Generation Interconnection Facility Study Report

For

PJM Generation Interconnection Request Queue Position AD1-022

Cashie-Trowbridge 230 kV
51.8 MW Capacity / 80.0 MW Energy

July 2022

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 Sumac 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).

Point of Interconnection

AD1-022 will interconnect with the ITO transmission system via a new three breaker ring bus switching station that connects the Cashie-Trowbridge 230kV line.

Cost Summary

The AD1-022 project will be responsible for the following costs:

Description	Total Cost
Oversight for Attachment Facilities	$1,060,135
Oversight for Direct Connection	$115,128
Non Direct Connection Network Upgrades	$1,702,152
Allocation for New System Upgrades	$14,073,759
Contribution for Previously Identified Upgrades	$0
Total Costs	**$16,951,174**

A. Transmission Owner Facilities Study Summary

1. Description of Project

This project is a request to interconnect a new 80 MW solar generating facility to be located in Bertie County, North Carolina. AD1-022 will interconnect with the ITO transmission system via a new three breaker ring bus switching station that connects on the existing Earleys - Trowbridge 230 kV Line 2034.

Attachment Facility and Network Upgrade construction is estimated to be 36-42 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 December 1, 2025
- Permits – state level Permit By Rule and county level final site plan approval complete October 1, 2023
- Substantial site work completed January 1, 2026
- Delivery of major electrical equipment September 1, 2026
- Back Feed Power June 1, 2025
- Commercial Operation December 31, 2026

4. Scope of Customer's Work

The IC has proposed a solar generating facility. AD1-022 will have a total installed capability of 80 MW (51.8 MW Capacity).

5. Description of Facilities Included in the Facilities Study

Project AD1-022 provides the initial construction of a new 230kV three breaker ring switching station to support a new 80 MW capacity solar generating facility. The site is located along Virginia Electric Power Company's existing 230 kV, 2034 line from Earleys Substation to Trowbridge Substation. 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 Interconnection Customer's Collector Station.

The collector station will be located adjacent to the interconnect station. The demarcation point between this station and the collector station will be the 4-hole pads on the interconnect station disconnect switch. The grounding systems for both the stations will be tied together. The Interconnection Customer will be responsible for all real estate, permitting, and site preparation and grading.

Virginia Electric Power Company to renumber the existing line segment between the new 230 kV three breaker ring switching station and Earleys Substation. The existing line segment between the new 230 kV three ring switching station and Trowbridge Substation shall remain line 2034.

Additional work will be required at Hathaway, Cashie, Trowbridge, and Earleys Substation.

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

Cost estimates for Dominion to perform construction:

Work Description	Direct		Indirect		Total Cost
	Labor	Material	Labor	Material	
Transmission Line #2034	$701,567	$416,282	$103,167	$40,480	$1,261,496
Hathaway Substation 115kV (n6618.1)	$16,946	$0	$3,803	$0	$20,749
Line Rebuild (n6618)	$7,522,315	$4,868,652	$1,166,866	$495,177	$14,053,010
Total Remote Changes	$152,040	$204,476	$43,884	$40,256	$440,656
Total Network Upgrades	$7,691,301	$5,073,128	$1,214,553	$535,433	$15,775,911
Oversight for Attachment Facilities	$90,903	$0	$24,225	$0	$115,128
Oversight for Direct Connection	$632,183	$272,360	$140,459	$15,133	$1,060,135
Total Option to Build Oversight	$723,086	$272,360	$164,684	$15,133	$1,175,263
Total Project Costs	$8,414,387	$5,345,488	$1,379,237	$550,566	$16,951,174

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

Facilities are estimated to take 36-42 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 (runs concurrent with design)
- Construction 12-18 months

ITO requires the site to be fully graded and permitted site so they can start construction by January 2024.

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 equipment associated 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.
4. One (1), 4524 – Revenue metering C.T. make-up 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 # n8070.1 - Re-arrange line #2034 to loop into and out of the new three breaker AD1-022 230 kV switching station

A new switching station is to be installed beneath existing 230kV Line 2034 between existing structures 2034/220 and 2034/221. The transmission line shall connect to the substation within the existing line right-of-way. Installation of the substation shall require the line to be renumbered from the new substation to Trowbridge Substation.

