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**Governor**

**Rebecca W. Goodman**
**Secretary**
**Energy and Environment Cabinet**

Commonwealth of Kentucky
**Kentucky State Board on Electric Generation and Transmission Siting**
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**Kent A. Chandler**
**Chairman**

August 30, 2021

PARTIES OF RECORD

Re: Case No. 2021-00029

Notice is given to all parties that the attached document has been filed into the record of this proceeding.

If you have any comments you would like to make regarding the contents of the document, please do so within five days of receipt of this letter. If you have any questions, please contact Jesse Fries, Staff Attorney III, at (502) 564-0801 or jesse.fries@ky.gov.

Sincerely,

Linda C. Bridwell, P.E.
Executive Director
*On Behalf of the Siting Board*

Attachment

# Review and Evaluation of Martin County Solar Project, LLC Siting Assessment Report

**FINAL REPORT**

**Final Report**

August 30, 2021

# Review and Evaluation of Martin County Solar Project, LLC Siting Assessment Report

**Prepared for**

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**Prepared by**

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# SECTION A.

## General Statement

# SECTION A.
# General Statement

This document provides a review of the Site Assessment Report (SAR) for the proposed Martin County Solar merchant electric generating facility submitted to the Kentucky State Board on Electrical Generation and Transmission Siting (the Siting Board). Martin County Solar submitted an administratively complete document titled "Application of Martin County Solar Project, LLC For a Certificate of Construction for an Approximately 200 Megawatt Merchant Electric Solar Generating Facility in Martin County, Kentucky, Case No. 2021-00029" (the "Application") to the Siting Board in May 2021. The proposed generating facility is subject to review by the Siting Board under KRS 278.700 *et seq.* (the Act), passed by the General Assembly of the Commonwealth of Kentucky in 2002. Board staff retained BBC Research & Consulting (BBC) to perform this review.

## Provisions of the Act Establishing the SAR Review Process

The part of KRS 278 entitled "Electric Generation and Transmission Siting" defined a class of merchant power plants and required them to obtain construction certificates as a prerequisite to the commencement of actual construction activity. Those statutes also created the Siting Board and gave it the authority to grant or deny construction certificates requested by individual applicants. The Siting Board is attached to the Kentucky Public Service Commission (PSC) for administrative purposes.

The Act created the application process and, within the process, a series of steps for preparing and submitting this report:

- The applicant files for a construction certificate and pays the fees. KRS 278.706.
- The applicant submits required items, including an SAR. KRS 278.706 & KRS 278.708.
- If it wishes, the Board may hire a consultant to review the SAR and provide recommendations about the adequacy of the information and proposed mitigation measures. KRS 278.708.
- The consultant must deliver the final report so the Board can meet its own statutory decision deadline — 120 days or 180 days from receipt of an administratively complete application, depending upon whether the Board will hold a hearing. KRS 278.710.

## SAR Review Methodology

BBC undertook the following tasks to review Martin County Solar's SAR and complete this report:

- Reviewed prior SAR reviews prepared for the Siting Board by BBC and others for proposed commercial solar generating facilities – including the proposed Turkey Creek and Glover Creek Solar facilities which were reviewed in 2020, and the proposed AEUG Fleming, Unbridled Solar, Ashwood Solar, and Flat Run Solar facilities which have been reviewed in 2021;

- Reviewed the contents of Martin County Solar's SAR and Application;

- Identified additional information we considered useful for a thorough review, and submitted questions to the applicant;

- Conducted the required site visit, including obtaining oral and written information supplied by the applicant, in August 2021;

- Completed data collection with several outside sources as sourced in this document; and

- Compiled and incorporated all of the foregoing in the analysis.

## Report Format

This report is structured to be responsive to KRS 278 and our contract. It begins with this general statement that introduces the review. In Section B of the report, we present the executive summary. Section C offers detailed findings and conclusions of the study.

## Certain Limitations

There are inherent limitations to any review process of documents such as the SAR. These must be understood in utilizing this report for decision-making purposes.

Based on previous experience with the SAR review process, BBC has exercised judgment in deciding what information is most relevant and what level of detail is appropriate. This relates to project components, geographic extent of impacts, and assessment methodology. Siting Board staff has provided review and guidance in this context.

At this point in the planning process, Martin County Solar has not finalized the specific locations and layout of the solar arrays and some additional components of project infrastructure. The SAR, and this review, are based on the best available information at this time.

# SECTION B.

## Executive Summary

# SECTION B.
# Executive Summary

This report documents the evaluation of a Site Assessment Report (SAR) in compliance with KRS 278.704 and KRS 278.708. The Kentucky State Board on Electrical Generation and Transmission Siting (the Siting Board) received an application from Martin County Solar, LLC for approval to construct a commercial, photovoltaic solar merchant electric generating facility in Martin County, Kentucky, in May 2021. Siting Board staff retained BBC Research & Consulting (BBC), a Denver-based firm, to review the SAR. BBC was directed by the staff to review the SAR for adequacy, visit the site, conduct supplemental research where necessary, and provide recommendations about proposed mitigation measures. This is the summary of BBC's final report, which encompasses the SAR review, establishes standards for evaluation, summarizes information from the applicant, notes deficiencies, offers supplemental information, and draws conclusions and recommendations related to mitigation. Issues outside the scope of KRS 278.708—such as regional economic impact, electricity market or transmission system effects, site decommissioning plans, and broader environmental issues—were not addressed in this engagement.

## Description of the Proposed Facility/Site Development Plan

The SAR provides a description of the proposed Martin County Solar facility in terms of surrounding land uses, legal boundaries, access control, utility service, setback requirements, visual impacts, impacts on surrounding property owners, noise levels and traffic impacts. The proposed Martin County Solar generating facility would be located in eastern Kentucky near the unincorporated community of Pilgrim and approximately eight miles from Kentucky's border with West Virginia. The proposed facility would be a 200-megawatt alternating current (MWac) photovoltaic (PV) electricity generation facility with a project area of 2,541 acres, situated on reclaimed coal mine land in a rural setting. Project facilities would include crystalline solar panels, racking, combiner boxes, inverters, voltage transformers, DC and AC electrical collection systems, an AC-coupled battery energy storage system, one substation, gen-tie lines, and meteorological towers. Conclusions with respect to other descriptive elements of the facility follow:

- **Surrounding land use** — Residential parcels comprise 60 percent of the parcels adjacent to the proposed Martin County Solar project. Parcels zoned for agriculture comprise 32 percent of adjacent parcels. By acreage, most adjoining land is agricultural (93.6 percent), while 4.7 percent is solely residential, 1.7 percent is zoned agricultural/residential, and less than 0.1 percent is cemetery land.

There are 2 residential neighborhoods[1] within 2,000 feet of the site boundary, and there are about 10 nearby dwellings that lie closer to the boundary, within the noise assessment area. The site boundary sits approximately 590 feet from and 200 feet in elevation above the nearest residence.

- **Proposed access control and security —** Martin County Solar identifies two site entrances, one each on the east and west sides of the project footprint, adjacent to KY-1714 and KY-1439. The SAR states that Martin County Solar will comply with the National Electric Safety Code requiring the site (all areas where equipment is located) to be fenced prior to the start of construction and entrances to the site to be gated and locked when workers are not active on site. (SAR, page 4).

- **Utilities —** Martin County Solar does not propose to require utilities on site during the operational life of the proposed project other than potential electrical service for site lighting at the substation.

- **Setback requirements —** Martin County does not have any applicable zoning or setback requirements that would apply to a commercial solar facility such as the proposed Martin County Solar project. As stated in the applicant's Response to the Initial Request for Information, there are two residential neighborhoods (as defined by KRS 278.700 (6)) within two thousand (2,000) feet of the Project. Consequently, Martin County Solar will be moving the Siting Board for a deviation from the statutory setback requirements in KRS 278.704(2). In the Motion for Deviation from Setback Requirements—submitted to the Siting Board in July 2021—the applicant proposed the following alternative setbacks from the project footprint:

    - Minimum 590-foot distance between solar generating equipment (e.g., panels) and the nearest residence

    - Minimum 1,000-foot distance between inverters and the nearest residence

  Regarding KRS 278.700(6), Martin County Solar's Response to the Initial RFI supersedes the original application materials, which had declared only one residential neighborhood within a 2,000-foot distance. However, the applicant's Motion for Deviation was submitted prior to the RFI response, and so Martin County Solar must confirm that the proposed setback requirements remain at 590 feet and 1,000 feet, as described in the original submission.

- **Other facility site development plan descriptions provided in the SAR —** Legal boundaries; location of facility buildings, transmission lines, and structures; and location of access roads, internal roads, and railways are all addressed in the SAR. Noise levels are briefly addressed and then evaluated more fully in a subsequent section of the SAR. When considered alongside additional information provided by the applicant in their responses to

[1] As defined in KRS 278.700(6), a residential neighborhood is an area of five or more acres with at least one residence per acre.

the Siting Board's and BBC's questions following our review of their SAR, these materials appear to meet the informational requirements identified in KRS 278.708.

## Compatibility with Scenic Surroundings

Visual impact analysis commonly includes a description of the visual setting, visual features of the facility and its appurtenances, and an identification of places where humans might observe the facility or its components. These factors contribute to the evaluation of visual impacts and the facility's compatibility with the existing setting.

Martin County Solar did not include a formal visual assessment of the proposed site in the SAR. However, the applicant did provide a description of the site—a reclaimed surface coal mine—and noted that it sits more than 200 feet in elevation above the surrounding residences and neighborhoods.

The proposed Martin County Solar site is comprised of land reclaimed from a former surface coal mine. The site is elevated, and mature vegetation and trees are present. Overall, the physical components of the proposed facility would not be visible from nearby homes, neighborhoods, or roadways (KY 1714 and KY 1439). The applicant has not proposed to plant additional vegetative buffers.

In general, BBC concurs with Martin County Solar's statements that the proposed facility would not be incompatible with its surroundings from a scenic standpoint. This assessment reflects the topography of the site, which eliminates its visibility from nearby homes, as well as the existing mature vegetation at the project boundary which naturally screens the site from view.

## Potential Changes in Property Values for Adjacent Property Owners

The central issue related to property values is whether or not, and to what extent, property values of other landowners will change as a result of development and operation of the proposed Martin County Solar facility. Exhibit B of the applicant's SAR (Property Value Impact Study) provides a comparative study of property values in proximity to solar facilities in Kentucky and in other states across the US, using a matched pairs design. The section draws its conclusions regarding the impacts of the proposed facility on adjacent property values based on market analysis of value impacts from numerous other solar facilities. The study uses an analysis of comparable home values design that is similar to the approach by which appraisers commonly appraise residential property values.

The Property Value Impact Study states, "Matched pair data presented later in this report shows no impact on home values as close as 105 feet when reasonable visual buffers are provided." This section of the Property Value Impact Study concludes that there is likely no impact on the value of adjoining properties at this distance from the proposed facility:

*The matched pair analysis shows no impact on home values due to abutting or adjoining a solar farm as well as no impact to abutting or adjacent vacant residential or agricultural land. The criteria that typically correlates with downward adjustments on property values such as noise, odor, and traffic all indicate that a solar farm is a compatible use for rural/residential transition areas and that it would function in a harmonious manner with this area.* (SAR Exhibit B, page 1)

The Property Value Impact Study presents an assessment of the proposed facility's harmony with the area, noting that solar facilities do not create any hazardous wastes during normal operation, nor do they produce odor; generate noise at levels that have a negative impact on the surrounding properties; or generate vehicle traffic at a significant level.

To obtain further perspective regarding potential effects on property values, BBC reviewed recent studies and articles related to potential concerns regarding solar facility effects on nearby property values. In some cases, recent proposals to construct large scale commercial solar projects have met with substantial public opposition. Although concerns regarding nearby property values have been one of the issues raised by project opponents, no data or analysis has been provided to substantiate that concern.

