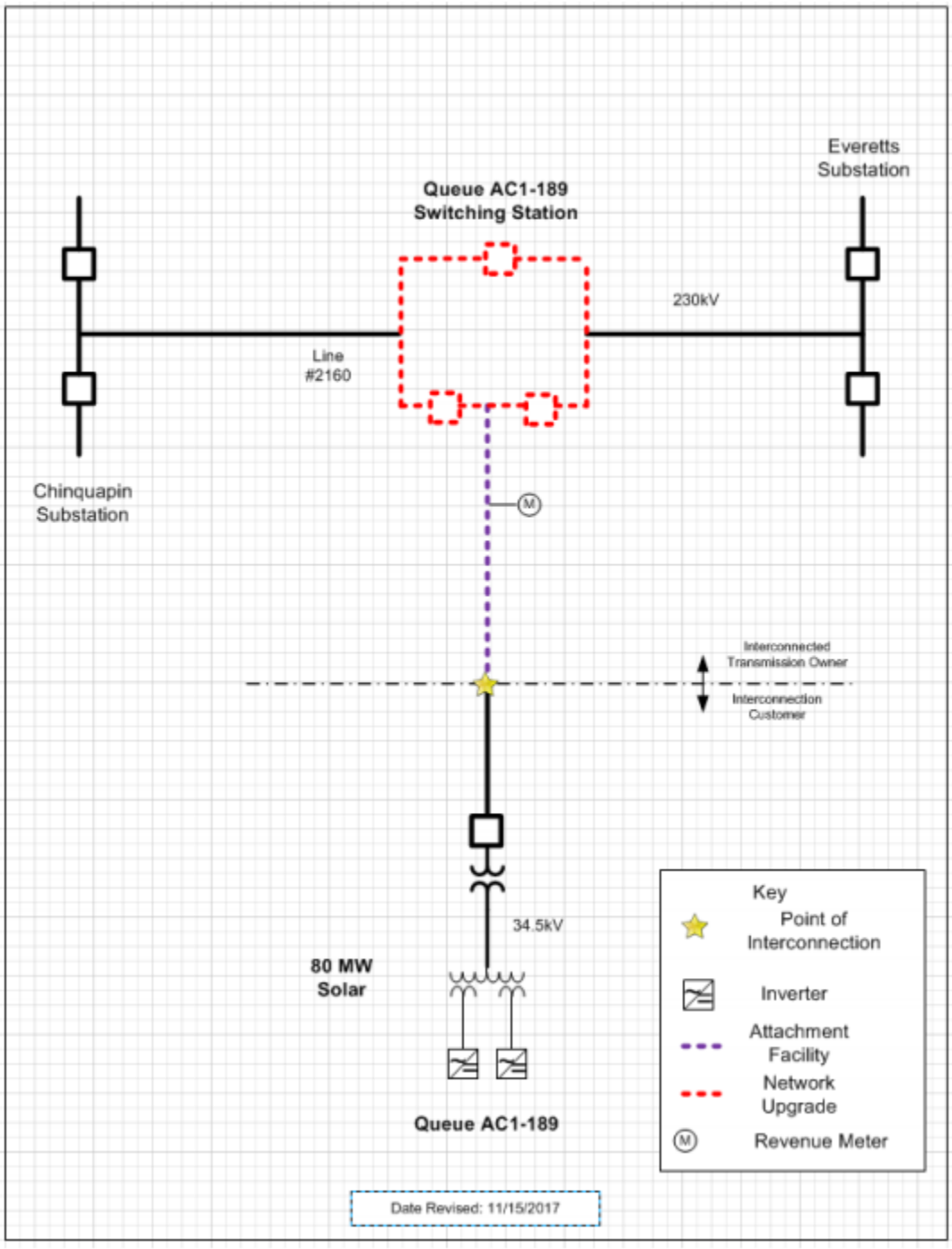
Attachment 1.
Single Line



Attachment 2.
AC1-189 Switching Station General Arrangement