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July 9, 2021

TO: DIVISION OF FILINGS

RE: Case No. 2020-00272

Electronic Application of Flat Run Solar LLC for a Certificate of Construction for an Approximately 55 Megawatt Merchant Electric Solar Generating Facility in Taylor County, Kentucky Pursuant to KRS 278.700 and 807 KAR 5:110

Please file in the administrative record of the above-referenced case the attached copy of the final report of BBC Research and Consulting, entitled "Review and Evaluation of Flat Run Solar, LLC Siting Assessment Report," dated July 8, 2021.

Sincerely,

A handwritten signature in blue ink that reads "Linda C. Bridwell".

Linda Bridwell  
Executive Director

Enclosure

cc: Parties of Record

# **Review and Evaluation of Flat Run Solar, LLC Siting Assessment Report**

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**FINAL REPORT**

**Final Report**

July 8, 2021

# **Review and Evaluation of Flat Run Solar, LLC Siting Assessment Report**

**Prepared for**

Kentucky State Board on Electrical Generation and Transmission Siting  
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# **SECTION A.**

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## **General Statement**

# SECTION A.

## General Statement

This document provides a review of the Site Assessment Report (SAR) for the proposed Flat Run Solar merchant electric generating facility submitted to the Kentucky State Board on Electrical Generation and Transmission Siting (the Siting Board). Flat Run Solar submitted an administratively complete document titled “Flat Run Solar, LLC Kentucky State Board on Electric Generation and Transmission Application, Application Documents, Case No. 2020-00272” (the “Application”) to the Siting Board in April 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 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 Flat Run 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 and Ashwood Solar facilities which have been reviewed in 2021;
- Reviewed the contents of Flat Run 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, on July 1, 2021;
- Completed interviews and data collection with a number of 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, and in Section D, we present our detailed recommendations concerning applicant mitigation measures.

## **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. Board staff has provided review and guidance in this context.

At this point in the planning process, Flat Run Solar has not finalized the specific locations and layout of the solar arrays, substation and other project infrastructure. The SAR, and this review, are based on the best available information at this time.

# **SECTION B.**

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## **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 Flat Run Solar, LLC for approval to construct a commercial, photovoltaic solar merchant electric generating facility in Taylor County, Kentucky, in April 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 to 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 Flat Run 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 Flat Run Solar generating facility would be located in central Kentucky, about eight miles northwest of the City of Campbellsville. The proposed facility would be a 55-megawatt alternating current (MWac) photovoltaic (PV) electricity generation facility, situated on approximately 450 acres of agricultural lands in a rural setting. Project facilities would include crystalline solar panels, racking, inverters, transformers, a DC-coupled energy storage system, one substation transformer, and associated wiring and balance of system. Conclusions with respect to other descriptive elements of the facility follow:

- **Surrounding land use** — Residential parcels comprise 15 of the total 27 parcels (56 percent) adjacent to the proposed Flat Run project. The average size of residential parcels adjoining the proposed Flat Run facility is 6.5 acres. Parcels zoned for agriculture comprise 33 percent of the 27 adjacent parcels. By acreage, most adjoining land is agricultural (56 percent), while 18 percent is zoned agricultural/residential, 15 percent is commercial or industrial, and 11 percent is solely residential.

There are 3 residential neighborhoods<sup>1</sup> within 2,000 feet of the boundary, and there are a few nearby dwellings that lie closer to the project boundary. There appear to be about 60

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<sup>1</sup> 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.

non-participatory homes within 2,000 feet of the project boundary, including about 35 homes within the three residential neighborhoods. There are five non-participating homes within 350 feet of the proposed project boundary.

- **Proposed access control and security** — Page 3 of the SAR references five proposed site entrances to be used during construction that are marked with yellow dots in Attachment A (Preliminary Project Layout.) The SAR also states that Flat Run Solar will comply with the National Electric Safety Code requiring the entire site (all areas where equipment is located) to be fenced prior to the start of construction and all entrances to the site to be gated, and locked at all times when workers are not active on site. (SAR, page 3). Three of the five proposed construction entrances would likely continue to be used for ongoing operations – including two entrances along Hobson Road (KY 744) and the entrance along Saloma Road (KY 527) close to the proposed substation location. Up to two more entrances (near the northeast and southeast corners of the site) might also be used during operations.
- **Utilities** — Flat Run Solar does not propose to require utilities on site during the operational life of the proposed project, except for communications fiber, which would be contracted with a local provider. While water for irrigation may be required at the initial planting of the planned vegetative buffers and continue until they are successfully established, this water would be trucked onto the site.
- **Setback requirements** — Taylor County does not have any applicable zoning or setback requirements that would apply to a commercial solar facility such as Flat Run. As stated in Section 5 of the Application, there are three residential neighborhoods (as defined by KRS 278.700 (6)) within two thousand (2,000) of the Project. Consequently, Flat Run Solar will be moving the Siting Board for a deviation from the statutory setback requirements in KRS 278.704(2). The applicant proposed the following alternative setbacks from the project footprint:
  - 50 feet from adjacent roadways
  - 25 feet from non-participating adjoining parcels
  - 150 feet from non-participating residences
- If central inverters are used (rather than string inverters), Flat Run Solar proposed the following additional setbacks for central inverters:
  - 150 feet from property boundaries
  - 300 feet from non-participating residences
- **Other facility site development plan descriptions provided in the SAR** — Legal boundaries; location of facility buildings, transmission lines, structures; 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. 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.

The applicant did not include a formal visual assessment in the SAR. However, Flat Run Solar provided visual simulations of the proposed facility — with and without their proposed vegetative screening plan — from seven key observation points near the boundaries of the proposed project footprint.

The proposed Flat Run Solar site is comprised of gently rolling farmland, divided in the middle by an area of mature trees and wetlands. In general, the site would be highly visible from Hobson Road (KY 744) and portions of Saloma Road (KY 527). The applicant has proposed to plant long stretches of vegetative buffers (trees) along these road segments. The primary road near the eastern boundary of the site (Old Lebanon Road, KY 289) is screened from the site — for the most part — by a combination of topography and existing vegetation. Most of that road lies below the proposed site. There is no substantial road along the southern boundary of the site.

In general, BBC concurs with Unbridled's statements that the proposed facility would not be incompatible with its surroundings from a scenic standpoint — particularly with the completion of Flat Run Solar's proposed vegetative screening plans along the primary roadways adjacent to the site. This assessment reflects the topography of the site, which limits or eliminates its visibility from some of the nearby homes, forested areas in some portions of the site which break up the views, and the proposed screening plan. It also recognizes that solar facilities have a relatively low profile — similar to or lower than most single-family homes.