To date, few studies have been conducted by academic researchers or other "third-party" analysts. Using different methods, and different data sources, recent studies by professors at the LBJ School of Public Affairs (University of Texas) and the University of Rhode Island have found that there could be small, negative impacts on property values from proximity to commercial solar facilities. However, those negative effects appear to be more likely in suburban settings, rather than rural settings such as the areas surrounding the proposed Martin County Solar facility.

Finally, the proposed Martin County Solar site is elevated by more than 200 feet above adjacent residences, neighborhoods, and roads, and for this reason the physical components of the facility will not be viewable from nearby residences.

Based upon review of the applicant's SAR, subsequent information obtained during our visit to the site and surrounding areas, and other supplemental research, BBC concludes that the proposed facility is unlikely to have measurable impacts on the property values of adjacent properties or other properties in the vicinity of the project.

## Expected Noise from Construction and Operation

Section 4 of the SAR summarizes the findings from the more detailed Noise Assessment (Exhibit D of the SAR). The applicant proposes that construction noise and activity will be time-constrained and that the natural topography, site elevation, proposed setbacks, and existing vegetation on site will mitigate construction noise at nearby residential noise receptors.

In addition to residential nose receptors, one non-residential noise receptor was included in the Noise Assessment: the Jude & Fletcher Cemetery, the boundary of which will sit approximately 250 feet from the closest solar panel and 780 feet from the closest facility inverter.

The Noise Assessment calculates that maximum noise levels including pile driving (which is the loudest machinery that will be onsite) will be 88 dBA at the Jude & Fletcher Cemetery (calculated for a distance of 218 feet) and 79.8 dBA at the nearest residence (calculated for a distance of 563 feet). Maximum noise levels excluding pile driving (i.e., noise generated from other all vehicles

and machinery operating on site) will be 67.8 dBA at the cemetery and 59.5 at the nearest residence.

The noise levels calculated for the nearest residence do not exceed the noise limits recommended by the National Institute for Occupational Safety and Health or the Centers for Disease Control and Prevention, and BBC concludes that noise levels during construction are unlikely to be disruptive to nearby residents.

During the operational life of the proposed project, the primary source of noise will be the panel tracking system. Noise from the tracking system would be 62 dBA as measured at the Jude & Fletcher Cemetery (or approximately the level of a conversation in a restaurant) and 55 dBA as measured at the nearest home (approximately as loud as a background noise in a quiet suburb). BBC concludes that noise levels during normal operation will not be disruptive to nearby residents.

## Impacts on Transportation

The Traffic Impact Study (Exhibit E of the SAR) describes the existing road network near the Project site and current traffic levels. The study calculates that the adjacent primary roads (KY 1714 and KY 1439) currently have an A grade for their existing level of service (LOS). The construction phase of the proposed project will bring increased personal vehicle traffic (workforce commuters) and truck traffic (equipment delivery) to site, but the study concludes that a high LOS will be maintained.

*[T]he construction period trip generation of workers and trucks will not generate a significant number of trips on local roadways. KY 1714 and KY 1439 will continue to operate at a LOS A during the scenario of when traffic is doubled during construction peak traffic. Although no significant, adverse traffic impacts are expected during project construction or operation, using mitigation measures such as ridesharing between construction workers, using appropriate traffic controls, or allowing flexible working hours outside of peak hours could be implemented to minimize any potential for delays during the AM and PM peak hours*. (Exhibit E, page 8)

Martin County Solar estimates that the weight of the main power transformer (the largest delivery to site) will be approximately 200,000 pounds, and that, "the subsurface conditions [of the project site] are not expected to be of concern as the heavy loads will be using the existing access roads installed during the mining operations." (Martin County Solar Responses to Initial RFI, pages 25 & 48).

For other standard equipment and supplies, the applicant anticipates a maximum of 100 truck deliveries to site per day.

BBC conducted further research on the weight limits and vehicle classes permitted to travel on specific roadways in Kentucky. The primary roads located near the proposed site—KY 1714 and KY 1439—are rated for 44,000 pounds (Kentucky Transportation Cabinet Truck Weight Classification). Any vehicle loads exceeding this limit could subject the roadway and shoulder to damage or degradation. Additionally, any overweight truck trips on smaller county roads may cause roadway degradation.

However, these challenges can likely be overcome with careful advance planning and communication with the KYTC and the Martin County road department.

After the construction period at the proposed facility site, traffic volumes in and out of the site will be minimal during daily operations.

## Recommendations

Martin County Solar has provided the required information for the site assessment, including responses to BBC's questions following our review of their SAR. The Martin County Solar site appears to be well selected in terms of compatibility with the surrounding area and access to transmission infrastructure.

**Mitigation recommendations.** Martin County Solar proposes the following mitigation measures.

The following setbacks for solar equipment:

- Minimum distance of 590 feet between solar panels and the nearest residence
- Minimum distance of 1,000 feet between facility inverters and the nearest residence

***BBC supports this proposed mitigation.***

Martin County Solar proposes to revegetate areas disturbed during construction with a mix of non-invasive native and non-native grass seed mixes to improve soil health and reduce stormwater runoff.

***BBC supports this proposed mitigation.***

Martin County Solar proposes to minimize tree clearing required by construction and to keep existing vegetation in place, to the extent practicable.

***BBC supports this proposed mitigation.***

Martin County Solar proposes to secure the site perimeter fence(s) in accordance with the guidelines of the NESC and American National Standards Institute (ANSI) Z535 Safety Sign Standards for Electric Utility Power Plants and Substations.

***BBC supports this mitigation, and further recommends that Martin County Solar or its contractor should control access to the site during construction and operation. All construction entrances should be gated and locked when not in use. The applicant's access control strategy should also include appropriate signage to warn potential trespassers. The applicant should ensure that all site entrances and boundaries have adequate signage, particularly in locations visible to the public, local residents, hunters, and business owners. According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work.***

In addition, BBC recommends the following mitigation regarding noise and traffic impacts from construction:

- ***Similar to other recent solar facility applications reviewed by the Siting Board, construction activity at the Martin County Solar site should be limited to the hours of 8 AM to 6 PM, Monday through Saturday, to reduce impacts from construction noise on nearby residents.***

- ***Martin County Solar should contact homes and businesses within 1,500 feet of any pile driving activity and notify them in advance of the upcoming activity, its timing, and anticipated duration. It should also provide the opportunity for residents to ask questions or provide feedback, if desired.***

- ***Martin County Solar should consult with the County regarding the noise impacts to the Jude & Fletcher Cemetery and coordinate a public notice to inform local residents that construction noise will be audible, but that access will not be impeded.***

- ***Martin County Solar should implement a Customer Resolution Program to address any complaints from surrounding landowners. Martin County Solar should submit an annual status report on the Customer Resolution Program to the Siting Board, identifying any complaints, the steps taken to resolve those complaints, and whether or not the complaint was resolved to the satisfaction of the affected landowner.***

- ***Martin County Solar should develop a traffic management plan for the construction phase of the project and implement the plan, as necessary, to minimize impacts on traffic flow and keep traffic safe. As part of this plan, Martin County Solar should use appropriate traffic controls or allow flexible working hours outside of peak hours to minimize any potential delays during AM and PM peak hours.***

- ***Martin County Solar should consult with the Kentucky Transportation Cabinet and the Martin County road department as soon as feasible to discuss the anticipated construction-related traffic and the transportation requirements for the power transformer and the KYTC's restrictions on KY 1714 and KY 1439. Martin County Solar should obtain any necessary permits from these agencies.***

- ***Martin County Solar should commit to rectify any damage to public roads by fixing or fully compensating the appropriate transportation authorities for any damage to the existing road network that it causes or to which it materially contributes.***

Subject to the foregoing mitigation measures, BBC recommends that the Board approve the application for a certificate to construct based upon the siting considerations addressed in this review. This recommendation presumes that the project is developed as described in the applicant's SAR and supplemental information, and that the mitigation measures above are implemented appropriately. Based upon the information available to BBC at the time of this report and if these presumptions are correct, there are unlikely to be significant unmitigated impacts from construction and operation of the Martin County Solar generation project regarding scenic compatibility, property values, noise, or traffic.

# SECTION C.

## Findings and Conclusions

# SECTION C.
# Findings and Conclusions

This section provides detailed review and evaluation of each element of the Martin County Solar Site Assessment Report (SAR) as prescribed in Section 5 of KRS 278.708. It is organized into five subsections:

1. Description of Proposed Facility/Site Development Plan;

2. Compatibility with Scenic Surroundings;

3. Potential Changes in Property Values for Adjacent Property Owners;

4. Expected Noise from Construction and Operation; and

5. Impacts on Transportation.

Although the Board will likely consider economic impacts and other issues in making its decision, these are beyond the present scope of our inquiry and so are not addressed here.

Within each of the five subsections identified above, BBC has followed a consistent pattern:

- First, BBC describes the generally accepted assessment criteria or methodology necessary to evaluate impacts of a project of this nature (**Potential Issues and Standard Assessment Approaches**).

- Secondly, we summarize relevant information included in the initial SAR (**Information Provided in the Applicant's SAR**).

- Thirdly, we describe supplemental information about the proposed Martin County Solar Generation facility, along with other information BBC was able to gather about the project and its impacts (**Supplemental Investigations, Research, and Analysis**).

- Finally, BBC draws its own conclusions about the project's potential impacts and recommended mitigation (**Conclusions and Recommendations**).

We believe that this format transparently presents the basis for our conclusions and recommendations.

## Description of Proposed Facility/Site Development Plan

### Potential Issues and Standard Assessment Approaches

As required by KRS 278.708(3)(a), the SAR must contain the following information:

- Subsection 1—surrounding land uses for residential, commercial, agricultural, and recreational purposes;
- Subsection 2—the legal boundaries of the proposed site;
- Subsection 3—proposed access control to the site;
- Subsection 4—the location of facility buildings, transmission lines, and other structures;
- Subsection 5—location and use of access ways, internal roads, and railways;
- Subsection 6—existing or proposed utilities to service the facility;
- Subsection 7—compliance with applicable setback requirements as provided under KRS 278.704(2), (3), or (4); and
- Subsection 8—evaluation of the noise levels expected to be produced by the facility.

BBC found each of these required information items in the SAR and examined them. To some extent, the required elements of the description of the facility and site development plan specified in the legislation overlap with topic-specific evaluations also required in the statute. In particular, the statute calls for specific evaluations of impacts on nearby property values, traffic, and noise levels. Both the applicant's SAR and the BBC team's evaluation provide further detail on these topics in subsequent sections.

### Information Provided in the Applicant's SAR

The required description of the proposed Martin County Solar Generation facility and site development plan is mainly set forth in Exhibit F of the Application (the Site Assessment Report), Section 1 (Description of Proposed Project Site), and Section 2 of the Application (Description of Proposed Site). Other related or supplementary information comes from various other sections of the SAR and other attachments included with the Application.

