



**BROOKSIDE SOLAR, LLC**

**Matter No. 21-00917**

**900-2.6 Exhibit 5**

**Design Drawings**

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## Acronym List

AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AES	The AES Corporation, Inc.
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
HDD	horizontal directional drilling
ICEA	Insulated Cable Engineers Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
kV	kilovolt
kW	kilowatt
LOD	limit of disturbance
MVA	mega volt-amp
MWAC	megawatt alternating current
NEC	National Electric Code
NEMA	National Electric Manufacturers Association
NESC	National Electrical Safety Code
NFPA	National Fire Protection Association
NYCRR	New York Codes, Rules and Regulations
NYSEG	New York State Electric and Gas
O&M	operations and maintenance
ORES	Office of Renewable Energy Siting
OSHA	Occupational Safety and Health Administration
PE	Professional Engineer
ROW	right-of-way
RUS	Rural Utilities Service
USCs	Uniform Standards and Conditions

## Glossary Terms

<b>Applicant</b>	Brookside Solar, LLC, a subsidiary of The AES Corporation, Inc. (AES), the entity seeking a siting permit for the Facility from the Office of Renewable Energy Siting (ORES) under Section 94-c of the New York State Executive Law.
<b>Facility</b>	The proposed components to be constructed for the collection and distribution of energy for the Brookside Solar Project, which includes solar arrays, inverters, electric collection lines, and the collection substation.
<b>Facility Site</b>	The parcels encompassing Facility components, which totals 1,471 acres in the Towns of Burke and Chateaugay, Franklin County, New York (Figure 2-1).
<b>Limits of Disturbance</b>	The area to which construction impacts will occur, totaling approximately 645 acres.
<b>Towns</b>	The Towns of Burke and Chateaugay, Franklin County, New York.

## **Exhibit 5: Design Drawings**

This Exhibit provides information required in accordance with the requirements of Section 900-2.6 of the Section 94-c regulations and contains the Design Drawings as Appendix 5-1.

As described previously in Exhibit 2 (Overview and Public Involvement), the Facility is a 100-megawatt alternating current (MWAC) solar electric-generating facility proposed within the 1,471-acre Facility Site in the Towns of Burke and Chateaugay, Franklin County, New York (Towns). Electric-generating components, as well as the collection substation, collection lines, and inverters will be installed entirely within the Facility Site and will require approximately 645 acres (referred to as the limit of disturbance [LOD]). The Facility Site also includes the construction of approximately 5 miles of haul roads, the majority of which are within the Facility Site, some of which will extend outside of the Facility Site boundary for connection to existing public roadways. Interconnection facilities required for the Facility include two proposed three-wire 115-kilovolt (kV) interconnection transmission lines, approximately 173 feet and 210 feet long, which will tie the proposed Facility POI switchyard to the existing New York State Electric and Gas (NYSEG) Line 911 Willis Road to Chateaugay 115-kV transmission line. The following subsections include descriptions of the proposed Facility components and reference the applicable locations where the information can be found on the Design Drawings included as Appendix 5-1.

### **5(a) Statement of Engineer Qualifications**

The Design Drawings and supporting documentation prepared for the Application, and included as Appendix 5-1, were developed under the direction of a licensed Professional Engineer (PE) in the State of New York, as identified on Sheet PV-G.00.01.

### **5(b) Conformance with Setback Requirements for Wind Turbines**

The proposed Facility is a solar facility. Therefore, this section is not applicable.

### **5(c) Wind Turbine Descriptions**

The proposed Facility is a solar facility. Therefore, this section is not applicable.

## 5(d) Conformance with Setback Requirements for Solar Facilities

The Facility has been designed to meet or exceed the setback requirements listed in Table 5-1 below, which correspond directly to the requirements presented in Table 2 of Section 900-2.6(d) of the Section 94-c Regulations and local town law. Three areas within the Facility Site contain chain-link fencing, which intersects the Section 94-c setbacks (Sheets PV-C.01.01, PV-C.01.02, PV-C.01.04, PV-C.01.05, PV-C.01.15, and PV-C.01.17 through PV-C.01.21).