## **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 land owners will change as a result of development and operation of the proposed Flat Run Solar facility. Attachment 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 that the closest home to the proposed facility site is 150 feet away from the nearest solar panel, and that the average distance to nearby homes is 524 feet. The Property Value Impact Study then 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.

Lastly, 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. There is no stigma attached to solar facilities, and they are in harmony with the surrounding agricultural and rural residential landscapes. According to the study, "The only category of impact of note is appearance, which is addressed through setbacks and landscaping buffers." (SAR Attachment B, page 107).

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 Flat Run Solar facility.

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 and Traffic Study (Attachment F to the SAR). The applicant proposes that construction noise and activity will be time-constrained and that notices will be sent to all potentially impacted neighbors in advance of construction processes. Additionally, the applicant proposes noise level limits for both the construction and operational phases of the proposed project.

In calculating the anticipated noise produced by the loudest piece of construction equipment on site (a pile driver for installing the racking poles on which the solar panels are mounted), the study finds that the noise from the pile driver at 150 feet (which is the distance to the closest 'non-participatory' residence) is 91 dba. At 300 feet, it would be approximately 85 dba. Flat Run Solar proposes a noise limit of 95 dBA, as measured at 150 feet from source, during the construction phase of the project.

At 150 feet (closest non-participatory residence), BBC estimates that sound from the pile drivers during the Project's construction phase will be approximately 91 dBA, which is consistent with the calculations from the Noise and Traffic Study. This exceeds the National Institute for

Occupational Safety and Health (NIOSH) recommended exposure limit of 85 dBA (note that decibels are measured on a logarithmic scale).<sup>2</sup>

BBC concludes that although noise levels similar to existing conditions applies to most of the construction activity, the pneumatic pile drivers are an important exception. During construction, noise from the pile drivers will have substantial impact on residences even at a distance greater than 150 feet, Residences closer than 150 feet to the pile drivers (i.e., some of the homes belonging to participating project landowners) will experience noise levels greater than 95 dBA, with the potential for that noise to damage hearing, dependent on a variety of factors.

Flat Run proposes a limit of 60 dBA at the nearest receptor (a neighboring residential home) during the operation period. Based on the setback requirements recommended by BBC (see page B-7), we estimate operational noise should be 45 dba or less at the nearest non-participating residence. Noise levels during operation of the proposed Flat Run facility are unlikely to be disruptive to local residents.

## **Impacts on Transportation**

The Noise and Traffic Study (Attachment F to the SAR) describes the existing road network near the Project site and current traffic levels:

*The proposed Flat Run solar facility, location shown on Figure 1, will be located near the community of Saloma, around five miles northwest of Campbellsville. The facility will be constructed along the east side of KY Route 527, west of KY Route 289, and along both sides of KY Route 774 (which intersects both KY Route 527 and KY Route 289).*

*The construction access points along KY Route 744 and Squires Road are all anticipated to use existing driveways or current field access points, and the access point along KY Route 527 is anticipated to be new. All state highways surrounding the Flat Run site are classified as Collectors and are not on the National Highway System (NHS). KY Route 289 is a major collector and KY Route 527 and 744 are minor collectors. (Attachment F, page 7)*

*Site traffic is assumed to follow general traffic trends in the area. A distribution of existing background vehicular traffic is shown in Figure 5. Assuming the same traffic pattern, a distribution of the anticipated 165 daily vehicles during construction is shown in Figure 6. This shows a maximum typical daily traffic increase of up to 50 vehicles per day (100 trips per day) per roadway. Two-way peak hour traffic volumes along nearby state highways average around 100 vehicles per hour and are all under 200 vehicles an hour, which is fewer than four vehicles per minute. Due to this low background traffic volume, no adverse traffic impacts are anticipated as a result of additional trips due to facility construction. (Attachment F, page 8)*

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<sup>2</sup> Noise and Hearing Loss Prevention. The National Institute for Occupational Safety and Health. <https://www.cdc.gov/niosh/topics/noise/default.html>

Up to 15 Class 9 trucks are expected to deliver equipment and supplies each day, carrying weights up to 20 tons. Additionally, approximately 11 Class 21 truck trips will be required to deliver the substation transformer and other heavy equipment.

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 Project site—SR 744 and SR 527—are rated for 62,000 pounds and 44,000 pounds, respectively (KYTC Truck Weight Classification). Any vehicle loads exceeding this limit could subject the roadway and shoulder to damage or degradation. Additionally, potential routes to the site may also include local county roads, which would be susceptible to degradation from heavy loads.

During construction, the anticipated 100 trips per day to the Flat Run Solar site could represent a 25 to 50 percent increase in traffic relative to current levels. Given the low traffic levels at present, this increase is likely to be noticeable to local residents, but is unlikely to impact the level of service on the nearby roadways.

The anticipated construction entrances on Hobson Road (KY 744) and Saloma Road (KY 527) — the northern and western boundaries of the site — are each abrupt, right angle turns from roadways where traffic currently moves at high rates of speed (50 MPH or greater). Proactive traffic management will be needed in order to assure the safety of the construction workers and other travelers along these roadways.

Delivery of the 60-to-70-ton power transformer to the construction entrance along Saloma Road (KY 527) will likely present challenges given the existing rating of the road for up to 44,000 pounds (22 tons). These challenges can likely be overcome with careful advance planning.

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

## Recommendations

Flat Run Solar has provided the required information for the site assessment, including responses to BBC's questions following our review of their SAR. The Flat Run Solar site appears to be generally well selected in terms of compatibility with the surrounding area and access to transmission infrastructure. However, as discussed in more detail in Section C of this report, BBC believes the alternative setback requirements proposed by Flat Run Solar should be modified to provide greater protection from noise impacts to nearby residents during the construction phase and that Flat Run Solar's proposed construction noise limit of 95 dba — measured at a 150-foot distance from the source (pile driving activity) is too high.

**Mitigation recommendations.** On pages 14-15 of the SAR, Flat Run Solar proposes the following mitigation measures.

The following setbacks for solar equipment:

- 50 feet from adjacent roadways
- 25 feet from non-participating adjoining parcels

- 150 feet from non-participating residences

Additional setbacks for central inverters, if used, and energy storage systems:

- 150 feet from property boundaries
- 300 feet from non-participating residences

The security fencing, vegetative buffer and pollinator plantings shall not be subject to these setback restrictions.