The project work summary is described below:

Existing facilities to be removed:

1. Remove (2) existing SC direct embed Wood H-frame structures as follows:
    a. Structures 2034/220 and 2034/221.
2. Remove approximately 0.1 miles of 545.6 ACAR (15/7) conductor from existing structures 2034/220 to 2034/221.
3. Remove approximately 0.2 miles of 3#6 AW shield wire from existing structures 2034/220 to 2034/221.

Permanent facilities to be installed:

1. Re-number TL2034 from existing structure 2034/222 – 2034/281 to be 2XXX/222 – 2XXX/281.
2. Install (2) SC steel dead-end H-frame structures with crossing insulator assemblies on one side as follows:
    a. Structures 2034/220 and 2XXX/221.
    b. Structures shall be designed for full dead-end loading to accommodate potential future uprates of the line to current 230kV loading standards.
3. Install (1) SC steel dead-end backbone structure within the new substation as follows:
    a. Structure 2034/220A, 2XXX/220A.
4. Install (2) steel static poles within the new substation as follows:
    a. Structures 2034/220B and 2034/220C.
5. Install approximately 0.1 miles of 2-636 ASCR (24/7) conductor from proposed structures 2034/220 to 2XXX/221.
6. Install approximately 0.2 miles of 7#7 AW shield wire from proposed structures 2034/220 to 2XXX/221.
7. Install approximately 0.1 miles of 7#7 AW shield wire within the substation connecting the two static pole structures 2034/220B and 2034/220C to structure 2034/220A, 2XXX/220A and to each other.
8. Install (2) sets of 3-phase risers to connect the proposed transmission conductors to the substation rigid bus in the spans as follows:
    a. (1) set in span from 2034/220 to 2034/220A, 2XXX /220A.
    b. (1) set in span from 2034/220A, 2XXX/220A to 2XXX/221.

Conceptual Design Notes:

1. Avian events have been recorded at nearby structure 2034/216 and bird guards are installed on existing structures 2034/216 and 2034/217. Bird deterrents shall not be required for this project as all new structures utilize strain assemblies.

2. Transmission line survey should be acquired from existing structures 2034/216 to 2034/226.
    a. This section of survey shall be sufficient to determine the affect the new dead-end structures have on existing structure swing and tensions. Loads on the back span of 2034/216 are assumed to be accurate from the 2012 NERC remediation model.
3. Land acquisition and switch installation shall occur for this project but are both included within the substation scope of work.

PJM Network Upgrade #n6618 – Partially rebuild line #55 and line #2229

In addition to the work identified at Hathaway substation, Project #n6618 partially rebuilds 115 kV line 55 from near the Anaconda Tap to Tarboro substation. 115kV line 55 is on double circuit structures with 230kV line 229 for a portion of this rebuild; therefore, 230kV work will be required.

Included in the scope are new engineering steel single circuit and double circuit monopoles, engineering steel single circuit H-frames, and steel self-supporting switch structures. The 230kV circuit will utilize bundled 768.2 ACSS/TW/HS "Maumee", while the 115kV circuit will be rebuilt with single 768.2 ACSS/TW/HS "Maumee". The 230kV circuit will be shielded with DNO-11410 throughout. The 115kV circuit shall be shielded with 3#6 Alumoweld shield wire while on single circuit structures and with DNO-11410 while on double circuit structures.

Transmission Line Scope of Work:

1. 230kV Line 229 / 115kV Line 55 double circuit segment:
    a. From new structure 55/179 (229/249) to new structure 55/190 (229/338)
2. 115kV Line 55 single circuit segments:
    a. From new structure 55/170 to new structure 55/179 (229/249)
    b. From new structure 5/190 (229/338) to existing structure 55/193
3. 230kV Line 229 single circuit segments:
    a. From new structure 229/237 to new structure 229/238 (55/190)
    b. From new structure 229/249 (55/179) to existing structure (229/250)

Existing facilities to be removed:

1. Remove three (3) 115kV phase-over-phase steel monopole switch structures as follows:
    a. Structures 55/181B, 55/182B, and 55/182C.
        i. This includes the removal of the corresponding SEECO switches. Respectively, the switches are identified as 5539, 5536, and 5537.
2. Remove three (3) 115kV self-supporting steel switch structures as follows:
    a. Structures 55/133, 55/171, and 55/192A.
        i. This includes the removal of the corresponding switches. Respectively, the switches are identified as 5599, 5596, and 5579.
3. Remove four (4) 115kV wood H-frame suspension structures as follows:
    a. Structures 55/174 to 55/177.
4. Remove two (2) 115kV steel H-frame suspension structures as follows:

   a. Structures 55/172 and 55/173.
5. Remove one (1) 115kV steel monopole double-deadend structure as follows:
   a. Structure 55/186A.
6. Remove two (2) 115kV steel H-frame double-deadend structures as follows:
   a. Structures 55/191 and 55/192.
7. Remove two (2) 115kV concrete monopole structures as follows:
   a. Structures 55/182A and 55/181A.
8. Remove one (1) 115kV steel 2-pole double-deadend structure as follows:
   a. Structure 55/182.
9. Remove one (1) 115kV wood H-frame double-deadend structure as follows:
   a. Structure 55/178.
10. Remove eleven (11) 230kV/115kV double circuit steel lattice towers as follows:
   a. Structures 229/249 (55/179) to 229/247 (55/181), 229/245 (55/183) to 229/238 (55/190).
11. Remove two (2) 230kV single circuit steel lattice tower as follows:
   a. Structures 229/246 and 229/237.
12. Remove approximately 1.94 miles of 3-phase 740.8 AAAC conductor for 115kV Line 55 from existing structure 55/133 to 55/191.
13. Remove approximately 0.08 miles of 3-phase 1033.5 ACSR conductor for 115kV Line 55 from existing structure 55/191 to 55/193.
14. Remove approximately 0.73 miles of 3-phase 2/0 CU conductor for 115kV Line 55 from existing structure 55/133 to 55/178.
15. Remove approximately 2.09 miles of two (2) 3#6 Alumoweld shield wires from existing structure 229/237 to 229/250.
16. Remove approximately 2.09 miles of 3-phase 1033.5 ACSR conductor for 230kV Line 229 from existing structure 229/237 to 229/250.

Modifications to existing facilities:

1. Install three (3) new conductor assemblies on existing steel backbone structure 55/193.
2. Install three (3) new conductor assemblies on existing steel backbone structure 229/250.

Permanent facilities to be installed:

1. Install three (3) 115kV steel engineered phase-over-phase switch monopole structures on foundations as follows: (DEV Std. 11.836)
   a. Structures 55/181A, 55/182A, and 55/1101.
2. Install three (3) 115kV self-supporting switch structures on foundations as follows: (DEV Std. 11.830)
   a. Structures 55/170A, 55/171A, and 55/192A.
3. Install six (6) 115kV steel engineered H-frame suspension structures on foundations as follows: (DEV Std. 11.600)
   a. Structures 55/172 to 55/177.
4. Install five (5) 115kV steel engineered H-frame double deadend structures on foundations as follows: (DEV Std. 11.610)
   a. Structures 55/170, 55/171, 55/178, 55/191, and 55/192.

