Facilities Study Report

For

Physical Interconnection of

PJM Generation Interconnection Request

Project ID AE1-092

Blue Jacket-Kirby 138 kV

Revision 0: December 2024

Introduction

This Facilities Study has been prepared in accordance with the PJM Open Access Transmission Tariff. The Transmission Owner is Dayton Power & Light Company d/b/a AES Ohio ("AES Ohio").

The information, conclusions, analyses, studies and recommendations (hereinafter referred to as "Information") contained herein have been prepared by AES Ohio. The Information was developed, in part, based upon information which has not been independently verified or confirmed by AES Ohio. Although AES Ohio has made all commercially reasonable efforts to develop the Information in an accurate manner consistent with the exercise of Good Utility Practice, the user of such Information accepts all risk and liability for the use thereof and agrees to indemnify and hold AES Ohio harmless from any subsequent action related to such use. No guarantees or warranties of any kind, including express or implied warranties of merchantability of fitness are made with respect to the information by AES Ohio, its affiliates, its officers, directors, employees, or agents, who also assume no legal responsibility for the accuracy of the information contained herein. In addition, no liability is assumed, and all liability is expressly disclaimed for negligence or damages of any kind, any decisions, contracts, commitments, obligations or any other actions undertaken or made on the basis of the information contained herein.

A. Transmission Owner Facilities Study Summary

1. PROJECT DESCRIPTION

The Project Developer has proposed a solar generating facility located in West Mansfield, Logan County, Ohio. See Attachment 2. The installed facilities for AE1-092 will have a total Maximum Facility Output (MFO) of 229.5 MW with 96.4 MW of this output being recognized by PJM as Capacity.

2. POINT OF CHANGE IN OWNERSHIP

The Generating Facility will interconnect with the AES Ohio transmission system via a newly constructed 138 kV two-bay breaker-and-a-half switchyard, Hamilton Substation, tapping the Blue Jacket - Kirby 138 kV line, 13829, approximately 10.6 miles from Blue Jacket Substation and approximately 17.4 miles from Kirby Substation.

The Point in Change of Ownership will be located at the dead-end structure outside the fence of the proposed AE1-092 interconnection substation and adjacent to the proposed property line.

The construction of the new interconnection substation will result in the splitting of the existing Blue Jacket - Kirby 138 kV line, 13829, into two lines on the transmission system. The new [13829a] will connect the AE1-092 interconnection substation to Blue Jacket and [13829b] will connect the AE1-092 interconnection substation to Kirby.

The proposed generation interconnection is shown on the single line diagram in Attachment #1.

3. AMENDMENTS TO THE IMPACT STUDY DATA OR IMPACT STUDY RESULTS

Changes to the data or results of the System Impact Study, dated August 2019 are noted as follows.

The AE1-092 Impact Study proposed a 138 kV three-breaker ring bus for the interconnection switchyard. However, AES Ohio now requires the interconnection switchyard to be configured in a 138 kV two-bay breaker-and-a-half layout. See Attachment 3.

4. PROJECT DEVELOPER SCHEDULE

Project Developer's in service date is dependent on the TO construction schedule.

5. SCOPE OF PROJECT DEVELOPER FACILITIES

The Project Developer will design, build, own, operate and maintain the Interconnection Facilities on the Project Developer's side of the Point of Change in Ownership (PCO). This includes, but is not limited to:

- 229.5 MW solar generating facility.
- Main Power Transformer (MPT)
- Generation step-up (GSU) transformer(s)
- Circuit breakers and associated equipment located between the high side of the GSU and the Point of Change in Ownership
- Generator lead line from the Generating Facility to the Point of Change in Ownership
- Protective relaying and telecommunication equipment and system(s) necessary to facilitate AES Ohio status monitoring and supervisory control of the circuit breaker(s) at the interconnection line terminal. Note: 48-count fiber will be installed between the AES Ohio interconnection substation and the Project Developer's collector substation for metering, relaying, monitoring, and remote tripping.
- See Attachment 3 for AES Ohio Generation Connection Requirements.
- See Attachment 4 for AES Ohio Protection Requirements.

AES Ohio requires the Project Developer to utilize all Schweitzer Engineering Laboratories (SEL) relays and related protective equipment for facilities that will be interconnecting or communicating with AES Ohio relaying. AES Ohio reserves the right to specify relays or other protective equipment utilized in the Project Developer's substation as required. All protection system designs shall be reviewed by AES Ohio during the design phase to ensure proper clearing times, coordination, and compliance with applicable NERC regulations and AES Ohio requirements.

B. Transmission Owner Facilities Study Results

The following is a description of Transmission Owner facilities for physical interconnection of project to the AES Ohio transmission system. These facilities and upgrades shall meet all applicable PJM requirements including "PJM Transmission and Substation Design Subcommittee Technical Requirements" and "PJM Protection Standards" (PJM Manual 7). They shall also be designed and constructed according to AES Ohio standards. See Attachment 3. After they have been constructed and put into service, AES Ohio will own, control, operate, and maintain these Facilities on the AES Ohio side of the Point of Change in Ownership.