***BBC supports these proposed setback requirements, with the exception that we recommend that the minimum setback for central inverters should be increased to 450 feet. This distance provides additional protection against ongoing operational noise impacts and would be consistent with previous Siting Board orders such as those for the proposed Ashwood Solar facility.***

Flat Run Solar further proposes that, upon its completion, a final site layout plan shall be submitted to the Siting Board. Material deviations from the preliminary site layout plan which formed the basis for the instant review shall be clearly indicated on the revised graphic. Material changes are defined as changes to the following:

- a. Potential Project Footprint (as defined in Section 1)
- b. utility easement
- c. Project setbacks from property lines and roads
- d. Project setbacks from non-participating residential homes
- e. vegetative buffer locations and specification
- f. substation and interconnection equipment location
- g. parcel boundaries

***BBC supports this proposed condition.***

Flat Run Solar further proposes planting of native evergreen species as a visual buffer to mitigate viewshed impacts (see the site development plan in Attachment A for proposed planting areas, and Section 1 of the Application for the proposed specifications of the vegetative buffer.) Plantings are primarily proposed in areas directly adjacent to the Project that lack existing vegetation.

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

Flat Run Solar proposes to cultivate at least 2 acres of native pollinator-friendly species onsite.

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

Flat Run solar further proposes to keep existing vegetation between solar equipment and neighboring residences in place, to the extent practicable, to help screen the Project and reduce visual impacts.

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

Placing safety warning signs along the perimeter of the facility fence 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 Flat Run 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, and business owners. According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work.***

In regard to noise and traffic impacts from construction, Flat Run Solar proposed that:

- Construction activity, process and deliveries shall be limited to the hours of 7am and 9pm daily.
- Flat Run Solar would provide notices to neighbors regarding potential construction and operation noises, as described in Section 4 of their SAR
- Maximum noise levels during construction and operation, as described in Section 4.

***BBC recommends the following revised mitigation in regard to noise and traffic impacts from construction:***

- ***Similar to other recent solar facility applications reviewed by the Siting Board, construction activity at the Flat Run 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.***
- ***Flat Run 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.***
- ***Where pile driving will occur within 1,500 feet of any nearby home or business, Flat Run Solar should implement a construction method to suppress the noise from the pile driving process – i.e., semi-tractor and canvass method, sound blankets on the permanent fencing surrounding the site or temporary fencing surrounding the immediate pile driving area, or other comparable methods.***
- ***Flat Run Solar should implement a Customer Resolution Program to address any complaints from surrounding land owners. Flat Run 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 land owner.***

- ***Flat Run 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, Flat Run Solar should implement ridesharing between construction workers, use appropriate traffic controls or allow flexible working hours outside of peak hours to minimize any potential delays during AM and PM peak hours.***
- ***Flat Run Solar should consult with the Kentucky Transportation Cabinet and the Taylor 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 SR 744 and SR 527. Flat Run Solar should obtain any necessary permits from these agencies.***
- ***Flat Run 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 to.***

Finally, Flat Run Solar proposes that Flat Run, its successors or assigns, shall decommission the entire site if the Project ceases producing electricity for a period of more than twelve (12) months. Decommissioning shall involve the removal of all solar panels, racking, and equipment including concrete pads and trenched electrical wiring. Fencing and internal access roads shall also be removed, unless the landowner states in writing that they prefer fencing and internal roads to remain in place.

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

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 Flat Run Solar generation project regarding scenic compatibility, property values, noise or traffic.

# **SECTION C.**

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## **Findings and Conclusions**

# SECTION C.

## Findings and Conclusions

This section provides detailed review and evaluation of each element of the Flat Run 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 Flat Run 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 Flat Run Solar Generation facility and site development plan is mainly set forth in Attachment O to the Application (the Site Assessment Report), Section 1 (Description of Proposed Facility), 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 Facility) refers to Section 2 of the Application (Description of Proposed Site) for an overview of the Project. The proposed Flat Run facility would be a 55-megawatt alternating current (MWac) photovoltaic electricity generation facility, situated in a rural setting on up to 450 acres of property in Taylor County in western Kentucky, just northwest of the county seat of Campbellsville and near the unincorporated community of Saloma.

As stated in Section 6 of the Application (Public Notice Report), the applicant signed a new lease agreement with one additional landowner after the proposed project’s original site layout map had already been created. In the first Request for Information to the applicant, BBC requested clarification regarding the additional parcel’s impact on the project’s total 450 acres.

Project facilities will include crystalline solar panels, racking, inverters, transformers, a DC-coupled energy storage system, one substation transformer, and associated wiring and balance of system. Section 2 of the Application (Description of Proposed Site) provides a description of the solar generation equipment that would be installed on site:

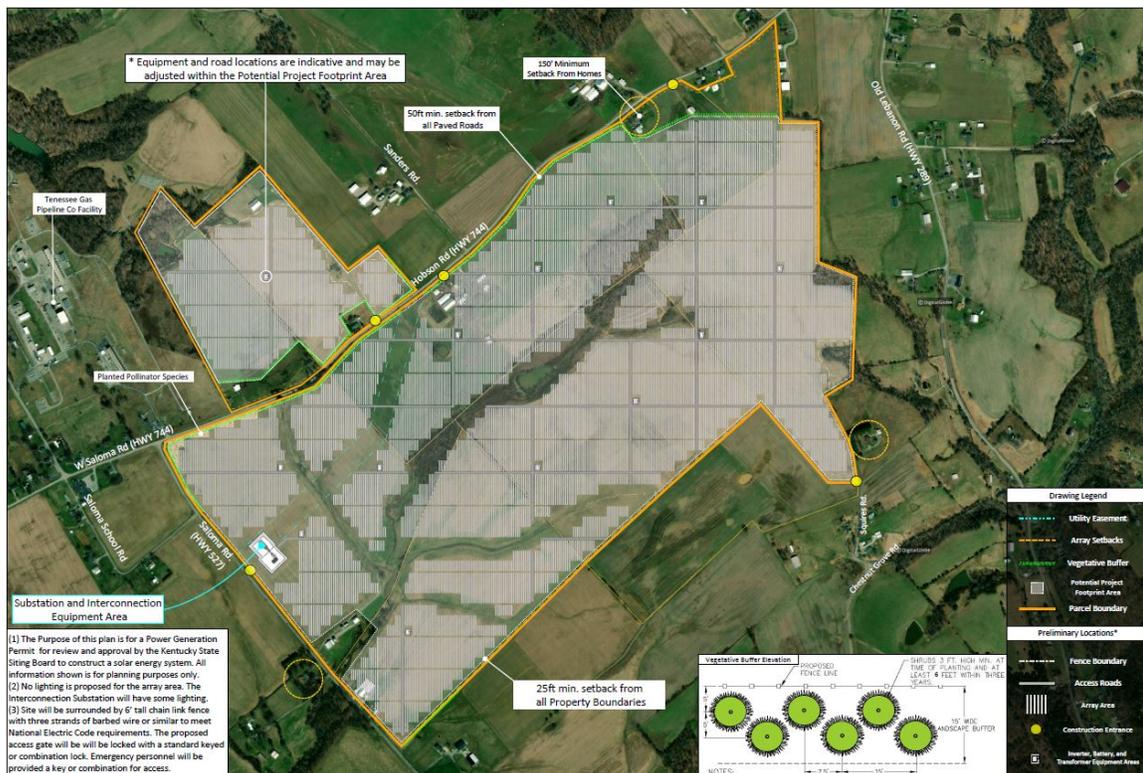
The racking system used to fix the solar panels to the ground has a small footprint that does not use concrete, and the panels are generally not considered impervious as rainwater can travel over and around the panels (...). The panels and racking are no more than 15 feet high at the highest point. The racks will be placed directly onto grass. Gravel will be placed on the access roads throughout the site, and will not be placed under the solar panels. (Application, page 3)