5. Install three (3) 115kV steel engineered 3-way deadend structures on foundations as follows: (DEV Std. 11.416)
    a. Structures 55/182, 55/186A, and 55/186B.
6. Install nine (9) 230kV steel engineered double circuit suspension structures on foundations as follows: (DEV Std. 12.612)
    a. Structures 229/249 (55/179) to 229/247 (55/181), 229/45 (55/229/241 (55/187), 229/239 (55/189) to 229/238 (55/190).
7. Install one (1) 230kV steel engineered double circuit double-deadend structure on a foundation as follows: (DEV Std. 12.614)
    a. Structure 229/240 (55/188).
8. Install one (1) 230kV steel engineered single circuit double-deadend structure on a foundation as follows: (DEV Std. 12.425)
    a. Structure 229/237.
9. Install one (1) 230kV steel engineered single circuit suspension structure with horizontal braced posts on a foundation as follows: (DEV Std. 12.619)
    a. Structure 229/246.
10. Install one (1) 230kV steel engineered single circuit suspension structure (arms on one side only) on a foundation as follows: (DEV Std. 12.422)
    a. Structure 229/242.
11. Install approximately 2.76 miles of 3-phase 768.2 kcmil Type 13 ACSS/TW/HS "Maumee" conductor for 115kV Line 55 from new structure 55/170 to existing structure 55/193.
    a. This includes the installation of dampers as required.
    b. This includes the installation of 3-phase jumpers as required.
12. Install approximately 2.76 miles of two (2) 3#6 Alumoweld shield wires over 115kV Line 55 from new structure 55/170 to existing structure 55/193.
    a. This includes the installation of dampers as required.
    b. This includes the installation of jumpers as required.
13. Install approximately 2.09 miles of 3-phase 2-768.2 kcmil Type 13 ACSS/TW/HS "Maumee" conductor for 230kV Line 229 from new structure 229/237 to existing structure 229/250.
    a. This includes the installation of dampers as required.
    b. This includes the installation of 3-phase jumpers as required.
14. Install approximately 2.09 miles of two (2) DNO-11410 OPGW from new structure 229/237 to existing structure 229/250.
    a. This includes the installation of dampers as required.
    b. This includes the installation of jumpers as required.
15. Transfer existing conductor and shield wire for Line 55 to the back side of new structure 55/170.
16. Transfer existing conductor and shield wire for Line 229 to the back side of new tructure 229/237.

Miscellaneous Notes:

1. This conceptual scope of work is based on Dominion's conceptual Project 992902.

   a. The necessary components of Project 992902 that pertain to Project AD1-022 are included here.
2. This conceptual scope of work assumes Project 992902 will not occur before Project AD1-022
3. All stakeholders should be able to analyze their respective inputs for the estimate associated with Project 992902, and piece out what is required for the scope of work described herein if needed.
4. All foundations/guy anchors shall be removed to a minimum of 18-inches below grade.
   a. Foundation cost is based on what was provided for Project 992902 that applies to this scope of work.
5. Tie Switch 5568 at Harts Mill Substation shall be closed by Substation Engineering.
6. Bird deterrents were not included in the scope of work for Project 992902. As such, it is assumed they are not necessary for Project AD1-022.
7. Additional ROW is not included in the scope of work for Project 992902. As such, no additional ROW is assumed necessary for Project AD1-022.
8. Detailed structural analysis will be required on any existing structure that loading will be altered on. It is assumed this has been considered for Project 992902.
9. This scope assumes outages have been discussed amongst DEV personnel and will not cause any issues. As such, it is assumed no temporary work will be required for the scope of this project.

3. New Substation/Switchyard Facilities

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

PJM Network Upgrade # n8070.3 - Build a three breaker AD1-022 230kV switching station.

Project AD1-022 provides the initial construction of a new 230kV three breaker ring switching station to support a new 120 MW capacity solar generating facility. The site is located along Virginia Electric Power Company's existing 230 kV, 2034 line from Earleys Substation to Trowbridge Substation. 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 Interconnection Customer's Collector Station.

The collector station will be located adjacent to the interconnect station. The demarcation point between this station and the collector station will be the 4-hole pads on the interconnect station disconnect switch. The grounding systems for both the stations will be tied together. The Interconnection Customer will be responsible for all real estate, permitting, and site preparation and grading.