**Overview of proposed facility.** Section 1 of the SAR (Description of Proposed Project Site) supplies an overview of the project. The proposed Martin County facility would be a 200-megawatt alternating current (MWac) photovoltaic electricity generation facility, situated on a 2,541-acre site of reclaimed coal mine land in eastern Kentucky, near the unincorporated community of Pilgrim. Martin County Solar describes the project elements in more detail in the SAR:

*Project components will include PV solar modules mounted on either single axis trackers or fixed-tilt racking systems supported by steel posts. Other components of the PV system include combiner boxes, inverters, high voltage transformers, junction boxes, DC and AC electrical collection systems, a project substation, and gen-tie lines. In addition, the Project will include an operation and maintenance (O&M) trailer, meteorological (MET) towers, access roads, and fencing. During construction, the Project*

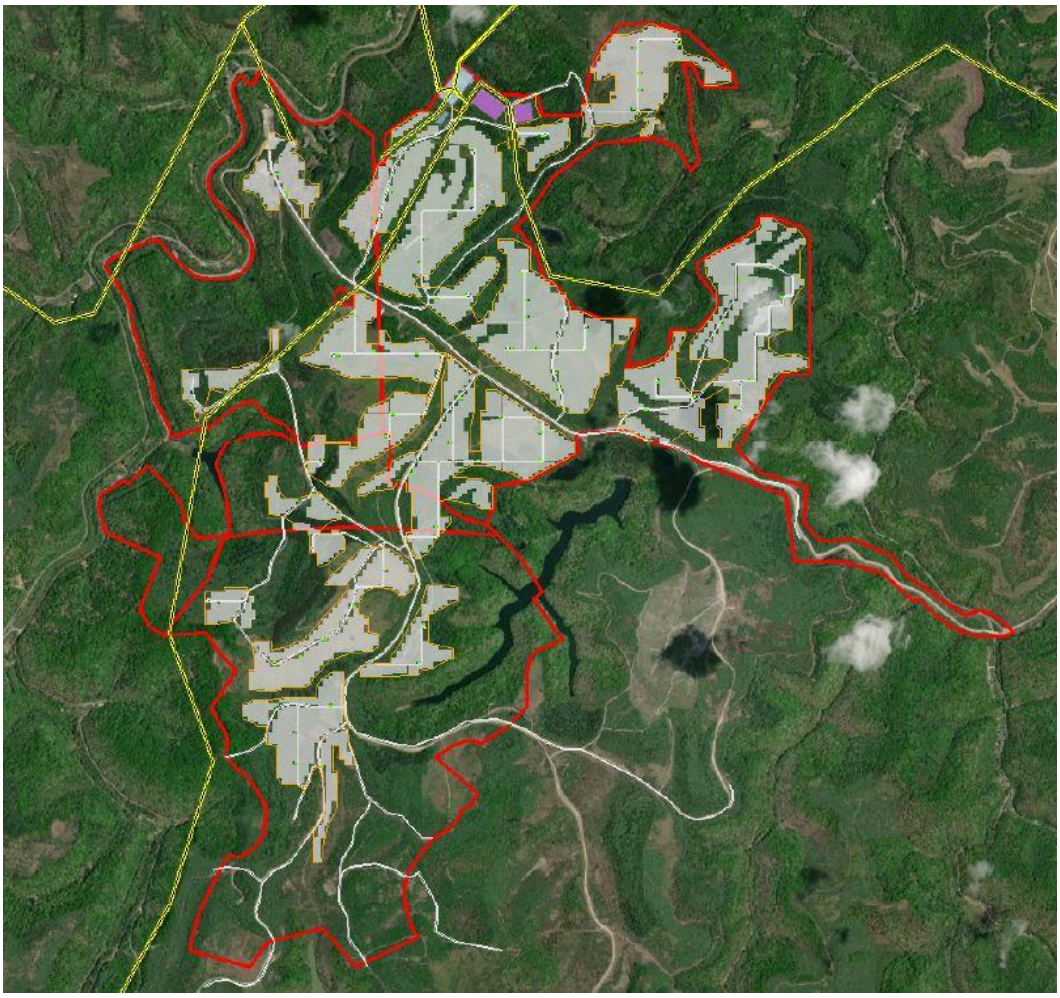
*will include temporary laydown yards, temporary construction management trailers, and stormwater management features. The Project will also include a 100MW (up to 6 hours) AC-coupled battery energy storage system (BESS).* (SAR, page 2)

The applicant provides estimates of select components required by the 200-MW proposed project:

- 105,000 steel posts to support the panel racking systems;
- 69 inverters to convert the collected DC power to AC power;
- An AC collection system with underground and/or overhead cabling;
- A substation on site to transform collected power to the voltage necessary to transmit via existing 138kV transmission lines;

Exhibit A of the SAR (Site Layout Map) presents satellite imagery of the proposed project site overlaid with a two-dimensional rendering of the boundaries and equipment associated with the solar generation facility. Exhibit A is excerpted in part, below, as Figure C-1.

**Figure C-1.**
**Site Layout Map for Martin County Solar Project**



In Figure C-1, the project site is outlined in red while the proposed fence line—encompassing all facility equipment, such as the solar arrays shown in grey—is in orange. Locations of the substation (light blue) and two BESS units (purple) are depicted on the northern boundary of the proposed project site.

**Surrounding land uses.** Exhibit B of the SAR (Property Value Impact Study by Kirkland Appraisals) provides detail on the composition of the surrounding land in terms of use and area. Figure C-2, from Exhibit B (Property Value Impact Report) of the SAR, presents these summary data.

**Figure C-2.**
**Land Use of Parcels and Acreage Adjoining Proposed Martin County Solar Facility**

| Adjoining Land Uses | Acreage | Parcels |
|---|---|---|
| Residential | 4.65% | 60.44% |
| Agricultural | 93.60% | 31.87% |
| Agri/Res | 1.69% | 2.20% |
| Cemetery | 0.06% | 5.49% |

By acreage, most adjoining land is agricultural (93.6 percent), with 4.65 percent zoned residential, 1.69 percent agricultural/residential, and less than 0.1 percent for cemetery land (there are four local cemeteries in the vicinity of the proposed project (SAR page 11).) However, by count, residential parcels constitute 60 percent of adjoining parcels while agricultural parcels comprise 32 percent. The accuracy of this information regarding adjoining land use is subject to the accuracy of the Kirkland report overall, several parts of which BBC had questions about and forwarded to the applicant in the First Request for Information.

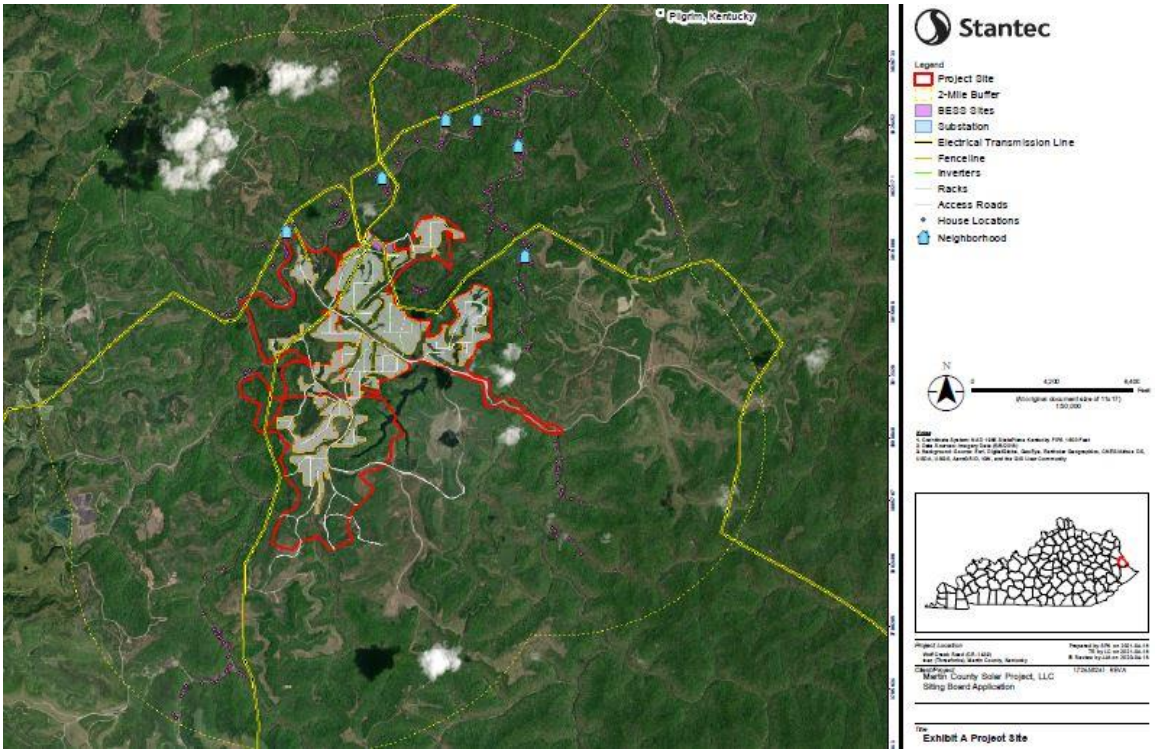
Other pertinent information about surrounding land uses includes the proximity of residential communities, schools, parks, or other relevant community buildings. The Application states:

*There is one residential neighborhood (as defined by KRS 278.700(6)) within two thousand (2,000) feet of the Project's facilities. However, the project sits approximately 240 feet in elevation above and 1,000 feet away from the site. Pursuant to KRS 278.704(4), a motion to deviate from the setback requirements is forthcoming.* (Application, page 6)

The SAR and Application materials do not indicate the existence of any schools, parks, or community buildings within a 2-mile project buffer. BBC sought to verify this information with supplemental research.

In Exhibit A of the Application (Project Site Map), the applicant presents satellite imagery of the proposed project with the additional context of a 2-mile buffer and depictions of the individual homes and residential neighborhoods within it. This figure is excerpted in part as Figure C-3.

**Figure C-3.**
**Project Site Map**




There are six residential neighborhoods within the 2-mile buffer, marked by light blue icons in Figure C-3. Of those, one neighborhood[1] is within 2,000 feet of the proposed project site boundary, shown near the northwest edge. This satellite image of the proposed project's boundary and context demonstrate that it will exist in a rural setting, with a substantial amount of adjacent agricultural land as well as low-density residential land.

**Legal boundaries.** Page 4 of the applicant's SAR refers to Exhibit C (Legal Description) for the legal description of the site. However, BBC found Exhibit C to be incomplete and it is not clear to what extent the assortment of documents therein clarifies the legal status of the proposed site; in the first RFI, BBC requested that Martin County Solar improve and augment Exhibit C.

**Access control.** Page 4 of the SAR states that proposed access points are shown in SAR Exhibit A (Site Layout Map, shown in part in Figure C-1 of this report). However, while Exhibit A does depict the site boundary, fence line, and internal access roads, the actual entrances to site are not featured, and it is not clear how many entrances the proposed project would have or in what ways access through site entrances would be secured. BBC requested this information from the applicant in the RFI.

[1] As defined in KRS 278.700(6), a residential neighborhood is an area of five or more acres with at least one residence per acre.

Additional information regarding proposed access control measures is outlined by the applicant on page 4 of the SAR:

*A fence meeting National Electric Safety Code (NESC) requirement, typically a seven-foot fence, which includes three strings of barbed wire at the top, will secure the facility.* (SAR, page 4)

**Location of buildings, transmission lines, and other structures.** Exhibit A of the SAR (Site Layout Map, shown in part in Figure C-1 of this report), shows the proposed locations of the project's substation, two BESS units, inverters, solar arrays, and fencing, as well as the current locations of the existing transmission lines already on site. The locations of other proposed structures—such as the O&M trailer and the meteorological towers as described on page 2 of the SAR—is not clear. BBC requested information on the location of the O&M trailer from the applicant during the RFI process.

**Location and use of access ways, internal roads, and railways.** Internal roads are depicted in Exhibit A of the SAR (Site Layout Map). However, site entrances and access points are not shown, and BBC followed up with the applicant during the RFI to request this information. There is one railway adjacent to the proposed site and the applicant references it in the SAR by stating:

*There is one railway adjacent to the proposed site to the west, however it is located downslope and will not likely be used for any construction or operational activities related to the Project.* (SAR, page 4)

**Existing or proposed utilities.** The applicant does not propose to require external utilities on site during "typical plant operation" (SAR, page 5). BBC requested the applicant to clarify under what circumstances external utilities would be required, even if unlikely.