The solar panels and racking would be the most numerous pieces of equipment at the project site, but additional equipment includes one substation transformer, approximately 13 energy storage systems (about the size and shape of a shipping container), and the inverters:

There are 2 types of inverters commonly used on solar facilities; central inverters and string inverters. Central inverters are typically located towards the interior of the solar farm, and there is usually 1 central inverter per few dozen rows of solar panels. String inverters are smaller units that are typically attached to the end of each row of solar panels. At the time of this application the Project has not committed to using one or the other technology, and will make this decision prior to construction. If central inverters are used, there will be approximately 13 central inverters in the facility. (Application, page 4)

Attachment A of the SAR (Preliminary Project Layout) presents satellite imagery of the proposed project site overlaid with a two-dimensional rendering of the equipment associated with the solar generation facility. Note that this figure includes all parcels leased to the project, including the late addition in fall 2020.

**Figure C-1.  
Preliminary Project Layout**



In Figure C-1, the arrays of solar panels are the most visible and ubiquitous feature of the facility. The locations of 13 energy storage facilities and their co-located central inverters (if used) are spread throughout the arrays and depicted with small square icons in the figure above. Construction entrances are marked with yellow dots, and the substation and interconnection area is located in the southwestern portion of the proposed site, just inside the site boundary adjacent to the construction entrance on Saloma Road.

**Surrounding land uses.** Attachment B of the SAR (Property Value Impact Study by Kirkland Appraisals) provides detail on the composition of the surrounding land. Figure C-2 summarizes these data for Flat Run as well as two other recent Carolina Solar proposed projects: Ashwood and Turkey Creek.

**Figure C-2.  
Land Use of Parcels  
Adjoining Three  
Proposed Solar  
Facilities in Kentucky**

Note:  
xxx.

Source:  
xxx.

Adjoining Land Uses	Proposed Kentucky Solar Facilities		
	Flat Run	Ashwood	Turkey Creek
<b>By Number of Parcels</b>			
Residential	55.6%	54.1%	56.1%
<i>Number of parcels</i>	15	21	23
<i>Average parcel size (acres)</i>	6.5	3.9	3.8
Agricultural	33.3%	24.3%	12.2%
Agri/Res	7.4%	18.9%	12.2%
Commercial/Industrial	3.7%	2.7%	19.5%
Total	100.0%	100.0%	100.0%
<b>By Acreage</b>			
Residential	11.1%	3.7%	7.3%
Agricultural	55.7%	46.1%	36.0%
Agri/Res	18.4%	23.0%	51.3%
Commercial/Industrial	14.7%	27.2%	5.4%
Total	100.0%	100.0%	100.0%

Residential parcels comprise 15 of the total 27 parcels (56 percent) adjacent to the proposed Flat Run project. The average size of residential parcels adjoining the proposed Flat Run facility is 6.5 acres. Parcels zoned for agriculture comprise 33 percent of the 27 adjacent parcels.

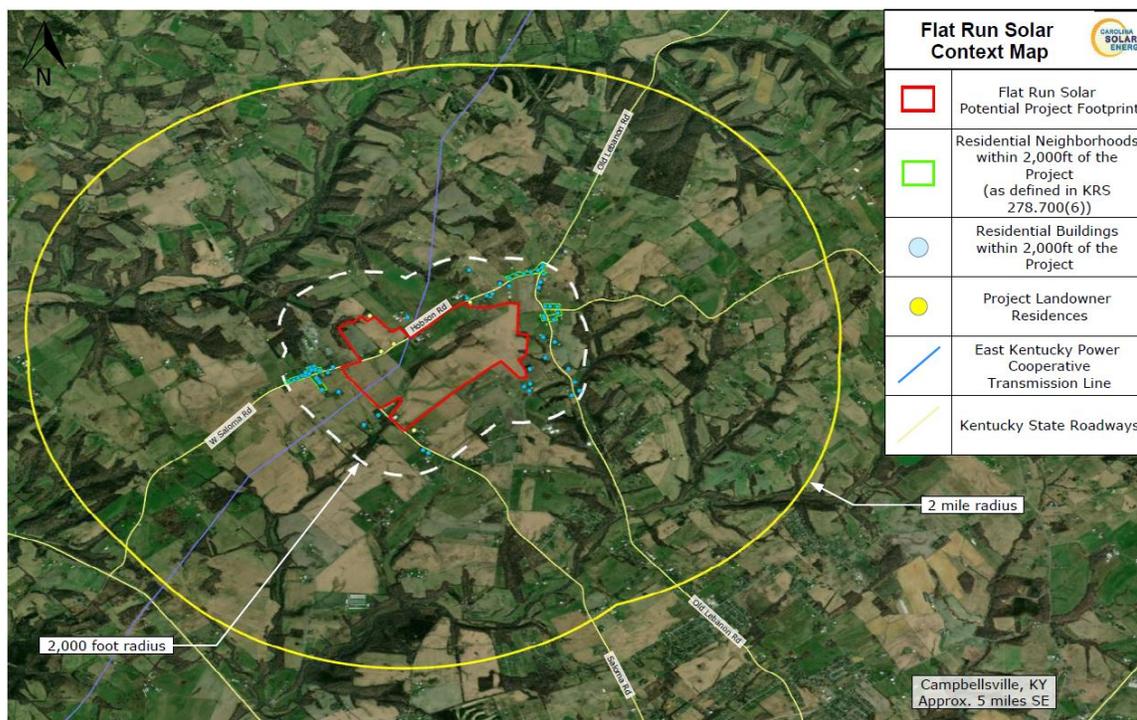
By acreage, most adjoining land is agricultural (56 percent), while 18 percent is zoned agricultural/residential, 15 percent is commercial or industrial, and 11 percent is solely residential. There are slight differences in the surrounding land use between Flat Run and the Ashwood and Turkey Creek projects, but in general the solar projects proposed within Kentucky occur in a predominantly rural setting, and the surrounding land is primarily agricultural or low-density residential.