**Table 5-1. Setback Requirements for Solar Facility Components**

Setback Type <sup>1</sup>	94-c Solar Facility Setback <sup>2</sup>	Town of Burke/Chateaugay Zoning Summary - Solar Energy Law <sup>3</sup>
Non-participating residential property lines	100 feet	n/a
Centerline of public roads	50 feet	50 feet
Non-participating property lines (non-residential)	50 feet	n/a
Non-participating occupied residences	250 feet	500 feet
Minimum setback from residential structures <sup>4</sup>	n/a	500 feet
Minimum setback from private/public right of ways	n/a	50 feet
Fence Height	n/a	7'-0"
<sup>1</sup> Part of this table was adapted from Table 2 under Section 900-2.6(d) of the Section 94-c Regulations. <sup>2</sup> The Facility was designed to meet the more stringent setback. <sup>3</sup> See Table 24-1 for further details. <sup>4</sup> Affected homeowners may irrevocably waive the requirement		

The Design Drawings in Appendix 5-1 depict setbacks in accordance with Section 94-c (per Table 5-1 above), where appropriate. Fencing, collection lines, haul roads, and landscaping may be constructed within the setbacks. All solar arrays, inverters, and the collection substation will be constructed in accordance with the required setbacks.

## 5(e) Solar Array Height

The maximum height of the Facility solar arrays is 8 feet, 11 inches (2.72 meters). Therefore, the arrays will not exceed 20 feet from finished grade. The height of the arrays is measured from the highest natural grade below each individual panel to its maximum potential height.

As stated in Section 900-2.6(e), this height restriction does not apply to electrical collection, transmission, or substation/switchyard components.

## **5(f) Design Drawings**

As required per Section 900-2.6(f) of the Section 94-c Regulations, the following sections describe the information included on the Design Drawings (Appendix 5-1) and within the supporting documentation.

### **(1) Site Plans**

The Site Plan of the proposed Facility has been provided within Appendix 5-1, depicting Facility components as required in the following subsections.

#### *(i) Solar Facility Site Plan Drawings*

General Site Plan drawings of all Facility components are included throughout the Design Drawings in Appendix 5-1 at a scale of 1 inch = 100 feet. Additionally, the Applicant has provided two full-size (22 inches x 34 inches) hard copy sets of the Design Drawings with the Application. Per the Section 94-c regulations, the Design Drawings include the following proposed and existing features.

#### *(a) Solar Panel and Setbacks*

The Overall Site Layout (Sheet PV-G.02.01 of Appendix 5-1) depicts the locations of the Facility solar arrays, property lines, and the applicable setbacks described above in Section 5(d). Detailed drawings inclusive of solar arrays, inverters, property lines, and setbacks (as well as additional Facility components) are depicted on Sheets PV-C.01.01 through PV-C.01.21. The Facility includes 246,298 solar modules organized by 26 modules per string (total of 9,473 strings). The inverters proposed for the Facility are Sungrow SG3600UD-MV inverters with a 3,600-kilowatt (kW) rating. The Facility proposes to use 30 inverters, centrally located throughout the panel arrays. The collection substation includes a 75/100/125-mega volt-amp (MVA)-rated step-up transformer, which steps up the voltage from the collection line voltage of 34.5 kV to 115 kV for interconnection to

the NYSEG 115-kV system (Appendix 5-3). The collection substation transformer is shown on the collection substation single-line diagram, Sheet HV-E.02.01.

#### (b) Haul Roads

The Facility proposes the use of permanent haul roads (referred to on the drawings in Appendix 5-1 as “haul roads”) throughout the Facility Site. Extents of proposed haul roads, including indications of any existing haul roads to be used, and any turn-around areas are shown. Site entrance improvement details are included on Sheet PV-C.03.01. Proposed permanent haul road widths vary throughout the Facility, with the majority designed at 20 feet wide, which is consistent with the local fire code. The Facility contains a total of approximately five miles of permanent haul roads. Additional 14-foot-wide areas designated for access are dispersed throughout the Facility.