The following upgrades, other than Section 1 and Section 3 below, are considered non-Stand Alone Network Upgrades and are not eligible for the Option to Build by the Project Developer.

1. INTERCONNECTION SUBSTATION (NEW)

Hamilton Substation Interconnection Substation (AE1-092)

A new two-bay breaker-and-a-half switchyard, Hamilton Substation 138 kV, will be constructed along the Blue Jacket - Kirby 138 kV transmission line, 13829, to interconnect the project with the AES Ohio transmission system. The scope of work for the new interconnection switchyard is further detailed below. This scope assumes that the new switchyard will be in proximity to the existing centerline of Line 13829. During detailed design and analysis, other components may be identified for installation or replacement due to this interconnection.

The scope of work for the installation of the Project Developer's interconnection and generation facilities are the responsibility of the Project Developer and are not included in this study.

A new 138 kV, two-bay breaker-and-a-half switchyard with four (4) terminal positions initially constructed with three (3) positions is required for this interconnection. Two (2) of the positions will be transmission line terminals for splitting and looping in Line 13829. One of the positions will be for the interconnection of the AE1-092 generation line. The fourth terminal position is for future use.

AES Ohio's standard 138 kV two-bay breaker-and-a-half switchyard requires site excavation and grading to develop an approximately 1.5 acre fenced switchyard with crushed rock surface. A stormwater detention basin will be installed adjacent to the switchyard outside the fence to manage runoff from the new yard depending on the results of stormwater analysis.

The bus and associated equipment for the new switchyard will be designed for operation at a nominal system voltage of 138 kV, 2000 amps continuous current, and insulated for a minimum of 550 kV BIL. Drilled pier foundations and AES Ohio standard structures will be used to support equipment such as disconnect switches, take-off structures, bus, and instrument transformers. Slab type foundations will be installed for the circuit breakers and control enclosure.

A new control enclosure will be included for relay protection and operation of the switchyard. The control enclosure will house the required protective relay panels, AC and DC systems, communications, and SCADA systems.

Protective relaying for each of the three (3) new line terminals will consist of SEL-411L (PRI) and SEL-411L (BU) relays. Protection relays for the lines to Blue Jacket and Kirby will connect to the remote end relays via power line carrier on two phases of the circuits. These terminals each require two (2) wave traps, two (2) line tuners and three (3) carrier sets for phase-to-phase coupling of tele-protection and anti-islanding control. Protection relays for the AE1-092 generation line will be connected to the generation facility via direct fiber (OPGW) on the transmission line.

Bus protection is required for each main bus of the breaker-and-a-half layout. Each bus will be protected by one (1) SEL-487B (PRI) and one (1) SEL-587Z (BU) relay. These relays will operate associated lock out relays to trip and/or isolate equipment connected to the main bus.

Breaker control, failure and reclosing will be accomplished using SEL-451 relays (one for each breaker). Breaker failure transfer trips will be sent to the appropriate remote end terminals via the carrier relays for the lines line to Blue Jacket and Kirby. For breaker failure schemes associated with the Project Developer's generation line, the associated SEL-451 relays will assert redundant transfer trip signals via fiber channels in the PRI and BU relays.

Metering of the POI will be included in the line protection panel for the AE1-092 interconnection via one (1) SEL-735 meter. This meter will be in addition to the Project Developer's required revenue meter installed at the collector substation on the high side of the main power transformer.

A RTU/communication panel is also required in the new control enclosure. This includes an IRIG antenna mounted to the outside of the control enclosure. The RTU/communication panel will include but not be limited to one (1) SEL-3350 processor, one (1) SEL Axion module, one (1) SEL-2488 GPS clock and one (1) SEL-2731 ethernet switch.

The new switchyard also requires a microwave radio system to connect it with the AES Ohio communication network. The microwave system includes one monopole mast and antenna, outdoor Cat5e cable, and one rack inside the control enclosure with a Cambium radio and Nokia router.

A fiber distribution panel in the control enclosure and 48 strand ADSS fiber optic cable from the splice enclosure on the PCO structure to the fiber panel are also required.

Major switchyard material and equipment items:

Material / Equipment	*Quantity*
138 kV Circuit Breaker 2000 A, 63 kA	5
138 kV Disconnect Switch, 2000 A	12
138 kV CCVT	2
138 kV CCVT with Carrier Accessories	4
138 kV PT	3
138 kV SSVT, 80,500/240-120 V, 100 kVA	2
138 kV Surge Arresters	9
138 kV Wave Trap, 2000 A	4
138 kV Disconnect Switch Stand, High	8
138 kV Disconnect Switch Stand, Low	4
138 kV CCVT Stand, Single Phase	2
138 kV CCVT & Wave Trap Stand	4
138 kV PT Stand, Single Phase	3
138 kV SSVT Stand	2
138 kV Deadend Take-Off Structure, 2 Bay	1
138 kV Bus Support Stand, 3-Phase, High	6
138 kV Bus Support Stand, 3-Phase, Low	4
Monopole Structure for Shielding	1
Monopole Structure for Microwave Antenna	1
138 kV Breaker Foundation (slab)	6
138 kV Disconnect Switch Stand Foundation (group of piers)	12
138 kV CCVT & PT Stand Foundation	5
138 kV CCVT & Wave Trap Stand Foundation	4
138 kV SSVT Stand Foundation	2
138 kV Deadend Take-Off Structure Foundation	6
138 kV Bus Support Stand Foundation (group of piers)	10
Shielding Monopole Foundation	1
Microwave Antenna Monopole Foundation	1