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

*A map showing the location of residential structures, schools, and public and private parks is located in Attachment A. There are no school, public or private parks within 2 miles of the Project's radius, and there are 3 residential neighborhoods (per KRS 278.701(6)) within 2,000 feet of the Project's radius. (Application, page 3)*

The referenced Attachment A is excerpted here in Figure C-3, below. It includes satellite imagery of the proposed project boundary as well as a 2,000-foot buffer, 2-mile buffer, and depictions of the residential buildings and residential neighborhoods that lie within 2,000 feet of the proposed project boundary. There appear to be about 60 non-participatory homes within 2,000 feet of the project boundary, including about 35 homes within the three residential neighborhoods.

**Figure C-3.**  
**Context Map**



This satellite image of the proposed project’s boundary and context demonstrate that it will exist in what is now a predominantly rural setting, with a substantial amount of adjacent agricultural land or low-density residential land. There are 3 residential neighborhoods<sup>1</sup> within 2,000 feet of the boundary, and there are a few nearby dwellings that lie closer to the project boundary.

Attachment C of the applicant’s SAR (Map of Nearest Neighbors) provided a closer and more detailed view of the proposed project site. That map was updated and revised to show five nearby, non-participating neighbors (instead of the three shown in the map in the SAR) in Flat Run Solar’s response to the Siting Board’s Second Request for Information. The revised map is excerpted in part and presented in Figure C-4, on the following page. It shows an aerial satellite view of the proposed site, with the project boundary outlined in red. Individual residences of project landowners (i.e., landowners leasing land to the Flat Run project) are marked in yellow, and non-participating landowners’ residences are marked in light blue.

<sup>1</sup> 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.

**Figure C-4.**  
**Map of Nearest Neighbors**

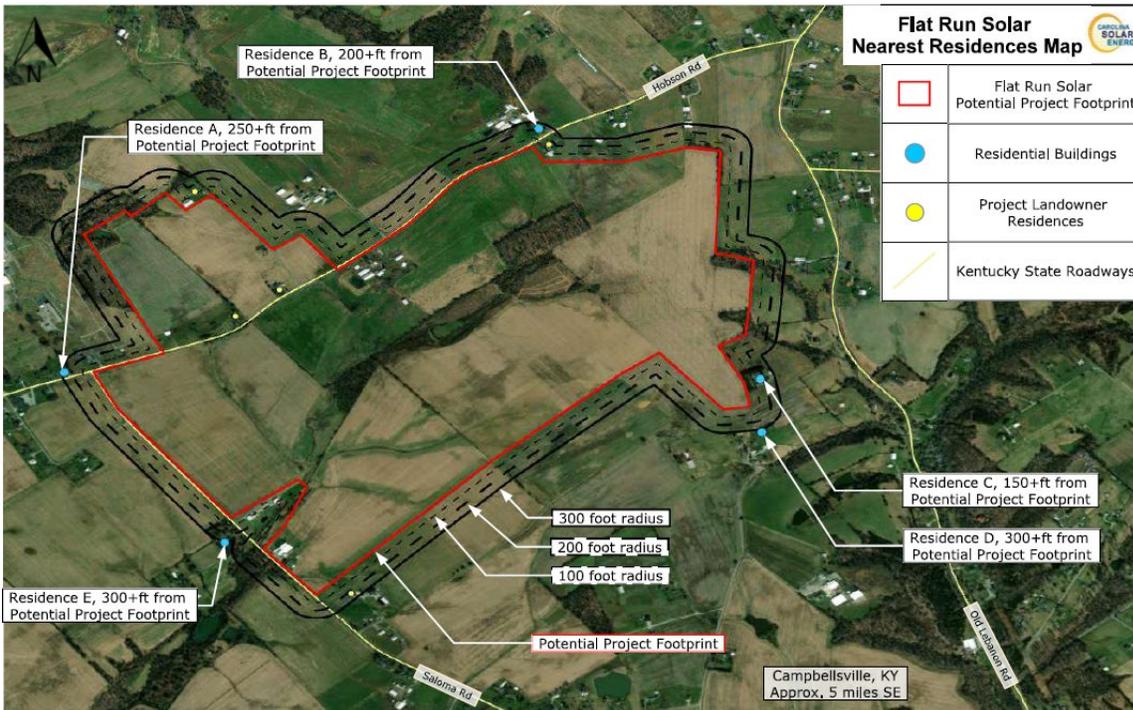


Figure C-4 depicts five residences belonging to project landowners who are leasing land to the proposed project; two of these homes are within the proposed project footprint, two are within the 200-foot radius, and another is within the 300-foot radius. There are an additional five residences belonging to landowners who are not participating in the proposed project; these homes are approximately 150 feet, 200 feet, and 250 feet and two residences at a little more than 350 feet from the proposed project boundary.

**Legal boundaries.** Page 3 of the applicant’s SAR refers to Attachment E (Boundary Survey and Legal Descriptions) for the legal descriptions of all properties that are leasing land to the proposed project. BBC reviewed Attachment E. The boundary survey map outlines and identifies nine parcels associated with the proposed project site. A legal description of each number parcel is included in the subsequent pages of the attachment. The information appears to be thorough and correct, however the legal description for the parcel identified on the boundary survey as “Parcel IX” is instead presented as Tract 2 of Parcel 8.

**Access control.** Page 3 of the SAR references the proposed site entrances that are marked with yellow dots in Attachment A (Preliminary Project Layout), which was shown as Figure C-1 earlier in this section. The SAR also states:

*In order to comply with the National Electric Safety Code, the entire site (all areas where equipment is located) will be fenced prior to the start of construction and all entrances to the site will be gated, and locked at all times when workers are not active on site. (SAR, page 3)*

The BBC team reviewed Attachment A (Preliminary Project Layout) and found five entrances marked with yellow dots around the perimeter of the proposed project boundary: three entrances on Hobson

Road (SR 744); one entrance on Saloma Road (SR 527) adjacent to the substation and interconnection area; and one entrance on Squires Road along the eastern point of the proposed boundary.

