

**APPLICATION**  
**TO THE**  
**OHIO POWER SITING BOARD**  
**FOR A**  
**CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY AND PUBLIC NEED**  
**FOR THE**  
**HILLCREST SOLAR FARM**  
Green Township  
Brown County, Ohio  
**Case No. 17-1152-EL-BGN**  
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## **COMMONLY USED ACRONYMS and ABBREVIATIONS**

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AC	Alternating Current
Board	Ohio Power Siting Board
DC	Direct Current
DSM	Digital Surface Model
EMF	Electromagnetic Field
ESA	Environmental Site Assessment
FAA	Federal Aviation Administration
HDD	Horizontal Directional Drilling
ISA	Interconnection Service Agreement
kV	Kilovolt
kw	Kilowatt
LIDAR	Light Detection and Ranging
MW	Megawatt
MW-ac	Megawatt-alternating current
NPDES	National Pollutant Discharge and Elimination System
ODNR	Ohio Department of Natural Resources
Ohio EPA	Ohio Environmental Protection Agency
PILOT	Payment in lieu of taxes
PV	Photovoltaic
PJM	PJM Interconnection, LLC
QEP	Qualified Energy Project
SWPA	Source Water Protection Area
SWPPP	Storm-water Pollution Prevention Plan

## **I. INTRODUCTION**

This Application for a Certificate of Environmental Compatibility and Public Need (“Application”) is submitted to the Ohio Power Siting Board (“Board”) by Hillcrest Solar I, LLC (“Applicant”) pursuant to Chapters 4906-3 and 4906-4 of the Ohio Administrative Code. The Application seeks a Certificate of Environmental Compatibility and Public need (“Certificate”) to construct and operate the Hillcrest Solar Farm, which is a proposed solar-powered electric generation facility of up to 125 megawatts (alternating current) in capacity in Brown County, Ohio (“Project”). Applicant seeks to construct and operate the Project within an approximately 2,100-acre area (“Project Area”).

At a capacity of 125 Megawatts (“MW”), the Project will generate more power than the amount used by 30,000 average Ohio homes. It will do so without the need for any pipelines or using any fuel. The Project will not use any appreciable amount of water, and it will not generate any air pollution, water pollution, or hazardous waste. The equipment comprising the Project will have very few moving parts and will make almost no sound. With only minimal disturbance of topsoil and few underground foundations, the Project will require very few changes to the land surface, and will productively utilize existing, open agricultural fields to diversify the income sources of dozens of area families.

This Application addresses each of the substantive requirements of Chapter 4906-4. For ease of review, the Application quotes each of the relevant specific regulatory requirements (under the heading “OPSB Application Requirement” and in italics) for each subject addressed in Chapter 4906-4. The Application then provides, under the heading “Response,” information responsive to that specific requirement. In some instances, the Application provides an explanation of why the Applicant believes that a particular requirement does not apply to the Project.

## **II. PROJECT SUMMARY AND APPLICANT INFORMATION**

### **A. SUMMARY OF PROPOSED PROJECT**

*OPSB Application Requirement [4906-4-02(A)]:*



*“(A) The applicant shall provide a summary of the proposed project. The summary should be suitable as a reference for state and local governments and for the public. The summary shall include the following:*

*(1) A statement explaining the general purpose of the facility.*

*(2) A description of the general location, size, and operating characteristics of the proposed facility.*

*(3) A discussion of the suitability of the site for the proposed facility.*

*(4) An explanation of the project schedule (a Gantt chart is acceptable).”*

Response:

[4906-4-02(A)(1)]

The general purpose of the Project is to use large arrays of ground-mounted photovoltaic (“PV”) modules, commonly known as solar panels, to generate affordable, clean and quiet renewable electricity for consumers in southwestern Ohio. The Project will provide “on peak” power during the high demand period of mid-day and late afternoon, which is when Ohio consumers need it the most. It also will provide employment opportunities throughout the region and State, as well as substantial annual tax revenues to the residents of Brown County.

[4906-4-02(A)(2)]

The Project will be located in Brown County, Ohio, approximately 30 miles due east of Cincinnati. It will supply wholesale power to the 138-kilovolt (“kV”) Hillcrest Substation (“Utility Substation”), which is owned and operated by Duke Energy Ohio, Inc. (“Duke Energy”). The Utility Substation is located approximately three (3) miles north of the Village of Mr. Orab and immediately east of Greenbush, an unincorporated community at the intersection of U.S. Highway 68 and Greenbush Road. The Project will occupy up to 1,100 of acres of private land within a larger area of approximately 2,100 acres. It will have the capacity to generate up to 125 MW-alternating current (“MWac”) of electricity.

The Project will generate electricity using PV panels. Photons in sunlight will strike the semiconducting material in the solar panels, which will excite electrons and generate

direct electric current (“DC”). DC will be converted to alternating electric current (“AC”) and the voltage will be increased. The electricity will be gathered through a network of buried wires at a Project-level electric substation. The substation then will increase the voltage again and deliver the power through a short, buried transmission line to the Utility Substation.

[4906-4-02(A)(3)]

The Project Area is ideal for a utility-scale solar farm because it is adjacent to a point in the regional transmission system at which power can be supplied without the need for substantial and costly upgrades to that system. Use of the Project Area will enable the generation of large amounts of solar power because it is generally level, open and dry. The Project also will minimize impacts to natural resources because most of the Project Area is annually disturbed by active cultivation.

[4906-4-02(A)(4)]

The schedule for development of the Project, which began in 2015, is well-advanced. Acquisition of the necessary land rights is complete, and survey and title work is well underway. Natural resources studies and associated field surveys largely are complete. It is anticipated that the interconnection study process for the Project will be concluded in July 2017. An interim interconnection service agreement has been executed, and final interconnection agreements are expected to be in place by the end of 2017. Pending receipt of the Certificate and other required authorizations, Applicant plans to begin construction of the Project in the first quarter of 2018, and construction would proceed throughout most of that year. The Project is expected to start commercial operations no later than December 2018.

**B. FUTURE PLANS FOR ADDITIONAL GENERATION UNITS IN REGION**

OPSB Application Requirement [4906-4-02(B)]:

*“(B) The applicant shall provide information regarding its future plans for additional generation units or facilities in the region, if any.*

*(1) The applicant shall provide a description of any plans for future additions of electric power generation units for the site (including the type and timing) and the maximum electric power generation capacity anticipated for the site.*

*(2) The applicant shall provide a brief description of the applicant's history, affiliate relationships and current operations, and a description of the company that will construct and operate the facility, if different from the applicant.”*

Response:

[4906-4-02(B)(1)]

Applicant seeks a Certificate to construct and operate the Project at 125 MWac in capacity within the Project Area. Following issuance of the Certificate, Applicant may propose to construct and operate an additional 75 MWac of solar PV generation within the Project Area, which also would deliver power to the Utility Substation. (This additional 75 MWac is reflected in a transmission interconnection queue position that is separate from the Project). Applicant’s plans with regard to this additional 75 MWac are dependent on a variety of factors, including the results of the associated transmission studies. It is possible, pending authorization from the Board and other authorities, that the additional 75 MWac could be constructed concurrently with, or relatively soon following, the construction of the Project. Applicant has no current plans for the generation capacity to be constructed within the Project Area to exceed 200 MWac.

[4906-4-02(B)(2)]

Applicant is owned by Blue Planet Renewable Energy, LLC, which in turn is a joint venture partnership between MAP Royalty, Inc. (“MAP”) and Open Road Renewables, LLC (“Open Road”) (together, the “Partners”). MAP is one of the most experienced private renewable energy investors in the U.S. with successful investments to date in over 6,000 MW of operating wind and solar projects. Open Road is a focused developer of utility-scale solar projects whose principals have successfully originated approximately 100 MW of operating projects in California and a number of operating projects in the

regional transmission area served by PJM Interconnection, LLC (“PJM”). Open Road’s principals also developed a 150 MW project in Maryland now under construction. MAP has worked with Open Road’s principals on a variety of utility-scale renewable energy projects for approximately six (6) years.

The Partners invest in and develop renewable energy projects, but the Applicant is not anticipated to construct and operate the Project. The Applicant anticipates selecting the company that will construct the Project through a competitive process. Likewise, it has not selected the firm that will operate the Project for the Applicant, but plans to make the selection from a well-known group of top tier providers. The Partners have collaborated with most of the leading construction and operation companies active in the utility-scale renewable energy industry in the U.S.

### **III. DETAILED PROJECT DESCRIPTION AND SCHEDULE**

#### **A. DESCRIPTION OF PROJECT AREA**

##### *OPSB Application Requirement [4906-4-03(A)]:*

*“(A) The applicant shall provide a description of the project area's geography, topography, population centers, major industries, and landmarks.*

*(1) The applicant shall provide a map of at least 1:24,000 scale containing a two-mile radius from the project area and showing the following features:*

*(a) The proposed facility.*

*(b) Population centers and administrative boundaries.*

*(c) Transportation routes and gas and electric transmission corridors.*

*(d) Named rivers, streams, lakes, and reservoirs.*

*(e) Major institutions, parks, and recreational areas.*

*(2) The applicant shall provide the area, in acres, of all owned and leased properties that will be used for construction and/or operation of the project, and the number of properties.”*

##### **Response:**

[4906-4-03(A)(1)]

The Project Area is located in Green Township in Brown County, Ohio. The area is bounded on the west by U.S. Highway 68, on the south by Greenbush Road, on the east by the Brown-Highland County line, and on the north by Upper 5 Mile East Road. The land within the Project has been mostly cleared for agriculture and is extremely level. The predominant industry is agriculture.

The Project Area is rural, and is largely characterized by medium- to large-sized farms with interspersed pockets of trees. Undeveloped land includes actively cultivated fields, small blocks and rows of trees and other vegetation, and old fields. Existing features in the Project Area include two electric transmission lines (one 345 kV and the other 138 kV), an electric substation (the Utility Substation), communication towers, public roads, single family homes and farm buildings. The Project Area itself does not include any population centers, major industries or notable landmarks.

A map depicting the two-mile area surrounding the Project Area and including each of the features required above is attached as **Figure 1**. The map, which shows an area that is two (2) miles in radius around the Project Area, includes the following: (1) the proposed facility; (2) population centers; (3) administrative boundaries; (4) transportation routes; (5) electric transmission corridors; (6) named rivers, streams, lakes and reservoirs; and (7) major institutions, parks, and recreation areas. No gas transmission lines occur within a 2-mile radius of the Project Area.

[4906-4-03(A)(2)]

The total area of all properties that are leased (or will be purchased pursuant to options) and that is available for use for construction and/or operation of the Project is approximately 2,100 acres. This total is comprised of over thirty (30) separate properties. Applicant expects to use up to 1,100 acres of this amount for construction and operation of the Project.

**B. DESCRIPTION OF PROPOSED PROJECT**

## 1. DESCRIPTION OF GENERATION EQUIPMENT

### OPSB Application Requirement [4906-4-03(B)(1)]:

*“(1) The applicant shall submit the following for each generation equipment alternative, where applicable:*

*(a) Type, number of units, estimated net demonstrated capacity, heat rate, annual capacity factor, and hours of annual generation.*

*(b) For wind farms, the turbine hub height, tip height, rotor diameter, and blade length for each model under consideration.*

*(c) Fuel quantity and quality (i.e., ash, sulfur, and British thermal unit value).*

*(d) A list of types of pollutant emissions and estimated quantities.*

*(e) Water volume requirement, source of water, treatment, quantity of any discharge and names of receiving streams.”*

### Response:

#### [4906-4-03(B)(1)(a)]

The generation equipment to be used by the Project are solar panels, and no alternatives are being considered. The basic components of the Project will be solar panels mounted on metal racking, inverters to convert DC to AC, transformers to increase electric voltage, a network of buried cables to collect the power, a Project-level substation, a very short and buried transmission line, roads and pyranometers. Each of these components is described below.

#### *Solar Panels and Racking*

The Project will generate electricity with conventional solar panels, which will be affixed to metal racking. The racking will include piles that will be driven, or screws that will be rotated, into the ground in long rows or “arrays”. The arrays generally will follow the existing topography of the land in the Project Area, although some rough grading may occur. Arrays will be grouped in several large clusters, each of which will be fenced, with locked gates, for equipment security and public safety (“Solar Field”).

Each of the Project's arrays will use one of two types of racking: "fixed-tilt" or "tracking." Fixed-tilt racking will be stationary, and each array will run in an east-west direction. Panels mounted on fixed-tilt racking will be oriented or "titled" to the south, with the low (southern) end of the panel two (2) to three (3) feet above the ground surface and the high (northern) end of the panel eight (8) to fourteen (14) feet above the ground surface. Fixed panels will be tilted at an angle based on the latitude of the Project Area to maximize the amount of sunlight striking the panels.

Tracking arrays will run in a north-south direction and be equipped with electric motors that very slowly rotate the panels throughout the day to keep them perpendicular to the direction of sunlight. Tracking arrays will face east at sunrise, rotate to the west during the day, face west at sunset, and then re-set to the east. At the beginning and ending positions of each day, the low end of the panels will be two (2) to three (3) feet, and the high end of the panels will be eight (8) to fourteen (14) feet, above the ground surface.

The solar panel technology for the Project will be one of two basic types: crystalline or thin-film. Crystalline modules are silicon-based. Thin-film modules use one of several alternative chemistries (such as cadmium telluride [CdTe] or copper indium gallium selenide [CIGS]). Crystalline modules cost more to manufacture than thin-film modules, but also are more efficient. Most racking systems, whether fixed-tilt or tracking, will accommodate either crystalline or thin-film modules.

Although the specific module vendor has not been selected, "Tier 1" modules will be used for the Project. At a capacity of 125 MWac, the Project will use approximately 375,000 to 475,000 modules. (There is no heat rate associated with solar panels.) The modules will operate 8,760 hours per year, although they will produce no electricity during the night. The modules also will produce little to no electricity during periods of heavy clouds and during and briefly following significant snowfall. Depending on the choice of racking and the specific module, the anticipated annual net capacity factor for the Project is anticipated to be from 23% to 25%. Accounting for the total generating capacity of 125 MW, anticipated operating times, and panel capacity factors, the Project will generate between 251,850 to 273,750 megawatt-hours ("MWh") of electricity each year. The

Project's year one net capacity factor when using industry-leading Tier 1 thin film modules mounted on single axis tracker is projected to be approximately 24.27%, resulting in the generation of 265,765 MWh of electricity.

#### *DC Collector System, Inverters and AC Collector System*

Within each Solar Field, a network of electric lines and associated communication lines will collect the electric power from different groups of arrays and transmit it to a central location ("DC Collector System"). Solar panels will be grouped into series of circuits that are routed, through cable trays on the racking, to combiner boxes. Power from one or more of the combiner boxes then will be transmitted to a group of related components: a DC-to-AC inverter, a step-up transformer that increases the voltage to 34.5 kV, and a cabinet containing power control electronics ("Inverter"). The equipment comprising each Inverter will be mounted on a pre-fabricated foundation such as a metal skid or a concrete block.

Each Inverter will deliver AC power to a single, fenced, Project-level substation ("Project Substation"). The Inverters will be connected to the Project Substation through a buried system of electric lines and associated communication lines ("AC Collector System"). Each portion of the AC Collector System will originate in one of the Solar Fields and terminate at the Project Substation. All portions of the AC Collector System that will lie outside the fenced Solar Fields and the fenced Project Substation will be buried at least 36 inches below grade.

#### *Project Substation and Gen-tie*

The Project Substation will be located on a 3-acre parcel of land adjacent to and immediately east of the Utility Substation. Among the major components of the Project Substation will be the following: (1) collection line feeders and breakers; (2) 34.5 kV bus; (2) main power transformer (to increase the voltage from 34.5 kV to 138 kV); (4) high-voltage breaker; (5) metering/relaying transformers; (6) disconnect switches; (7) equipment enclosure containing power control electronics; and (8) a lightning mast.

The equipment for the Project Substation will be constructed on a concrete foundation that is expected to be a maximum of 50,000 square feet, e.g., 200 feet by 250



feet, in size. For equipment security and public safety, a fence with a locked access gate will be installed around the perimeter.

A very short 138 kV transmission line will connect the Project Substation to the Utility Substation (“Gen-tie”). The Gen-tie will be a maximum of 1,000 linear feet in length, and will be constructed almost entirely below grade on property owned by Duke Energy. It will be routed under the existing 345 kV transmission line and connect to the north side of the Utility Substation. A self-supporting, steel structure (dead-end structure) will be used where the circuit changes from a buried cable to an above ground line prior to entering the Substation. Typical heights for these dead-end structures range from twenty (20) to twenty-five (25) feet. The Gen-tie will be the subject of a construction notice submitted to the Board separately from this Application, but for ease of review and completeness is described as part of the Project in this Application.

### *Roads*

The Project will include a number of unpaved roads (“Access Roads”) comprised of aggregate material and/or grass used to access each Solar Field. Short driveways will connect Access Roads to public roads at one or more points for each Solar Field. Access Roads are used for the operations, maintenance, repair, and replacement of equipment in addition to providing sufficient access for emergency response. Access Roads will only be as long and as wide as necessary to accommodate construction and operational activities. All permanent Access Roads will be a maximum of twenty (20) feet wide, though a number of roads may temporarily be up to twenty-five (25) feet wide to accommodate construction activities.

### *Pyranometers*

The Project will include up to six (6) solar meteorological stations, which will include pyranometers that measure solar resource, ancillary meteorological instruments such as an anemometer, a wind vane, a barometer, a rain bucket and a temperature probe, as well as associated communications equipment (“Pyranometer”). Each of the instruments comprising a Pyranometer will be installed on a pre-cast concrete block foundation or directly on the ground, and will be less than fifteen (15) feet in height. Each

Pyranometer will occupy less than four hundred (400) square feet and, if not located within a Solar Field, will be separately fenced and gated.

[4906-4-03(B)(1)(b)-(e)]

Subsections (b) through (e) are not applicable to the Project. Subsections (b), (c) and (d) do not apply because the Project will not include wind turbines, use any fuel, or emit any stationary source air emissions. With regard to Subsection (e), the Project will use only an extremely small volume of water for occasional cleaning or solar panels, which will be trucked to the Project or acquired within the Project Area from one or more land owners participating in the Project. There will no discharges of wastewater, wastewater treatment, or receiving streams.