**Compliance with applicable setback requirements.** Kentucky statute 278.704(2) states that "…beginning with applications for site compatibility certificates filed on or after January 1, 2015, the proposed structure or facility to be actually used for solar or wind generation shall be required to be at least one thousand (1,000) feet from the property boundary of any adjoining property owner and two thousand (2,000) feet from any residential neighborhood, school, hospital, or nursing home facility."

Information regarding setback requirements applicable to this project is found in the Application and in the SAR. Page 5 of the SAR states:

*Pursuant to KRS 278.708(3)(a)(7), Martin County has not enacted any zoning ordinances or setback requirements for the location of the Project. There is no planning and zoning commission with jurisdiction over the location of the Project and, therefore, no setback requirements set by such a planning commission exist. The Applicant will file a request to deviate from the setback requirements provided at KRS 278.704(2) by filing a motion to deviate, pursuant to KRS 278.704(4), and thus it will comply with the relevant setback requirements provided at KRS 278.704.* (SAR, page 5)

The Martin County Solar Application describes the necessity for the request for deviation from setback requirements:

*There is one residential neighborhood (as defined by KRS 278.700(6)) within two thousand (2,000) feet of the Project's facilities. However, the project sits approximately 240 feet in elevation above*

*and 1,000 feet away from the site. Pursuant to KRS 278.704(4), a motion to deviate from the setback requirements is forthcoming.* (Application, page 6)

**Evaluation of Noise Levels.** Section 4 of the SAR summarizes the findings from the more detailed Noise Assessment conducted by Stantec (Exhibit D of the SAR). During the construction phase of the project, increased vehicle traffic and construction activities on site will generate intermittent noise at the nearest receptors, which are a cemetery and a residential home:

*This construction noise is expected to be of short duration at any given location within the project. The majority of the noise producing activities will occur many hundreds to thousands of feet from, and at significantly higher elevations than, the nearest noise sensitive receptors. The noisiest portion of the construction includes the use of pile drivers to install the solar panel supports. These will only be used very briefly and the worst-case maximum noise […] expected to occur at the nearest receptor […] is 88 dBA which is similar to a train at 100ft. [When disregarding intermittent noise from the pile driver], the sound levels for typical construction onsite ranges from a dishwasher to heavy traffic in similarity.* (SAR, pages 7-8)

Noise levels and the details of the Noise Assessment (Exhibit D) are discussed in greater depth and detail in a subsequent section of this report (Expected Noise from Construction and Operation).

## Supplemental Investigations, Research, and Analysis

After reviewing the applicant's SAR, the BBC team sought to supplement the information provided in the SAR where necessary to describe more fully the proposed facility and site development plan.

**Overview of proposed facility.** Both BBC and the Siting Board requested additional information from the applicant regarding the proposed project and site.

***Site characteristics.*** As described in detail by the applicant in their RFI response, the project site has seven surface mining permits:

*Reclamation on the vast majority of these permits has been substantially completed for many years. Reclamation of Permit 880-8023 was completed in late 2020 and Phase I bond release was achieved February 16, 2021. These permits are currently undergoing revisions by Martin County Solar to allow for final bond release.* (Martin County Solar Responses to Initial RFI, page 32)

Regarding proposed stabilization of the project site, the applicant states that grasses or other native ground cover will be used to revegetate the areas under the solar panels. (Martin County Solar Responses to Initial RFI, page 36)

***Construction on reclaimed mining site.*** In their responses to questions posed by the Siting Board and by BBC, Martin County Solar described some of the considerations taken in planning for construction on the unique site:

*Due to the Project site being an abandoned coal mine, the subsurface conditions for the site have impacted the design for the installation of the piles that support the racking of the modules. Based on the draft geotechnical studies and reports, the Applicant intends to use two methods of installing piles. In one method the pile hole will be pre-drilled and the post placed with lean concrete, whereas the other method would be to use a ground screw system. All responsive reports and studies are currently in*

*draft form. Once those studies and reports are finalized, summaries can be provided upon request.* (Martin County Solar Response to RFI, pages 11, 12, & 42)

**Surrounding land uses.** A few questions relating to the project's surrounding land uses arose during BBC's supplemental investigations and in the RFI questions that were posed to Martin County Solar by the Siting Board and the BBC team.

***Neighborhoods and community buildings.*** As noted in a previous section of this report, the SAR and Application state that one residential neighborhood lies within 2,000 feet of the proposed site. However, in their response to the RFI, Martin County Solar corrected this, stating that there are two neighborhoods (as defined by KRS 278.700(6)) within 2,000 feet of the boundary:

*Upon re-evaluation, applicant added Neighborhood #1 at 1,200 ft from project footprint [at the end of Big Peter Cave Road]. Neighborhood #2 (along Dye Bottom Road) is 1,300 feet away from Project footprint.* (Martin County Solar Response to RFI, page 4)

While the SAR and Application materials do not indicate the existence of any schools, parks, or community buildings within the project buffer, Martin County Solar's response to the RFI clarified that there is one community public park (Pigeon Roost Community Center) located 1.3 miles north of the proposed site, on KY 1714. BBC did not find evidence of any schools, private parks, hospitals, or nursing homes within a two-mile radius of the site.

***Hunting access area.*** As noted in the RFI, the proposed project footprint contains what is currently part of a hunting access area. Martin County Solar confirmed that they have not corresponded with the Kentucky Department of Fish and Wildlife Resources regarding this area, but that they will coordinate with the Department to inform the public that the site is no longer open. The applicant states that the project's perimeter fencing will secure the site from access by hunters.

**Legal boundaries.** In response to BBC's first RFI, the applicant supplied a Schedule C Legal Description from Commitment for Title Insurance #19-12-00217 – Triple H Real Estate, issued by Stewart Title Guaranty Company. This document was not available when the SAR was filed. The applicant also stated they have commissioned an ALTA (American Land Title Association) Survey of the proposed site, which will include a metes and bounds description to augment the information included in the Commitment.

**Access control.** Martin County Solar stated in the RFI response that first responders will be given keys to the locks securing fences at the project site, in order to have access in the event of emergency. Additionally, the applicant supplied an updated project boundary map marked with the site's two entrances, one each on the east and west sides of the site off of State Highway 1714 and 1439, respectively (Martin County Solar Responses to Initial RFI, page 28)

**Location of buildings, transmission lines, and other structures.** The BBC team requested more information from Martin County Solar regarding descriptions of the components and equipment of the project.

In their responses to BBC's first RFI, the applicant stated that 12 six-foot meteorological towers will be installed as part of the project, and these will not be visible from neighboring homes. However, the applicant did not know where the towers would be placed on the site. At request from the Siting

Board in the second RFI, Martin County Solar provided a project site map marking the location of the project's Operations & Maintenance Building adjacent to the proposed project substation on the northern boundary of the site.

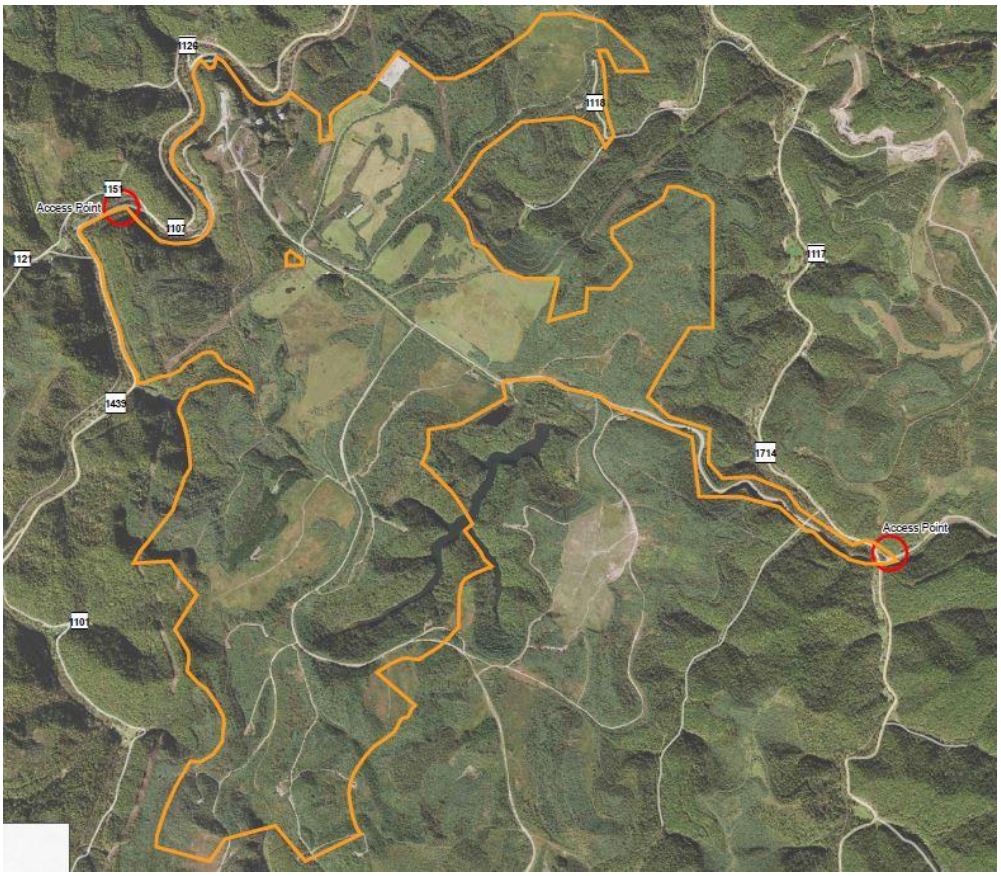
Decisions on which type of solar racking system to use (i.e., single-axis or fixed-tilt) and whether to use underground or overhead AC collection cables will be finalized in January and February 2022. (Martin County Solar Responses to Initial RFI, pages 45-47)

During a visit to site in August 2021, the Martin County Solar project team supplied BBC with additional detail on the overhead collection system. The AC cables collecting power from the project inverters would run overhead at a height of approximately 45 feet, and a gen-tie pole to connect to the nearby Inez Substation would be no taller than existing transmission lines. As the substation presently houses poles, towers, and other associated structures, the impact of the gen-tie pole on the viewshed would be negligible.

**Location and use of access ways, internal roads, and railways.** The applicant's responses to the RFI provided some additional detail regarding access to the proposed site.

***Access points to site.*** In their response to the first RFI, Martin County Solar provided a map detailing the location of the project's access entrances, which are both in place from the site's previous mining operation. The two access points are marked in red in the excerpted map in Figure C-4.

**Figure C-4.**
**Site Access Points**



***Internal roads.*** In their responses to the RFI, the applicant stated that plans for paving or laying gravel for access and internal roads will be determined nearer to the start of construction, dependent on the needs of the project. Several internal roads already exist on the site.

***Railways.*** In their responses to questions posed in the RFI, Martin County Solar confirmed that the railway adjacent to the proposed project site will not be used for any reason.

**Utilities.** In their responses to questions posed in the RFI, the applicant confirms that there are no plans to use any external utility services other than potential electrical service for site lighting at the substation.

In response to a separate question from the Siting Board in the RFI, Martin County Solar acknowledged several pipelines and wells that are located on the proposed site:

*The Project will not have exact locations identified until the ALTA survey have been completed, which is expected in September 2021. […] The Project has made inquiries into liquid mineral rights and reviewed historical maps identifying primary operators. At present the Project is still identifying minor operators and will coordinate with any owner of pipelines to obtain an encroachment agreement prior to construction. […] The status of [the] wells has not yet been confirmed; however, the Project will coordinate with any owner of gas wells to obtain an encroachment agreement prior to construction.* (Martin County Solar Response to RFI, pages 8-9)

**Compliance with applicable setback requirements.** The applicant submitted a Motion for Deviation from Setback Requirements to the Siting Board on July 7, 2021, stating:

*[The] Applicant seeks a deviation from the 2,000-foot setback requirement in KRS 278.704(2) to allow it to place generating equipment 590 feet from the nearest residential neighborhood and to place invertors no closer than 1,000 feet from the residential neighborhood.* (Martin County Solar Motion for Deviation, page 1)

In the time since submitting the motion, Martin County Solar has responded to questions from the RFI and stated that there are two residential neighborhoods within 2,000 feet of the proposed project boundary, rather than only one neighborhood as originally stated in the SAR, Application, and Motion for Deviation. According to the applicant, the two neighborhoods are 1,200 and 1,300 feet from the project footprint.