However, the legend included in Attachment A (Figure C-1 in this section) describes these as “Construction Entrances,” and it is not clear from the application or SAR if these entrances would continue to function as access points during the operational lifetime of the proposed Flat Run project. Further information regarding operational entrances is provided later, on page C-9 and C-10 in this section of BBC’s report.

**Location of buildings, transmission lines and other structures.** On page 3 of the SAR, the applicant clarifies that they will provide the Siting Board with a final site plan prior to construction, but that at this time the locations of equipment and structures inside the project boundary are not final and will change during the final site design process.

Attachment A of the SAR (Preliminary Project Layout) provides approximate locations of the proposed facility’s substation, energy storage units (and co-located central inverters, if applicable), and solar arrays. The applicant proposes that the project boundary, setbacks, vegetative buffers, and substation location will not materially change. However, regarding other, internal project equipment locations, the applicant states:

*Until detailed civil engineering and equipment manufacturing sourcing selections are made prior to construction, Applicant is not able to provide the exact location of these items. The Applicant proposes that changes to the location of these items will not require approval from the Siting Board, as these modifications will not materially change the off-site visual or auditory perception of the facilities:*

*h. interior access roads*

*i. construction entrances*

*j. solar panel, racking, inverter, energy storage, and transformer equipment areas (indicative locations for this equipment are shown on the preliminary facility layout, but actual locations will change within the Potential Project Footprint)*

*k. security fence (the security fence will enclose all Project equipment, but its location may change from the specific locations shown on the preliminary facility layout based on changes in the location of the equipment within the Potential Project Footprint). (SAR, page 4)*

**Location and use of access ways, internal roads, and railways.** The applicant states there are no railways that intersect with the proposed Flat Run project site and rail transportation will not be used during construction or operation (SAR, page 5). For location of access ways and internal roads, the applicant reiterates that precise location of these items within the project footprint is not yet finalized.

**Existing or proposed utilities.** The applicant does not propose to require utilities on site during the operational life of the proposed project, except for communications fiber, which will be contracted with a local provider.

Page 5 of the SAR states:

*The Green County – Saloma 161kv transmission line will serve the facility and carry electricity generated by the Project. At this time, it is not anticipated that the Project will need to receive external utility services during typical plant operation. If electricity service is required during construction or operation of the Project, it will be contracted with the local utility, Taylor County RECC.*

*There will not be any water or sewer servicing the Project site. There is likely to be no permanent project office building on site (there will not be permanent workers at the Project site after construction.) If there is a permanent building on site, it will likely be a trailer or container to store operations and maintenance equipment and parts. This trailer or container will not require water or sewer service. (SAR Section 1, page 5)*

The SAR goes on to state that water for irrigation may be required at the initial planting of the planned vegetative buffer and continue until it is successfully established. However, the applicant clarifies that this water would be trucked onto the site.

**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 6 of the SAR states:

*As stated in Section 5 of the Application, there are three residential neighborhoods (as defined by KRS 278.700 (6)) within two thousand (2,000) of the Project. Pursuant to KRS 278.704 (4), Flat Run Solar will be moving the Siting Board for a deviation from this setback requirement. (SAR, page 6)*

More detail of the applicant’s proposed setbacks is provided elsewhere in the SAR (Section 1 – Description of Proposed Facility):

*The Potential Project Footprint in the site development plan conforms with the following proposed setbacks:*

- *50 feet from adjacent roadways*
- *25 feet from non-participating adjoining parcels*
- *150 feet from non-participating residences*

*Applicant proposes the following additional setbacks for central inverters, if used, and energy storage systems within the Potential Project Footprint:*

- *150 feet from property boundaries*
- *300 feet from non-participating residences*

The applicant's rationale for their proposed, modified setback requirement is stated as:

*[...] In proposing the setbacks for this Project, the Applicant considered the Project's location along 2 rural county roads, and the fact that the Project area is relatively close to only three non-participating residences as described in Attachment C. Due to the constrained amount of land available for the Project, Applicant requires these proposed setbacks in order to build the Project at the proposed size. (SAR, pages 4 and 5)*

Taylor County does not have any applicable setback requirements, and the applicant has included a letter from the Taylor County Judge Executive (Attachment D to the Application) indicating that the county does not have a planning or zoning ordinance that would prevent the project from going ahead as proposed by the applicant. However, the BBC team followed up with the applicant in its First Request for Information, as this letter is addressed to the Horseshoe Bend solar project rather than Flat Run.

**Evaluation of Noise Levels.** Section 4 of the SAR summarizes the findings from the more detailed Noise and Traffic Study conducted by GAI Consultants (Attachment F to the SAR). The applicant proposes that construction noise and activity will be time-constrained and that notices will be sent to all potentially impacted neighbors in advance of construction processes. Additionally, the applicant proposes noise level limits for both the construction and operational phases of the proposed project.

Noise levels and the details of the Noise and Traffic Study (Attachment F) 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.** BBC requested clarification from the applicant regarding the total acreage of the project footprint as a new lease had been negotiated with a neighboring landowner after the original project plans were developed and the public meeting held. The applicant responded that the 450-acre project footprint included the 25 acres gained from the new lease. Attachment I of the Application (Map Showing New Parcel) outlines the parcel gained by the new lease. Attachment J of the Application (Layout Map Presented at Public Meeting) shows the preliminary project layout that was presented at the public meeting, prior to the inclusion of the new parcel. It should be noted that in their response to Request No. 4 in the Siting Board's Second Request for Information, Flat Run Solar stated that "The Potential Project Footprint is 456 acres" which is six more acres than indicated in the original application and SAR.

**Access Control.** The Application and SAR identified five potential construction entrances, but did not indicate whether those same entrances would continue to be used during project operations. In their response to the Siting Board's Second Request for Information, Flat Run Solar indicated that three of the five proposed construction entrances would likely continue to be used for ongoing operations – including two of the three construction entrances along Hobson Road (KY 744) and the construction entrance along Saloma Road (KY 527) close to the proposed substation location. The new figure provided with the applicant's response, however, does indicate the possibility that up to two other

operational entrances might be needed, located in the vicinity of the northeastern and southeastern corners of the project footprint.