Material / Equipment	*Quantity*
Control Enclosure Foundation (slab)	1
138 kV Station Post Insulators, High Strength	26
138 kV Deadend Insulator Assembly	6
3/8" Shield Wire Deadend Assembly	9
5" SPS AL Bus (Sch 40) with 1351 ACSR Damper	1,450 FT
1351 AAC Bare Conductor	800 FT
4/0 AAC Bare Conductor	150 FT
3/8 in 7-Strand EHS Steel Shield Wire	300 FT
Yard Fencing with Dual Swing Gate	1,038 FT
Ground Conductor, 4/0 Bare Copper (Soft Drawn)	8,000 FT
Control Enclosure, includes AC/DC Panelboards, 125VDC Battery & Charger and Building Systems (35'x21')	1
Pre-cast Cable Trench (20" W x 16" D)	320 FT
Conduit	LOT
Power and Control Cable	LOT
COAX Cable	250 FT
Bus Differential Relay Panel with two (1) SEL-487B & (1) SEL-587Z	2
Line Relay Panel with (1) SEL-411L & (1) UPLC II	1
Line Relay Panel with (1) SEL-411L, (1) SEL-451, & (1) UPLC II	1
Line Relay Panel with (1) SEL-411L, (1) SEL-451, (2) UPLC II, (1) Skewed Hybrid, (1) Balanced Combiner	2
Line Relay Panel with (2) SEL-411L, (2) SEL-451& (1) SEL-735 Meter	1
RTU/Communications Panel with (1) SEL 2488 GPS Clock, (1) SEL-3350 Processor, (1) SEL-2731 Switch, (1) SEL-2240 I/O, Fiber Dist.	1
Microwave Radio Rack with (1) Cambium Radio & (1) Nokia Router	1
Microwave Antenna, 2 ft Dish	1
ADSS Fiber Trunk Cable, 48 Strand	600 FT
Serial/Fiber Optic Transceiver (SEL-2830)	1
Multimode (62.5um) Fiber-Optic Cable	300 FT
Single-Mode (1300nm) Fiber-Optic Patch Cable	150 FT
Outdoor Junction Box	5
Yard Lights	8

A geotechnical investigation and ground resistivity testing will be required for the design of foundations and the station grounding grid. Additional studies such as short circuit, lighting, direct stroke shielding, AC and DC station service studies will be required. FAA and FCC applications and filings will also be required for the microwave system.

All work to accommodate the installation of the interconnection substation is dependent upon the Developer obtaining all necessary permits, real property rights and acquisitions, including, but not limited to rights of way and easements in a form approved by AES Ohio. Any delays in obtaining the necessary real property rights, acquisitions and permits required for this interconnection may delay the execution of the project.

2. TRANSMISSION LINE TIE-IN

BLUE JACKET - KIRBY 138 kV LINE

The Blue Jacket - Kirby 138 kV line must be cut and looped into the new AE1-092 interconnection substation. This study estimates one (1) double circuit steel dead-end structure, and one (1) double circuit steel tangent structure will be installed to route Line 13829 from its existing centerline to the takeoff structures within the new switchyard. The dead-end structure will be supported on concrete drilled pier foundation. The tangent structure will be supported on direct embed foundation with crushed rock backfill. The new line sections will consist of 1351.5 kcmil 45/7 ACSR conductors and 3/8" 7-strand EHS steel overhead shield wire. Polymer insulators will be used for all structures.

Major transmission line tie-in material and equipment items:

Material / Equipment	*Quantity*
138 kV Transmission Line Conductor, 1351.5 kcmil 45/7 ACSR "Dipper"	2,300 FT
3/8 in 7-Strand EHS Steel Shield Wire	800 FT
138 kV Dead-end Steel Monopole Structures	1
138 kV Tangent Steel Monopole Structures	1
138 kV Drilled Pier Foundation, Dead-end Structures	1
138 kV Direct Embedded Foundation, Tangent Structures	1
Insulators, Connectors, Fittings, Grounding & Misc.	LOT

A geotechnical investigation will be required for the design of the structure foundations. Additional studies may also be required.

3. TRANSMISSION OWNER INTERCONNECTION FACILITIES

The TO Interconnection Facilities include, but are not limited to, the following. One 138 kV transmission line span, approximately 210-foot total, will be installed from the new AE1-092 interconnection substation bus position (POI) to the change of ownership structure (PCO) outside the substation fence. Any future revisions to the location of the PCO may trigger the need for a scope and cost re-evaluation of these interconnection facilities.