## **2. CONSTRUCTION AND RECLAMATION METHODS**

OPSB Application Requirement [4906-4-03(B)(2)]:

*“(2) The applicant shall describe, in as much detail as is available at the time of submission of the application, the construction method, site preparation and reclamation method, materials, color and texture of surfaces, and dimensions of all facility components, including the following:*

- (a) Electric power generation plant or wind-powered electric generation turbines, including towers and foundations.*
- (b) Fuel, waste, water, and other storage facilities.*
- (c) Fuel, waste, water, and other processing facilities.*
- (d) Water supply, effluent, and sewage lines.*
- (e) Associated electric transmission and distribution lines and gas pipelines.*
- (f) Electric collection lines.*
- (g) Substations, switching substations, and transformers.*
- (h) Temporary and permanent meteorological towers.*
- (i) Transportation facilities, access roads, and crane paths.*

*(j) Construction laydown areas.*

*(k) Security, operations, and maintenance facilities or buildings.*

*(l) Other pertinent installations.”*

Response:

[4906-4-03(B)(2)(a) & (e)-(j)]

The Project will include one or more of the components listed in subsections (a) and (e) through (j) above.

The method that will be used to construct the Project will be similar to that generally used in the U.S. to construct similar, large-scale, ground-mounted solar facilities generating wholesale power. The primary steps will be the following: (1) securing of the perimeter of each of the areas in which construction will occur; (2) installation of storm-water and erosion management controls; (3) clearing vegetation, if any; (4) minor grading, if any; (5) construction of roads; and (6) installation of equipment (racking, panels, buried electric and communication lines, Inverters, Pyranometers, the Project Substation and permanent fencing).

Other than the Project Substation, and because the panels will be affixed to racking largely using hand tools, the major equipment used to construct the Project will include bulldozers and dump trucks (primarily to build roads), pile drivers (primarily to install racking), trenchers (primarily to lay the AC Collector System and the buried portion of the DC Collector System), and a directional drilling system (to place a portion of the AC Collector System under a waterbody). A more detailed description of the steps comprising construction is provided below in connection with the schedule for the Project.

For several reasons, the land within the Project Area that will host the equipment will require relatively little work to prepare it for construction. First, relatively little land will need to be cleared of vegetation. Most of the Project Area consists of previously disturbed land that has been in active cultivation for many years. Also, the design of the Solar Fields will obviate the need to remove the vast majority of trees in the Project Area, particularly those associated with wetlands or containing potential wildlife habitat. Finally, only minimal grading will be required because the Project Area already is extremely level.

Specific methods to be used to remove trees and vegetation and perform minimal grading have not been determined, but will be those standard for the commercial construction industry. The vast majority of the land surface within each Solar Field, including almost all of the area below the arrays themselves, will be planted with a robust, low-growing seed mix, primarily native grasses and other low-maintenance varieties.

The construction of the Project is expected to require up to fourteen (14) temporary laydown areas, also referred to in the Figures as staging areas, for construction staging, equipment storage, and parking for workers. The laydown areas generally will be located adjacent to public roads, and usually will be located adjacent to the entrances to the Solar Fields. Each of the laydown areas will range from approximately one (1) to three (3) acres in size, and collectively are expected to occupy from fifteen (15) to twenty (20) acres. The laydown areas are temporary features associated with the construction of the Project, and will be restored following construction to the extent the area does not host components of the Project.

The proposed Project includes up to five (5) narrow corridors of land to host the Project Collection Lines. The lines will be buried at a maximum depth of four (4) feet. The lines will be installed via open cut method or horizontal directional drilling (“HDD”), depending on the location. HDD will be used to install the Collection Line under two perennial streams.

Up to 26.4 miles of access roads will be utilized for construction, operation and maintenance of the Project. The Access Roads will be comprised of aggregate material and/or grass. Access Roads will only be as long and as wide as necessary to accommodate construction and operational activities. All permanent Access Roads will be a maximum of twenty (20) feet wide, though a number of roads may temporarily be up to twenty-five (25) feet wide to accommodate construction activities.

The specific materials, and the associated textures and colors, to be used in the components of the Project have not yet been determined, but will be typical of other large-scale, ground-mounted solar projects in the U.S. Racking will be largely metal, such as aluminum, and will have a smooth texture and be of a grey or silver color. Panels will be comprised of the materials previously described, with the exterior layer consisting of a

glass cover within a metal frame. Generally, panels have a relatively smooth texture and are black or another dark color. Buried electrical and communication lines will be made of copper or other materials standard in the electric utility industry. Fencing is expected largely to be standard, chain-link material. The dimensions of the components of the Project have been provided in Section III.B.1 of the Application, above.

Applicant holds land rights to operate the Project for up to forty (40) years, and the Project is expected to operate for at least that period of time. At the end of that period, Applicant would expect to either re-power the Project with state-of-the-art PV technology, which would require the consent of the participating land owners, or remove the Project and return the land to approximately its original condition. If the Project is removed, then the materials would be reused or recycled to the extent possible, and the remaining materials disposed of in a sanitary landfill. With very few concrete foundations, the equipment more than three (3) feet above grade can be removed and the land restored to essentially its original condition. If the participating land owners prefer, the land can be returned to cultivation.

[4906-4-03(B)(2)(b)-(d), (k) & (l)]

Subsections (b), (c), (d) and (k) are not applicable to the Project. Specifically, the Project does not include any of the following: (1) fuel, waste, water or other storage facilities; (2) fuel, waste, water or other processing facilities; (3) water supply, effluent and sewage lines; or (4) buildings. Regarding subsection (l), there are no significant installations associated with the Project not otherwise addressed above.

### **3. NEED FOR NEW TRANSMISSION**

OPSB Application Requirement [4906-4-03(B)(3)]:

*“(3) The applicant shall submit a brief description of the need for new electric transmission lines(s) or gas pipelines associated with the proposed facility.”*

Response:

[4906-4-03(B)(3)]

The only new transmission line associated with the Project will be the Gen-tie, which will be less than 1,000 feet in length and largely buried. The Gen-tie line will transmit the energy generated by the Project from the Project Substation to the Utility Substation. The Project will not use natural gas or include any gas pipelines.

**4. PROJECT MAP**

OPSB Application Requirement [4906-4-03(B)(4)]:

*“(4) The applicant shall supply a map of at least 1:12,000 scale of the project area, showing the following features:*

*(a) An aerial photograph.*

*(b) The proposed facility, including all components listed in paragraph (B)(2) of this rule.*

*(c) Road names.*

*(d) Property lines.”*

Response:

[4906-4-03(B)(4)]

Applicant seeks authorization to construct and operate the Project, at a maximum capacity of 125 MWac, within the Project Area. The Project Area is divided into three different use categories. First, the Project Substation will be located on a specific, 3-acre parcel of land adjacent to and immediately east of the Utility Substation (“Project Substation Parcel”). Second, five (5) narrow strips of land within the Project Area will host only portions of the AC Collector System to be located outside of the fenced perimeters of the Project Substation and the Solar Fields (“AC Collector Corridors” or “Collection Lines”). Finally, the remaining portions of the Project Area are available to host the Solar Fields, which will include all of the remaining components of the Project: arrays, Inverters, DC Collector System, roads, and Pyranometers.

A map with a satellite-generated aerial photograph background showing a maximum layout of the Project is attached as **Figure 2**. The map shows the locations of the Project Substation Parcel, the AC Collector Corridors and the Solar Fields. The map also shows the road names, property lines, and each of the major features of the Project in relation to the above three categories of land comprising the Project Area. The Solar Fields are depicted at their maximum aerial extent, but in one or more areas may not extend as far as indicated. Similarly, the depictions of the specific components within each Solar Field are illustrative only; the final locations will be determined in the final design of the Project.

Prior to the start of construction, Applicant will submit to the Board for its review final designs for the Project. These final designs will address all of the following:

- (1) the location of the Project Substation, and the termination of the AC Collector System within the Project Substation Parcel;
- (2) the location of the AC Collector System within the AC Collector Corridors;
- (3) the perimeters of each Solar Field within the remainder of the Project Area;
- (4) the orientation (north-south or east-west) of the arrays within each Solar Field;
- (5) the location of the arrays, the DC Collector System, the Inverters, the Access Roads, and the beginning of the AC Collector System within each Solar Field;
- (6) the type of racking (fixed-tilt and/or tracking);
- (7) the panel technology (crystalline and/or thin-film);
- (8) the location of the Access Roads within the Project Area; and
- (9) the specific component manufacturers and equipment vendors.

The Application has been prepared to present the Project at its maximum aerial extent within the Project Area and, therefore, its broadest and most significant impact. Applicant has conducted the necessary studies for the entire Project Area to facilitate the use of any portion of it for the construction and operation of the Project. To illustrate the maximum possible impact of the Project from any vantage point in the general area, **Figure 2** depicts potential solar array areas (i.e., the maximum extent of north-south

running arrays using tracking technology with thin-film panels), the Project Substation facilities, and representative (but not final design) locations of Collection Lines, Access Roads, Pyranometers, and construction laydown areas (staging areas).

Importantly, and although not reflected in the scale of the above map, most of the land surface within each Solar Field will be unoccupied by any equipment. Sufficient open space on each side of an array is necessary to preclude adjacent arrays from blocking sunlight to each other. Open space between and around arrays and Inverters also is needed to allow for the manual cleaning of panels, the performance of routine maintenance, and the repair and replacement of major components. Finally, sufficient open space is needed to maintain ground cover.

### **C. PROJECT SCHEDULE**

#### *OPSB Application Requirement [4906-4-03(C)]:*

*“(C) The applicant shall provide a detailed project schedule.*

*(1) The applicant shall provide a proposed project schedule in Gantt chart format covering all major activities and milestones, including:*

*(a) Acquisition of land and land rights.*

*(b) Wildlife and environmental surveys/studies.*

*(c) Receipt of grid interconnection studies and other critical path milestones for project construction.*

*(d) Preparation of the application.*

*(e) Submittal of the application for certificate.*

*(f) Issuance of the certificate.*

*(g) Preparation of the final design.*

*(h) Construction of the facility.*

*(i) Placement of the facility in service.*

*(2) The applicant shall describe the proposed construction sequence.*



*(3) The applicant shall describe the potential impact of critical delays on the in-service date.”*

Response:

[4906-4-03(C)(1)]

A detailed schedule for the of the Project in Gantt chart format that includes each of the elements listed above is attached as **Figure 3**.

[4906-4-03(C)(2)]

The proposed sequence of construction of the Project is as follows:

- (1) surveying and staking of sensitive areas, perimeters, foundations for Access Roads, and equipment locations;
- (2) clearing, ground leveling, compaction and grading;
- (3) drainage and erosion control;
- (4) installation of perimeter fencing and lighting;
- (5) construction of Access Roads;
- (6) installation of temporary power;
- (7) delineation of temporary storage and construction areas;
- (8) installation of temporary facilities;
- (9) installation of foundations (for the Project Substation, Inverters, and Pyranometers);
- (10) installation of Project Substation
- (11) installation of supports, racking and modules;
- (12) installation of Inverters;
- (13) installation of Pyranometers;
- (14) installation of lighting and signage

(15) clean-up of work areas; and

(16) landscaping.

Many of the above activities may occur concurrently.

[4906-4-03(C)(3)]

Certain critical delays in the development of the Project may have a material, adverse effect on Applicant's efforts to secure equity investment for it and finance its construction by the planned in-service date of December 2018. These critical delays could include, for instance, Applicant's inability to timely purchase panels, racking, inverters or transformers, permitting delays, and labor shortages. Delays such as these may require the start of construction of the Project to be postponed. Postponement of the start of construction also could affect the Project's eligibility for certain important financial incentives, such as the full value of the federal Investment Tax Credit.

#### **IV. PROJECT AREA SELECTION AND SITE DESIGN**

##### **A. SELECTION OF PROJECT AREA**

OPSB Application Requirement [4906-4-04(A)]:

*“(A) The applicant shall describe the selection of the project area.*

*(1) The applicant shall provide a description of the study area or the geographic boundaries of the area considered for development of the project, including the rationale for the selection.*

*(2) The applicant shall provide a map of suitable scale that depicts the boundary of the study area and the general sites which were evaluated.*

*(3) The applicant shall provide a comprehensive list and description of all qualitative and quantitative siting criteria utilized by the applicant, including any weighting values assigned to each.*

*(4) The applicant shall provide a description of the process by which the applicant utilized the siting criteria to determine the proposed project area and any alternative area(s).*

*(5) The applicant shall provide a description of the project area(s) selected for evaluation, and the factors and rationale used by the applicant for selecting the proposed project area and any alternative area(s)."*

Response:

[4906-4-04(A)(1) & (2)]

Applicant chose to pursue the Project in southwestern Ohio for a variety of reasons. First, the area offers an attractive combination of strong electricity demand, stable power prices, and a robust transmission system. Generating power close to the large metropolitan areas of Cincinnati, Dayton and Columbus provides power where it is most needed, and also reduces issues of transmission congestion often presented by generating power distant from load. The need for power in the area is strong and the associated transmission system can cost-effectively accommodate large amounts of additional power. Secondly, the Project was sited in Appalachian Ohio, which is a 32-county area of the State in particular need of investment and employment opportunities, to provide economic benefits where they are needed most. A map depicting the general location of the Project Area in Appalachian Ohio is attached as **Figure 4**. Finally, as shown on the map attached as **Figure 5**, southwestern Ohio enjoys some of the best solar resource in the State.

Within the general region, the study area was determined largely by the location of the Utility Substation. A key ingredient for generating the most affordable electricity for Ohio consumers with solar panels is identifying those locations at which substantial new generation may be injected without extensive and costly upgrades to the transmission system. Applicant's preliminary studies indicated that delivering power to Ohio consumers through the Utility Substation would be highly cost-effective. As discussed in Section V, below, this has been confirmed by the results of the formal transmission studies conducted regarding the Project by PJM Interconnection, Inc ("PJM").

A map depicting the boundary of the study area and general sites that were evaluated for the Project is attached as **Figure 6**. The selection of the Utility Substation as the point to inject power necessarily limited the study area to the properties within a radius of approximately three (3) miles of the Utility Substation. Siting the Project in

proximity to the Utility Substation avoided the need to construct a transmission line between the solar panels and the transmission system. It also reduced the potential electrical losses of collecting the power distant from the point of interconnection.

[4906-4-04(A)(3), (4) & (5)]

Once the Utility Substation was selected as the point of interconnection, the location of the Project largely was determined by four siting criteria. First, the land to be used generally needed to be relatively level, previously disturbed, and dry. Second, it was important that land to be used for the Project be contiguous to or in close proximity to other, similarly suitable parcels. Third, it was important and appropriate to minimize impacts to sensitive features such as streams, wetlands and potential wildlife habitat. Finally, individual property owners made personal decisions on whether to host solar panels and other components of the Project. These criteria were not assigned particular weights; rather, each played a similar role in determining the location of the Project within the study area.

As noted above, the critical factor in determining the study area was the identification of the Utility Substation as a promising point of interconnection in southwest Ohio. Having made this determination, the siting process was to determine the location of the Project, within the study area, based on the more parcel-specific criteria set forth above. From this two-step process, Applicant decided to pursue development of the Project within the Project Area.

Applicant is not presenting for consideration any alternative locations for the Project, either within the study area or southwestern Ohio generally. Rather, the only proposed location for the Project is the Project Area.

**B. PROCESS OF DESIGNING PROJECT LAYOUT**

OPSB Application Requirement [4906-4-04(B)]:

*“(B) The applicant shall describe the process of designing the facility layout.*

*(1) The applicant shall provide a constraint map showing setbacks from residences, property lines, utility corridors, and public rights-of-way, and any other constraints of the site design.*

*(2) The applicant shall provide a description of the criteria used to determine the facility layout and site design, and a comparison of any site design alternatives considered, including equipment alternatives where the use of such alternatives influenced the site design.*

*(3) The applicant shall provide a description of how many and what types of comments were received.”*

Response:

[4906-4-04(B)(1)]

A map showing constraints that influenced the design of the Project is provided in **Figure 7**. The constraints shown on the map include those listed above: setbacks from residences, property lines, utility corridors, and public rights-of-way. The map also shows additional constraints Applicant considered, such as streams, wetlands, and larger woodlots that could be potential wildlife habitat.

[4906-4-04(B)(2)]

The Project Area was designed to facilitate a layout of arrays that will produce electricity at the lowest cost using the land of those in the community desiring to participate while also avoiding or accounting for a variety of site-specific constraints. The specific parcels chosen to host the arrays were those that reflect the same factors that led to the location of the Project Area within the large study area: (1) relatively level, previously cleared and disturbed, and dry; (2) close to other parcels; and (3) avoidance or minimization of impacts to sensitive features (such as streams, wetlands and larger blocks of potential wildlife habitat). Also, the layout necessarily was significantly influenced by the decisions of individual property owners whether to participate.

Because ground-mounted solar arrays are highly modular, they are well-suited to accommodating a variety of spatial site constraints. It was not necessary, therefore, for Applicant to consider alternative site designs or equipment. Rather, within the larger

areas surrounding the Project Area, which is generally level, cleared and dry, it was merely necessary for the Project Area to conform to the various constraints.

[4906-4-04(B)(3)]

In compliance with Board requirements, Applicant held a public informational meeting regarding the Project on May 23, 2017. The public information meeting was held at a local hotel in Mt. Orab, which is approximately three (3) miles from the Project Area. Among other visual aids regarding the Project and general information about solar energy, Applicant displayed the required map showing the proposed Project at a scale sufficient to allow affected property owners to identify their property in relation to it.

Nine (9) written comments and various oral comments were received at the public meeting. Comments supporting the proposed Project specifically mentioned air quality and other environmental benefits, and economic benefits. These issues are addressed in this Application. Air quality benefits are discussed in Section VII.B, environmental benefits are described in Section VIII.B, and economic benefits are discussed in Section VI.E.

Comments raising concerns about the proposed Project related to property values, wildlife impacts (e.g., birds, bats, and threatened and endangered species), public health and safety, impacts to floodplains, traffic, noise, and wetlands. Wildlife impacts are discussed in Section VIII.B; public health and safety is discussed in Section VIII.A.1; the prospect of floods is discussed in Section VIII.A.4; traffic is discussed in Section VI.F.4; sound is discussed in Section VIII.A.3; and wetlands are discussed in Section VIII.B.

## **V. ELECTRIC GRID INTERCONNECTION**

### **A. CONNECTION OF PROJECT TO REGIONAL ELECTRIC GRID**

OPSB Application Requirement [4906-4-05(A)]:

*“(A) The applicant shall describe how the facility will be connected to the regional electric grid.”*

Response:

[4906-4-05(A)]

The Project will be connected to the regional electric grid through a new connection to the Utility Substation. Specifically, the power will be delivered through the Gen-tie (to be the subject of a construction notice application), which will be buried in part to travel beneath an existing 345 kV transmission line. From the Utility Substation, the power will be supplied to the Electric Service Area of Duke Energy Ohio, which covers most of Brown County as well as the Greater Cincinnati Metropolitan Area, and is part of the multi-state, regional transmission system managed by PJM.