Limited use pervious haul roads are proposed to provide access to the equipment pads, collector substation, and operations and maintenance (O&M) yard. Limited use stabilized pervious haul roads will be used in areas where grades make the use of culverts impractical, and stormwater runoff will flow over the road. Limited use pervious haul roads are intended for post-construction use only.

#### (c) Collection Lines

The Facility includes 54,287 linear feet (10.3 miles) of 34.5-kV collection lines that will gather power from the inverters and transport it underground to the collection substation. Collection lines will be installed underground via trenching with the exception of 15 locations where horizontal directional drilling (HDD) will be employed to avoid impacts to sensitive resources and road crossings. Collection lines have been co-located with haul roads to the maximum extent practicable to reduce the extent of impacts within the Facility Site. There are no overhead collection lines proposed as part of the Facility. Specific details regarding collection lines are located on PV-E.02.01 through PV-E.02.13 of the Design Drawings included in Appendix 5-1.



#### (d) Existing Utility and Interconnection Plan

A new proposed interconnection line will originate from the collection substation and extend to the proposed NYSEG owned interconnection yard. This NYSEG interconnection yard will have two connections to the existing NYSEG Line 911 Willis Road to Chateaugay 115-kV transmission line. Interconnection facilities include two 115 kV transmission lines between the Facility's proposed interconnection substation and the existing transmission line. The two proposed 115-kV transmission lines are approximately 173 feet and 210 feet long. Interconnect details, including the location of the existing transmission line and proposed new transmission structures, are shown on Sheets HV-C.09.01 through HV-C.09.05, respectively, of Appendix 5-1. The limits of utilities outside the Facility Site are identified on the Design Drawings. There are no pipelines or other existing utilities mapped within the Facility Site.

#### (e) LODs

The approximate LOD for the Facility is approximately 645 acres and includes the limits of all areas to be disturbed as part of the Facility, including locations of solar panels, temporary and permanent haul roads, collection lines, inverters, the collection substation and interconnection, and fence line. The LOD also includes areas that will be temporarily disturbed during construction including laydown yards and clearing limits.

#### (f) Clearing Limits

The vegetative clearing limits for the Facility are shown on Sheets PV-C.00.01 through PV-C.00.21 of Appendix 5-1. Vegetative clearing has been minimized to the maximum extent practicable for construction, placement of Facility components, and to prevent module shading during operation. It includes a total of approximately 46 acres, including for solar panel placement, haul roads, electric collection lines, and shading vegetation.

#### (g) Interconnection Facilities and Setbacks

The collection substation, interconnection, and existing NYSEG right-of-way (ROW) is depicted on Sheets PV-C.01.15 and PV-C.01.17 of Appendix 5-1. The interconnection substation and the collection substation will be accessible via a new permanent haul road off County Route 23 and adheres to both Section 94-c and the Town of Burke setback requirements. Full details of the collection and interconnection design are located on the following Sheets in Appendix 5-1:

- Point of Interconnection Substation: 422299-0001-001 through 422299-0006-001
- Collection Substation: Sheets HV-P.01.01 through HV-P.15.02,
- Collection System: HV-P.01.01 through HV-P.15.02, and
- Transmission Drawings: Sheets HV-C.09.01 through HV-C.09.06.

#### (h) Energy Storage Systems and Setbacks for Solar Facilities

No battery energy storage systems are proposed for the Facility.

#### (i) Site Security Features

A discussion of site security for the Facility is included in Section 6(b) of Exhibit 6 (Public Health, Safety, and Security), including security features such as access controls, electronic security and surveillance, security lighting, and cyber system security. Additionally, a Site Security Plan detailing security features and risk mitigation measures has been included as Appendix 6-2. The self-locking security fencing for the array will consist of a 7-foot-tall chain-link fence, with no barbed wire, surrounding the Facility as shown on Sheet PV-C.10.01. Fencing specific to the collection substation is shown on Sheet PV-C.10.02. The fencing will be 7 feet in height with an additional 1 foot of barbed wire for additional security at the collection substation. The locations of Facility fencing are shown on Sheets PV-C.01.01 through PV-C.01.21.