This study estimates one (1) 138 kV take-off structure inside the substation fence and one (1) 138 kV steel dead-end structure outside the fence will be installed. The steel dead-end structure will be the PCO structure. The structures will be supported on concrete drilled pier foundations. The new line section will consist of 1351.5 kcmil 45/7 ACSR conductors and 3/8" 7-strand EHS steel overhead shield wire. Polymer insulators will be used for all structures. One (1) new OPGW-ADSS splice enclosure will also be included on the PCO structure.

Major transmission line material and equipment items:

Material / Equipment	*Quantity*
138 kV Transmission Line Conductor, 1351.5 kcmil 45/7 ACSR "Dipper"	700 FT
3/8 in 7-Strand EHS Steel Shield Wire	500 FT

Material / Equipment	*Quantity*
138 kV Deadend Steel Take-Off Structure, 1 Bay	1
138 kV Dead-end Steel Monopole Structure	1
138 kV Deadend Take-Off Structure Foundation	4
138 kV Drilled Pier Foundation, Dead-end Structure	1
Fiber Splice Case	1
Fiber Splice Tray	2
Cable Storage, For OPGW Cable, 5ft Loop Diameter	1
Insulators, Connectors, Fittings, Grounding & Misc.	LOT

A geotechnical investigation will be required for the design of the structure foundations. Additional studies may also be required.

4. UPGRADE TO NEIGHBORING SUBSTATIONS

The project will require upgrades of equipment and relays at Blue Jacket and Kirby Substations to accommodate interconnection of the proposed AE1-092 interconnection substation to the AES Ohio transmission system.

4.1 BLUE JACKET SUBSTATION

The existing line protection at Blue Jacket Substation for Line 13829 no longer meets AES Ohio's protection and control standards so it will be replaced with new SEL-411L (PRI) and SEL-411L (BU) relays. The existing breaker failure and breaker control relays for 138 kV breaker EI-A at this line terminal will also be upgraded with a new SEL-451 relay to meet AES Ohio's protection and control standards.

End-to-end relay communications is currently implemented via power line carrier on one of the phases of Line 13829. Tele-protection with the new Hamilton Substation will require upgrades to utilize phase-to-phase coupling and anti-islanding control. To implement this, new equipment at the Blue Jacket Substation Line 13829 terminal will be added to a second phase of the circuit. These upgrades include a new wave trap and new CCVT with carrier accessories. AES Ohio's standard structures and drilled pier foundations will be used to support the new equipment.

Anti islanding protection will also be included with the new Line [13829a] relaying at Blue Jacket Substation. This equipment includes and is not limited to Ametek UPLC-II relays, Ametek balanced/skewed RF hybrid, and Ametek balanced/combiner RF hybrid devices.

Major terminal upgrade material and equipment items:

Material / Equipment	*Quantity*
138 kV Wave Trap, 2000 A	1
138 kV CCVT with Carrier Accessories	1
138 kV CCVT & Wave Trap Stand	1
138 kV CCVT & Wave Trap Stand Foundation	1
SEL-411L Primary and Backup Line Relays	2

Material / Equipment	*Quantity*
SEL-451 Breaker Failure and Control Relay	1
Ametek UPLC-II Relay	3
Ametek Balanced/Skewed RF Hybrid	1
Ametek Balanced/Combiner RF Hybrid	1
4/0 AAC Bare Conductor	100 FT
Power and Control Cable	LOT
Conduit	LOT
COAX Cable	400 FT
Connectors, Fittings, Grounding & Misc.	LOT

4.2 KIRBY SUBSTATION

The owner of the affected system, First Energy, will need to perform a facility study to document and estimate the upgrades needed for the AE1-092 interconnection project.

4.3 E. LOGAN SUBSTATION

A Logan REA substation, E. Logan Substation, is tapped off AES Ohio transmission Line [13829b] approximately 3.2 miles east of the proposed AE1-092 interconnection project location. New equipment is required at this substation to accommodate the AE1-092 project. The upgrades include installing a new wave trap on a second phase of Line [13829b] to prevent loss of the carrier channel between Kirby Substation and the AE1-092 interconnection substation.

Major terminal upgrade material and equipment items:

Material / Equipment	*Quantity*
138 kV Wave Trap, 2000 A	1
138 kV Wave Trap Stand	1
138 kV Wave Trap Stand Foundation	1
Jumpers, Connectors, Fittings, Grounding & Misc.	LOT

4.3 LIBERTY SUBSTATION

The new Hamilton Substation will be connected to the AES Ohio communication network via a microwave link with Liberty Substation. The network upgrades at Liberty include and are not limited to one new microwave antenna, outdoor Cat5e cable, and one Cambium radio.