## **B. INFORMATION ON INTERCONNECTION OF PROJECT**

OPSB Application Requirement [4906-4-05(B)]:

*“(B) The applicant shall provide information on interconnection of the facility to the regional electric power grid.*

*(1) The applicant shall provide information relating to their generation interconnection request, including interconnection queue name, number, date, and website.*

*(2) The applicant shall provide system studies on their generation interconnection request. The studies shall include, but are not limited to, the feasibility study and system impact study.”*

Response:

[4906-4-05(B)(1)]

Applicant applied in June 2015 to PJM to interconnect 125 MWac of solar generation, through the Utility Substation, to the Duke Energy Ohio system. The Project's projected in-service period is the fourth quarter of 2018. PJM assigned the application Queue No. AB1-014 under the name Hillcrest 138 kV, effective June 8, 2015.

With respect to the Project, Applicant has entered into an agreement entitled Interim Interconnection Service Agreement among PJM Interconnection, LLC and Hillcrest Solar I, LLC and Duke Energy Business Services, LLC for Duke Energy Ohio, LLC (“Interim ISA”). The purpose of the Interim ISA is to expedite Duke Energy's

acquisition and design of certain interconnection-related equipment in advance of the execution of the final Interconnection Service Agreement (“ISA”) for the Project, which is expected to supersede the Interim ISA. A copy of the Interim ISA is attached as **Exhibit A**. The PJM website location for this agreement is as follows:

[http://pjm.com/pub/planning/project-queues/isa/ab1\\_014\\_isa2.pdf](http://pjm.com/pub/planning/project-queues/isa/ab1_014_isa2.pdf)

[4906-4-05(B)(2)]

PJM completed the Generation Interconnection Feasibility Study Report Queue Position AB1-014 (Revised) for the Project (“Feasibility Study Report”) in February 2016. It completed the Generation Interconnection System Impact Study Report for PJM Generation Interconnection Request Queue Position AB1-014 (“System Impact Report”) for the Project in September 2016. Copies of the Feasibility Study Report and the System Impact Study Report are attached as **Exhibit B** and **Exhibit C**, respectively. The PJM website locations for these studies are as follows:

[http://www.pjm.com/pub/planning/project-queues/feas\\_docs/ab1014\\_fea.pdf](http://www.pjm.com/pub/planning/project-queues/feas_docs/ab1014_fea.pdf)

[http://www.pjm.com/pub/planning/project-ueues/impact\\_studies/ab1014\\_imp.pdf](http://www.pjm.com/pub/planning/project-ueues/impact_studies/ab1014_imp.pdf)

The Feasibility Study Report and System Impact Report confirm that the Project can be constructed and operated without requiring any “network upgrades” to the regional transmission system. PJM currently is conducting the Facilities Study for the Project, which is expected to be completed in July 2017.

## **VI. ECONOMIC IMPACT AND PUBLIC INTERACTION**

### **A. CURRENT AND PROPOSED OWNERSHIP STATUS OF PROJECT**

OPSB Application Requirement [4906-4-06(A)]:

*“(A) The applicant shall state the current and proposed ownership status of the proposed facility, including leased and purchased land, rights-of-way, structures, and equipment.”*

Response:



[4906-4-06(A)]

Applicant currently owns all of the assets that comprise the Project or will be used to construct, own and operate the Project. Applicant holds all the development rights (lease, easements and options-to-purchase) for over 90% of the land in the Project Area and rights of access to the remainder. Applicant has either the right to exclusively occupy the land for up to 40 years for operation of the Project or the right to purchase the land. Other assets comprising the Project include contracts, solar data, studies, reports and other analysis. The only existing physical structure or equipment that is currently part of the Project is a single Pyranometer; all other equipment that will comprise the Project will be acquired in the future.

The Applicant expects to own the Project but as indicated above, anticipates using third parties to construct and to operate the project.

**B. CAPITAL AND INTANGIBLE COSTS**

OPSB Application Requirement [4906-4-06(B)]:

*“(B) The applicant shall provide information regarding capital and intangible costs.*

*(1) The applicant shall provide estimates of applicable capital and intangible costs for the various alternatives. The data submitted shall be classified according to federal energy regulatory commission uniform system of accounts prescribed by the public utilities commission of Ohio for utility companies, unless the applicant is not an electric light company, a gas company or a natural gas company as defined in Chapter 4905 of the Revised Code (in which case, the applicant shall file the capital and intangible costs classified in the accounting format ordinarily used by the applicant in its normal course of business).*

*(2) The applicant shall provide a comparison of the total costs per kilowatt with the applicant's similar facilities, and explain any substantial differences.*

*(3) The applicant shall provide a tabulation of the present worth and annualized cost for capital costs and any additional cost details as required to compare capital cost of alternates (using the start of construction date as reference date), and describe techniques and all factors used in calculating present worth and annualized costs.”*

Response:

[4906-4-06(B)(1)]

The total estimated capital and intangible costs of the Project is expected to range between approximately \$[REDACTED]/kW to \$[REDACTED]/kW, inclusive of intangible costs and dependent on the final module, racking, and inverter suppliers and modules selected. These costs are broken out in the table below. The assumed cost of the Project is in the middle of the estimated range.

Expense Description	Cost (\$/kW)
<u>Tangible Costs</u>	
Modules and Racking	\$[REDACTED]
Balance of Plant & Civil	\$[REDACTED]
Substation and Gen-Tie	\$[REDACTED]
Interconnection Upgrades	\$[REDACTED]
<i>Total Tangible Costs</i>	<i>\$[REDACTED]</i>
<u>Intangible Costs</u>	
Legal & Development Costs	\$[REDACTED]
Financing & Transaction	
Fees	\$[REDACTED]
Other	\$[REDACTED]
<i>Total Intangible Costs</i>	<i>\$[REDACTED]</i>
<i>Total Capital Expenses</i>	<i>\$[REDACTED]</i>

As described above, the Applicant is not proposing alternatives to the Project Area. Therefore, no cost comparisons between alternatives is included.

[4906-4-06(B)(2)]

Installed project costs compiled by Lazard's Levelized Cost of Energy Analysis – Version 10.0 indicate that the capital costs of the Project are consistent with recent industry trends (Lazard, 2016). Lazard indicates that solar facilities installed in 2016 using thin-film technology have a capital cost between \$1,300 to \$1,450 per kW. By way of further comparison, the costs of solar generation projects under development by the

Partners in other states in the mid-Atlantic region have similar capital costs averaging \$■■■■ per kW. Variances in capital costs across the projects are due to a variety of factors, including solar resource, topography and other site-specific characteristics, project scale, proximity to equipment suppliers, and climate.

[4906-4-06(B)(3)]

Capital costs for the Project will include development costs, construction design and planning, equipment costs, and construction related costs. The costs will be incurred within two (2) years of start of construction. Therefore, a present worth analysis is essentially the same as the costs presented above. Because alternatives to the Project are not under consideration, the capital cost information presented is limited to the Project.

**C. OPERATION AND MAINTENANCE EXPENSES**

OPSB Application Requirement [4906-4-06(C)]:

*“(C) The applicant shall provide information regarding operation and maintenance expenses.*

*(1) The applicant shall provide applicable estimated annual operation and maintenance expenses for the first two years of commercial operation. The data submitted shall be classified according to federal energy regulatory commission uniform system of accounts prescribed by the public utilities commission of Ohio for utility companies, unless the applicant is not an electric light company, a gas company or a natural gas company as defined in Chapter 4905. of the Revised Code (in which case, the applicant shall file the operation and maintenance expenses classified in the accounting format ordinarily used by the applicant in its normal course of business).*

*(2) The applicant shall provide a comparison of the total operation and maintenance cost per kilowatt with applicant's similar facilities and explain any substantial differences.*

*(3) The applicant shall provide a tabulation of the present worth and annualized expenditures for operating and maintenance costs as well as any additional cost breakdowns as required to compare alternatives, and describe techniques and factors used in calculating present worth and annualized costs.”*

Response:

[4906-4-06(C)(1)]

For the first two (2) years of commercial operation, the annual operations and maintenance cost of the Project are expected to be approximately \$[REDACTED], or \$[REDACTED]/kW. These costs can be categorized as solar plant O&M, balance of plant O&M, site maintenance, and unplanned maintenance reserves. Solar plant O&M is expected to cost between \$[REDACTED] and \$[REDACTED] per year, balance of plant is expected to cost between \$[REDACTED] and \$[REDACTED] per year, site maintenance is expected to cost between \$[REDACTED] and \$[REDACTED] per year, and unplanned maintenance reserves are expected to cost between \$[REDACTED] to \$[REDACTED] per year.

[4906-4-06(C)(2)]

Operations and maintenance expenses are significant components of the overall cost of solar projects, and can vary widely among different facilities. Similar to capital costs, annual operations and maintenance expenses vary across geographies and by project scale. Key activities include monitoring and supervision, grid regulation, corrective maintenance, preventative maintenance, and site maintenance.

Solar facilities recently installed often enjoy lower operations and maintenance costs than industry reports indicate. Industry competition and consolidation of operations and maintenance providers has led to significant cost reductions as the solar industry continues to mature. The Sandia National Laboratory reported in 2016 that utility scale solar facilities in 2015 signed operations and maintenance contracts for between \$20.50/kW for fixed-tilt crystalline silicon facilities to \$21.50/kW for facilities using thin film solar modules, on average (Sandia, 2015). The use of single axis trackers typically adds roughly \$1.00/kW to operations and maintenance costs. The National Renewable Energy Laboratory estimates that due to optimized project layouts, economies of scale, and component improvements, operations and maintenance for utility scale solar PV projects will be approximately \$8/kW-year in 2020 (NREL 2016).

The annual operations and maintenance costs for the Project are estimated to be approximately \$[REDACTED]/kW in the first year of operations and increase at a rate of approximately 2% per annum through the life of the Project. These estimated costs exclude property taxes, land rent payments, and other ongoing expenses not directly related to the efficient operation of the Project. The operations and maintenance costs are similar to costs expected at other facilities under development by the Partners in other states in the mid-Atlantic region of between \$[REDACTED]/kW to \$[REDACTED]/kW, and will likely be lower on a per kW cost than the costs reported by Sandia National Laboratory.

[4906-4-06(C)(3)]

The annual operation and maintenance costs itemized above will be subject to real and inflationary increases. Therefore, these costs are expected to increase with inflation throughout the life of the Project. The Net Present Value of the operation and maintenance costs per kW, using an inflation rate of 2% and assuming a 7% discount rate, is between \$[REDACTED]/kW and \$[REDACTED]/kW. Because alternatives to the Project are not under consideration, the above operation and maintenance cost information is limited to the Project.

#### **D. COST FOR A DELAY**

OPSB Application Requirement [4906-4-06(D)]:

*“(D) The applicant shall submit an estimate of the cost for a delay prorated to a monthly basis beyond the projected in-service date.”*

Response:

[4906-4-06(D)]

The cost of month-to-month delays beyond the anticipated in-service date of December 2018 would depend on a number of factors. If the delay were to occur during project development (including the process for obtaining the Certificate), the losses would primarily be those attributable to the time value of money associated with the delayed earning of power sale revenue. Such a loss is estimated to be approximately \$[REDACTED]

per month. Delays beyond the planned in-service date also could incur costs pursuant to one or more power purchase agreements under which the Project is expected to deliver power on a date certain. Finally, delays that extended the in-service date past December 2019 could jeopardize the Project's expected eligibility for the full value (30%) of the federal Investment Tax Credit.

## **E. ECONOMIC IMPACT OF PROJECT**

### OPSB Application Requirement [4906-4-06(E)]:

*"(E) The applicant shall provide information regarding the economic impact of the project.*

*(1) The applicant shall provide an estimate of the annual total and present worth of construction and operation payroll.*

*(2) The applicant shall provide an estimate of the construction and operation employment and estimate the number that will be employed from the region.*

*(3) The applicant shall provide an estimate of the increase in county, township, and municipal tax revenue accruing from the facility.*

*(4) The applicant shall provide an estimate of the economic impact of the proposed facility on local commercial and industrial activities."*

### Response:

#### [4906-4-06(E)(1) & (2)]

Applicant retained Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C. ("EDR") to evaluate the anticipated economic impact of the construction and operation of the Project. EDR provides an array of professional services for project development, and has prepared numerous Certificate applications to the Board on behalf of several clients. This work has included the preparation of economic impact reports for several electric generation facilities that have been issued a Certificate. A complete copy of EDR's Socioeconomic Report dated May 2017 for the Project ("Socioeconomic Report") is attached as **Exhibit D**.

As described in **Table 6** of the Socioeconomic Report, the Project is expected to generate substantial new employment. The Project is estimated to create approximately

644 new construction-related jobs, many of which would be of approximately ten (10) months in duration. The construction of the Project also is estimated to result in the creation of approximately 504 supply chain related jobs and approximately 361 jobs resulting from induced impacts, i.e., the near-term reinvestment of new and increased wages in the local economy. EDR estimates that the total annual worth of the payroll from these construction-related jobs will be approximately \$92 million.

EDR also estimated that the Project will result in the creation of approximately 17 new operation-related jobs, with an additional eight (8) secondary and “induced” jobs. These new positions would remain in existence over the 40-year life of the Project. EDR estimates that the total annual worth of the payroll from these operation-related jobs will be approximately \$1.5 million.

Applicant intends that at least 80% of the full-time equivalent employees who are employed for the construction or installation of the Project be domiciled in Ohio. Applicant estimates that approximately 30% of the total figure employed will be from the general region in which the Project is located. In particular, many of the construction jobs calling for general trade skills, such as laborers and electricians, will be available to those in the region. These general skills include those sufficient to fulfill positions for the construction of roads and fencing, the performance of landscaping services, performing general labor and providing security. Many of the positions requiring more specialized skills, such as panel assemblers, operators of specialized excavators, and high-voltage electrical specialists, are likely to be filled by those outside the general region, although many are expected to live in Ohio.

[4906-4-06(E)(3)]

Part VI of the Socioeconomic Report (**Exhibit D**) also includes an examination of the probable increases in county and township tax revenue resulting from the Project. The Applicant expects to be successful in designating the Project as a “qualified energy project” (“QEP”) and securing a related agreement for payment in lieu of taxes (“PILOT”) with Brown County, pursuant to Section 5727.75 of the Ohio Revised Code and procedures developed by the Ohio Development Services Agency. Based on an

assumption of a PILOT of \$7,000/MW for 125 MWac, it is estimated that the Project will generate \$875,000 in revenue annually for Brown County and its residents.

[4906-4-06(E)(4)]

The Project is expected to have a number of positive economic impacts on commercial activities in the local area. Part V of the Socioeconomic Report (**Exhibit D**) estimates that, during the construction phase, the Project is expected to generate new economic output of approximately \$193m. Of this total, an estimated \$50m is expected to represent induced impacts, which in part reflects spending in at local commercial establishments of substantial construction-related wages. In addition, additional local employment during the construction period is expected in supporting commercial sectors, such as in restaurants and hotels. Similar induced impacts benefiting local commerce are expected to occur from operation-related employment and tourism-related spending, albeit to a much smaller degree than during construction. Finally, land lease payment to land owners participating in the Project are expected to augment local income, which will result in increased demand for local commercial services.

**F. PUBLIC RESPONSIBILITY**

**1. PUBLIC INTERACTION**

OPSB Application Requirement [4906-4-06(F)(1)]:

*“(1) The applicant shall describe the applicant's program for public interaction during the siting, construction, and operation of the proposed facility. This description shall include detailed information regarding the applicant's public information and complaint resolution programs as well as how the applicant will notify affected property owners and tenants about these programs at least seven days prior to the start of construction.”*

Response:

[4906-4-06(F)(1)]

Applicant's interaction with the public regarding the siting of the Project, which continues, has consisted primarily of one-on-one outreach to individual property owners



in the vicinity of the Project Area and informal consultations with local officials. As part of determining the best location for the Project, Applicant communicated with scores of property owners within the study area. Ultimately, over thirty (30) different property owners chose to participate in the Project. Applicant also conferred with a variety of local officials as part of its due diligence in making the original siting decision. Consultations with local officials have included the County Commissioners, the Director of Economic Development, the County Auditor, the County Engineer, and officials with the Building Department. Applicant also consulted with the permitting staff in neighboring Clermont County, which provides commercial permitting services to Brown County.

With regard to the anticipated construction of the Project, Applicant presented at the public informational meeting a map showing the location of the Project as well as the location of each parcel of property either (1) within the Project Area; or (2) contiguous to the Project Area. This map was of sufficient scale to enable affected property owners and tenants to identify their property in relation to the Project. Applicant solicited written comments on the Project at the public information meeting, and has incorporated comments relating to construction into this Application.

Applicant will require that the general contractor retained to construct the Project identify a specific person whose responsibilities include addressing any complaints, concerns or comments from the public during construction. Applicant also will require, as a condition of performance, that information be posted to provide the public with contact information to submit complaints, concerns or comments regarding construction and that a prompt response be made to any such complaint, concern or comment (for which a response either is requested or clearly implied). Finally, the general contractor will be responsible for making commercially reasonable efforts to expeditiously resolve any complaints or concerns.

No later than seven (7) days prior to the start of construction, Applicant will mail a notice of construction of the Project to the following persons: (1) affected property owners and tenants who were provided notice of the public information meeting; (2) attendees of the public information meeting who requested updates regarding the Project and provided a mailing address for that purpose; and (3) any other person who requests updates

regarding the Project and provides a mailing address for that purpose. The notice of construction will summarize the upcoming construction activities, describe the areas in which construction will occur, including the main routes of equipment delivery, and provide the name and contact information of a representative of the Project to whom any complaints, concerns or comments may be addressed.

With respect to operations, Applicant will require that the company retained to operate the Project post its contact information at or near the entrance of each Solar Field and the Project Substation. Applicant also will require, as a condition of performance, that information be posted to provide the public with contact information to submit complaints, concerns or comments regarding operation and that a prompt response be made to any such complaint, concern or comment (for which a response either is requested or clearly implied). The operator also will be required to make commercially reasonable efforts to expeditiously resolve any complaints or concerns.

## **2. INSURANCE**

OPSB Application Requirement [4906-4-06(F)(2)]:

*“(2) The applicant shall describe any insurance or other corporate programs for providing liability compensation for damages to the public resulting from construction, operation, or decommissioning of the proposed facility.”*

Response:

[4906-4-06(F)(2)]

Applicant will maintain a comprehensive package of liability insurance to protect the public in connection with the Project. Throughout the construction, operation and decommissioning of the Project, Applicant will maintain insurance against claims and liability for personal injury, death and property damage arising from the construction, operation or decommissioning of the Project. At a minimum, the coverage limits of such insurance will be \$1,000,000 per occurrence and \$2,000,000 in the aggregate. Applicant also will maintain, throughout this period, umbrella insurance coverage against claims and liability for personal injury, death and property damage arising from the construction,

operation or decommissioning of the Project in the amounts of \$10,000,000 per occurrence and \$10,000,000 in the aggregate.