Martin County Solar should revise and resubmit the Motion for Deviation from Setback Requirements in order to reflect accurately the impact of the proposed project on these two neighborhoods; this resubmission should include updated estimates of distance between the neighborhoods' nearest residences and any applicable structures, equipment, or facilities associated with the proposed project.

**Evaluation of noise levels.** BBC's investigation of the proposed project's expected noise levels is addressed in full in a subsequent section of this report (Expected Noise from Construction and Operation).

**Landowner engagement.** In response to a question from BBC, Martin County Solar stated that the project team has not met directly with landowners of properties adjoining the project, but that landowners have been notified through mail and public notices and that Martin County Solar has not received any concerns. BBC verified this information with the County Judge Executive during our site visit in August 2021.

## Conclusions and Recommendations

Based upon review of the applicant's SAR, subsequent conversations with the applicant, and additional data collected by the BBC team, we reach the following conclusions concerning the description of the facility and the proposed site development plan:

- The applicant has generally complied with the legislative requirements for describing the facility and site development plan.

- Martin County Solar has requested a deviation from the statutory setback requirements of a minimum of 1,000 feet between nearby residences and solar equipment and a minimum of 2,000 feet from the property boundary to the nearest residential neighborhood. The physical elements of the proposed project (e.g., solar panels, inverters) generally sit further away from and at a higher elevation to neighboring residences than physical elements of other solar projects that the Siting Board has recently approved.

**Recommended mitigation.** Based on our review of the SAR and Application, the applicant's responses to the Request for Information from the Siting Board and BBC, and our visit to site—as well as recent Siting Board orders in other solar cases—BBC recommends the following mitigation measures regarding this portion of the Kentucky statutory requirements (KRS 278.708(3)(a):

- Any change in project boundaries from the information reviewed during this evaluation should be submitted to the Siting Board for review.

- Martin County Solar should provide the results of the ALTA Survey to the Siting Board as soon as it is completed, as well as an update on correspondence with owners of pipelines and wells located on the site.

- Martin County Solar should control access to the site during construction and operation. All entrances should be gated and locked when not in use. The applicant's access control strategy should include appropriate signage to warn potential trespassers. The applicant should ensure that site entrances and boundaries have adequate signage, particularly in locations visible to the public, local residents, and business owners. According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work.

- Martin County Solar should coordinate with the Kentucky Department of Fish and Wildlife Resources to notify hunters that access at the site will no longer be allowed. The applicant should also incorporate this message into its signage at site entrances and boundaries.

- Martin County Solar should resubmit its Motion for Deviation from Setback Requirements based on its correction to acknowledge two adjacent residential neighborhoods rather than only one. The Motion should describe the applicant's proposed setbacks based on the distance estimates from facility components (e.g., solar panels) for all applicable adjoining residences.

## Compatibility with Scenic Surroundings

This section of the SAR review addresses the compatibility of the proposed Martin County Solar Generation facility with the scenic surroundings. This component of the SAR is identified in KRS 278.708(3)(b).

### Potential Issues and Standard Assessment Approaches

Various government agencies throughout the country employ visual assessment methodologies based on professionally accepted techniques. These techniques are fundamentally consistent in their approach to evaluating the elements of a project and its compatibility with existing landscapes and other surroundings.

An example of a visual assessment methodology in use by a state power plant siting agency is the methodology employed by the staff of the California Energy Commission. In California siting assessments, the assessment of potential incompatibility between a project and its scenic surroundings focuses on project structures, such as smokestacks. Typically, the assessment also addresses project lighting and the potential for visible cooling tower plumes.

A standard visual analysis generally proceeds in this sequence:

- Analysis of the project's visual setting;
- Identification of key observation points (KOP);
- Descriptions of visual characteristics of the project; and
- Evaluation of impacts to KOPs.

A KOP is a location where people may periodically or regularly visit, reside, or work within the viewshed of the project's structures or emissions. [2]

In general practice, visual impact evaluations are conducted within one of three general frameworks, depending upon the relevant jurisdiction and its level of involvement at the project site. These are listed in order of structural formality:

- A formal visual resource or scenery management system, typically in effect only on federal lands, such as the U.S. Forest Service Scenery Management System or the U.S. Bureau of Land Management Visual Resource Management System;
- Locally applicable laws, ordinances, regulations, or standards, where imposed by state or local governments; and
- The cultural context, including the influence of previous uses on the landscape and public attitudes toward the compatibility of various types of land use.

[2] The viewshed is defined as an area of land, water, or other part of the environment visible to the eye from a vantage point. Conversely, the vantage point is presumed to be visible from locations within the viewshed.

Each framework, in its own way, embodies explicit or implicit consideration of some or all of the standard measures of visual impact: viewer exposure and sensitivity; relative project size, quality, visibility, exposure, contrast and dominance; and prevailing environmental characteristics, such as season and light conditions. Local regulations especially focus on screening of facilities from public view and the effects of glare from outdoor lighting upon adjacent property.

In this instance, the visual impact evaluation followed the third, and least formal, of the three approaches listed above. The selected approach is appropriate given that there is no formal visual resource system, nor are there local ordinances related to visual impacts in effect for the area surrounding the proposed facility.

## Information Provided in the Applicant's SAR

In compliance with KRS 278.708, Section 2 of the SAR summarizes the assessment of compatibility with scenic surroundings. Section 2, in turn, cites the findings from SAR Exhibit B (Property Value Impact Study), conducted by Kirkland Appraisals, LLC. Page 6 of the Application references one paragraph of the findings from Exhibit B:

*[L]arger solar farms using fixed or tracking panels are a passive use of the land that is in keeping with a rural/residential area. The solar panels are all less than 15 feet high, which means that the visual impact of the solar panels will be similar in height to a typical greenhouse and lower than a single-story residential dwelling. Were the subject property developed with single family housing, that development would have a much greater visual impact on the surrounding area given that a two-story home with attic could be three to four times as high as these proposed panels.* (Exhibit B, page 115)

The applicant also states:

*[D]ue to this Project being built at an elevation significantly higher than local residences, visual impacts to nearby resources will be minimal. Additionally, given that the Project is sited on a former coal mine, any changes to current visual impacts will be less than those caused by the former land use.* (SAR, page 6)

As described in the previous section of this report, the proposed Martin County solar generation facility will consist of solar panels and racking, inverters, energy storage systems, a substation, meteorological towers, AC collection cables, an O&M trailer, and associated equipment. The central concern is whether the equipment of the proposed solar generation project will be compatible with its surroundings.

The applicant does not supply any visual imagery of the site from key observation points near neighboring homes or along the perimeter of the proposed site. While Exhibit B of the SAR (Property Value Impact Study) refers to proposed vegetative buffers, there are no buffers proposed in any parts of the Application, SAR, or relevant attachments and exhibits. BBC followed up with the applicant and confirmed that they are not proposing to plant any vegetative buffers.

## Supplemental Investigations, Research, and Analysis

**Visual assessment.** BBC's visit to the project site in August 2021 confirmed that the site is considerably elevated and while the perimeter of site will be visible from surrounding residences, neighborhoods, or community buildings, the project's physical elements will be shielded from view by the site's elevation and existing vegetation.

During the site visit, the study team visited nearby areas and took a number of photos to help put the proposed site into additional context. Figure C-5 provides a view looking south towards the site from the closest neighborhood within 2,000 feet of the site. Figure C-6 provides a view south from the furthest neighborhood within 2,000 feet of the site. Figure C-7 was taken at the site's west entrance on Kentucky State Highway 1439 and shows the extent, height, and maturity of existing vegetation around the site perimeter.

**Figure C-5.**
**View Facing South Towards Proposed Site From Neighborhood on Dye Bottom Road**

**Figure C-6.**
**View Facing South Towards Proposed Site From Neighborhood on Peter Cave Road**

**Figure C-7.**
**View Facing East Toward Access Point to Proposed Site Off Kentucky State Highway 1439**

**Vegetative buffers.** BBC requested information from Martin County Solar regarding the proposed vegetative buffers referenced in Exhibit B of the SAR (Property Value Impact Report). In their responses to the RFI, the applicant clarified that no buffers are proposed for the site. However, much of the site has been reclaimed for several years and mature vegetation and trees exist on site. The existing vegetation will be retained as much as feasible, particularly around the site boundary, to limit any potential viewshed impacts. The site's elevation and existing buffer of mature vegetation will ensure that it is not visible from the two neighborhoods on Peter Cave and Dye Bottom roads. Figure C-8 shows the size and maturity of existing vegetation on the site from a vantage point looking north toward the Inez Substation, which is located on the site's northern edge.

**Figure C-8.**
**View Facing North on Proposed Site Towards Inez Substation**

## Conclusions and Recommendations

The proposed Martin County Solar generating facility would be located in an area of predominantly agricultural and some low-density residential land. Given the site's elevation above the valley floor, the size, extent, and maturity of vegetation on the site's boundaries, and the site's distance from most neighboring homes, BBC believes the proposed facility is compatible with the scenic surroundings.

**Recommended mitigation.** BBC recommends the following mitigation measures regarding this portion of the Kentucky statutory requirements (KRS 278.708(3)(b):

- Martin County Solar should retain existing vegetation around the site's perimeter to the extent possible and ensure the long-term health of the existing vegetation for the operation life of the project.

- While it is not expected, if any components of the facility are visible to neighboring homes after construction, Martin County Solar should assess whether a screening plan is appropriate by consulting with neighbors to determine if there are adverse impacts to their viewshed.

## Potential Changes in Property Values for Adjacent Property Owners

### Potential Issues and Standard Assessment Approaches

Development of new power plants can raise issues related to potential changes in property values for nearby property owners. These issues may arise from the widespread perception that a power plant and its ancillary facilities—such as ash disposal landfills, overhead electric transmission lines and electric transformer sites—may be "undesirable land uses" whose impacts are expected to be translated economically into negative effects on property values. Studies also show that impacts may extend for some distance from the site, and possibly beyond the immediately adjacent properties. These findings, however, primarily apply to conventional, fossil fuel-fired plants.

Criteria for evaluating property values effects that reflect the concerns of a broad range of interested parties typically include these aspects of the issue:

- Land use compatibility;
- Findings from other empirical studies; and
- Potential for effects to other than adjacent property owners.

**Land use compatibility.** State and local governments around the country use standards of land use compatibility to minimize the effect of industrial land uses, like power plants, upon nearby properties. KRS Chapter 278 incorporates setback requirements as its primary standard for buffering the siting of power plants. Land use compatibility, in the strict sense of legal use, and in the general sense of reasonably probable use for a given location and "neighborhood," are also factors in a general appraiser's judgment and analysis concerning the "highest and best use" of a property.

Other general issues are also considered to encourage facility siting in compatible settings where negative effects would be minimal to the uses and values of nearby properties. In Wisconsin, for example, the Public Service Commission publishes this general definition of the range of potentially compatible sites for power plants:

"Typically, active or vacant industrial lands may be more compatible and urban residential lands may be less compatible with power plants. Generally, sites that are more compatible with present and planned land uses are more desirable, as are those where the plant would comply with existing land use regulations."

General land use planning practice offers the option to adopt or negotiate for performance standards for outdoor lighting, noise, vibration, odor, smoke, or particulate matter, and so forth to minimize off-site impacts to adjacent uses.