Major terminal upgrade material and equipment items:

Material / Equipment	*Quantity*
Cambium Radio, PTP-670	1

Material / Equipment	*Quantity*
Microwave Antenna, 2 ft Dish	1
Connectors, Fittings, Grounding & Misc.	LOT

5. INSTALLATION OF FIBER CABLE CIRCUITS

A fiber optic pathway shall be installed for protective relay communications between the new AE1-092 interconnection substation and the Project Developer's remote end collector substation. The Project Developer is responsible for installing 48 strand OPGW, DNO-12161, on the approximately 0.15 miles generator lead line up to the PCO structure. AES Ohio will route ADSS fiber optic cable from the splice point on the PCO structure into the new AE1-092 interconnection substation control building.

6. COST ESTIMATE OF AES OHIO FACILITIES FOR PHYSICAL INTERCONNECTION

The following table summarizes the total estimated costs according to FERC criteria. The estimated costs are in 2028 dollars. **This cost excludes Federal Income Tax Gross Up charges on Contributions in Aid of Construction (CIAC)**. This tax may or may not be charged based on whether this project meets the eligibility requirements of IRS Notice 88-129. If at a future date it is determined that the Federal Income Tax Gross charge is required, the Transmission Owner shall be reimbursed by the Project Developer for such taxes.

6.1 COST ESTIMATE FOR TRANSMISSION OWNER-BUILD OPTION

Work Description	Type of Upgrade	Direct		Indirect		Total Cost	Tax
		Labor	Material	Labor	Material		
Transmission Owner Interconnection Facilities	TOIF	$408,434	$242,393	$145,785	$0	$796,612	$0
New Interconnection Substation	Stand Alone Network Upgrade	$4,116,124	$6,024,513	$2,271,503	$0	$12,412,140	$0
Interconnection Substation tie-in	Network Upgrade	$420,470	$186,936	$408,332	$0	$1,015,738	$0
Remote End Upgrades at Blue Jacket Substation	Network Upgrade	$192,002	$160,712	$318,431	$0	$671,145	$0
Remote End Upgrades at Liberty Substation	Network Upgrade	$17,281	$12,825	$80,173	$0	$110,279	$0
Remote End Upgrades at E. Logan Substation	Network Upgrade	$41,638	$24,896	$191,717	$0	$258,251	$0
Total Project Costs		$5,195,949	$6,652,275	$3,415,941	$0	$15,264,165	$0

6.2 COST ESTIMATE FOR DEVELOPER-BUILD OPTION

Work Description	Type of Upgrade	Direct		Indirect		Total Cost	TAX
		Labor	Material	Labor	Material		
Transmission Owner Interconnection Facilities (Oversight)	TOIF	*	*	*	*	*	*
New Interconnection Substation (Oversight)	Stand Alone Network Upgrade	$611,738	$22,500	$12,685	$0	$646,923	$0
Interconnection Substation tie-in	Network Upgrade	$420,470	$186,936	$408,332	$0	$1,015,738	$0
Remote End Upgrades at Blue Jacket Substation	Network Upgrade	$192,002	$160,712	$318,431	$0	$671,145	$0
Remote End Upgrades at Liberty Substation	Network Upgrade	$17,281	$12,825	$80,173	$0	$110,279	$0
Remote End Upgrades at E. Logan Substation	Network Upgrade	$41,638	$24,896	$191,717	$0	$258,251	$0
Total Project Costs		$1,283,129	$407,869	$1,011,338	$0	$2,702,336	$0

* See assumptions in Section 8.

Project Developer and Transmission Owner hereby acknowledge and agree that the costs listed in this report are only estimates. Project Developer is responsible for all actual costs, including any applicable direct or indirect taxes and/or gross-up, associated with Transmission Owner's installation of Transmission Owner's Facilities.

7. MILESTONE SCHEDULE FOR COMPLETION OF AES OHIO WORK

Facilities outlined in this report are estimated to take 49 months to construct, from the time the Generation Interconnection Agreement is fully executed. This schedule is based on the ability to obtain outages to construct and test the proposed facilities and is subject to change.

Description	Start month	Finish month
Project Kickoff	0	0
Preliminary Engineering	0	4
Detailed Engineering	4	12
Procure Materials and Equipment	0	41
Permitting	26	36
Construction, non-Outage	36	43
Testing & Commissioning, non-Outage	41	44

Construction, Outage 1	44	45
Testing & Commissioning, Outage 1	45	46
Construction, Outage 2	46	48
Testing & Commissioning, Outage 2	48	49

8. ASSUMPTIONS IN DEVELOPING SCOPE/COST/SCHEDULE

Interconnection Construction Service Agreement or Generation Interconnection Agreement will be executed by the end of 2024, and the project start will be early in 2025.

Project developer will be responsible for all expenses to meet the AES Ohio Protection Requirements required for developer to connect to the AES Ohio system.

Project developer will be responsible for acquiring all new rights-of-way, easements and properties required for the project. The Project developer will also be responsible for the costs incurred to obtain the necessary state siting approvals, environmental and other permits required to construct the facilities.