Applicant also is prepared to post a road bond or similar surety, if needed, to ensure the repair of any roads damaged by construction of the Project. Applicant will work with the local authorities to develop a common understanding for the use and protection of roads. This may include a road agreement (or a similar document) that will ensure that any construction-related damages to Brown County and Green Township roads are properly and expeditiously repaired. As part of that arrangement, Applicant stands ready to establish appropriate surety to guarantee funds for the fulfillment of those obligations.

### **3. TRANSPORTATION**

OPSB Application Requirement [4906-4-06(F)(3) and (4)]:

*“(3) The applicant shall evaluate and describe the anticipated impact to roads and bridges associated with construction vehicles and equipment delivery. Describe measures that will be taken to improve inadequate roads and repair roads and bridges to at least the condition present prior to the project.*

*“(4) The applicant shall list all transportation permits required for construction and operation of the project, and describe any necessary coordination with appropriate authorities for temporary or permanent road closures, lane closures, road access restrictions, and traffic control necessary for construction and operation of the proposed facility.”*

Response:

[4906-4-06(F)(3)]

The Project is expected to have only very modest impacts on roads, bridges and traffic in the local community. During construction, which is expected to be a limited period of approximately ten (10) months, the area will experience a substantial number of component-related deliveries by conventional road trucks. With the limited exception of several pieces of equipment to be installed as part of the Project Substation, however, the equipment and materials will not be unusually large or heavy. There will be a

substantial increase in worker-related traffic during the construction period, but not so much as to cause adverse effects in the community. Operation of the Project will necessitate very few deliveries and have minimal traffic from operational vehicles, and so is expected to have no adverse effects on roads, bridges and traffic.

Applicant retained Fisher Associates P.E., L.S., L.A., D.P.C. (“Fisher”) to evaluate the anticipated impact of the construction of the Project on road and bridges and any needed improvements prior to construction or likely repairs needed following construction. Fisher also was retained to advise Applicant regarding any required transportation-related permits and local traffic coordination. Among other services, Fisher provides planning and engineering services for a variety of clients in the transportation, land development and energy sectors. Fisher has been providing similar professional services for over thirty (30) years, and has prepared transportation-related evaluations for several proposed electric generation facilities for which the Board has issued a Certificate. A complete copy of Fisher’s Transportation Effect and Route Evaluation Study dated May 2017 (“Transportation Report”) is attached as **Exhibit E**.

Fisher conducted an on-site study of the transportation routes to the Project Area and the conditions of the local roads adjacent to and near the Project Area. Generally, the study concluded that the roads and bridges were in good condition, that they are of a type and width sufficient to accommodate the deliveries for the construction of the Project, and that no major repairs or upgrades are anticipated to enable the construction of the Project to safely proceed. Some of the smaller roads adjacent to and near the Project Area are in only fair condition, with some cracking and potholes noted and some culverts potentially in need of repair or replacement. In Fisher’s professional opinion, however, all of these potential minor issues can readily be addressed with local authorities so that the Applicant can ensure conditions are as good or better after construction of the Project than now exist. The Applicant will collaborate with local officials on commitments to repair potential damages to roads and/or bridges as a result of the Project.

The Transportation Report also describes Fisher’s efforts to examine current traffic conditions in and near the Project Area and address the effect of the likely volume of construction-related traffic. Fisher concluded that the travelling public is likely to

experience, at most, minor delays and inconveniences during the construction of the Project. As with road conditions, it concluded that these are manageable matters that can readily be addressed by Applicant in cooperation with local authorities.

[4906-4-06(F)(4)]

Fisher also examined whether the construction or operation of the Project would necessitate any transportation-related permits. It concluded that no special hauling permits would be needed because all of the vehicles needed for construction are anticipated to be within legal heights, weights and widths for the applicable roads and bridges. Fisher noted that Driveway Permits would be required for the Access Roads and Utility Permits would be required for any crossings of roads with buried electrical lines. As with any roads and culvert repairs and traffic coordination, Fisher advised that these routine permits can be secured through consultation with the appropriate State and local officials.

#### **4. DECOMMISSIONING**

OPSB Application Requirement [4906-4-06(F)(4)]:

*“(5) The applicant shall describe the plan for decommissioning the proposed facility, including a discussion of any financial arrangements designed to assure the requisite financial resources.”*

Response:

[4906-4-06(F)(4)]

The Project will have only a slight impact on the land, and the components requiring removal at the end of the Project’s useful life, or in the unexpected case that Project is abandoned, will be relatively easy to decommission. The racking will be affixed to the land with simple posts that are driven or rotated into the ground, probably to a depth of no more than eight (8) feet. Racking will not have concrete foundations. The Inverters and Pyranometers will be installed on pre-fabricated foundations, which can be lifted out of place, not poured foundations. Although the equipment for the Project Substation may

be installed on poured concrete, it will not cover a large area. Access Roads will be constructed of aggregate material or covered in grass--not paved--and land owners participating in the Project may choose to retain certain roads for their own use following decommissioning. The DC Collector System and the buried portions of the AC Collector System will be buried more than three (3) feet below grade and, therefore, need not be removed to return farm fields to cultivation.

It is not expected that the decommissioning of the Project will entail the need to conduct any soil or groundwater remediation. The operation of the Project will not produce any hazardous waste or wastewater. The only materials that may be left on the Project Area are roads desired by the land owner, lines buried at least three (3) feet below grade, and possibly piles from racking broken off more than three (3) feet below grade. Solar panels contain only very small, often only trace, amounts of hazardous substances, all of which are safely encased in glass. Even if damaged by breakage or fire, solar panels are exceedingly unlikely to cause any contamination necessitating remediation of soil or water.

Applicant will develop a comprehensive plan that will outline the responsible parties, schedules, and projected costs for decommissioning the Project and restoring the Project Area to substantially its pre-construction condition ("Decommissioning Plan"). The Decommissioning Plan will provide for the safe removal and sale, re-deployment, recycling or proper disposal of all components of the Project, including components containing rare or valuable materials. The duration of decommissioning activities is expected to be from six (6) and nine (9) months. The Decommissioning Plan will be provided to the Board's Staff once it is finalized.

The Decommissioning Plan will prioritize reuse and recycling over land disposal as waste. Most of the materials used in state-of-the-art solar generating facilities are reusable or recyclable. Given recent and expected trends, it is likely that the percentage of components that will be reusable or recyclable in the future will increase. PV panels are comprised mostly (almost 80%) of commonly recycled materials: glass, aluminum and copper. Although little recycling has been needed to date due to the relative youth of the commercial PV industry, an effort was launched in 2016 by the Solar Energy Industry

Association to develop a national recycling program for PV panels (SEIA, 2016). The ultimate goal of the program is to make the entire U.S. solar industry landfill-free. One of the top U.S.-based PV suppliers, which manufactures panels in Ohio, is a leader in the field, with current recovery of up to 90% of its raw materials (First Solar, 2013).

Even if PV panels used for the Project are not fully recyclable in 30-40 years, it is unlikely that they will constitute waste that is classified as hazardous or dangerous. Many suppliers of the two most common types of PV panels, both crystalline or thin film, already have demonstrated that their products pass the “Toxic Leaching Characteristic Procedure” promulgated by the U.S. Environmental Protection Agency pursuant to the Resource Conservation and Recovery Act. This includes the Ohio-made, thin-film panels referred to above, which are based on CdTe chemistry (Lagunas, January 2017). As a result, PV panels generally are not considered “hazardous waste” and may be disposed of as routine waste in common landfills.

The Decommissioning Plan will require that the contractor leading the decommissioning effort work closely with manufacturers, local subcontractors, and waste management firms to segregate—based on the prevailing standards and practices at the time—materials that can be reused and recycled from those that must be land-disposed as waste.

The Decommissioning Plan will require that the Project Area be restored to use for cultivation, unless circumstances prevailing shortly in advance of the start of decommissioning indicate that another use is more appropriate or explicitly desired by the land owner. Restoration will include a return to the same or functionally similar pre-construction drainage patterns, including farm drainage tiles, decompaction of soil, and seeding with an appropriate, low-growing vegetative cover, such as clover, to stabilize soil, enhance soil structure, and increase soil fertility. As addressed with respect to impacts to agricultural resources, the Decommissioning Plan also will repair any damage to drain tile systems.

Applicant also will provide for financial security to ensure that funds are available for the removal of the Project and restoration of the Project Area. Prior to the start of construction, an independent and registered professional engineer who is licensed to

practice in Ohio and retained by Applicant will estimate the total cost of fully implementing the Decommissioning Plan, which will consist of (1) an estimate of the total cost of implementing the Decommissioning Plan, without regard to the salvage value of the components of the Project, plus a 10% amount to cover contingencies; less (2) an estimate of the salvage value of the components of the Project, less a 10% amount to cover contingencies ("Net Decommissioning Cost"). The Professional Engineer (or an equally qualified one) will re-calculate the Net Decommissioning Costs approximately every five (5) years over the operating life of the Project.

If and when the Net Decommissioning Cost is a positive number, Applicant will post and maintain a surety bond or similar financial assurance instrument in the amount of the Net Decommissioning Cost that may be drawn upon to implement the Decommissioning Plan. If and when a subsequent estimate of the Net Decommissioning Cost increases the New Decommissioning Cost, the financial assurance instrument will be increased to the higher amount. Except as it may be drawn upon to implement the Decommissioning Plan, the amount of the financial assurance will not be decreased.

## **VII. COMPLIANCE WITH AIR, WATER, SOLID WASTE, AND AVIATION REGULATIONS**

### **A. PURPOSES OF RULE**

OPSB Application Requirement [4906-4-07(A)]:

*"(A) The information requested in this rule shall be used to determine whether the facility will comply with regulations for air and water pollution, solid and hazardous wastes, and aviation. Where appropriate, the applicant may substitute all or portions of documents filed to meet federal, state, or local regulations. Existing data may be substituted for physical measurements."*

Response:

[4906-4-07(A)]

Because of the nature of utility-scale solar farms, several of the requirements on these subjects, especially with regard to air regulations, do not apply to the Project. The specific instances in which a particular requirement does not apply are identified below.



## **B. AIR QUALITY**

### **1. PRECONSTRUCTOIN AIR QUALITY AND PERMITS**

#### OPSB Application Requirement [4906-4-07(B)(1)]:

*“(1) The applicant shall submit information regarding preconstruction air quality and permits.*

*(a) Provide available information concerning the ambient air quality of the proposed project area and any proposed alternative project area(s).*

*(b) Describe the air pollution control equipment for the proposed facility.*

*Stack gas parameters including temperature and all air pollutants regulated by the federal or state environmental protection agency shall be described for each proposed fuel. These parameters shall be included for each electric power generation unit proposed for the facility. Include tabulations of expected efficiency, power consumption, and operating costs for supplies and maintenance. Describe the reliability of the equipment and the reduction in efficiency for partial failure.*

*(c) Describe applicable federal and/or Ohio new source performance standards (NSPS), applicable air quality limitations, applicable national ambient air quality standards (NAAQS), and applicable prevention of significant deterioration (PSD) increments.*

*(d) Provide a list of all required permits to install and operate air pollution sources. If any such permit(s) have been issued more than thirty days prior to the submittal of the certificate application, the applicant shall provide a list of all special conditions or concerns attached to the permit(s).*

*(e) Except for wind farms, provide a map of at least 1:100,000 scale containing:*

*(i) The location and elevation (ground and sea level) of Ohio environmental protection agency primary and secondary air monitoring stations or mobile vans which supplied data used by the applicant in assessing air pollution potential.*

*(ii) The location of major present and anticipated air pollution point sources.*

*(f) Describe how the proposed facility will achieve compliance with the requirements identified in paragraphs (B)(1)(c) and (B)(1)(d) of this rule.”*

#### Response:

[4906-4-07(B)(1)(a)]

The Project will be located in Brown County, which is only a short distance from the Cincinnati metropolitan area. The ambient air in Brown County currently is in compliance with all applicable air quality requirements. The air quality in the Cincinnati area, including Clermont County to the immediate west of Brown County, however, fails to meet current national ambient air quality standards promulgated by the U.S. Environmental Protection Agency for ground-level ozone (OEPA, 2013). (The air quality in the Dayton and Columbus areas similarly fails to attain ozone targets.) With the continued growth in the Cincinnati area's economy and population, it is possible, and perhaps likely, that the air quality in Brown County will soon fail to attain the same standard.

Urban ozone problems chiefly result from emissions into the air of nitrogen oxides and volatile organic compounds from a variety of stationary and mobile sources, including factories, chemical plants and motor vehicles. These precursor pollutants mix in the atmosphere, in the presence of sunlight, to form ground-level ozone, which is commonly known as "smog." Traditional electric generation using coal or natural gas contributes to this problem primarily due to emissions of nitrogen oxides resulting from combustion. The Project will help provide electricity to Brown County and the surrounding region, including Cincinnati, without also exacerbating the ozone problem. Over time, a transition to non-polluting energy sources such as solar farms may contribute to the attainment of ozone goals even in Cincinnati.

[4906-4-07(B)(1)(b)-(f)]

Subsections (b) through (f) do not apply to the Project because the Project will not include any air pollution point sources or produce any air emissions from stationary or point sources of air pollution. As a result, the Project will not require any preconstruction air quality permits and will not include any stationary source air pollution control equipment.

In regards to subsection (e), while the regulations state that except for wind farms, a map of air monitoring stations should be provided, the proposed Project is a renewable energy project that will not produce any air pollution. As such, this figure is not applicable.

Solar panels and their associated infrastructure produce electricity without any stationary source air pollution.

## **2. AIR EMISSIONS AND DUST DURING CONSTRUCTION**

OPSB Application Requirement [4906-4-07(B)(2)]:

*“(2) The applicant shall describe plans to control emissions and fugitive dust during the site clearing and construction phase.”*

Response:

[4906-4-07(B)(2)]

Some emissions of fugitive dust necessarily will be generated by the construction of the Project, particularly roads. The amount of dust generated, however, will be relatively low for the spatial size of the Project because little topsoil will be removed to install the arrays and there will be minimal grading and other earth-moving activities, and virtually no excavation except for efficient trenching. As with other construction activities, dust emissions will be localized to the area of activity and temporary.

Best management practices in the construction industry will be used to minimize the amount of dust created by construction of the Project. These best practices will include the following: (1) retention of licensed construction firms that are knowledgeable about the importance of minimizing dust creation during construction activities; (2) maintenance of construction vehicles in proper working condition; and (3) use of water and/or dust suppressant on unpaved roads as needed to reduce dust creation.

## **3. AIR QUALITY FOR OPERATION**

OPSB Application Requirement [4906-4-07(B)(3)]:

*“(3) Except for wind farms, the applicant shall provide information regarding air quality for the operation of the proposed facility.*

*(a) Describe ambient air quality monitoring plans for air pollutants regulated by the federal or state environmental protection agency.*

*(b) On a map of at least 1:24,000 scale, show three isopleths of estimated concentrations that would be in excess of the U.S. environmental protection agency-defined "significant emission rates" when the facility is operating at its maximum rated output. The intervals between the isopleths shall depict the concentrations within a five-mile radius of the proposed facility. A screening analysis may be used to estimate the concentrations.*

*(c) Describe procedures to be followed in the event of failure of air pollution control equipment, including consideration of the probability of occurrence, expected duration and resultant emissions.”*

Response:

[4906-4-07(B)(3)]

This requirement, including the map required in subsection (b), does not apply to the Project because it will not include any air pollution point sources or produce any air emissions from stationary or point sources of air pollution. As a result, the Project will not include any quality monitoring or experience any failure of air pollution control equipment. The only air emissions resulting from operation will be from mobile sources, which will consist of the emissions from the regular, but occasional, use of highway-qualified motor vehicles and the very infrequent use of heavier mobile vehicles for equipment replacement.

## **C. WATER QUALITY**

### **1. PRECONSTRUCTION WATER QUALITY AND PERMITS**

OPSB Application Requirement [4906-4-07(C)(1)]:

*“(1) The applicant shall provide information regarding preconstruction water quality and permits.*

*(a) Provide a list of all permits required to install and operate the facility, including water pollution control equipment and treatment processes.*

*(b) On a map of at least 1:24,000 scale, show the location and sampling depths of all water monitoring and gauging stations used in collecting preconstruction survey data. Samples shall be collected by standard sampling techniques and only in bodies of water likely to be affected by the proposed facility. Information from U.S. geological survey (USGS), Ohio environmental protection agency, and similar agencies may be used where available, but the applicant shall identify all such sources of data.*

*(c) Describe the ownership, equipment, capability, and sampling and reporting procedures of each station.*

*(d) Describe the existing water quality of the receiving stream based on at least one year of monitoring data, using appropriate Ohio environmental protection agency reporting requirements.*

*(e) Provide available data necessary for completion of any application required for a water discharge permit from any state or federal agency for this project. Comparable information shall be provided for the proposed site and any proposed alternative site(s)."*

Response:

[4906-4-07(C)(1)(a)]

The Project will not create any identifiable, water-related discharges of the kind typically associated with other electric generation and industrial facilities. Accordingly, it will include no water pollution control equipment or wastewater treatment processes. The Project does not require a traditional National Pollution Discharge Elimination System ("NPDES") permit of the kind issued by the U.S. Environmental Protection Agency or Ohio Environmental Protection Agency.

The Project will seek certain water protection-related permits. First, the Project is expected to employ a limited number of "nationwide permits" issued by the U.S. Army Corps of Engineers ("Corps") under Section 404 of the federal Clean Water Act for crossings of certain "waters of the U.S." Second, in connection with those nationwide permits, the Project will seek a water quality certification from the Ohio Environmental Protection Agency ("Ohio EPA") pursuant to Section 401 of the federal Clean Water Act. Finally, the Project will seek approval by Ohio EPA of a proposed storm-water pollution prevention plan ("SWPPP") for erosion control and storm-water management at the Project.

[4906-4-07(C)(1)(b)-(e)]

Subsection (b) through (e) are inapplicable to the Project because it will not generate any wastewater. As there will be no impacts to water quality due to the construction and operation of the Project, water quality monitoring was not necessary for pre-construction surveys. As such, the figure required by subsection (b) is not applicable. The Project, therefore, does not require any traditional wastewater discharge permits and will not include any water pollution control equipment or treatment processes. There will be no water monitoring or gauging stations, receiving streams or associated sampling data related to the Project.