**Findings from empirical studies.** Standard real estate appraisals are the most common type of empirical study used to evaluate potential changes to property values. The appraiser generally relies upon an examination of as many actual sales as possible of comparable properties in similar locations and with similar expectations for highest and best use.

Academic studies published in the land and environmental economics literature have used a variety of property value based analyses to estimate the actual effect of power plants and other "undesirable

land uses" whose impacts may have translated economically into negative effects on adjacent property values. So called "undesirable" uses that have been studied in this fashion over time include nuclear and non-nuclear power generation; hazardous, toxic, and nuclear waste disposal; conventional solid waste disposal; waste incineration; and hazardous industrial facilities.

For example, one study investigated the effect newly opened power plants had on property values in neighborhoods located within five miles of the plant. The study included 60 power plants, several of which were located in Kentucky and the surrounding states. The study found that housing values decreased by 3 to 5 percent between 1990 and 2000 in these neighborhoods compared to neighborhoods located further away from the plant. Another study of 262 undesirable or "noxious" facilities located across the country, including 92 coal, natural gas, or oil-fired power plants (of which two were in the East South Central region that includes Kentucky), illustrates this effect. Power plants were found to significantly decrease property values in the communities where they are located. The literature also includes numerous studies of the effect of electric transmission lines upon property values.

The standard statistical technique for evaluating the potential effects of an environmental amenity (such as beach frontage) or a disamenity (such as proximity to a hazardous waste site) is called hedonic pricing analysis. This technique recognizes that before one can evaluate the impact of an external characteristic on property values, the influences of other important value factors must be isolated and held constant using statistical techniques (e.g., multiple regression analysis). A hedonic pricing model treats the good in question (in this case local property values) as a bundle of amenities (size, aesthetic quality of property, access to local town, etc.) and disamenities (pollution, noise, etc.). Such a model is designed to isolate and quantify the implied effect on overall property value from each amenity or disamenity. Hedonic pricing models have been used to evaluate the impacts of many different factors contributing to the value of a piece of property. Examples include examining the effect of the proximity to hog farms (Palmquist, Roka and Vukina, 1997), beaches (Pompe and Rinehart, 1995), airports, and electric power plants (Blomquist, 1973).

Hedonic models are statistically estimated using multiple regression analysis. However, hedonic studies are complex and require extensive statistical training and large amounts of data. Moreover, not all factors that influence a home's selling price can be measured, and housing markets vary greatly from one region to another.

**Potential for more distant off-site effects.** Most analyses of property value impacts are local in scope. However, the effect of power plants and other facilities on property values has been shown to extend well beyond the site. This has been shown in at least one study, where negative effects of a small power plant located within the city of Winnetka, Illinois, were significant out to a distance of 11,500 feet, or more than two miles. As noted earlier, these findings also primarily apply to conventional, fossil-fuel fired plants.

## Information Provided in the Applicant's SAR

The applicant engaged a certified real estate appraiser (Kirkland Appraisals, LLC) to examine the proposed project's potential impact on property values. Exhibit B of the applicant's SAR (Property Value Impact Study) provides a comparative study of property values in proximity to solar facilities in Kentucky and in other states across the US, using a matched pairs design. The section draws its

conclusions regarding the impacts of the proposed facility on adjacent property values based on market analysis of value impacts from numerous other solar facilities.

Regarding the impact of the facility based on distance to the nearest home, Exhibit B of the SAR states that the closest home to the proposed facility site is 1,450 feet away from the nearest solar panel, and that the average distance to nearby homes is 4,029 feet. The study also states that the facility is 100 MW, that the project site is 4,122 acres, and that vegetative buffers will be used to mitigate visual impacts, All of the above contradicts information in both the applicant's SAR and Application, and BBC requested clarification from Martin County Solar in the first RFI. In its original form, there appear to be several inaccurate or incorrect parameters on which Exhibit B is based.

In its summary statement, the Property Value Impact Study concludes that there will be no property value impacts from the proposed facility on adjoining properties and that the proposed facility will be in harmony with the area:

*The matched pair analysis shows no impact on home values due to abutting or adjoining a solar farm as well as no impact to abutting or adjacent vacant residential or agricultural land. The criteria that typically correlates with downward adjustments on property values such as noise, odor, and traffic all indicate that a solar farm is a compatible use for rural/residential transition areas and that it would function in a harmonious manner with this area.* (SAR Exhibit B, page 1)

## Supplemental Investigations, Research, and Analysis

**BBC's investigation of additional peer-reviewed research.** To obtain further perspective regarding potential effects on property values, BBC reviewed recent studies and articles related to potential concerns regarding solar facility effects on nearby property values.

In some cases, recent proposals to construct large scale commercial solar projects have met with substantial public opposition. Notable examples include the proposed 500 MW facility at Fawn Lake, in Spotsylvania County, Virginia and the proposed 120 MW facility in Madison County, Indiana.[3] Although concerns regarding nearby property values have been one of the issues raised by opponents of these projects, no data or analysis has been provided to substantiate that concern. The opposition may be more related to change in character of the land use (e.g., from agriculture to what some perceive as an industrial use) than to actual effects on property values.

A more neutral evaluation was provided in a 2018 study conducted by the LBJ School of Public Affairs at the University of Texas. That study contacted public sector property assessors in 430 counties across the United States that had at least one utility-scale PV solar facility in place. Thirty-seven residential property assessors agreed to fill out the on-line survey. Among the findings of that study were that:

- "The majority of responses suggested either no impact (66 percent of all estimates) on home prices, or a positive impact (11 percent of all estimates), as a result of proximity to solar installations."

[3] *When Residents Support Solar – Just Not in My Backyard*. Linda Poon. CityLab.com. November 20, 2019; and *County Council Rescinds Revitalization Area Designation for Lone Oak Solar*. Ken de la Bastide. The Herald Bulletin. January 15, 2020.

- "However, some respondents did estimate a negative impact on home prices associated with solar installations." In the 23 percent of cases where negative impacts on value were estimated, the negative effect was estimated to increase with closer proximity and larger scale solar installations. Respondents who had actual experience in assessing homes near solar installations estimated a 3 percent decline in value for homes within 100 feet of a 20 MW solar installations and a 5 percent decline in value within 100 feet of a 102 MW solar facility.
- "The results also suggest that experience assessing near a solar installation is associated with a much less negative estimate of impact."[4]

Most recently, a 2020 study published by economists from the University of Rhode Island using the hedonic pricing analysis approach described earlier identified statistically significant negative impacts on home prices due to proximity to commercial solar sites—under certain conditions. The study, based on "over 400,000 transactions within three miles of a solar site", found that property values within one mile of a solar facility declined by 1.7 percent, with larger effects on home values within 0.1 miles (500 feet) of a solar site (-7.0 percent). However, these findings were specific to solar sites in suburban areas. Solar sites in industrial or rural areas[5] had no statistically significant impact on home prices.[6]

**Misalignment of the Kirkland Property Values Impact Study with the proposed project parameters.** Exhibit B of the SAR—the Property Value Impact Study conducted by Kirkland Appraisals—conflicts with information provided in the SAR and Application documents. The Siting Board and the BBC team requested clarification from Martin County Solar in the RFI regarding the issues itemized here:

- The Application's Site Layout Map contains 25 land parcels not included in the analysis in Exhibit B.
- Exhibit B states that the closest residence will be 1,450 feet from a solar panel, and that the average distance to adjoining homes from a solar panel will be 4,029 feet. These distances are substantially greater than the distances described in other parts of the SAR and Application.
- Exhibit B describes the proposed project as a 100 MW solar farm, rather than 200 MW as stated in the SAR and Application.

In their responses to the RFI, Martin County Solar supplied this explanation:

*The Project boundary expanded after the Kirkland report* [Property Value Impact Study] *was prepared. The Applicant informed Kirkland of the expansion and according to Kirkland, the expansion is*

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[4] *An Exploration of Property-Value Impacts Near Utility-Scale Solar Installations.* Project Director: Dr. Varun Rai. Policy Research Project (PRP), LBJ School of Public Affairs, The University of Texas at Austin, May 2018.

[5] In the study by Guar and Lang cited below, "rural" is defined as areas with municipal population density of less than 850 people per square mile. The proposed Martin County Solar facility would sit near the unincorporated community of Pilgrim, and the surrounding area has a low population density.

[6] *Property Value Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island.* Vasunda Gaur and Cory Lang, University of Rhode Island. September 29, 2020. Available at https://works.bepress.com/cory_lang/33/

*not expected to materially change the findings of its report.* (Martin County Solar Responses to Initial RFI, pages 7, 51, & 52)

In this situation, it would be appropriate for Kirkland Appraisals to update their report document to reflect the scope and impact of the project proposed by Martin County Solar to the Siting Board.

**Neighboring residential parcels without structures.** In the RFI, BBC requested information from the applicant regarding adjacent residences, identified in Exhibit B of the SAR, that did not include distances to the closest solar panel. Martin County Solar clarified that all residential parcels adjacent to the project boundary were labeled as residences even if no residential structure was present.

## Conclusions and Recommendations

With the proliferation of commercial solar facilities across the U.S., there has been increasing focus on the potential effects on residential property values from proximity to such facilities.

Most studies sponsored by solar developers have analyzed this question using sales price comparisons of homes near solar facilities to comparable homes that are not proximate to a solar facility, using techniques similar to the approach used in appraising homes. These studies identify similar homes (except for their proximity to solar facilities) and adjust for differences in age, square footage, and other home characteristics. BBC has reviewed several of these studies and can confirm that they have consistently found no impact on property values from proximity to solar installations.

To date, few studies have been conducted by academic researchers or other "third-party" analysts. Using different methods, and different data sources, recent studies by professors at the LBJ School of Public Affairs (University of Texas) and the University of Rhode Island have found that there could be small, negative impacts on property values from proximity to commercial solar facilities. However, those negative effects appear to be more likely in suburban settings, rather than rural settings.

Given the rural setting for the proposed Martin County Solar project—and acknowledging that the site's elevation and existing vegetation substantially reduce the likelihood of the site's physical elements being visible from nearby residences and neighborhoods—we conclude that the proposed solar facility is very unlikely to have any adverse impacts on nearby residential property values.

**Recommended mitigation.** In previous SAR reviews, BBC has recommended that applicants mitigate for potential adverse effects to property values by establishing vegetative buffers between projects and nearby residences. However, as noted above, the site is located at a substantial height above existing residences and the physical elements of the project are screened from view by existing vegetation. The site's height and existing vegetation are more than adequate for mitigating any negative impacts that might otherwise occur.

- As a result, BBC recommends that Martin County Solar commit to maintaining as much existing vegetation around the site's perimeter as possible to preserve local property values.

- BBC also recommends that the Property Value Impact Study by Kirkland Appraisals be updated to correct several inaccuracies. In lieu of an updated report, Martin County Solar should, at a minimum, supply a written statement from Kirkland Appraisals summarizing the conclusions of the original report and their continued applicability to the proposed project in spite of the substantial expansion of the project footprint.

## Expected Noise from Construction and Operation

This section evaluates the studies and conclusions discussed in the SAR concerning peak and average noise levels associated with construction and operation of the proposed Martin County Solar Generation facility. This component of the SAR is identified in KRS 278.708(3)(d).

### Potential Issues and Standard Assessment Approaches

Various governmental agencies throughout the country employ noise assessment methodologies based on professionally accepted techniques. In evaluating the construction and operational stages of a project, these techniques are fundamentally consistent in that they seek to estimate the potential contribution to ambient noise levels at the site in terms of sensitive receptors. Generally, the assessment methodologies are meant to measure the increase in noise levels over the ambient conditions at residential and non-residential sensitive receptors.