#### (j) Landscaping improvements

Sheets PV-C.13.00 through PV-C.14.07 of Appendix 5-1 include details of the Landscaping Plan for the Facility. The landscape drawings detail the location of proposed vegetative screening in relation to Facility components and adjacent sensitive receptors. Additionally, Sheets PV-C.14.01 through PV-C.14.07 include general planting notes, details on plantings, and identifies the quantities and types of

tree and shrub species that are proposed. No berms or retaining walls are proposed for the Facility.

*(ii) Wind Facility Site Plan Drawings*

The proposed Facility is a solar facility. Therefore, this section (and subsections (ii)(a) through (ii)(l)) are not applicable.

**(2) Design Detail Drawings**

The Applicant has provided the following typical design detail drawings within Appendix 5-1 as required by the Section 94-c regulations. The plans were prepared using AutoCAD Civil 3D design software and are generally presented at a scale of 1-inch equals 100 feet, with the exception of those intended to provide an overview of the Facility Site.

*(i) Typical Elevation Drawings*

Typical elevation drawings for the collection substation and interconnection facilities are included in Appendix 5-1 and described further in subsections 5(2)(i)(b) and (c) below. Drawings include the length, width, height, material of construction, color, and finish of all structures and fixed equipment as part of the Facility and are described by Facility component in the following sections. There will be a control house at the proposed collection substation and container storage at the O&M yard.

*(a) Wind Turbine Typical Elevation Drawings*

The proposed Facility is a solar facility. Therefore, this section is not applicable.

*(b) Interconnection Facilities Drawings*

Interconnection facilities include two 115-kV transmission lines, approximately 173 and 210 feet long that will originate from the collection substation and extend from the Facility Site to the existing NYSEG Line 911 Willis Road to Chateaugay 115-kV transmission line. An elevation drawing for the interconnection line and proposed new transmission structures is included on Sheet HV-C.09.02 of Appendix 5-1, with additional details on Sheets HV-C.09.01 through HV-C.09.06. The proposed interconnection lines are approximately 173 and 210 feet long, 25 feet wide, and 53

feet above ground. The color of the line will be galvanized gray and will be self-supported steel poles on foundations.

**(c) Collection Substation Drawings**

The Applicant has included with this application drawings for the collection substation (including fencing, gates, the take-off structure, and all substation equipment), and a general arrangement plan has been included in the drawing set showing elevation mark pointers (arrows) with a reference to the associated elevation views (including views of all components of the substation). The general arrangement plan is included on Sheet HV-P.01.01 of Appendix 5-1, with additional electrical equipment elevations included on Sheets HV-P.02.01 and HV-P.02.02. The control house general arrangement and details are included on HV-P.14.01, HV-P.15.01, and HV-P.15.02.

**Table 5-2. Collection Substation Specifications**

<b>Length</b>	229 feet
<b>Width</b>	130 feet
<b>Height</b>	65 feet (take-off structure)
<b>Material of Construction</b>	Steel structures, steel equipment enclosures, and steel control building
<b>Color and Finish</b>	Galvanized steel structures, equipment painted light gray, and control building painted light gray.

**(d) Energy Storage Typical Elevation Drawings**

No battery energy storage systems are proposed for the Facility.

**(ii) Permanent Point of Access Drawings**

Each proposed permanent point of access and access type has been depicted in the design plans. Per the Section 94-c regulations, these drawings include a typical installation plan view, cross-section, and side view with appropriate dimensions (temporary and permanent width(s)) and identification of materials to be used along with

corresponding material thickness. Where existing accessways will be used, a description of proposed upgrades for Facility construction has been provided.