## **2. WATER QUALITY DURING CONSTRUCTION**

OPSB Application Requirement [4906-4-07(C)(2)]:

*“(2) The applicant shall provide information regarding water quality during construction.*

*(a) Indicate, on a map of at least 1:24,000 scale, the location of the water monitoring and gauging stations to be utilized during construction.*

*(b) Provide an estimate of the quality and quantity of aquatic discharges from the site clearing and construction operations, including runoff and siltation from dredging, filling, and construction of shoreside facilities.*

*(c) Describe any plans to mitigate the above effects in accordance with current federal and Ohio regulations.*

*(d) Describe any changes in flow patterns and erosion due to site clearing and grading operations.*

*(e) Describe the equipment proposed for control of effluents discharged into bodies of water and receiving streams.”*

Response:

[4906-4-07(C)(2)]

Although it will cover a relatively large area, the construction of the Project will involve only limited activities that require management of storm-water related pollutants.

Construction of the Project will necessitate very little earth-moving and grading because the Project Area is relatively level. (This is one of the features making the Project Area an excellent candidate to host solar panels; except for very limited instances, the racking simply will conform to the existing site topography.) Construction will include only the occasional clearing of trees because most of the Project Area consists of active or dormant farm fields, and the Project design will avoid the need to clear any large blocks of active wildlife habitat. Construction of the Project also will necessitate little excavation, which will be limited primarily to the digging of road beds and efficient trenching for the installation of buried electrical and communication lines. Nonetheless, the Project will implement an approved SWPPP for erosion control and the management of storm-water.

As a result, the above requirements do not apply to the Project. No water monitoring and gauging stations are proposed to be utilized during construction because the construction of the Project will not result in any aquatic discharges and the Project will not include any shoreline facilities. There are no anticipated changes in flow patterns and erosion from the Project because the Project Area already is level and very little, if any, grading will be needed. No equipment is proposed to control effluents discharged to water bodies and receiving streams because no such discharges are expected to occur.

### **3. WATER QUALITY DURING OPERATION**

#### *OPSB Application Requirement [4906-4-07(C)(3)]:*

*“(3) The applicant shall provide information on water quality during operation of the facility.*

*(a) Indicate, on a map of at least 1:24,000 scale, the location of the water quality monitoring and gauging stations to be utilized during operation.*

*(b) Describe the water pollution control equipment and treatment processes planned for the proposed facility.*

*(c) Describe the schedule for receipt of the national pollution discharge elimination system permit.*

*(d) Provide a quantitative flow diagram or description for water and water-borne wastes through the proposed facility, showing the following potential sources of pollution, including:*

- (i) Sewage.*
- (ii) Blow-down.*
- (iii) Chemical and additive processing.*
- (iv) Waste water processing.*
- (v) Run-off and leachates from fuels and solid wastes.*
- (vi) Oil/water separators.*
- (vii) Run-off from soil and other surfaces.*
- (e) Describe how the proposed facility incorporates maximum feasible water conservation practices considering available technology and the nature and economics of the various alternatives.”*

Response:

[4906-4-07(C)(3)(a)-(d)]

Subsection (a) through (d) are not applicable to the Project because its operation will not consume an appreciable amount of water or generate any wastewater. The Project will not include any water quality monitoring stations, water pollution control equipment and treatment processes, or a NPDES permit for any point source discharge. The Project will not generate any water or water-borne waste, including sewage, blow-down, chemical and additive processing, waste water processing, run-off and leachates from fuel or solid wastes, or oil-water separators and other surfaces.

[4906-4-07(C)(3)(e)]

Opportunities to employ water conservation practices are extremely limited because the only material use of water will be to occasionally clean the panels, and even this use may not occur in periods of sufficient rainfall. The operation of the Project will use virtually no water and will produce no wastewater discharges. The Project will use water only for occasional cleaning of panels to reduce inefficiency in electric generation due to accumulated soiling. Cleaning is expected to occur two (2) or three (3) times annually, and potentially less frequently depending on the amount of rainfall in a given



year. All water used for this purpose will be trucked to the Project or acquired from one or more of the land owners participating in the Project. The Project will not include an operations and maintenance building; rather, operational personnel will office off-site.

## **D. SOLID WASTE**

### **1. SOLID WASTE IN PROJECT AREA**

OPSB Application Requirement [4906-4-07(D)(1)]:

*“(1) The applicant shall provide information regarding preconstruction solid waste.*

*(a) Describe the nature and amount of debris and solid waste in the project area.*

*(b) Describe any plans to deal with such wastes.”*

Response:

[4906-4-07(D)(1)]

The Project Area is rural in character and comprised chiefly of farm fields. It historically has had a relatively low population density and only a modest number of structures. The general area is relatively free of debris and other solid waste. It is therefore highly unlikely that significant land contamination, especially with hazardous wastes, is present in the Project Area.

Prior to the start of construction, however, Applicant will retain an experienced and qualified firm to perform a Phase 1 Environmental Site Assessment survey of the Project Area (“Phase 1 ESA”). The Phase 1 ESA will be conducted pursuant to appropriate standards adopted by the American Society for Testing and Materials and regulations promulgated by the U.S. Environmental Protection Agency for “All Appropriate Inquiries” under the Comprehensive, Environmental Response, Compensation and Liability Act. It is expected that the Phase 1 ESA will be completed in Q3 2017. Applicant fully expects that the final design of the Project can accommodate any need to fully avoid any “area of concern” that may be identified by the Phase 1 ESA. A copy of the report of the Phase 1 ESA will be provided to the Board.

## 2. CONSTRUCTION

OPSB Application Requirement [4906-4-07(D)(2)]:

*“(2) The applicant shall provide information regarding solid waste during construction.*

*(a) Provide an estimate of the nature and amounts of debris and other solid waste generated during construction.*

*(b) Describe the proposed method of storage and disposal of these wastes.”*

Response:

[4906-4-07(D)(2)]

Construction of the Project will generate very limited amounts of non-hazardous, solid waste, which will be reused, recycled, or disposed of accordance with applicable requirements. These non-hazardous, solid wastes may include package-related materials, such as crates, nails, boxes, containers, and packing materials, damaged or otherwise unusable parts or materials, and occasional litter and miscellaneous debris generated by workers. Construction of the Project will not generate any hazardous wastes. Non-hazardous, solid waste that is not reused or recycled will be disposed of in a sanitary landfill.

## 3. OPERATION

OPSB Application Requirement [4906-4-07(D)(3)]:

*“(3) The applicant shall provide information regarding solid waste during operation of the facility.*

*(a) Provide an estimate of the amount, nature, and composition of solid wastes generated during the operation of the proposed facility.*

*(b) Describe proposed methods for storage, treatment, transport, and disposal of these wastes.”*

Response:

[4906-4-07(D)(3)]

Operation of the Project will generate only exceedingly small amounts of non-hazardous, solid waste, which will be reused, recycled, or be disposed of accordance with applicable requirements. These non-hazardous, solid wastes are expected to be of the same general nature as those generated during construction, but in far smaller quantities. Operation of the Project will not generate any hazardous wastes. Non-hazardous, solid waste that is not reused or recycled may be accumulated in small amounts in appropriate trash receptacles prior to disposal, will not require any treatment, and will be disposed of in a sanitary landfill.

#### **4. PERMITS**

OPSB Application Requirement [4906-4-07(D)(4)]:

*“(4) The applicant shall describe its plans and activities leading toward acquisition of waste generation, storage, treatment, transportation and/or disposal permits. If any such permit(s) have been issued more than thirty days prior to the submittal of the certificate application, the applicant shall provide a list of all special conditions or concerns attached to the permit(s).”*

Response:

[4906-4-07(D)(4)]

This requirement does not apply to the Project because it will not generate any waste that requires a permit to generate, store, treat, transport or dispose.

#### **E. AVIATION**

OPSB Application Requirement [4906-4-07(E)]:

*“(E) The applicant shall provide information on compliance with aviation regulations.*

*(1) List all public use airports, helicopter pads, and landing strips within five miles of the project area and all known private use airports, helicopter pads, and landing strips or property within or adjacent to the project area, and show these facilities on a map(s) of at least 1:24,000 scale. Provide confirmation that the owners of these airports have been notified of the proposed facility and any impacts it will have on airport operations.*

*(2) Provide the FAA filing status of each airport and describe any potential conflicts with air navigation or air traffic communications that may be caused by the proposed facility.”*

Response:

[4906-4-07(E)(1)]

There are no public use airports, helicopter pads, or landing strips within five (5) miles of the Project Area. There are no private use airports, helicopter pads, or landing strips within or adjacent to the Project Area, as such no figure was generated for this section.

[4906-4-07(E)(2)]

The Federal Aviation Administration (“FAA”) requires that proponents of solar generation projects at airports notify the FAA so that it can conduct an aeronautical study of the proposed facility and determine whether it presents a hazard to air navigation. Such a study would include an analysis of the potential effect of “reflectivity” (also known as “glint” and/or “glare”) of the facility to ensure that it does not have the potential to cause brief losses of vision for pilots during the final runway approach or air traffic controllers. The FAA has explained that PV may be more compatible for airports than other solar energy generation technologies because among several factors, PV “is designed to absorb sunlight (rather than reflect it), minimizing potential impacts of glare,” and also has noted that “many airports are currently employing solar PV and reporting reliable and safe performance” (FAA Guidance, 2010).

The FAA also encourages facilities proposed to be located “in the vicinity” of a federally-obligated airport to notify the FAA for a possible aeronautical study, but it has acknowledged that it is not clear to what proposed PV facilities this applies. On the subject of off-airport solar generation facilities proposed to be located at locations than that at an airport itself, the FAA guidance state the following:

“Solar projects constructed off-airport are proposed and managed by private developers and public agencies. They include a wide variety of technologies (PV, solar thermal, and concentrated solar power) and sizes (residential, commercial, and utility-scale or grid-fed). While projects proposed on-airport have a direct link with FAA

authority and NEPA responsibilities, the need for FAA airspace review is less clear the farther away projects are from the airport fence. The FAA has broad authority for airspace review and the evaluation of any solar project that could pose a potential hazard to air navigation.

The clearest trigger for FAA review is a physical penetration of airspace. It is well-established that structures rising 200 feet or greater above the land surface must be reviewed by the FAA. Tall structures, such as wind turbines, cell towers, and communication antennae customarily rise above 200 feet and proponents know that an airspace review is required. The FAA will review the location of structures and, depending on their proximity to existing airports, will either limit their height to remain out of flight paths or condition their approval to day and night obstruction lighting. Concentrated solar power projects with power towers may rise to a height of 200 feet or greater, triggering an airspace review. Many other solar projects including parabolic trough and V farms will not and therefore the need to file a notice with the FAA may not be clear.

Currently, no defined thresholds for project size, type, or distance from the airport are available that automatically trigger FAA airspace review. However, proximity to the airport and CSP technology are two indicators of likely FAA interest in a solar project.

....

How the FAA is notified about potential impacts to airspace, or how it hears about pending solar projects, varies. However, it is the responsibility of local governments, solar developers, and other stakeholders in the vicinity of an airport to check with the airport sponsor and the FAA to ensure there are no potential safety or navigational problems with a proposed solar facility, especially if it is a large facility. Likewise, sponsors must be aware of nearby off-airport activities that could have a negative effect on the safe and efficient operation of the airport. Sponsors should notify the FAA when such activities are proposed and the FAA needs to participate in public meetings or permitting processes” (emphasis added, FAA Guidance, 2010).

There is no need for an aeronautical study with respect to the Project because no part of the Project will be tall enough to obstruct air traffic and the Project is not located “in the vicinity” of a federally-obligated airport. All parts of the Project will be lower than

200 feet in height, which is the threshold that triggers the need to notify the FAA. The tallest structure at the Project will be the lighting mast (maximum height of 70 feet) at the Project Substation, which will rise no higher than existing structures at the Hillcrest Substation. With respect to reflectivity, the FAA's data shows that the nearest federally-obligated airport to the Project is the Brown County Municipal Airport, which lies approximately 15 miles away from the Project Area. The Project will not be visible to, and will present no risk of glare, to pilots making final approaches to the Brown County Municipal Airport.

## **VIII. HEALTH AND SAFETY, LAND USE AND ECOLOGICAL INFORMATION**

### **A. HEALTH AND SAFETY**

#### **1. SAFETY AND RELIABILITY OF EQUIPMENT**

OPSB Application Requirement [4906-4-08(A)(1)]:

*“(1) The applicant shall provide information on the safety and reliability of all equipment.*

*(a) Describe all proposed major public safety equipment.*

*(b) Describe the reliability of the equipment.*

*(c) Provide the generation equipment manufacturer's safety standards. Include a complete copy of the manufacturer's safety manual or similar document and any recommended setbacks from the manufacturer.*

*(d) Describe any measures that will be taken to restrict public access to the facility.*

*(e) Describe the fire protection, safety, and medical emergency plan(s) to be used during construction and operation of the facility, and how such plan(s) will be developed in consultation with local emergency responders.”*

Response:

[4906-4-08(A)(1)(a)]

The only aspect of the Project that may constitute major safety equipment is perimeter fencing with locked gates. Except for the Access Roads, this fencing will surround all above-ground features of the Project. This includes the Project Substation, the Solar Fields, and, if not located within the perimeter of a Solar Field, each Pyranometer. Appropriate warning signage will be posted throughout the Project.

The general public will be prohibited from entering the Project. (Guided tours of the Project by qualified personnel may allow designated members of the public to enter one or more of the Solar Fields for limited periods of time.) In addition, warnings regarding the dangers of high-voltage equipment will be displayed on appropriate signage throughout the Project Area. Accordingly, the general public will have no access to any potential hazards associated with the Project, and also will be warned regarding those potential hazards.

[4906-4-08(A)(1)(b) & (c)]

The operational components of the Project will have a high degree of reliability as Applicant will select only leading suppliers. The manufacturers' safety standards, including complete copies of their safety manuals or similar documents, will be provided to the Board's Staff as part of the final construction plans for the Project, and a waiver has been requested to allow for that submittal. Applicant also will identify any setbacks recommended by the manufacturers once the specific vendors have been selected. The reliability of the solar panels themselves are highly unlikely to present any safety concerns. Also, as discussed above, the general public will not be exposed to the components of the Project because, except for Access Roads, they all will be either securely fenced or buried.

[4906-4-08(A)(1)(d)]

To provide appropriate distances between the Project and the general public, the Solar Fields will be designed to incorporate several minimum setbacks. These will include (1) a 25-foot setback between the perimeter fence of a Solar Field and the edge of any

public road; (2) a 40-foot setback between the any above-ground equipment within a Solar Field and the edge of any public road; (3) a 10-foot setback between the perimeter fence of a Solar Field and the property line of any parcel whose owner is not participating in the Project (“Non-participating Parcel”); (4) a 25-foot setback between any above-ground equipment within a Solar Field and any parcel line with a Non-participating Parcel; and (5) a 100-foot setback between any above-ground equipment within a Solar Field and any habitable residence located on a Non-participating Parcel. The Project Substation will be located several hundred feet away from the nearest habitable structure.

In addition to these setbacks, the general public will be prohibited from coming into contact with any equipment that comprises the Project. (As noted above, guided tours of the Project by qualified personnel may take place.) All of the above-ground equipment will be located behind fences with locked gates. To further protect the public, appropriate warning signs will be posted and maintained for the Solar Fields and the Project Substation.

[4906-4-08(A)(1)(e)]

Prior to the start of construction of the Project, Applicant will develop an emergency response plan that will including plans for fire and ambulance, in consultation with potentially affected local officials and emergency personnel. These will include the Brown County Engineer, the Brown County Sherriff’s Department, the Township Officials of Green Township, the Mt. Orab Fire Department, the Mt. Orab Medical Center, and local ambulance services. The emergency response plan will include information on the location of the different components of the Project, the potential hazards presented (including potential hazards to emergency responders), the locations of access gates for the Solar Fields and the Project Substation, and appropriate (24/7) contact information.

## **2. FAILURE OF AIR POLLUTION CONTROL EQUIPMENT**

OPSB Application Requirement [4906-4-08(A)(2)]:



*“(2) Except for wind farms, the applicant shall describe in conceptual terms the probable impact to the population due to failures of air pollution control equipment.”*

Response:

[4906-4-08(A)(2)]

This requirement does not apply to the Project because it will not include any stationary sources of air emissions and, therefore, no air pollution control equipment.

### **3. NOISE FROM CONSTRUCTION AND OPERATION**

OPSB Application Requirement [4906-4-08(A)(3)]:

*“(3) The applicant shall provide information on noise from the construction and operation of the facility.*

*(a) Describe the construction noise levels expected at the nearest property boundary. The description shall address:*

*(i) Blasting activities.*

*(ii) Operation of earth moving equipment.*

*(iii) Driving of piles, rock breaking or hammering, and horizontal directional drilling.*

*(iv) Erection of structures.*

*(v) Truck traffic.*

*(vi) Installation of equipment.*

*(b) Describe the operational noise levels expected at the nearest property boundary. The description shall address:*

*(i) Operational noise from generation equipment. In addition, for a wind facility, cumulative operational noise levels at the property boundary for each non-participating property adjacent to or within the project area, under both day and nighttime operations. The applicant shall use generally accepted computer modeling software (developed for wind turbine noise measurement) or similar wind turbine noise methodology, including consideration of broadband, tonal, and low-frequency noise levels.*

*(ii) Processing equipment.*

*(iii) Associated road traffic*

*(c) Indicate the location of any noise-sensitive areas within one mile of the proposed facility, and the operational noise level at each habitable residence, school, church, and other noise-sensitive receptors, under both day and nighttime operations.*

*(d) Describe equipment and procedures to mitigate the effects of noise emissions from the proposed facility during construction and operation, including limits on the time of day at which construction activities may occur.*

*(e) Submit a preconstruction background noise study of the project area that includes measurements taken under both day and nighttime conditions.”*

Response:

[4906-4-08(A)(3)(a)]

Applicant retained Hessler Associates, Inc. (“Hessler”) to conduct a pre-construction background noise study for the Project, model the noise it is expected to generate, and assess the impacts of that noise. Hessler has been working in the acoustics field for approximately 40 years, and provides acoustical engineering design and testing services to a variety of industries, including electric generation. Hessler has prepared noise assessments for several proposed electric generation facilities for which the Board has issued a Certificate. A complete copy of the Hessler’s report, which is entitled Existing Conditions Background Sound Survey and Operational Noise Impact Assessment and is dated May 2, 2017 (“Noise Report”), is attached as **Exhibit F**.