A standard noise impact assessment focuses on several key factors:

- Identification of sensitive receptor sites;
- Existing local ambient noise levels;
- Estimated construction or operational noise intensities;
- Distances between noise sources and sensitive receptors;
- Time of day during which peak noises are anticipated;
- Noise created by transportation features such as conveyors, trucks, and rail lines; and
- Calculation of the cumulative effect of the new noise sources when combined with the existing ambient noise level, recognizing that new noise sources contribute to the ambient noise level, but not in an additive way.

### Information Provided in the Applicant's SAR

Noise generation from construction and operation is addressed in Section 4 of the SAR and in detail in the Noise Assessment performed by Stantec (Exhibit D of the SAR). Stantec conducted a desktop noise assessment to ascertain noise impacts, from construction as well as operation, to receptors within 1,000 feet of the proposed project boundary (Exhibit D, page 1):

*Ten (10) residences consisting of single family homes are located within the Noise Assessment Area. […] The nearest residence is approximately 590 feet from the project boundary, [and] proposed inverters are located even further away with the nearest being more than 1,000 feet from a dwelling. Additionally, an active railroad runs between all ten dwellings and the proposed solar site. Significant topography changes are present onsite and the dwellings are located within a valley more than 200 feet in elevation lower than the proposed solar site. Due to both the horizontal and vertical distance from the proposed site to the residences, and the presence of the nearby railroad, it is likely that noise inputs from the proposed site will be negligible compared to existing background noise.* (Exhibit D, page 2)

In addition to residential noise receptors, there are four cemeteries within the noise assessment area:

*For the purposes of this report, only one cemetery will be considered a noise sensitive receptor as it appears to exhibit characteristics that would indicate frequent human use. The Jude & Fletcher Cemetery is located at the end of Fletcher Jude Cemetery Road on the northeastern portion of the site and has at least three covered shelters including one with picnic tables. The closest shelter appears to be approximately 250 feet from the closest solar panel and approximately 780 feet from the nearest inverter.* (Exhibit D, page 2)

During the construction phase, vehicles and machinery such as trucks, bulldozers, excavators, and pile drivers will generate noise onsite while preparing the site and installing the facility's panels, racking, inverters, substation, and associated structures. The Noise Assessment calculates that maximum noise levels including pile driving (which is the loudest machinery that will be onsite) will be 88 dBA at the Jude & Fletcher Cemetery (distance of 218 feet) and 79.8 dBA at the nearest residence (distance of 563 feet). According to the Federal Transit Administration, a noise level of 88 dBA roughly corresponds to the noise from jack hammer as measured at 50 feet (Exhibit D, page 5).

Maximum noise levels excluding pile driving (i.e., noise generated from other all vehicles and machinery operating on site) will be 67.8 dBA at the cemetery and 59.5 at the nearest residence. Figure C-9 presents a summary table excerpted from Exhibit D of the SAR.

**Figure C-9.**
**Calculated Noise Levels at Nearest Receptor Due to Construction (Exhibit D, Noise Assessment)**

| | Distance (ft) | Calculated $L_{max}$ ($dB_A$) | Calculated $L_{eq}$ ($dB_A$) |
|---|---|---|---|
| Noise Level at Nearest Receptor - Cemetery (including pile driver) | 218 | 88 | 81.2 |
| Noise Level at Nearest Receptor – Cemetery (minus pile driver) | 218 | 67.8 | 65.2 |
| Noise Level at Nearest Residential Receptor (including pile driver) | 563 | 79.8 | 72.9 |
| Noise Level at Nearest Residential Receptor (minus pile driver) | 563 | 59.5 | 57.0 |

During the operational life of the proposed project, the primary sources of noise will be the panel tracking system—if the applicant selects to use a single-axis tracking system rather than a fixed-tilt panel design—and the approximate 70 inverters on site (note that the Noise Study refers to 71 inverters while the SAR states there will be 69 inverters). Noise from the tracking system would be 62 dBA as measured at the Jude & Fletcher Cemetery (or approximately the level of a conversation in a restaurant) and 55 dBA as measured at the nearest home (approximately as loud as a background noise in a quiet suburb). Noise generated by the project inverters would be even quieter. Figure C-10 presents a summary table excerpted from Exhibit D of the SAR.

**Figure C-10.**
**Approximate Noise Levels at Nearest Receptor During Operation (Exhibit D, Noise Assessment)**

| | Panel Tracking System | | Inverter | | Transformer | | Operation & Maintenance (Automobile) | |
|---|---|---|---|---|---|---|---|---|
| | Distance (ft) | $dB_A$ | Distance (ft) | $dB_A$ | Distance (ft) | $dB_A$ | Distance (ft) | $dB_A$ |
| Nearest Receptor - Cemetery | 334 | 62 | 779 | 35 | 3,950 | <10 | 218 | 58 |
| Nearest Residential Receptor | 670 | 55 | 1,013 | 33 | 3,740 | <10 | 563 | 50 |
| Note | Operates 1 minute every 15 minutes during daylight hours | | Continuous low hum | | Only two areas located onsite | | Typical - Pickup truck in various locations only during business hours | |

The Noise Assessment report concludes that noise levels will increase during the construction phase of the project, due to vehicle traffic and construction activity, but that the increases will be temporary, intermittent, and within a reasonable range. During the operational lifetime of the proposed facility, limited noise would be generated by maintenance vehicles driving to and from the site, and frequent noise would be generated by the panel tracking system and inverters – however, this noise would not be loud enough to be classed as damaging or annoying.

Additionally, Exhibit D briefly discusses the historical use of the site as a surface mine, and highlights that the vehicles, equipment, and machinery that operated on the site when it was an operational mine would often have been louder than the noise levels generated by proposed solar facility, in both the construction and operation phases.

## Supplemental Investigations, Research, and Analysis

**Commonly accepted noise level exposure limits.** BBC researched noise level exposure limits advocated by public health agencies such as the CDC and the National Institute for Occupational Safety and Health (NIOSH). NIOSH has a recommended exposure limit of 85 dBA (note that decibels are measured on a logarithmic scale).[7] Figure C-11 identifies the time that it takes for a person to reach their full daily noise dose based on differing levels of noise exposure.

[7] Noise and Hearing Loss Prevention. The National Institute for Occupational Safety and Health. https://www.cdc.gov/niosh/topics/noise/default.html

**Figure C-11.**
**Time to Reach 100 Percent of Daily Noise Dose**

Source: Centers for Disease Control and Prevention, The National Institute for Occupational Safety and Health, Guidance and Regulations

| Time to reach 100% noise dose | Exposure level (dBA) |
|---|---|
| 8 hours | 85 |
| 4 hours | 88 |
| 2 hours | 91 |
| 1 hour | 94 |
| 30 minutes | 97 |
| 15 minutes | 100 |

At 88 dBA—the estimated noise level of a pile driver as measured at the proposed project's nearest receptor—daily noise dose would be reached within 4 hours. However, pile driving will be an intermittent activity on site, and pile drivers will move regularly around the site to install the panel support systems.

**Construction schedule.** BBC requested Martin County Solar's estimates of the amount of time each type of construction equipment (e.g., dump trucks, pile drivers, excavators) is expected to be in use during construction of the project. The applicant responded with a proposed construction schedule providing some detail on the processes involved during that phase.

**Figure C-12.**
**Martin County Solar Proposed Project Construction Schedule**

| MARTIN COUNTY PROJECT SCHEDULE | | |
|---|---|---|
| PROJECT MILESTONE | START | FINISH |
| NOTICE TO PROCEED | Mar-22 | - |
| MOBILIZATION | Mar-22 | - |
| CIVIL WORKS INCLUDING FENCING AND ACCESS ROADS | Mar-22 | Apr-23 |
| PIER INSTALLATION | May-22 | Oct-22 |
| RACKING AND MODULES | Jun-22 | Jan-22 |
| COMBINER TO INVERTER ELECTRICAL | Jun-22 | Feb-22 |
| SUBSTATION (ENERGIZE) | - | Mar-23 |
| COMMISSIONING | Apr-23 | Jun-23 |
| MECHANICAL COMPLETION | - | Apr-23 |
| SUBSTANTIONAL COMPLETION | - | May-23 |
| FINAL COMPLETION | - | Jun-23 |

Source: Martin County Solar responses to Request for Information.

**Pile driving during construction.** Construction of the panel racking system requires the use of a pile driver to install racking posts into the ground, and this will be the noisiest element of the proposed project's construction. In their responses to the RFI, Martin County Solar indicated that they do not plan to specifically mitigate the pile driving noise (e.g., sound blankets on fencing), in part because of the characteristics of the proposed site:

*Pile drivers will only be used very briefly (approximately 30 seconds to 1 minute per pile) and would move around the site during construction. Temporary noise barriers are capable of reducing noise between 10-20 dBA. Due to the unique nature of the site, both that it is a reclaimed mine site and that it is significantly higher in elevation than all noise receptors, Martin County Solar does not intend to employ noise mitigators during construction.* (Martin County Solar Responses to Initial RFI, page 22)

**Fencing construction.** The process of fencing the proposed site will generate some noise at the nearest receptors. In their response to the RFI, Martin County Solar stated that the site's perimeter and substation will be enclosed by standard commercial grade chain-link fencing, and that workers will use a small backhoe or track mounted post hole digger to install the fence posts.

**Cemetery impacts and access.** The Noise Assessment describes the impacts expected to the Jude & Fletcher Cemetery, which is the closest noise receptor to the proposed project boundary. In their responses to questions in the RFI, Martin County Solar further explained that access to the cemetery would not be impeded during construction or operation. The applicant has not consulted with Martin County or any private individuals regarding access to the cemetery.

**Substation operational noise levels.** In their responses to the RFI, Martin County Solar provided distances from the project substation to the five nearest noise receptors and the associated noise level.

**Figure C-13.**
**Substation Operational Noise Levels at Nearest Receptors**

Source: Martin County Solar responses to Request for Information.

| | Distance (ft) | Noise level (dBA) |
|---|---|---|
| Receptor #1 | 1,473 | 6 |
| Receptor #2 | 1,583 | 6 |
| Receptor #3 | 1,341 | 7 |
| Receptor #4 | 1,388 | 7 |
| Receptor #5 | 1,553 | 6 |

**Inverter operational noise levels.** In their responses to the RFI, Martin County Solar provided distances from the project inverters to the five nearest noise receptors and the associated noise level.

**Figure C-14.**
**Inverter Operational Noise Levels at Nearest Receptors**

Source: Martin County Solar responses to Request for Information.

| | Distance (ft) | Noise level (dBA) |
|---|---|---|
| Receptor #7 | 1,224 | 31 |
| Receptor #8 | 1,104 | 32 |
| Receptor #9 | 1,013 | 33 |
| Receptor #10 | 1,332 | 30 |
| Receptor #11 | 779 | 35 |

**Tracking motor operational noise levels.** In their responses to the RFI, Martin County Solar provided distances from the project tracking motors to the five nearest noise receptors and the associated noise level, noting that tracking motors run for one minute in a 15-minute interval.

**Figure C-15.**
**Tracking Motor Operational Noise Levels at Nearest Receptors**

Source: Martin County Solar responses to Request for Information.

| | Distance (ft) | Noise level (dBA) |
|---|---|---|
| Receptor #6 | 918 | 53 |
| Receptor #7 | 782 | 54 |
| Receptor #8 | 746 | 55 |
| Receptor #9 | 670 | 55 |
| Receptor #11 | 334 | 62 |

## Conclusions and Recommendations

During construction, noise from the pile drivers will have the most substantial impact on the nearest noise receptors, such as the Jude & Fletcher Cemetery and the nearest adjoining homes. However, the site's topography—distance from and elevation above any nearby dwellings or neighborhoods—as well as the presence of existing mature vegetation at the project boundary will likely mitigate impacts from construction noise.

Noise levels during operation of the proposed Martin County Solar facility are unlikely to be disruptive to local residents.