Security and Fence Type – Design Level 4

Note: Currently, the scope and estimate assume DVP standard spread footer foundations. Once the 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 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 325’ x 256’. 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.
2. Approximately 1,162 linear ft of 5/8” Chain Link, 12 ft tall, perimeter fence around the station (Design 4 Standard)
3. Three (3), 230kV, 3000A, 63kAIC, SF-6 circuit breaker
4. Six (6), 230kV, 3000A, 3-phase center break gang operated switch
5. Six (6), 230kV, relay accuracy CCVT
6. Two (2), 230kV, 3000A wave trap
7. Two (2), line tuner
8. Nine (9), 180kV, 144kV MCOV surge arrester
9. Two (2), 230kV, 3000A, 2-phase center break switch (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 wire (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 20 ft road crossing section
16. Two (2), 36” x 36” x 42” precast yard pull box
17. Station stone as required
18. Station lighting as required

19. Steel structures as required including switch stands, bus supports, station service transformers, CCVT and wave trap supports
20. Foundations as required including control house, equipment and bus support stands
21. Conductors, connectors, conduits, control cables, cable trough, and grounding materials as per 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 no. 1
7. One (1), 5603 – network Panel no. 2
8. One (1), high voltage protection (HVP) box (provided by IT)
9. One (1), telephone interface box
10. One (1), 4523 – security camera interface box

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

1. Three (3), 1510 – 28" dual SEL-351-7 transmission breaker with reclosing panel
2. Three (3), 4510 – SEL-2411 breaker annunciator
3. Two (2), 1340 – 28" dual SEL-411L DCB line panel
4. Two (2), 4506 – 3-phase CCVT potential make-up box
5. One (1), 1603 – 28" SEL-451 islanding control scheme panel
6. Two (2), 4000 – station service potential make-up 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 3-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 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 # n8070.2 - Remote protection and communication work.

Additional protection and communication work to be required at Cashie, Earleys, and Trowbridge 230 kV substations.

These costs include the following:

Cashie 230 kV Substation

Project Summary
Project AD1-022 provides for the drawing work and field support necessary to change the Line 2034 destination(s) at Cashie Substation(s). The line number may or may not be changed. Consult the Construction One Line. This project is the Non-Direct Connect for the AD1-022 generator interconnect project.

Purchase and install relay material:

1. No relay material

Earleys 230 kV Substation

Project Summary
Project AD1-022 provides for the drawing work, relay resets, and field support necessary to change the line 2034 destination at Earleys Substation. The line number may or may not be changed. Consult the Construction One Line. Install islanding transfer trip to work with the AD1-022 generator interconnect. This project is the Non-Direct connect for the AD1-022 generator interconnect project.

Purchase and install relay material:

1. One (1), 1603 – 28" SEL-451 islanding control scheme panel

Trowbridge 230 kV Substation

Project Summary:
This project provides for the drawing work, relay resets, and field support necessary to change the Line 2034 destination at Trowbridge Substation. The line number may or may not be changed. Install islanding transfer trip to work with AD1-022.

The Trowbridge substation control enclosure will be expanded by 10ft to accommodate the new relay panels required for the project.

This project is the Non-Direct Connect for the AD1-022 generator interconnect project.

Purchase and install substation material:

1. Expand control enclosure

Purchase and install relay material:

1. One (2), 1603 – 24" SEL-451 islanding control scheme panel
2. One (1), Panel retirement (panel No. 16)

Work Description	Direct		Indirect		Total Cost
	Labor	Material	Labor	Material	
Cashie Substation 230kV	$9,339	$0	$2,408	$0	$11,747
Earleys Substation 230kV	$35,877	$36,805	$7,409	$5,747	$85,838
Trowbridge Substation 230kV	$106,824	$167,671	$34,067	$34,509	$343,071
Total Remote Relay Upgrades	$152,040	$204,476	$43,884	$40,256	$440,656

PJM Network Upgrade #n6618.1 – Split the 115 kV Hathaway substation

In addition to the work identified on lines #55 and #2229, network upgrade n6618.1 includes the separation of the 115kV busses at Hathaway station in Rocky Mount, North Carolina.

Substation Equipment at Hathaway Substation:

1. Open 115kV circuit breaker 103202-3 and leave in normally open position
2. Open 115kV switch 103204-3 and leave in normally open position
3. Open 115kV circuit breaker 101402-4 and leave in normally open position
4. Open 115kV switch 101404-4 and leave in normally open position

Relay Equipment at Hathaway Substation:

1. Adjust relay settings for circuit breakers 103202-3 and 101402-4 being normally open

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.