New Interconnection Substation oversight costs in Table 6.2 include both TOIF and New Interconnection Substation construction.

Outages can be scheduled as planned. Outage starts are based on long lead material availability and are subject to change. Outage durations are based on 5x10s. Note: no outages have been planned or scheduled as of this study date.

Transmission outages are typically not granted from June to September and are discouraged during extreme winter conditions. PJM and AES Ohio require 6 to 12-month notice for greater than 5-day and 30-day outages, respectively.

Project developer will provide location and orientation of their attachment facilities.

No delays due to funding, equipment or material delivery, environmental, regulatory, permitting, real estate, extreme weather, or similar events. Lead times for long lead equipment and material are subject to change. Schedule assumes 173-week lead time for breakers.

No significant sub-surface rock encountered during construction, and soil conditions are suitable for standard foundation installations.

Neither foundation nor structural analyses have been performed. Study assumes that no significant foundation or structural issues are present.

Existing structures adjacent to the new cut and loop structures on the Blue Jacket-Kirby 138 kV line have sufficient capacity to support the new line configuration and will not need to be replaced as part of this project.

Existing microwave structure at remote end substation has sufficient space and loading capability to accommodate the new radio equipment.

Existing AC and DC power systems are adequate for proposed remote end upgrades under normal and emergency conditions. Formal power studies will be conducted during detailed engineering to confirm.

Taxes are not required and have not been included.

9. METERING REQUIREMENTS

All metering needed for this interconnection project must meet the metering requirements stated in Appendix 2, section 8 of the AE1-092 GIA, and in PJM Manuals M01 and M14D. The details of applicable metering requirements are given in the 'AES Ohio Interconnection Standards' posted on the PJM website.

The revenue metering shall be located at the Generating Facility's collector substation on the high side of the main power transformer. The metering data shall be electrically compensated to the Point of Interconnection (the take-off structure inside the new Lexington Substation fence). The revenue meter will be owned and maintained by the Project Developer. Revenue metering is to include KWH, KVARH and real time data (KW, KVAR) for the Project Developer's generating facility.

Check metering will be installed at the Point of Interconnection and will be owned and maintained by AES Ohio.

10. LAND REQUIREMENTS FOR INTERCONNECTION SUBSTATION

AES Ohio land requirements for the interconnection include but are not limited to the substation site, site access, transmission line corridor and storm water detention as required for the project. A parcel of land measuring a minimum of 385 feet by 650 feet is required for the AE1-092 Interconnection Substation. Drive access to the new substation yard and storm water detention are included in these dimensions.

Property, ROW, easements, etc provided by the Project Developer must meet the minimum requirements described above and in the 'AES Ohio Interconnection Standards' document posted on PJM website. Other property, ROW, easements, etc may also be required to accommodate other needs based on the interconnection project and the site.

11. ENVIRONMENTAL AND PERMITING

The facility study included an environmental desktop review of the proposed AE1-092 interconnection substation location:

40°25'48.55"N 83°35'26.66"W

The environmental desktop review included the following resource agency databases for potential environmental conflicts: U.S. Fish and Wildlife Service (USFWS), U.S. Geological Survey National Hydrological Dataset (NHD) and topo maps, Federal Aviation Administration, Federal Emergency Management Agency, Ohio Environmental Protection Agency (Ohio EPA), Ohio Department of Natural Resources (ODNR), Ohio Power Siting Board (OPSB), and Logan County's Engineer's Office, Building Authority and Soil & Water Conservation District.

The desktop review indicated there are no wetlands or stream resources, no potential habitat for threatened/endangered species, and no floodplains within the project's limits of disturbance. An on-site delineation and habitat evaluation is recommended to identify any potential Waters of the US, sensitive species habitat, and to complete informal consultation with the USFWS related to the

Migratory Bird Treaty Act (MBTA) and Bald and Golden Eagle Protection Act (BGEPA). This documentation will be required for Ohio Power Siting Board (OPSB) submission.

The Information for Planning and Consultation (IPaC) database indicated that "There are bald and/or golden eagles in your project area." An on-site habitat evaluation is recommended to complete informal consultation with the USFWS related to the MBTA and BGEPA. Due to the lack of potential habitat apparent from a desktop review, it is anticipated there will be no effect to bald or golden eagles. Costs are also included for informal consultation with USFWS to confirm no impacts to threatened or endangered species, and no effects to bald or golden eagles. There appear to be no trees on site, however if trees are to be cleared, a survey should be conducted to identify the presence of potentially suitable habitat for listed threatened and endangered bat species. It is recommended that any necessary tree clearing be conducted between October 1st and March 31st to avoid impacts to listed bat species.