**Recommended mitigation.** Martin County Solar should consult with the County regarding the noise impacts to the Jude & Fletcher Cemetery and coordinate a public notice to inform local residents that construction noise will be audible from the cemetery, but that access will not be impeded. In addition:

- Similar to other recent solar facility applications reviewed by the Siting Board, construction activity at the Martin County Solar site should be limited to the hours of 8 AM to 6 PM, Monday through Saturday, to reduce impacts from construction noise on nearby residents.

- Martin County Solar should contact homes and businesses within 1,500 feet of any pile driving activity and notify them in advance of the upcoming activity, its timing, and anticipated duration. It should also provide the opportunity for residents to ask questions or provide feedback, if desired.

- Martin County Solar should implement a Customer Resolution Program to address any complaints from surrounding landowners. Martin County Solar should submit an annual status report on the Customer Resolution Program to the Siting Board, identifying any complaints, the steps taken to resolve those complaints, and whether the complaint was resolved to the satisfaction of the affected landowner.

## Impacts on Transportation

This portion of the SAR review examines the impacts of the proposed Martin County Solar Generation facility on road transportation. This also includes traffic effects, such as congestion, safety, fugitive dust, and degradation of the transportation infrastructure. This component of the SAR corresponds to KRS 278.708(3)(e).

### Potential Issues and Standard Assessment Approaches

Development of a new power plant can raise a variety of potential traffic related issues. These issues may arise from the movement of construction workers and heavy and oversized loads during the construction process and added congestion during both construction and subsequent operations.

Standard components of the evaluation of traffic related impacts include:

1. Identification of access methods, and a description and visual portrayal of primary access routes to the site during construction and during operation.

2. Description of baseline traffic conditions: existing traffic counts, road capacity and level of service and any major existing constraints (e.g., bridge weight limitations, etc.).

3. Identification of any special transportation requirements during construction (e.g., the need to reinforce or "ramp over" existing bridges, detours, temporary closures, etc.).

4. Projection of traffic volumes related to construction and operation.

5. Determination of whether the additional traffic, during construction and operation, would lead to congestion, changes in the level of service of the existing road network or additional road maintenance costs.

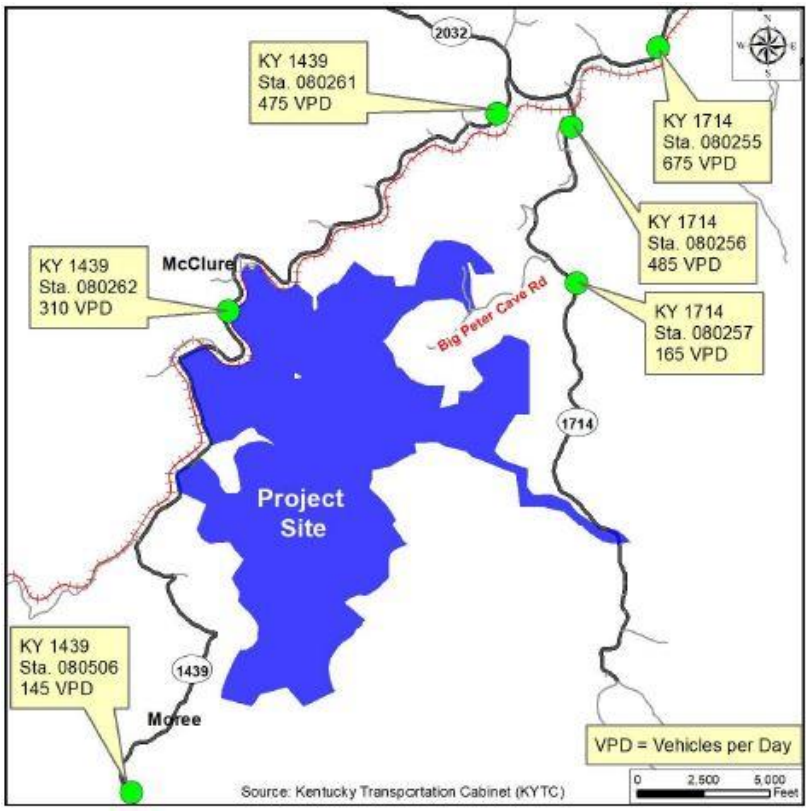
### Information Provided in the Applicant's SAR

The Traffic Impact Study (Exhibit E of the SAR) describes the existing road network near the proposed project site and road segments evaluated in the study:

*The development will have a primary access point along KY 1439 near the railroad crossing and a second access point that would provide access to KY 1714 north of Lick Bridge. Analyses of the 2021 existing conditions and the 2022 construction year were performed. The traffic impact study (TIS) evaluated the operating conditions for the AM and PM peak hours at […] six roadway segments.* (Exhibit E, page i)

Stantec compiled data from the Kentucky Transportation Cabinet (KYTC) to establish an existing traffic baseline. Figure C-16, excerpted in part from Exhibit E of the SAR, shows the count stations and vehicles per day (VPD) counts for the six relevant road segments.

**Figure C-16.**
**Traffic Data Count Stations and Vehicles Per Day (VPD) Counts (Exhibit E, Traffic Impact Study)**




The Traffic Impact Study calculates that the adjacent primary roads (KY 1714 and KY 1439) currently have an A grade for their existing level of service (LOS). The construction phase of the proposed project will bring increased personal vehicle traffic (workforce commuters) and truck traffic (equipment delivery) to site, but the study concludes that a high LOS will be maintained.

*The construction year analysis assumed the same roadway geometry that was used for the analysis of existing conditions. The [results] indicate that all highway segments are anticipated to continue to operate at acceptable LOS standards during construction for both peak hours. Therefore, the construction for this project will not adversely affect the operation of KY 1714 and KY 1439.* (Exhibit E, page 6)

During the operational lifetime of the proposed project, the study estimates that up to four employees would be on site at once, with only one employee on site for most days throughout the year. Normal operations would have no impact on local road traffic.

Based on this assessment, the Traffic Impact Study draws its conclusions:

*[T]he construction period trip generation of workers and trucks will not generate a significant number of trips on local roadways. KY 1714 and KY 1439 will continue to operate at a LOS A during the scenario of when traffic is doubled during construction peak traffic. Although no significant, adverse traffic impacts are expected during project construction or operation, using mitigation measures such as ridesharing between construction workers, using appropriate traffic controls, or allowing flexible*

*working hours outside of peak hours could be implemented to minimize any potential for delays during the AM and PM peak hours.* (Exhibit E, page 8)

## Supplemental Investigations, Research, and Analysis

**Vehicle load weights and compatibility with local roadways.** BBC conducted further research on the weight limits and vehicle classes permitted to travel on specific roadways in Kentucky. The primary state route located near the proposed project site (SR 40) is rated for 62,000 pounds (KYTC Truck Weight Classification). Local roads KY 1714 and KY 1439 are rated for 44,000 pounds. Any vehicle loads exceeding these limits could subject the roadways and shoulders to damage or degradation. Additionally, local roads (e.g., 1439 and 1714) may be more susceptible to degradation from heavy loads.

Regarding potential damage to local roadways, the most concerning delivery to site would be that of the proposed project's substation transformer. A 2012 publication on Large Power Transformers (LPTs) by the U.S. Department of Energy states:

*Transporting an LPT is challenging – its large dimensions and heavy weight pose unique requirements to ensure safe and efficient transportation… When an LPT is transported on the road, it requires obtaining special permits and routes from the department of transportation of each state on the route of the LPT being transported. According to an industry source, obtaining these special permits can require an inspection of various infrastructure (e.g., bridges), which can add delay. In addition, transporting LPTs on the road can require temporary road closures due to traffic issues, as well as a number of crew and police officers to coordinate logistics and redirect traffic.*

The proposed project site was formerly a large surface coal mine and BBC acknowledges that heavy deliveries to and from the site are not unusual for this area. However, much of the transport of loads to and from the mine may have occurred via the railway at the project's northwestern boundary, which Martin County Solar does not propose to use at any point. The construction of the proposed project—and its location in a rural, agricultural, and mountainous region—may subject the local road network to heavy loads beyond what is usual.

BBC contacted the Kentucky Transportation Cabinet's Department of Overweight/Over-dimensional Vehicles regarding their permitting process. As a result of conversations with department representatives, BBC then utilized the KYTC Route Evaluation online tool to ascertain potential route restrictions for oversized deliveries. The BBC team input information for several sample configurations into the KYTC Route Evaluation tool and found that there could be problems with clearances that may make permit approval difficult for Martin County Solar, dependent on the exact configuration of the delivery load.

Additionally, local roads that are not state routes are not covered by KYTC permits and must instead go through the appropriate county entity.

**Delivery vehicles.** The SAR and Application documents did not offer an estimate of the largest vehicle loads that will be delivered to the project site. In their response to the RFI, Martin County Solar estimates that the weight of the main power transformer (the largest delivery to site) will be approximately 200,000 pounds, and that, "the subsurface conditions [of the project site, a reclaimed surface mine] are not expected to be of concern as the heavy loads will be using the existing access

roads installed during the mining operations [as well as KY 1714 as the primary route for delivery to site]." (Martin County Solar Responses to Initial RFI, pages 25 & 48)

For other standard equipment and supplies, the applicant anticipates a maximum of 100 truck deliveries to site per day.

**Commuter vehicles.** The SAR and Application documents did not offer an estimate of the worker vehicles expected on site each day. In their response to the RFI, the applicant states that they expect between 40 and 60 commuter vehicles on site each day during the project's construction phase.

**Traffic signaling.** In their response to the RFI, the applicant indicates that they will follow the Manual on Uniform Traffic Control Devices guidelines for construction traffic, but that the need for traffic signaling is not expected.

**Dust generation.** Construction activities at the project site—such as vehicle traffic, equipment delivery, and the install of project components—will create dust. In the responses to the RFI, Martin County Solar states that they are unaware of any relevant studies on how much dust will be generated during construction. However, the applicant provides more detail about the planned dust mitigation on site:

*Dust generation is expected to be minimal and less than that created by previous land uses. According to the Traffic Study any dust created by construction would be temporary. Dust would be controlled by appropriate revegetation measures, including the application of water, or covering of spoil piles. Additionally, open-bodied trucks transporting dirt will be covered while moving. Martin County Solar will comply with all KY Energy and Environment Cabinet requirements regarding dust.* (Martin County Solar Responses to Initial RFI, page 31)

## Conclusions and Recommendations

During construction, the anticipated 40 to 60 commuter vehicle roundtrips and up to 100 delivery truck trips would substantially increase local traffic relative to current levels. However, given the low traffic levels at present, and the history of the site as a surface mine, this is unlikely to impact the level of service on nearby roadways.

Delivery of the 100-ton substation transformer will likely present challenges given the existing load rating of KY-1439 and KY-1714. These challenges can likely be overcome with careful advance planning.

**Recommended mitigation.** BBC recommends the following measures to mitigate potential impacts on traffic and the local road network:

- Martin County Solar should develop and implement a traffic management plan for the construction phase of the project to minimize impacts on traffic flow and keep traffic safe. As part of this plan, Martin County Solar should implement ridesharing between construction workers as appropriate and feasible due to the COVID-19 pandemic, use appropriate traffic controls or allow flexible working hours outside of peak hours to minimize any potential delays during AM and PM peak hours.

- Martin County Solar should consult with the Kentucky Transportation Cabinet and the Martin County road department as soon as feasible to discuss the anticipated construction-related traffic and the transportation requirements for the power transformer and the KYTC's restrictions on KY-1439 and KY-1714. Martin County Solar should obtain any necessary permits from these agencies.

- Martin County Solar should commit to rectify any damage to public roads by fixing or fully compensating the appropriate transportation authorities for any damage or degradation to the existing road network that it causes or to which it materially contributes.

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