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

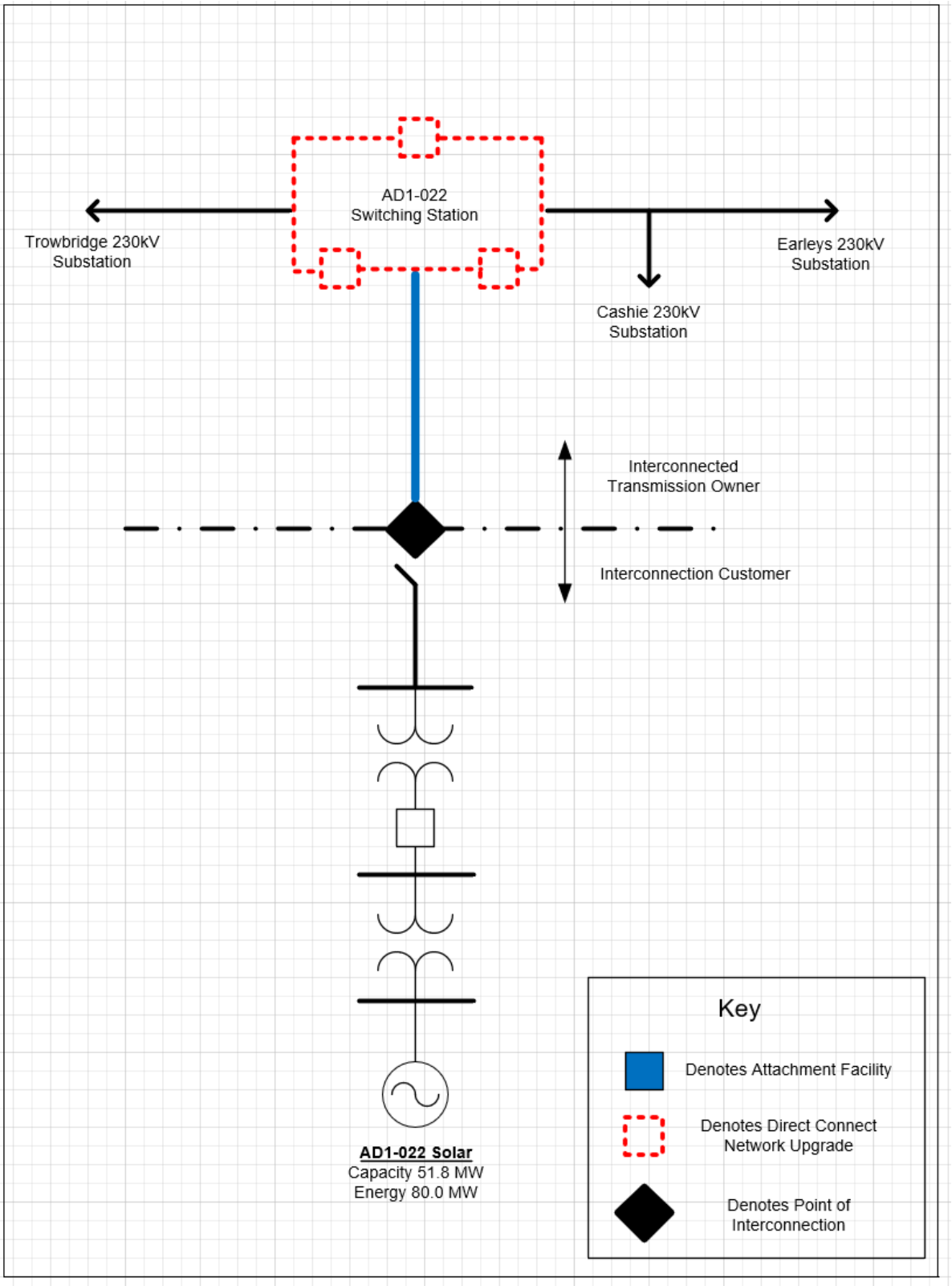
The IC would be responsible for the following expectations in the area of Environmental, Real Estate and Permitting:

- 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 325' x 256' 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 December 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.

Attachment 1.
Single Line Diagram AD1-022



Attachment 2.
AD1-022 Switching Station General Arrangement