*(iii) Underground Infrastructure Drawings*

Typical underground infrastructure/collection system details have been provided, including single and multiple circuit layouts with dimensions of proposed depth, trench width, level of cover, separation requirements between circuits, clearing width limits for construction and operation of the Facility, LOD, required permanent ROW, and a description of the cable installation process. Appendix 5-1 includes details on the collection system and installation information. Typical details of any proposed splice vaults have also been provided, including vault dimensions; level of cover; required trench length, width, and depth; clearing width limits for construction and operation of the Facility; and LOD.

*(iv) Overhead Electric Transmission and Collection Typical Elevation Drawings*

Details have been provided for typical overhead electric transmission lines, including a profile of the centerlines at an exaggerated vertical scale and typical elevation plans including height above grade and structure layouts. An elevation drawing for the interconnection line and proposed new transmission structures is included on Sheet HV-C.09.02 of Appendix 5-1, with additional details on Sheets HV-C.09.01 and HV-C.09.03. There are no overhead collection lines proposed for the Facility.

**(3) Compatibility of Wind Turbine with Existing Conditions**

The proposed Facility is a solar facility. Therefore, this section is not applicable.

**(4) Engineering Codes, Standards, and Guidelines**

The Applicant intends to conform to the below listed engineering codes, standards, guidelines, and practices during the planning, designing, construction, and operation of the Facility's solar arrays, electric collection system, substation, transmission line, interconnection, and associated structures, as applicable:

- American National Standards Institute (ANSI)
- Institute of Electrical and Electronics Engineers (IEEE)

- International Electrotechnical Commission (IEC)
- Insulated Cable Engineers Association (ICEA)
- American Society of Mechanical Engineers
- National Electric Code (NEC)
- National Electrical Safety Code (NESC)
- National Electric Manufacturers Association (NEMA)
- National Fire Protection Association (NFPA)
- Uniform Building Code
- United Laboratories
- American Iron and Steel Institute
- American Institute of Steel Construction
- International Building Code 2006
- American Association of State Highway and Transportation Officials (AASHTO) Standard for Aggregates
- American Society of Civil Engineers (ASCE)
- Federal Occupational Safety and Health Administration (OSHA) 1910.269
- American Concrete Institute (ACI)
- Rural Utilities Service (RUS) bulletins

#### **(5) *Design, Safety, and Testing of Equipment***

The Applicant intends to use a module similar to the Jinko Solar TR 72M 515-535 watt bi-facial module. The Applicant is also proposing to use the DuraTrack HZ v3 array tracking system, or similar, which will be installed with minimal ground disturbance via driven posts. A specification sheet for the modules and tracking system has been included as Appendices 2-1 and 2-2, respectively. The collection system will include a CAB<sup>®</sup> cabling system or underground line to connect the solar modules to the inverters and ultimately to collection substation. The Applicant intends to use a Sungrow SG3600UD-MV inverter, or a similar inverter, for this Facility. A specification sheet for this inverter has been included in Appendix 5-2. A specification sheet for the main power step-up transformer at the collection substation has also been included in Appendix 5-3. All Facility components including the solar modules, collection system, inverters, substation, transmission line, and interconnection systems have been designed to meet the specifications that are provided by the manufacturer of each component and specifications

listed in Section 5(f)(4). All systems will be tested prior to commercial operation of the Facility and to ensure components are functioning properly.

## **Conclusions**

The Design Drawings and supporting documentation prepared for the Application are provided within Appendix 5-1 and were developed under the direction of a licensed PE in the State of New York. The Facility has been designed to meet or exceed the local laws and requirements under Section 94-c, including setback requirements and maximum panel height. The Applicant intends to conform to all applicable engineering codes, standards, guidelines, and practices during the planning, designing, construction, and operation of the Facility's solar arrays, electric collection system, substation, and interconnection. The Facility has been designed to comply with 19 New York Codes, Rules and Regulations (NYCRR) Section 900-2.6 and the Uniform Standards and Conditions (USCs).