Hessler concluded that, although construction of the Project will generate some of intermittent types and levels of noise common at large construction sites, the construction period will be substantially shorter than, and construction of the Project will not feature many of the most significant noise-generating activities common during construction of, a traditional fossil generation plant. The Project is expected to be constructed in months, not years. The Project also will not involve extensive excavation or other earth-moving work, construction of significant concrete foundations, or blasting. Although piles for racking will be driven or screwed in the ground surface, they are expected to be placed at a depth of up to eight (8) feet, and this activity will be relatively brief at any particular location within the Project Area. Horizontal directional drilling is expected to be used for

the Project, but only on a very limited number of occasions. Sound levels associated with typical construction equipment, including truck traffic, are discussed in Table 6.0.1 of **Exhibit F**. The table provides representative sound levels from construction equipment at 50 feet, which may be conservatively interpreted as the site property boundary. Levels as high as 95 dBA (A-weighted decibel) could be temporarily produced. However, at the nearest house, sound from concrete pouring for the base of the Project Substation could produce sounds of around 56 dBA. This sound would occur intermittently during day and last for only one or two days. In general, Hessler concluded that construction-related noise would be modest and intermittent, and would result in only minimal, unavoidable impacts.

Especially in comparison to a fossil generation plant, a large-scale solar facility comes close to operating silently. The Project's operation will generate only very small amounts of noise because the generation equipment involves no fuel movement, no combustion, no waste movement, and very few moving parts. The only components of the Project's generation equipment that will result in any discernable noise--even immediately at the source--are the Inverters and small electric motors. At only short distances from these sources, the noise generated rapidly dissipates to background levels. The Project will produce no sound at night.

Operation-related noise will be very small. Major equipment repairs or replacement, which are expected to be very rare, will generate occasional noise, but not unlike common construction activities. The use of highway-rated vehicles to occasionally access each Solar Field will not add appreciably to routine road traffic noise.

[4906-4-08(A)(3)(b)]

The noise generated by equipment in the Solar Fields will be minimal and should not be a concern for any off-site receptors. The electric motors that power tracking racks are very small, operate very slowly, and operate only in daylight hours. The Inverters also will generate noise only when the Project is generating electricity, which is during daylight hours. As Hessler notes, the noise that inverters and their associated step-up transformers generate is inaudible at a distance of 50 to 150 feet from the source. The

Project will be designed to site the Inverters within the Solar Fields to ensure that they do not result in material, adverse impacts to any sensitive, off-site receptors.

Because the generation equipment for the Project will not generate any significant noise, the pre-construction background noise study (**Exhibit F**) that Hessler conducted focused on the existing Utility Substation and its modeling on the Project Substation to be constructed adjacent to it. The residence nearest to the Utility Substation is approximately 800 feet away, and the next closest residences are more than twice that distance. Because the Project as a whole, and therefore the Project Substation, will operate only during the day, nighttime sound conditions are not relevant to the analysis.

Modeling demonstrated that any sound emissions during the day from the Project Substation will be significantly lower than the current natural background sound level, making it generally inaudible all of the time at these few nearby residences. In addition, a sound level of 61 dBA is estimated at the nearest property boundary, which abuts the Project Substation and is adjacent to the Utility Substation. At the nearest residence, the transformer may occasionally be about 3 dBA higher than the background ambient sound levels. This means that, while it would not be clearly audible or obvious, its tonal sound emission may be barely perceptible with careful listening for brief periods when all other background sounds are momentarily at a minimum. The sound at the nearest residence would be inaudible or inconsequential most of the time, although there may be occasional periods during which it is faintly perceptible with careful listening. Overall, however, Hessler concluded that no adverse community noise impact is expected from the operation of the Project Substation.

[4906-4-08(A)(3)(c)]

Only the Project Substation is expected to generate any material, off-site noise from operation of the Project. Therefore, the only noise-sensitive receptor that may be affected by the operation of the Project is a single residence located approximately 800 feet from the Project Substation Parcel, and the impacts at that location are expected to be minimal. The operational noise level at that location is detailed in the Noise Report (see **Exhibit F**). The next-nearest residences, which are more than twice that distance

from the Project Substation, will not be impacted. Because the Project will not operate during the night, it will produce no sound during that particularly sensitive period. The noise generated by equipment in the Solar Fields will be minimal and should not be a concern for any off-site receptors.

[4906-4-08(A)(3)(d)]

To mitigate noise during construction as much as reasonable possible, Applicant will employ best management practices for the construction industry. These measures will include the following: (1) limiting construction activities to 7:00 a.m. to 7:00 p.m., or until dusk when sunset occurs after 7:00 p.m.; (2) maintaining construction-related vehicles in proper working condition; and (3) working with the local community to advise residents of those periods when sustained construction activity is expected to take place in relatively close proximity to their homes. Because the operational noise from the Project Substation it is expected to be so limited, especially given the adjacent Utility Substation, no mitigation of operational noise is planned.

[4906-4-08(A)(3)(e)]

The Noise Report prepared by Hessler (**Exhibit F**) includes the results of a preconstruction background noise study that it conducted for the Project. Measurements were taken during both daytime and nighttime conditions, although the latter is not relevant to the Project as it will operate only during daylight hours. The methodology for the study is described in Section 2.0 and the results it produced are set forth in Section 3.0 of the Noise Report.

#### **4. WATER IMPACTS**

OPSB Application Requirement [4906-4-08(A)(4)]:

*“(4) The applicant shall provide information regarding water impacts*

*(a) Provide an evaluation of the impact to public and private water supplies due to construction and operation of the proposed facility.*

*(b) Provide an evaluation of the impact to public and private water supplies due to pollution control equipment failures.*

*(c) Provide existing maps of aquifers, water wells, and drinking water source protection areas that may be directly affected by the proposed facility.*

*(d) Describe how construction and operation of the facility will comply with any drinking water source protection plans near the project area.*

*(e) Provide an analysis of the prospects of floods for the area, including the probability of occurrences and likely consequences of various flood stages, and describe plans to mitigate any likely adverse consequences.”*

Response:

[4906-4-08(A)(4)(a)]

Applicant retained Hull and Associates, Inc. (“Hull”) to review the available geologic, hydrogeologic, and geotechnical data for the Project Area. Hull, which is based in Dublin, Ohio, is experienced in performing these assessments for proposed electric generation projects in Ohio. The company has a particular focus in certain sectors of the economy, one of which is renewable energy. A copy of Hull’s report, which is entitled Groundwater Hydrogeological and Geotechnical Desktop Document Review Summary Report for the Proposed Solar Farm Project Located in Brown County, Ohio and is dated May 3, 2017 (“Geotechnical-Hydrogeology Report”), is attached as **Exhibit G**.

The Project will not have any impact to public or private water supplies because the construction of the Project will not involve work more than approximately eight (8) feet below the ground surface, the Project will use very little water, and it will not generate any wastewater discharges. As noted below, area aquifers and water wells in the Project Area for which there is public information have been identified. In addition, Attachment A of the Geotechnical-Hydrogeology Report includes the results of a well survey of the land owners participating in the Project, which had an outstanding (95%) response rate. This information on wells that was not publicly available provides Applicant with ample information to ensure its construction activities will not adversely affect area drinking water supplies.

[4906-4-08(A)(4)(b)]

The Project will not impact public and private water supplies due to failures of pollution control equipment because the Project will not include any such equipment.

[4906-4-08(A)(4)(c)]

**Figure 8** depicts aquifers, water wells, and Source Water Protection Areas (“SWPA”). The Geotechnical-Hydrogeology Report also includes a map (Figure 7 of **Exhibit G**) that depicts within and near the Project Area the locations of the aquifers and water wells based on information provided by ODNR, the Ohio Environmental Protection Agency (“Ohio EPA”) and the Brown County Health Department. Based on data from the Ohio EPA, there is one Inland Surface Water Protection Area within the Project Area. The Corridor Management Zone, identified on **Figure 8**, extends 1,000 feet from each bank of Sterling Run. However, as it will involve only limited ground disturbance and no wastewater discharges, the Project is not expected to directly affect any aquifers, water wells or Source Water Protection Areas.

[4906-4-08(A)(4)(d)]

Ohio EPA and other regulatory agencies have adopted regulations that restrict specific activities within SWPAs. Hull has reviewed the rules and regulations related to the presence of SWPAs and has concluded that construction of the Project will not be considered an activity that would be restricted within either a surface water or groundwater SWPA.

[4906-4-08(A)(4)(e)]

Hull determined that there are no 100-year floodplains outside of the surface water bodies in the Project Area or in the surrounding areas (**Exhibit G**). Soils in the Project Area are generally poorly-draining, and so there is some potential for localized, rainfall-

driven event flooding that may affect the Project by impeding the travel and work of operational personnel. Such events will be fully accounted for in the SWPPP for the Project. Given the largely passive nature of the infrastructure and the lack of any storage of fluids or potentially hazardous materials, such events should not be of concern to the community or environment.

## **5. GEOLOGICAL FEATURES, TOPOGRAPHY AND WELLS**

OPSB Application Requirement [4906-4-08(A)(5)]:

*“(5) The applicant shall provide a map of suitable scale showing the proposed facility, geological features of the proposed facility site, topographic contours, existing gas and oil wells, and injection wells. The applicant shall also:*

*(a) Describe the suitability of the site geology and plans to remedy any inadequacies.*

*(b) Describe the suitability of soil for grading, compaction, and drainage, and describe plans to remedy any inadequacies and restore the soils during post-construction reclamation.*

*(c) Describe plans for the test borings, including closure plans for such borings. Plans for the test borings shall contain a timeline for providing the test boring logs and the following information to the board:*

*(i) Subsurface soil properties.*

*(ii) Static water level.*

*(iii) Rock quality description.*

*(iv) Percent recovery.*

*(v) Depth and description of bedrock contact.”*

Response:

[4906-4-08(A)(5)]

The Project does not have stringent requirements for subsurface conditions because of the very limited degree to which the equipment will use the subsurface region. Racking piles are expected to reach at most a depth of eight (8) feet below surface and



the AC Collector System and DC Collector System is expected to be installed at a maximum depth of four (4) feet below grade. Similarly, the Project will not have stringent requirements for soil because the land is generally very level and the arrays will largely follow the existing terrain with little grading needed. The layout of the components of the Project will be designed so as to avoid all known and active wells.

**Figure 9** depicts the location of the proposed Project, geological features of the proposed Project Area, and topographic contours. According to ODNR data, there are no existing gas and oil wells within or adjacent to the Project Area. Maps showing various subsurface features, including geologic features and topographic contours, are also included in the Geotechnical-Hydrogeology Report (see **Exhibit G**). There are no oil and gas wells or injection wells in the immediate vicinity of the Project Area.

[4906-4-08(A)(5)(a)]

The site geology is highly suitable for the Project because the Project's subsurface impact will be very shallow and bedrock is not expected to be encountered. Accordingly, there are no geology-related inadequacies to remedy in connection with the Project. Hull analyzed available information to estimate the depth to bedrock throughout the Project Area, and concluded that it ranges from between approximately 38 to 109 feet below the surface. It is anticipated that piles for racking will be (or rotated) to a maximum depth of only eight (8) feet, and that buried electric and communication lines will be buried at a depth of no more than four (4) feet. No feature of the Project will be constructed at a depth of more than ten (10) feet.

[4906-4-08(A)(5)(b)]

The soils in the Project Area, which consist primarily of poorly-draining silt loams, is suitable for grading, compaction and drainage for the Project, and there are no soil-related inadequacies to remedy in connection with the Project. Importantly, the Project will necessitate only very limited grading and compaction, primarily in connection with the construction of the Project Substation and the Access Roads. The Project Area is very

level, obviating the need for substantial grading. The racking and panels will be installed without removing significant quantities of top soil, and the arrays generally will follow the (very limited) contours of the surface. The limited amounts of soil removed for construction of the Project will be retained by the relevant land owner participating in the Project.

[4906-4-08(A)(5)(c)]

Applicant expects to need to conduct only limited test borings in connection with construction of the Project. A waiver has been submitted to allow the Applicant to submit its plan for such borings, including appropriate closure plans, to the Board's Staff no more than thirty (30) days prior to the commencement of the field work and after the Project layout has been finalized. Within sixty (60) days following the receipt of all relevant data from the borings, Applicant will provide the Board with all of the information required above: subsurface soil properties, static water level, rock quality description, percent recovery, and depth and description of bedrock contact.

## **6. HIGH WINDS**

OPSB Application Requirement [4906-4-08(A)(6)]:

*“(6) The applicant shall provide an analysis of the prospects of high winds for the area, including the probability of occurrences and likely consequences of various wind velocities, and describe plans to mitigate any likely adverse consequences.”*

Response:

[4906-4-08(A)(6)]

This requirement does not apply to the Project because its components are not susceptible to damage from high winds. All project equipment will be installed, given the site-specific soil conditions, at sufficient depths to preclude any adverse influence from wind.

## **7. BLADE SHEAR**

OPSB Application Requirement [4906-4-08(A)(7)]:

*“(7) The applicant shall evaluate and describe the potential impact from blade shear at the nearest property boundary and public road, including its plans to minimize potential impacts and instruct workers of potential hazards.”*

Response:

[4906-4-08(A)(7)]

This requirement does not apply to the Project because it will not include blades.

## **8. ICE THROW**

OPSB Application Requirement [4906-4-08(A)(8)]:

*“(8) The applicant shall evaluate and describe the potential impact from ice throw at the nearest property boundary and public road, including its plans to minimize potential impacts and instruct workers of potential hazards.”*

Response:

[4906-4-08(A)(8)]

This requirement does not apply to the Project because it will not include any unenclosed, moving parts that potentially could throw ice. Any ice “drop” from elevated equipment would fall only short distances and wholly within secured the fence lines of the Solar Fields and the Project Substation.

## **9. SHADOW FLICKER**

OPSB Application Requirement [4906-4-08(A)(9)]:

*“(9) The applicant shall evaluate and describe the potential impact from shadow flicker at habitable residences within at least one-half mile of a turbine, including its plans to minimize potential impacts.”*

Response:

[4906-4-08(A)(9)]

This requirement does not apply to the Project because it does not include any wind turbines and the Project will not include any moving parts that potentially could produce shadow flicker at any habitable residence.

## **10. TV AND RADIO RECEPTION**

OPSB Application Requirement [4906-4-08(A)(10)]:

*“(10) The applicant shall evaluate and describe the potential for the facility to interfere with radio and TV reception and describe measures that will be taken to minimize interference.”*

Response:

[4906-4-08(A)(10)]

The Project is not expected to have any material impact on radio or TV reception because it lacks tall structures, it lacks exposed moving parts, and it will generate only very weak electromagnetic fields (“EMFs”), and only during the day, that will dissipate rapidly within short distances. “PV arrays generate EMF in the same extremely low frequency (ELF) range as electrical appliances and wiring found in most homes and buildings” (MDER, 2015). In a recent study of three (3) solar arrays in Massachusetts, electric fields levels measured along the boundary were not elevated above background (Massachusetts Clean Energy Center, 2012). Applicant is aware of no research that indicates that the Project has the potential to interfere with radio or television reception.

## **11. RADAR SYSTEMS**

OPSB Application Requirement [4906-4-08(A)(11)]:

*“(11) The applicant shall evaluate and describe the potential for the facility to interfere with military and civilian radar systems and describe measures that will be taken to minimize interference.”*

Response:

[4906-4-08(A)(11)]

The Project is not expected to have any material impact on military or civilian radar systems because it lacks tall structures that could potentially block radar signals. It also lacks exposed moving parts and it will generate only very weak EMFs that will dissipate rapidly within short distances. The Federal Aviation Administration (“FAA”) has concluded that solar arrays do not cause radar interference:

“Radar interference occurs when objects are placed too close to a radar sail (or antenna) and reflect or block the transmission of signals between the radar antenna and the receiver (either a plane or a remote location).

. . .

Due to their low profiles, solar PV systems typically represent little risk of interfering with radar transmissions. In addition, solar panels do not emit electromagnetic waves over distances that would interfere with radar signal transmissions, and any electrical facilities that do carry concentrated current are buried beneath the ground and away from any signal transmission.

. . .

Off-airport solar projects are even more unlikely [than on-airport solar projects] to cause radar interference unless located close to airport property and within the vicinity of a radar equipment and transmission pathways” (FAA Guidance, 2010).

Applicant is aware of no research that indicates that the Project has the potential to interfere with any radar systems.

## **12. MICROWAVES**

OPSB Application Requirement [4906-4-08(A)(12)]:

*“(12) The applicant shall evaluate and describe the potential for the facility to interfere with microwave communication paths and systems and describe measures that will be taken to minimize interference. Include all licensed systems and those used by electric service providers and emergency personnel that operate in the project area.”*

Response:

[4906-4-08(A)(12)]

The Project is not expected to have any adverse impact on microwave communication paths because it lacks any tall structures with the potential to block those paths. The only structure at the Project at an appreciable height will be a single lighting mast at the Project Substation. The lightning mast will not interfere with any microwave transmissions because it will be too narrow and, in any event, will be located immediately adjacent to the (existing) Utility Substation comprised of similar equipment. Applicant is aware of no information that suggests that the Utility Substation is causing, or that the Project would cause, interference with any microwave transmissions.

## **B. ECOLOGICAL RESOURCES**

### **1. ECOLOGICAL RESOURCES IN PROJECT AREA**

OPSB Application Requirement [4906-4-08(B)(1)]:

*“(1) The applicant shall provide information regarding ecological resources in the project area.*

*(a) Provide a map of at least 1:24,000 scale containing a one half-mile radius from the project area, showing the following:*

*(i) The proposed facility and project area boundary.*

*(ii) Undeveloped or abandoned land such as wood lots or vacant fields.*

*(iii) Wildlife areas, nature preserves, and other conservation areas.*

*(iv) Surface bodies of water, including wetlands, ditches, streams, lakes, reservoirs, and ponds.*

*(v) Highly-erodible soils and slopes of twelve percent or greater.*

*(b) Provide the results of a field survey of the vegetation and surface waters within one-hundred feet of the potential construction impact area of the facility. The survey should include a description of the vegetative communities, and delineations of wetlands and streams. Provide a map of at least 1:12,000 scale showing all delineated resources.*

*(c) Provide the results of a literature survey of the plant and animal life within at least one-fourth mile of the project area boundary. The literature survey shall include aquatic and terrestrial plant and animal species that are of commercial or recreational value, or species designated as endangered or threatened.*

*(d) Provide the results of field surveys of the plant and animal species identified in the literature survey.*

*(e) Provide a summary of any additional studies which have been made by or for the applicant addressing the ecological impact of the proposed facility.”*

Response:

[4906-4-08(B)(1)(a)]

Applicant retained Cardno, Inc. (“Cardno”) to catalog the ecological resources in the Project Area, conduct field surveys of vegetation and surface waters located within 100-feet of the potential construction impact zone, perform a literature review of the plant and animal life located within one-fourth mile of the Project Area, and conduct field surveys of the plant and animal species identified in the literature review. Cardno is a professional infrastructure and environmental service company that has been in operation for over 60 years and has worked on projects in over 100 countries. Cardno has conducted ecological assessments for several electric generation facilities that have been issued a Certificate. A complete copy of Cardno’s Ecological Assessment dated May 2017 (“Ecology Report”) is attached as **Exhibit H**.