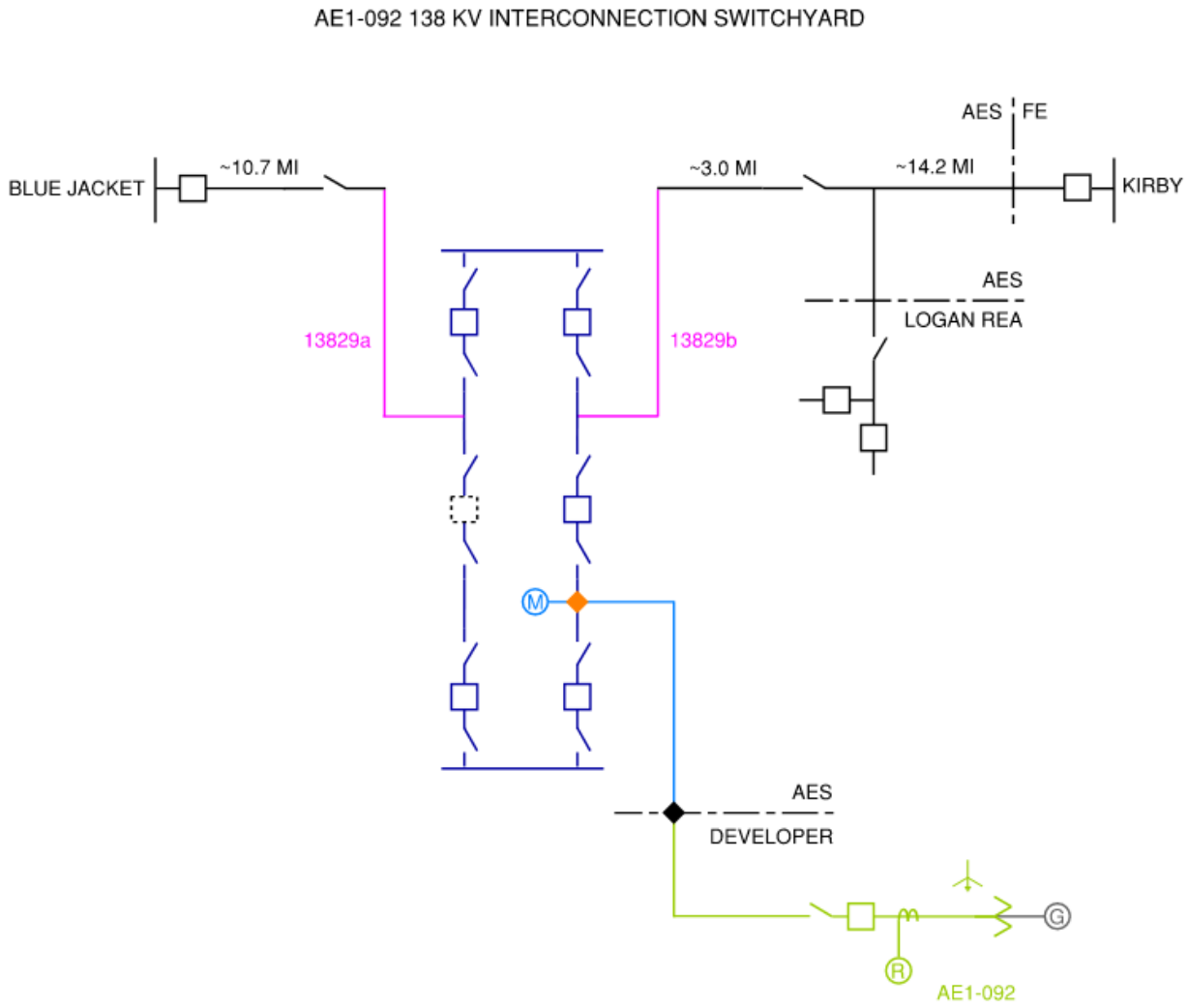
The proposed project space is anticipated to be greater than 1 acre of disturbance and will require a National Pollutant Discharge Elimination System (NPDES) permit. Additionally, the project meets the OPSB criteria for a "Major utility facility" due to design capacity being greater than the 100kV threshold (Section 4906.01 of the Ohio Revised Code) and the criteria "(3) Constructing a new electric power transmission substation" in the Ohio Revised Code 4906-1-01 Appendix A "Application Requirement Matrix for Electric Power Transmission Lines". Due to the need for OPSB filing, Cultural and Historic Resource Consultation with State Historic Preservation Office (SHPO) will be required, and consultation with the USFWS and ODNR for threatened and endangered species will be required. Since the project includes the construction of a new driveway access off of County Road 26, a Logan County Access Permit Request and a Work Along or Across Roads or Streets Application will be required. A Special Hauling Permit may also be required for travel to the site via Logan County roadways.