A map depicting the above-listed ecological resources located within one-half mile of the Project Area is attached as **Figure 10**. This map shows the following: (1) the Project and its component parts and the boundary of the Project Area; (2) undeveloped or abandoned land (e.g., wood lots and shrubland); (3) wildlife areas (there are no nature preserves or other conservation areas); (4) surface water, including wetlands; and (5) highly-erodible soils and slopes of 12% or more grade. This map was prepared using a variety of desktop sources, but has been field-verified by Cardno.

[4906-4-08(B)(1)(b)]

Cardno conducted a comprehensive field survey of the vegetation and surface waters located within 100-feet of the potential construction impact zone within the Project Area. The background, methods and results of the field study are set forth in Section 5 (“Wetland & Waterbody Delineations”) of the Ecology Report (**Exhibit H**). A map

depicting vegetative communities and Cardno-delineated wetlands and streams is attached as **Figure 11**

Cardno identified 42 waterbodies in the Project Area, which consist of 34 ditches, four (4) stream reaches and four (4) ponds. Six (6) wetlands totaling approximately 11.6 acres were identified in the Project Area, with one (1) of them accounting for over 8.6 acres of the total. The majority of the wetlands were of relatively low quality. There will be minor impacts to wetlands and ditches as a result of the Project. Section 6 of **Exhibit H** discusses impacts in greater detail.

[4906-4-08(B)(1)(c)]

Cardno also conducted an extensive literature review of plant and animal life located within one-fourth mile of the Project Area boundary. The review included not only aquatic or terrestrial plant and animal species designated as threatened or endangered, but also those deemed to have commercial or recreational value. The literature review is found in Section 2.4 (“Biological/Conservation”) of the Ecology Report (**Exhibit H**). Plant life is addressed in Section 2.4.1 (“Vegetative Community”), animal life is addressed in Section 2.4.2 (“Wildlife Resources”), and threatened or endangered species are addressed in Section 2.4.3 (“Rare, Threatened & Endangered Species”).

Cardno determined that the species present in the Project Area are those primarily associated with agricultural fields, pasture grasslands, isolated wood lots, and wetlands. It noted that a majority of the federal- or Ohio-listed species potentially present in the area would be expected to inhabit the wetlands and associated streams. Cardno concluded, however, that it is unlikely that these habitats are well-developed due to constant disturbance from cultivation and habitat fragmentation. Cardno determined that the Project Area and one-quarter mile buffer are not known to provide significant habitat for sensitive bird species, and that there are no records of bald eagle nests or known bat hibernacula in the area. It also advised that no commercially valuable species were expected to be present in the Project Area.



[4906-4-08(B)(1)(d)]

Cardno's field surveys of the Project Area and one-quarter mile buffer confirmed the conclusions it drew from the literature survey. It observed no evidence of (1) bald eagle nests or activity; (2) nests of listed or sensitive raptor species; (3) bat activity; or (4) any federal- or Ohio-listed species. Although these field observations did not constitute formal presence/absence surveys for specific species, they do confirm that the Project Area and one-quarter mile buffer constitute generally poor wildlife habitat owing to the historically high degree of fragmentation and the constant disturbance of the vast majority of the land by agriculture and related operations.

[4906-4-08(B)(1)(e)]

Prior to engaging in extensive field studies, EDR was retained to conduct a desktop review of a variety of subjects of the larger study area in which the Project Area is located. The analysis was conducted in late 2016 and included high-level information about the study area's water resources, habitat and terrestrial and aquatic ecology. Although the analysis was preliminary, its results confirmed that the Project Area likely was highly suitable to host the Project.

## **2. POTENTIAL IMPACT DURING CONSTRUCTION**

OPSB Application Requirement [4906-4-08(B)(2)]:

*“(2) The applicant shall provide information regarding potential impacts to ecological resources during construction.*

*(a) Provide an evaluation of the impact of construction on the resources surveyed in response to paragraph (B)(1) of this rule. Include the linear feet and acreage impacted, and the proposed crossing methodology of each stream and wetland that would be crossed by or within the footprint of any part of the facility or construction equipment. Specify the extent of vegetation clearing, and describe how such clearing work will be done so as to minimize removal of woody vegetation. Describe potential impacts to wildlife and their habitat.*

*(b) Describe the mitigation procedures to be utilized to minimize both the short-term and long-term impacts due to construction, including the following:*

*(i) Plans for post-construction site restoration and stabilization of disturbed soils, especially in riparian areas and near wetlands. Restoration plans should include details on the removal and disposal of materials used for temporary access roads and construction staging areas, including gravel.*

*(ii) A detailed frac out contingency plan for stream and wetland crossings that are expected to be completed via horizontal directional drilling.*

*(iii) Methods to demarcate surface waters and wetlands and to protect them from entry of construction equipment and material storage or disposal.*

*(iv) Procedures for inspection and repair of erosion control measures, especially after rainfall events.*

*(v) Measures to divert storm water runoff away from fill slopes and other exposed surfaces.*

*(vi) Methods to protect vegetation in proximity to any project facilities from damage, particularly mature trees, wetland vegetation, and woody vegetation in riparian areas.*

*(vii) Options for disposing of downed trees, brush, and other vegetation during initial clearing for the project, and clearing methods that minimize the movement of heavy equipment and other vehicles within the project area that would otherwise be required for removing all trees and other woody debris off site.*

*(viii) Avoidance measures for major species and their habitat.”*

Response:

[4906-4-08(B)(2)(a)]

As part of its surveys and analysis, Cardno calculated the probable impact of the construction of the Project on the ecological resources that it inventoried in the Project Area. Those impacts are set forth in Section 6.2 of the Ecology Report (**Exhibit H**), with a summary detailed in Table 6-2. The impacts addressed in Appendix E of the Ecology Report include (1) the linear feet and acreage of each stream and wetland crossing; (2) the methodology used for each stream and wetland crossing; (3) the extent of vegetation

clearing, including the steps to be taken to minimize the removal of woody vegetation; and (4) the impacts to wildlife and their habitat.

Roughly 10% of the Project Area is occupied by trees, which can be divided into two categories: (1) narrow (30-to-60 feet wide), linear strips of trees (often known as or “windrows”) running between cultivated areas that likely served historically as property boundaries; and (2) larger, more substantial blocks of trees and associated habitat (often known as “woodlots”), with the largest of these likely maintained for hunting as many featured tree stands and utility vehicle trails. The vast majority of the trees in the Project Area, especially the woodlots, will not be disturbed by the construction of the Project.

The construction of the Project is expected to have almost negligible impacts on wildlife and their habitat. The vast majority of the Project will be constructed on agricultural fields, which already provide minimal habitat for plant and animal life. The relatively small areas of trees to be removed do not provide significant habitat for wildlife. Permanent disturbance of all streams and wetlands will be avoided, with horizontal, directional drilling used to place collection lines under the sole high quality (HHEI Class III) waterbody in the Project Area and several agricultural ditches. The disturbance of other waterbodies will be limited to agricultural ditches that have historically been highly impacted by cultivation and, while providing some habitat, do not support rich animal communities and are unlikely to support aquatic communities.

[4906-4-08(B)(2)(b)]

In addition to this general approach of avoiding ecological impacts in the Project Area, Applicant will employ a variety of measures to mitigate those impacts that could occur. Prior to the start of construction in any particular area, sensitive resources such as stream and wetlands, will be demarcated with flagging or signage. The general site orientation and job training provided to construction personnel will include information regarding these resources, their importance to the area ecology, and procedures and techniques to minimize impacts to them. HDD will be employed to cross jurisdictional waterbodies, as described in **Exhibit H**. Appendix E of **Exhibit H** is a “frac out” contingency plan that sets forth procedures to avoid, minimize, and remediate potential

environmental impacts resulting from an inadvertent return of drilling fluids during HDD operations. Timber and other vegetative debris may be chipped for use as erosion control mulch or disposed of in accordance with local regulations and landowner preferences. The SWPPP for the Project will incorporate appropriate erosion and sediment control measures to ensure that waterbodies close to construction activities are not adversely impacted. As necessary, environmental monitors will be used to ensure appropriate implementation and faithful observance of all of these protective and minimization measures. Additionally, the Applicant will restore all disturbed waterbodies from construction to pre-construction conditions within one growing season.

Final construction designs will be submitted to the Board's Staff for its review prior to the start of construction. Those plans will include detailed procedures for each of the elements listed above, and which will address: (1) soil management; (2) a detailed frac-out contingency plan for the HDD; (3) surface water and wetland demarcation; (4) SWPPP inspection procedures; (5) vegetation protection; and (6) vegetation disposal. The construction is not expected to interfere with any major species or its habitat.

### **3. POTENTIAL IMPACT DURING OPERATION**

OPSB Application Requirement [4906-4-08(B)(3)]:

*“(3) The applicant shall provide information regarding potential impacts to ecological resources during operation and maintenance of the facility.*

*(a) Provide an evaluation of the impact of operation and maintenance on the undeveloped areas shown in response to paragraph (B)(1) of this rule.*

*(b) Describe the procedures to be utilized to avoid, minimize, and mitigate both the short- and long-term impacts of operation and maintenance. Describe methods for protecting streams, wetlands, and vegetation, particularly mature trees, wetland vegetation, and woody vegetation in riparian areas. Include a description of any expected use of herbicides for maintenance.*

*(c) Describe any plans for post-construction monitoring of wildlife impacts.”*

Response:

[4906-4-08(B)(3)(a)]

The operation and maintenance of the Project will not have any significant adverse impacts to ecological resources, including on the undeveloped areas previously identified or streams, wetlands, and vegetation. However, there will be some minor permanent impacts to a wetland and ditches as a result of the Project. These impacts are listed in Appendix E of **Exhibit H**. The Project will be a highly passive operation. The equipment will have few moving parts, all of which will be fully enclosed. The Project will consume essentially no water (only for occasional cleaning of panels) and its only fuel will be sunlight. It will generate no stationary source emissions of air pollutants, wastewater or appreciable amounts of solid waste.

Only a few operational personnel will be needed for the Project, and they will be present at any given location within the Solar Fields on only an occasional basis. Operational personnel for the Project will perform essentially five basic tasks: (1) maintenance and repair of equipment on a periodic and as-needed basis; (2) occasional cleaning of soil (except during periods of heavy rain) and removal of snow, from panels; (3) regular mowing and associated maintenance of vegetative ground cover; (4) periodic security checks; and (5) availability for emergency response and community relations. On most days, at any particular location within the Solar Fields, no operating personnel will be present.

[4906-4-08(B)(3)(b)]

The operation of the Project will be highly passive and will not entail activities with the potential to adversely affect the environment, including stream, wetlands and vegetation. Following construction, the Project is expected to have essentially no impact on mature trees, wetland vegetation or woody vegetation in riparian areas. Operating personnel may use commercially-available herbicides for the control of noxious weeds and as needed for the proper maintenance of the vegetative cover within and around the perimeter of the Solar Fields. Over the life of the Project, however, this will entail far less use of herbicides and pesticides than modern cultivation. Because the Solar Fields will be constructed only in cleared, dry, upland areas, the use of herbicides will not adversely affect mature trees, streams, wetland vegetation, and riparian areas.

Additionally, the final design of the Project will include the planting and maintenance of pollinator-friendly, native plantings in selected locations along the outside border of the Solar Fields. These features not only will enhance the visual appeal of the Project, but also will enrich local wildlife habitat and benefit the local farming community. The use of native fruit and flowering plants can provide a much-needed food source for wild, native butterflies, bees, and insects that pollinate flowering forbs and some commercial crops. As with the vegetative cover for the Project generally, pollinator-friendly plantings also will reduce erosion, reduce fertilizer, herbicide and pesticide use, discourage invasive species and improve water quality. Pollinator features will be included in the landscape plan, which will be part of the final design of the Project.

[4906-4-08(B)(3)(c)]

Applicant has no plans for the post-construction monitoring of impacts to wildlife because no adverse impacts are expected to occur. The Project will have no moving parts that are not fully enclosed (and these will be limited to the Project Substation, the Inverters and, if tracking is employed, small electric motors). It will have no environmental discharges potentially affecting wildlife. Even operational vehicle use will not appreciably increase the amount of traffic in the general vicinity of the Project Area.

## **C. LAND USE AND COMMUNITY DEVELOPMENT**

### **1. LAND USE IN PROEJCT AREA AND POTENTIAL IMPACTS**

OPSB Application Requirement [4906-4-08(C)(1)]:

*“(1) The applicant shall provide information regarding land use in the region and potential impacts of the facility.*

*(a) Provide a map of at least 1:24,000 scale showing the following within one-mile of the project area boundary:*

*(i) The proposed facility.*

*(ii) Land use, depicted as areas on the map. Land use, for the purposes of paragraph (C) of this rule, refers to the current economic use of each parcel. Categories should include residential, commercial, industrial, institutional,*

*recreational, agricultural, and vacant, or as classified by the local land use authority.*

*(iii) Structures, depicted as points on the map. Identified structures should include residences, commercial centers or buildings, industrial buildings and installations, schools, hospitals, churches, civic buildings, and other occupied places.*

*(iv) Incorporated areas and population centers.*

*(b) Provide, for the types of structures identified on the map in paragraph (C)(1)(a) of this rule, a table showing the following:*

*(i) For all structures within one thousand feet of the generation equipment or wind turbine, the distance between the structure and the equipment or nearest wind turbine.*

*(ii) For all structures within two hundred fifty feet of a collection line, access road, or other associated facility, the distance between the structure and the associated facility.*

*(iii) For each structure in the table, whether the structure is on a property that is being leased by the applicant for the proposed facility.*

*(c) Provide an evaluation of the impact of the proposed facility on the above land uses identified on the map in paragraph (C)(1)(a) of this rule. Include, for each land use type, the construction impact area and the permanent impact area in acres, in total and for each project component (e.g., turbines, collection lines, access roads), and the explanation of how such estimate was calculated.*

*(d) Identify structures that will be removed or relocated.”*

Response:

[4906-4-08(C)(1)(a) & (b)]

The map and table required by the above are attached as **Figure 12** and **Figure 13**, respectively.

[4906-4-08(C)(1)(c)]

The impacts, in acres, of the Project on each land use category identified in the above map, including the construction impact area and the permanent impact area, in

total, and separately for each project component (Solar Fields, AC Collector System outside the Solar Fields and Project Substation, Project Substation, Gen-tie, and Access Roads) are provided in the table attached as **Figure 14**. (Note that the total acreage impacted by the Solar Fields represents the entire acreage within the perimeter fences of the Solar Fields, but that less than 50% of the land within the Solar Fields actually will be occupied by equipment.)

[4906-4-08(C)(1)(d)]

It is not anticipated that any structures will be relocated to accommodate the Project, and no significant structures will be removed. The Project Area does include a very limited number of non-residence, farm-related structures or partial structures that are old and in relatively poor condition. In consultation with the land owners participating in the project who own these structures or partial structures, one or more of them may be removed facilitate the construction of the Project and put the specific land to more productive use.

## **2. MAP REQUIRED FOR WIND FARMS**

OPSB Application Requirement [4906-4-08(C)(2)]:

*“(2) For wind farms only, the applicant shall provide a map(s) of at least 1:24,000 scale showing the proposed facility, habitable residences, and parcel boundaries of all parcels within a half-mile of the project area. Indicate on the map, for each parcel, whether the parcel is being leased by the applicant for the proposed facility, as of no more than thirty days prior to the submission of the application. Include on the map the setbacks for wind turbine structures in relation to property lines, habitable residential structures, electric transmission lines, gas pipelines, and state and federal highways, consistent with no less than the following minimum requirements:*

*(a) The distance from a wind turbine base to the property line of the wind farm property shall be at least one and one-tenth times the total height of the turbine structure as measured from its tower's base (excluding the subsurface foundation) to the tip of a blade at its highest point.*

*(b) The wind turbine shall be at least one thousand, one hundred, twenty-five feet in horizontal distance from the tip of the turbine's nearest blade at*



*ninety degrees to the property line of the nearest adjacent property at the time of the certification application.*

*(c) The distance from a wind turbine base to any electric transmission line, gas pipeline, hazardous liquid pipeline, or state or federal highway shall be at least one and one-tenth times the total height of the turbine structure as measured from its tower's base (excluding the subsurface foundation) to the tip of a blade at its highest point.*

*(d) Minimum setbacks from property lines and residences may be waived in the event that all owners of property adjacent to the turbine agree to such waiver."*

Response:

[4906-4-08(C)(2)]

This requirement is not applicable to the Project because it does not include wind turbines.

### **3. LAND USE PLANS**

OPSB Application Requirement [4906-4-08(C)(3)]:

*"(3) The applicant shall provide information regarding land use plans.*

*(a) Describe formally adopted plans for future use of the project area and surrounding lands for anything other than the proposed facility.*

*(b) Describe the applicant's plans for concurrent or secondary uses of the site.*

*(c) Describe the impact of the proposed facility on regional development, including housing, commercial and industrial development, schools, transportation system development, and other public services and facilities.*

*(d) Assess the compatibility of the proposed facility and the anticipated resultant regional development with current regional plans.*

*(e) Provide current population counts or estimates and ten-year population projections for counties and populated places within five miles of the project area."*

Response:

[4906-4-08(C)(3)(a)]

As part of its Socioeconomic Report (**Exhibit D**), EDR examined land use plans in the Project Area and the surrounding lands. As noted, the Project Area is located wholly within Green Township in Brown County. Neither Brown County nor Green Township has adopted comprehensive land use plans. Part III Section 4 of the Socioeconomic Report summarizes pertinent provisions of land use plans for the neighboring Counties, Highland and Clermont, but the Project will have no material interaction with these plans, particularly Clermont County, which is a considerable distance (over four (4) miles) from the western edge of the Project Area.

[4906-4-08(C)(3)(b)]

Applicant has no plans for concurrent or secondary use of the Project Area.

[4906-4-08(C)(3)(c) & (d)]

As EDR's analysis indicates, the Project is not expected to have any significant adverse effect on regional development, including housing, commercial and industrial development, schools, transportation system development, or other public services and facilities. The Project will, however, positively contribute to employment, as well as providing the secondary and induced effects of increased wages. Similarly, the Project will contribute significant new sums annually to the tax base for Brown County. As described above, there are no local regional plans for Green Township or Brown County.

[4906-4-08(C)(3)(e)]

Estimates of current population and ten-year population projections for counties and populated places within five (5) miles of the Project Area are provided Part II, Section 1 of the Socioeconomic Report. In particular, population figures for Brown, Highland and Clermont Counties are provided in Table 1 of the Socioeconomic Report (**Exhibit D**). Similar data for each of the populated areas within five (5) miles of the Project Area are set forth in Table 2 of the Socioeconomic Report.

#### **D. CULTURAL AND ARCHAEOLOGICAL RESOURCES**

The Project will have a very low visual profile on the land. The highest points within the Solar Fields will be the “high end” of the panels, whether fixed or, twice daily, tracking. In each case, the highest point will be less than fifteen (15) feet above ground level. All other portions of the Project will either be located at the Project Substation or be installed below grade.

The highest part of the Project above ground level will be equipment within the Project Substation. The highest structure within the Project Substation will be a single, narrow lighting mast, with an anticipated maximum height of seventy (70) feet. Other components within the Project Station are likely to have maximum heights of thirty (30) feet. Despite these features, the Project Substation will not add materially to the anthropogenic profile of the existing area because it will be constructed adjacent to the existing Utility Substation, 345 kV transmission line, and 138 kV transmission line. Each of these existing facilities include structures that are higher than thirty (30) feet.

Applicant retained EDR to evaluate the visual impact that the Project would have on registered landmarks, formally-adopted reaction amenities, as well as the community at large. EDR has extensive experience in performing evaluations of this type, including a number that have been submitted to the Board on behalf of other clients. EDR performed both a Cultural Resources Records Review dated June 2017 (“Cultural Resources Report”), a copy of which is attached as **Exhibit I**, as well as a Visual Resource Assessment dated June 2017 (“Visual Resources Report”), a copy of which is attached as **Exhibit J**.

As part of these studies, EDR conducted a viewshed analysis of the Project based on a bare earth digital surface model (“DSM”). The DSM conservatively assumed a viewer height of six (6) feet and a maximum height for the Project of fifteen (15) feet, i.e., higher than the maximum height for the panels, throughout the entire Project Area. It incorporated both topographical data for the area as well as buildings and vegetation derived from the Ohio Statewide Imagery Program’s 2007 “light detection and ranging” (also known as “LIDAR”) data for Brown, Highland and Clermont Counties.

The results of this methodology conservatively demonstrate that the Project will not be visible at locations more than two (2) miles beyond the perimeter of the Project Area. The analysis also illustrates why the Project will not be visible from the vast majority of areas even within two (2) miles of the perimeter of the Project Area. Rather, owing to the extremely low profile of the Project and the significant amount of vegetation in the area, the number of locations from which the Project may be visible are very limited and the vast majority of them are very close to the infrastructure itself.

## 1. RECREATION AREAS AND LANDMARKS IN PROJECT AREA

OPSB Application Requirement [4906-4-08(D)(1)]:

*“(1) The applicant shall indicate, on a map of at least 1:24,000 scale, any formally adopted land and water recreation areas, recreational trails, scenic rivers, scenic routes or byways, and registered landmarks of historic, religious, archaeological, scenic, natural, or other cultural significance within five miles of the project area. Landmarks to be considered for purposes of paragraph (D) of this rule are those districts, sites, buildings, structures, and objects that are recognized by, registered with, or identified as eligible for registration by the national registry of natural landmarks, the Ohio historical society, or the Ohio department of natural resources.”*

Response:

[4906-4-08(D)(1)]

The Applicant has provided the cultural resources map required above in **Figure 15** and the landmarks within five miles of the Project Area. As noted in the next section, Applicant’s evaluation of impacts on landmarks focused on the two-mile area surrounding the Project Area because the Project will not be visible or audible beyond that perimeter (a waiver has been submitted to allow for the two-mile review).

## 2. IMPACTS ON REGISTERED LANDMARKS

OPSB Application Requirement [4906-4-08(D)(2)]:

*“(2) The applicant shall provide an evaluation of the impact of the proposed facility on the preservation and continued meaningfulness of these landmarks and describe plans to avoid or mitigate any adverse impact.”*

Response:

[4906-4-08(D)(2)]

EDR evaluated the impact of the Project on the preservation and continued meaningfulness of the registered landmarks within the vicinity of the Project Area in Section 2.3 of the Cultural Resources Report (see **Exhibit I**). As part of its review, and because of the Project's low-profile, as well as screening afforded by vegetation and existing structures, visibility of the planned components is anticipated to be limited to the immediate vicinity of the Project. Therefore, due to the nature of the technology and the setting specific to the Project, the effects on landmarks outside of the immediate Project Area was studied and considered within a 2-mile radius of the Project with no effects anticipated on landmarks outside of that 2-mile radius. A request for waiver has been submitted to allow for the reduced study area.

Because all of the landmarks are distant from the Project Area, EDR concluded that there would be no direct effects from the construction or operation of the Project on any of the landmarks. (EDR recommended that, for those few areas of significant ground disturbance, such as the Project Substation, Applicant conduct a limited Phase 1 archeological survey to avoid any direct effects to below-grade resources.) EDR's viewshed analysis demonstrates that the Project also will not be visible from any of the area landmarks. Accordingly, the Cultural Resources Report concludes that the Project is not anticipated to result – even indirectly – in significant adverse effects on historic-architectural resources in the five-mile vicinity of the Project Area.

### **3. IMPACTS ON FORMALLY-ADOPTED RECREATION AREAS**

OPSB Application Requirement [4906-4-08(D)(3)]:

*“(3) The applicant shall describe the identified recreation areas within five miles of the project area in terms of their proximity to population centers, uniqueness, topography, vegetation, hydrology, and wildlife. Provide an evaluation of the impact of the proposed facility on identified recreational areas within five miles of the project area and describe plans to mitigate any adverse impact.”*

Response:

[4906-4-08(D)(3)]

In Section 2 of its Visual Resources Report (see **Exhibit J**), EDR evaluated the impact that the Project would have on formally-adopted recreation areas, and includes a comprehensive inventory of all formally-adopted recreation areas within five (5) miles of the perimeter of the Project Area. The Visual Resources Report concludes that, within that 5-mile area, are no State Parks, Heritage Areas, State Forests, National Wildlife Refuges, National Park Service Lands, National Natural Landmarks, State Nature Preserves, Scenic Byways, State Historic Markers, or state-designated trails. Two (2) state-managed wildlife areas, one (1) “nationwide rivers inventory” stream, one (1) national scenic trail, and one (1) trail of regional significance are located within the 5-mile area, but the closest of these is located more than three (3) miles from the Project Area. Accordingly, the Project will not be visible from any of them and will have no impact on these resources.

#### **4. VISUAL IMPACTS**

OPSB Application Requirement [4906-4-08(D)(4)]:

*“(4) The applicant shall evaluate the visual impact of the proposed facility within at least a five-mile radius from the project area. The applicant shall:*

*(a) Describe the visibility of the project, including a viewshed analysis and corresponding map of the study area.*

*(b) Describe the existing landscape and evaluate its scenic quality.*

*(c) Describe the alterations to the landscape caused by the facility, and evaluate the impact of those alterations to the scenic quality of the landscape.*

*(d) Evaluate the visual impacts to the resources identified in paragraph (D)(1) of this rule, and any such resources within ten miles of the project area that are valued specifically for their scenic quality.*

*(e) Provide photographic simulations or artist's pictorial sketches of the proposed facility from public vantage points that cover the range of landscapes, viewer groups, and types of scenic resources found within the study area. The applicant should explain its selection of vantage points,*

*including any coordination with local public officials and historic preservation groups in selecting these vantage points.*

*(f) Describe measures that will be taken to minimize any adverse visual impacts created by the facility, including, but not limited to, project area location, lighting, turbine layout, visual screening, and facility coloration. In no event shall these measures conflict with relevant safety requirements.”*

Response:

The Visual Resources Report comprehensively addresses the full range of visibility-related considerations set forth above. This includes an evaluation of the existing landscape and its scenic quality, the maximum extent of changes in the landscape that will result from construction of the Project throughout the entire Project Area, photographic simulations of the Project from a variety of vantage points representing different viewer groups and types of scenic resources, and measures that Applicant will take to minimize adverse impacts. See **Exhibit J**.

[4906-4-08(D)(4)(a)-(c)]

The land use within the 5-mile area surrounding the perimeter of the Project Area is characterized by a mix of open agricultural fields, sparse rural residential properties, forested windrows and woodlots, and utility corridors. The Project Area itself is primarily located on private agricultural land. Most of these farms are in active use, but some of them are fallow. In general, the existing landscape in and immediately around the Project Area is typical of rural Ohio, in which there is ample vegetation, the predominant land use is agriculture, and there is relatively low population density.

The Project will only moderately alter this landscape and will not materially affect its scenic quality. The Project will have a very low profile and present a consistent visual image throughout the Project Area. Except for the Project Substation, which will have very limited visibility and likely be seen merely as an expansion of the existing Utility Substation, the equipment comprising the Project will be either buried or less than fifteen (15) feet in height. Each of the Solar Fields will contain essentially the same components, which will consistently follow the existing level of the various farm fields that will host them. With no discernable movement of the equipment (none if fixed tracking is used), it is fair

to characterize the Solar Fields as appearing to passively “harvest” the sun, rather than corn or soybeans.

The Project also will have a low profile with regard to reflectivity. Solar panels are designed to maximize energy production by capturing as much light as possible, which means that they inherently have low levels of glare from reflection of sunlight. Solar panels “use high-transmission, low-iron glass, which absorbs more light, producing smaller amounts of glare and reflectance than normal glass” (SunPower, 2010). With regard to glare from PV systems, The Massachusetts Department of Energy Resources has reported the following:

“Solar panels are designed to absorb solar energy and convert it to electricity. Most are designed with anti-reflective glass front surfaces to capture and retain as much of the solar spectrum as possible. Solar module glass has less reflectivity than water or window glass. Typical panels are designed to reflect only about 2 percent of incoming sunlight. Reflected light from solar panels will have a significantly lower intensity than flare from direct sunlight” (MDER, 2015).

The operation of the Project also will include only very limited lighting, which will not adversely affect existing nighttime conditions. The solar arrays will not generate electricity during the night and operating personnel normally will not be present. Lighting will be used primarily for safety and security and will be limited to only a relatively few locations, such as gates to the Solar Fields, Pyranometers and the Project Substation.

[4906-4-08(D)(4)(d)]

The DSM analysis indicates that there will be essentially no potential visibility of the Project from areas located more than two (2) miles or more away from the Project Area. Actual visibility is likely to be even more limited than the DSM modeling indicates because screening provided by buildings, yard trees, and windrows (i.e., areas not mapped as forest) within the study area provide more extensive and effective screening than assumed in the modeling. Visibility of the Project will be restricted largely to areas within 1.5 miles of the Project, including portions of Routes 68 and 286. Visibility of the



Project beyond that is expected to be insignificant as the infrastructure will blend into the existing landscape from any open view.

[4906-4-08(D)(4)(e)]

The Visual Resources Report includes seven (7) visual simulations that illustrate representative views of the Project from various foreground and near mid-ground distances, as well as different viewer circumstances and landscape contexts within the larger area. Among the viewpoints selected are ones from a major transportation corridor, a distant view of the Project as it interacts with the existing vegetated windrows, and an open, immediate foreground views of the Project in its agricultural setting. The overall visual effect from the Project could be considered adverse only when largely unscreened and viewed in the immediate foreground (i.e., where the Project occurs in an open field directly adjacent to a public road). However, none of these unscreened foreground views are available from scenic resources and, therefore, do not cause an undue adverse effect on aesthetic resources.

[4906-4-08(D)(4)(f)]

There may be instances in which the Project is regarded as causing an adverse visual effect for a unique viewer location in close proximity to the infrastructure, such as a home immediately adjacent to the Project and that is directly oriented toward a broad and unobstructed view of the infrastructure. Situations such as these will be considered and accounted for in the development of a landscape plan for the Project, which will be included as part of the final design. A number of cost-effective options are available to address specific issues in limited circumstances. First, in some cases, full screening with short trees, native hedges or low-growing vegetation outside a portion of the fence of a Solar Field may be employed. Second, portions of the perimeter fence can be designed with different materials or colors to enhance its visual appeal. Finally, native pollinator habitat outside a portion of the fence can provide a partial screen that “softens” the visual differences between the Project and the rural character of the Project Area. Given the

level topography in the Project Area, attention to the perimeter fence of a particular Solar Field using these and similar techniques can significantly address most aesthetic concerns. The Applicant will work closely with nearby residents and local officials to identify those locations that may be best suited for landscaping treatments.

The Project also will be designed to mitigate the effects of night-time lighting. As noted above, lighting for the Project will be minimal. These systems, however, will be designed to reduce any off-site impacts. Among the features that may be incorporated into the design are that lights be down-ward facing, equipped with side shields, or motion-activated.

## **E. AGRICULTURAL DISTRICTS AND AGRICULTURAL LAND**

### **1. AGRICULTURAL RESOURCES IN PROJECT AREA**

OPSB Application Requirement [4906-4-08(E)(1)]:

*“(1) The applicant shall identify on a map of at least 1:24,000 scale the proposed facility, all agricultural land, and separately all agricultural district land existing at least sixty days prior to submission of the application located within the project area boundaries. Where available, distinguish between agricultural uses such as cultivated lands, permanent pasture land, managed woodlots, orchards, nurseries, livestock and poultry confinement areas, and agriculturally related structures.”*

Response:

[4906-4-08(E)(1)]

The above-required map is attached as **Figure 16**. It identifies all agricultural land, and separately identifies all land enrolled in the Current Agricultural Use Value (CAUV) program. This program allows farmland devoted exclusively to commercial agriculture to be valued based on the agricultural use of the land rather than its "highest and best" potential use, resulting in a substantially lower tax bill for working farmers. The map categorizes agricultural land as one of the following agricultural uses, based on 2015 data from the National Agricultural Statistics Service uses 2015 Cropland Data Layer Program: (1) soybeans; (2) corn; (3) deciduous forest; (4), hay/alfalfa; (5) grassland/pasture; (6)

winter wheat; and (7) winter wheat and soybeans. No agricultural districts occur within the Project Area.

## **2. IMPACTS TO AGRICULTURAL RESOURCES**

OPSB Application Requirement [4906-4-08(E)(2)]:

*“(2) The applicant shall provide, for all agricultural land, and separately for agricultural uses and agricultural districts identified under paragraph (E)(1) of this rule, the following:*

*(a) A quantification of the acreage impacted.*

*(b) An evaluation of the impact of the construction, operation, and maintenance of the proposed facility on the land and the following agricultural facilities and practices within the project area:*

*(i) Field operations such as plowing, planting, cultivating, spraying, harvesting.*

*(ii) Irrigation.*

*(iii) Field drainage systems.*

*(iv) Structures used for agricultural operations.*

*(v) The viability as agricultural district land of any land so identified.*

*(c) A description of mitigation procedures to be utilized by the applicant during construction, operation, and maintenance to reduce impacts to agricultural land, structures, and practices. The description shall illustrate how avoidance and mitigation procedures will achieve the following:*

*(i) Avoidance or minimization to the maximum extent practicable of any damage to field tile drainage systems and soils in agricultural areas.*

*(ii) Timely repair of damaged field tile systems to at least original conditions, at the applicant's expense.*

*(iii) Segregation of excavated topsoil, and decompaction and restoration of all topsoil to original conditions unless otherwise agreed to by the landowner.”*

Response:

[4906-4-08(E)(2)(a)]

The table attached as **Figure 17** lists the acreage of disturbance, including temporary disturbance and permanent loss of cultivated lands/croplands, grassland pasture, and land enrolled in the Current Agriculture Use Valuation (“CAUV”) program. Impacts are totaled for each agricultural use and broken out by Project component. No agricultural districts occur within the Project Area.

[4906-4-08(E)(2)(b)]

With respect to the impact of the Project, for any of the agricultural land within the Solar Fields and the Project Substation that is used for operation of the Project, the associated agricultural use will be supplanted by the Project for approximately 40 years. For these areas, all field operations, irrigation and viability as agricultural district land will be precluded during that time. These activities and uses may be continued after that period of time, however, following decommissioning of the Project and restoration of the occupied area for agricultural purposes. As noted above, construction of the Project is not expected to result in the removal of or damage to any significant or valuable structure currently used for agricultural operations.

[4906-4-08(E)(2)(c)]

Prior to commencing construction, Applicant will consult with owner of agricultural land participating in the Project and other readily available public resources to ascertain, to the extent practicable, the type, size and location of all functioning drain tile on all portions of the land on which construction is planned. Applicant will use this information to map the expected locations of drain tile and physically mark the surface above the areas where it believes functional drain tile is located. To the extent that the location of drain tile is known, during construction Applicant either will avoid damage to the functional drain tile or, subject to any required permitting, repair any drain tile that is purposefully damaged. Subject to any required farm-related permitting, Applicant will use commercially reasonable efforts during construction to promptly repair any functional drain tile that it becomes aware has been inadvertently damaged.

If during the operation of the Project, Applicant becomes aware of circumstances indicating that drain tile below portions of the land on which the Project is located likely has been damaged during Applicant possession of the land (whether or not as a result of construction of the Project), then Applicant will promptly investigate the matter and, subject to any required farm-related permitting, use commercially reasonable efforts to promptly repair any such damage.

Relatively little topsoil will be disturbed or significantly compacted during construction of the Project. The primary activities that will necessitate some topsoil movement or compaction will be (1) the laying of the foundations for the Project Substation, Inverters, and Pyranometers; (2) the burying of the Gen-tie, (3) the trenching of the channels for the AC Collector System and the buried portion of the DC Collector System, and (4) creation of beds for the Access. All topsoil removed during construction either will be returned before the end of construction or provided to the participating land owner, not removed from the Project Area. Any needed decompaction and restoration of topsoil at the end of the life of the Project will be addressed in the Decommissioning Plan.

In addition, the vast majority of the land surface within each Solar Field, including almost all of the area below the arrays themselves, will be planted with a robust, low-growing seed mix, primarily native grasses and other low-maintenance varieties. The only areas that may not be vegetated will be those roads with an aggregate surface, the Inverters, the Pyranometers, the fencing and the specific locations where the pilings for the racking are installed. (Each piling would occupy much less than one square foot of land surface.) This vegetative cover will have a variety of benefits for the land and the surrounding area. It will absorb precipitation, provide stable mammal and avian habitat, and improve water quality by filtering storm-water and reducing the use of herbicides. The cover will reduce erosion and run-off and it will be in place even in winter, when the fields hosting it normally may be unplanted, and therefore subject to erosion and nutrient loss. As a result, the area topsoil will remain largely intact for participating land owners who chose to return their fields to crop production following the Project's useful life. Finally, the vegetative cover will enhance the aesthetic qualities of the Project.

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