C. APPENDICES

Attachment #1:	Single line Diagram for the Physical Interconnection
Attachment #2:	Substation Location Plan
Attachment #3:	Generator Connection Requirements
Attachment #4:	Protection Requirements

Attachment #1

Single line Diagram for the Physical Interconnection



Attachment #2

Substation Location Plan

Attachment #3

Generator Connection Requirements

AES Ohio has prepared this “AES Ohio Interconnection Standards” document to ensure compliance with North American Electric Reliability Council (NERC) Reliability Standards and applicable Regional Reliability Organization, sub regional, Power Pool, individual Transmission Owner planning criteria and Facility Interconnection requirements in compliance to NERC Standard FAC-001-3. These connection requirements apply to all generation facilities, transmission facilities, and end-users connecting to the AES Ohio transmission system. The “AES Ohio Interconnection Standards” document can be reviewed utilizing the following link:

https://www.pjm.com/planning/design-engineering/to-tech-standards/private-dayton.aspx

Attachment #4

Protection Requirements

The Project Developer will be required to comply with all AES Ohio System Relay and Protection Requirements. The System Relay and Protection Requirements may be found within the "AES Ohio Interconnection Standards" which can be reviewed at the following link:

https://www.pjm.com/planning/design-engineering/to-tech-standards/private-dayton.aspx

System Protection and Coordination

Generation facilities, transmission facilities, and end-user facilities connecting to the AES Ohio transmission system are responsible for determining that the proper protective equipment meet all applicable standards, it is properly installed, and it coordinates with AES Ohio relaying. Protective relaying systems and associated communications systems for all facility interconnections shall be planned, designed, constructed, and maintained in accordance with applicable NERC, RF, and PJM standards. Utility grade protective relays and fault clearing systems are to be utilized on the interconnected power system. Utility grade relays are defined as follows:

- Meet ANSI/IEEE Standard C37.90, Relays and Relay Systems Associated with Electric Power Apparatus.
- Have relay test facilities to allow testing without unwiring or disassembling the relay.
- Have appropriate test plugs/switches for testing the operation of the relay.
- Have targets to indicate relay operation.

The Developer must take responsibility for providing adequate system protection to its facilities and to AES Ohio's facilities under any transmission operating condition, whether or not their facilities are in operation. Conditions may include but are not limited to:

1. Single phasing of supply
2. System faults.
3. Equipment failures.
4. Abnormal voltage or frequency.
5. Lightning and switching surges.
6. Excessive harmonic voltages and/or currents.
7. Excessive negative sequence voltages
8. Separation from AES Ohio.
9. Synchronizing of generation to the AES Ohio system

AES Ohio reserves the right to specify functional specifications and relay settings deemed necessary to avoid safety hazards or to prevent any disturbance, impairment or interference with AES Ohio's ability to serve other customers. The criteria for these functional specifications and settings will be based on existing AES Ohio protection practices. AES Ohio reserves the right to specify the type and manufacturer for these protective relays to ensure compatibility with existing relays. AES Ohio will

make specific recommendations and requirements for protection based on the individual substation location, voltage and configuration.

For generation facilities, the relay protection system may be part of a self-contained generation control package. Additional relay protection may be required if testing or operational problems are encountered with this self-contained generation control package. AES Ohio shall review the interface protection and/or the self-contained protection schemes included with the generation before the unit will be permitted to connect to the AES Ohio system. The following relay functions are required from the Project Developer for protection of the AES Ohio system. Use of the transfer trip receiver is conditional as set forth below.

Relay	**Purpose**
Frequency	To detect under and over frequency operation and separate the customer's parallel generation.
Under/Over voltage	To detect under and over voltage operation and cause separation of the customer's parallel generation.
Transfer Trip Receiver	To receive a trip signal from a AES Ohio transfer trip transmitter and separate the customer's parallel generation.
Ground Detector	To detect a ground fault on the AES Ohio or customer system and separate the customer's parallel generation.
Directional Power	To detect a reverse power flow condition and separate the customer's parallel generation.

The purpose of these relays is to detect the generation owner's energizing of a AES Ohio circuit that has been isolated from the AES Ohio system, by circuit breaker or other disconnect device operations or detect the generation operating at an abnormal voltage or frequency, or to detect a fault or abnormal condition on the AES Ohio system thereby requiring the generation owner to separate their generation from the AES Ohio system. Output contacts of these relays shall directly energize the trip coil(s) of the generation breaker or an intermediate auxiliary tripping relay that directly energizes the breaker trip coil(s). The relaying system shall have a power source independent from the ac system or immune to ac system loss or disturbances (e.g., dc battery and charger) to assure proper operation of the protection scheme. Loss of this source shall cause removal of the generation from the AES Ohio system.

AES Ohio will specify settings for the generation's AES Ohio -required relays to ensure coordination between the generation protective equipment and the AES Ohio system relays. It is the generation owner's responsibility to determine that their internal protective equipment coordinates with the required AES Ohio protective equipment and is adequate to meet all applicable standards. AES Ohio reserves the right to modify relay settings when deemed necessary.

A transfer trip relaying system (or other not specified above) must be installed at the generation owner's expense if AES Ohio determines it is necessary to protect the transmission system. The transfer trip relaying system shall consist of all transfer trip transmitters located at AES Ohio facilities, transfer trip receivers at the generation facility and the communication channels between the AES Ohio location(s) and the generation facility.

Project Developer should also be familiar with the PJM Protection System Standards which can be found at the link below.

http://www.pjm.com/-/media/documents/manuals/m07.ashx