**Compliance with applicable setback requirements.** As noted earlier, there are a number of residences (including residents participating in the project by leasing portions of their property to Flat Run Solar and residents who are not participating) that would be within 1,000 feet of Flat Run Solar's proposed solar arrays. The *Flat Run Solar Nearest Residences Map* (provided as part of Flat Run Solar's Response to the Siting Board's Second Request for Information) further indicates there are five non-participating residences located between about 150 feet and 325 feet of the potential project footprint (as well as five participating residences labelled as "project landowner residences" that are either within the project footprint or within 300 feet of the footprint.) There are also three residential neighborhoods within 2,000 feet of the potential project footprint. Consequently, Flat Run Solar has indicated they will request a deviation from the statutory setback requirements in favor of their proposed alternative setback requirements cited previously on pages C-8 and C-9.

BBC requested clarification on the difference between participating homes (i.e., homes belonging to landowners leasing land to the project) and non-participating homes with respect to the applicant's proposed 150-foot setback from any solar equipment (SAR, page 11). The applicant responded that the 150-foot proposed setback would only apply to non-participating homes. In their response, the applicant noted:

*There are three lease agreements with Flat Run landowners who own residential homes that will be nearer than 150 feet from the solar equipment on their property. In all three cases, the landowners are aware of the setbacks and spacing of solar equipment on their properties. (Flat Run Solar, Response to BBC First Request for Information, page 2).*

Based on the *Flat Run Solar Nearest Residences Map* referred to previously, it appears there are actually five participating homes that may be within 150 feet of solar equipment.

BBC also sought clarification from Flat Run Solar regarding Attachment D of the Application (Letter from Taylor County Judge Executive Barry Smith), in which the Judge Executive had stated that there are no planning/zoning ordinances applicable to the Horseshoe Bend project. The original letter was also addressed to Horseshoe Bend Solar rather than Flat Run Solar. In their response, the applicant explained that the original letter had been addressed in error and supplied an amended letter, now addressed to Flat Run Solar.

**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).

## **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.

- The most recent information (from Flat Run Solar’s Response to the Siting Board’s Second Request for Information) indicates the size of the potential project footprint is 456 acres, rather than the “up to 450 acres” stated in the SAR.
- Flat Run Solar will be requesting 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. Ashwood Solar’s proposed alternative setback requirements include a minimum distance of 150 feet between non-participating residences and the project footprint and a minimum distance of 300 feet between non-participating residences and the nearest central inverter (if central inverters are used) or energy storage system.

Given the layout of the site and its surroundings, it is likely true that the proposed project could not be successfully constructed and operated under the statutory setback requirements. Flat Run Solar’s proposed 150-foot minimum setback between the project footprint and non-participating residences would be consistent with the Siting Board’s recent orders in regard to the Ashwood Solar project, which is generally similar in terms of size and nearby surroundings. However, in the Ashwood Solar orders, the Siting Board also specified a minimum distance of 450 feet between central inverters and the nearest noise receptor.

**Recommended mitigation.** Based on our review of the Application and SAR, the applicant’s responses to requests for information from the Siting Board and BBC, and our visit to the 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):

- Flat Run Solar should provide a final site layout plan to the Siting Board upon completion of the final site design. Any change in project boundaries from the information reviewed during this evaluation should be submitted to the Siting Board for review.
- Flat Run 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, and business owners. According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work.
- If the Siting Board chooses to grant Flat Run Solar’s request for a deviation from the statutory setback requirements, Flat Run Solar should be required to provide at least a 150-foot minimum setback from the project footprint to the nearest non-participating residences (as the applicant has proposed). Flat Run Solar should also be required to provide at least a 450-foot setback between central inverters and energy storage systems and the nearest non-participating residence. Although that setback is larger than the 300-foot setback proposed by the applicant, the 450-foot setback would be more consistent with previous Siting Board orders, and would provide more protection to nearby landowners from potential operating noise. The larger setback does not appear to be overly burdensome given the figure the applicant provided in their response to the Second Request for Information showing representative locations for

central inverters – all of which appear to be located more than 450 feet away from the nearest non-participating residences.

## **Compatibility with Scenic Surroundings**

This section of the SAR review addresses the compatibility of the proposed Flat Run 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.<sup>2</sup>

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

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<sup>2</sup> 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.

- The cultural context, including the influence of previous uses on the landscape and public attitudes toward the compatibility of various types of land use.

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**

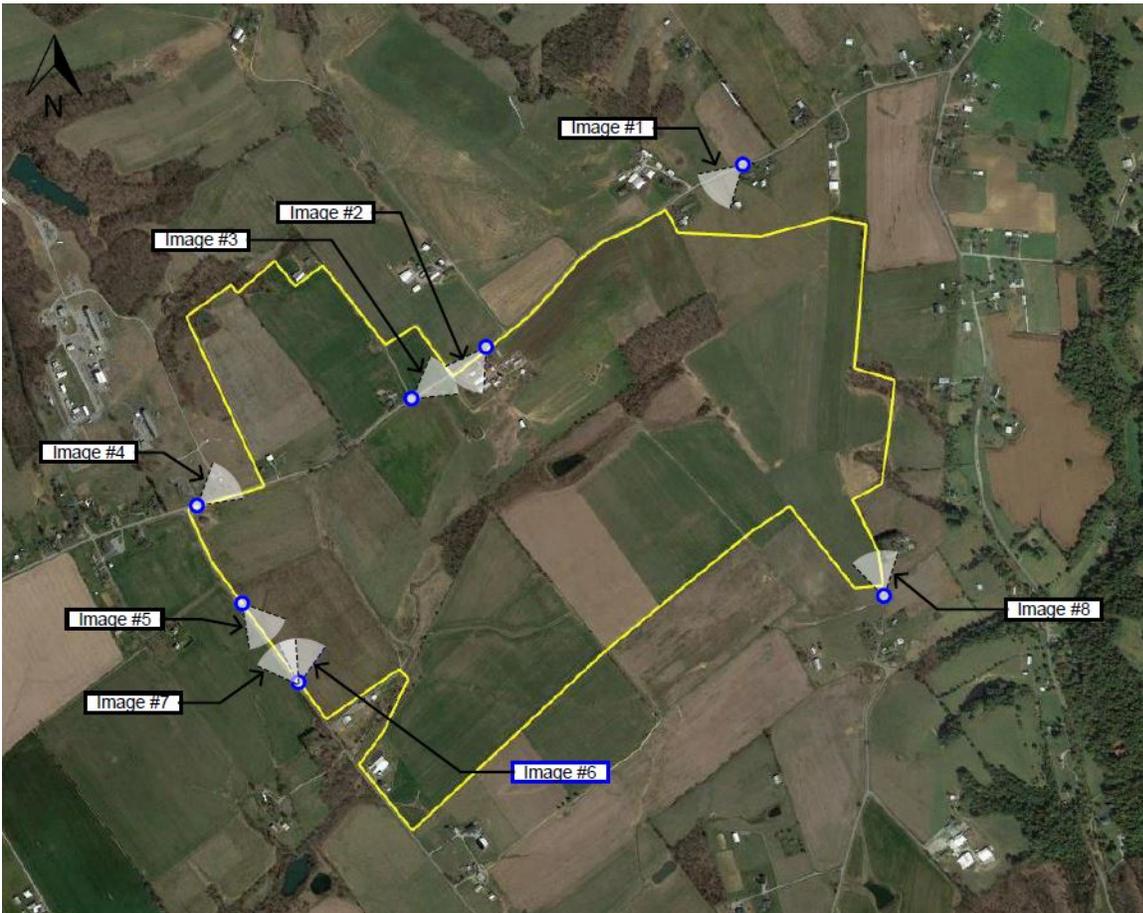
In compliance with KRS 278.708, Section 2 of the SAR summarizes the assessment of compatibility with scenic surroundings. As stated in Section 2:

*Once the Project is complete, it will be visible from stretches of Hobson Road and Saloma Road, small county roadways. The Project has proposed long stretches of vegetative buffering to obscure the view of the facility from Hobson Road and Saloma Road, as shown on the site layout map in Attachment A. Four of the landowners who are leasing land to the Project live or own residential homes adjacent to the Project site, making up the majority of residences located within three hundred feet of the Project footprint. (SAR, page 7)*

As described in the previous section of this report, the proposed Flat Run solar generation facility will consist of solar panels and racking, as well as inverters, energy storage systems, and a substation. The central concern is whether the equipment of the proposed solar generation project will be compatible with its surroundings.

The applicant's inclusion of Attachment D of the Application (Surrounding Area Images) provides visual imagery of the site from key observation points, primarily along the perimeter of the proposed site. The following several figures are excerpted from Attachment D and included here to contribute to the assessment of scenic compatibility.

**Figure C-5.**  
**SAR Attachment D, Location and Focal Direction of Surrounding Area Images**



**Figure C-6.  
SAR Attachment D,  
Image #5, Looking  
Southeast along  
Saloma Road**



**Figure C-7.  
SAR Attachment D, Image  
#5, With Simulation of  
Solar Arrays and Proposed  
Vegetative Buffer at Left**



**Figure C-8.  
SAR Attachment D, Image  
#7, Looking Northwest  
along Saloma Road**



**Figure C-9.  
SAR Attachment D, Image  
#7, With Simulation of  
Solar Arrays and Proposed  
Vegetative Buffer at Right**



The applicant's provision of these two simulations in the SAR is helpful for assessing the visual impact of the proposed site on the surrounding area. Based on these two sample images, with the proposed vegetative buffers the solar arrays appear unobtrusive and compatible with the scenic context and local land use.

The applicant has put effort into developing a screening mitigation plan for the project, noting:

*Applicant proposes sections of vegetative buffers to help screen the view of the facility from sections of the roads surrounding the Project that do not have existing vegetation to block the view of the Project. The vegetative buffer will consist of two staggered rows of evergreen shrubs that have a mature height of approximately 15 feet. The rows will be spaced approximately 15 feet apart, and the shrubs will be at least three feet in height at time of planting. (Application, page 4)*

Attachment B of the Application provides several image examples of vegetative buffers from other solar facilities in the country. Two of these examples are excerpted and inserted here as Figures C-10 and C-11, below. These images show vegetative buffers shortly after installation and at maturity.

**Figure C-10.**  
**Vegetative Buffer Example, Single Row of Immature Evergreen Shrubs**



**Figure C-11.**  
**Vegetative Buffer Example, Alternating Rows of Mature Evergreen Trees**



As seen in the visual simulations provided by the applicant, these images indicate that a well-designed and mature vegetative buffer can help preserve the viewshed and enhance the facility's compatibility with the scenic surroundings.

### **Supplemental Investigations, Research, and Analysis**

**Visual assessment.** Representatives from BBC, the Siting Board and the Public Service Commission toured the proposed Flat Run Solar site on July 1<sup>st</sup>, 2021. During that tour, we were able to observe all of the nearby, non-participating residences and their location relative to the proposed project footprint. We were also able to observe the locations of proposed construction and operating entrances and the proposed substation, as well as the general viewshed from the nearby roads.

The proposed Flat Run Solar site is comprised of gently rolling farmland, divided in the middle by an area of mature trees and wetlands. Figure C-12 looks into the southwestern portion of the site from near the westernmost corner at the intersection of West Saloma Road (KY 744) and Saloma Road (KY 527). Saloma Road can be seen in the right-hand portion of the image. The proposed substation would be located about halfway between the intersection where this photograph was taken and the farm buildings seen in the distance along Saloma Road.

**Figure C-12.**  
**Southwestern Portion of Flat Run Solar Site Along Saloma Road**



Figure C-13, taken from the same vantage point but looking northeast, provides a view of the northwestern portion of the proposed site. As shown in this image, there are some areas where existing vegetation would screen the site from the roadway, but lengthy stretches where the solar facility could dominate the view. The applicant has proposed to develop vegetative buffers along this stretch of roadway.

**Figure C-13.**  
**Northwestern Portion of Flat Run Solar Site Along Hobson Road**



Figure C-14, also looking northeast along Hobson Road, shows the additional area added to the Flat Run Solar site after the public meeting (to the left of the road as it curves left) as well as the participating farm where an entrance would likely be located for construction and subsequent operations (just beyond the curve in the road.)

**Figure C-14.**  
**View to Northeast Along Hobson Road (KY 744)**



Figure C-15 shows the proposed entrance to the portion of the site north of Hobson Road (in the foreground) as well as the farm where the proposed entrance to the main part of the site from Hobson Road would be located (at the farm to the right of the road in the middle distance).

**Figure C-15.**  
**Proposed Site Entrances from Hobson Road (KY 744)**



In general, the site would be highly visible from Hobson Road (KY 744) and portions of Saloma Road (KY 527). The applicant has proposed to plant long stretches of vegetative buffers (trees) along these road segments. The primary road near the eastern boundary of the site (Old Lebanon Road, KY 289) is screened from the site – for the most part – by a combination of topography and existing vegetation. Most of that road lies below the proposed site. There is no substantial road along the southern boundary of the site.

### **Conclusions and Recommendations**

The proposed Flat Run Solar generating facility would be located in an area of predominantly agricultural and some low-density residential land. The proposed facility is compatible with the scenic surroundings, provided the Applicant follows through with their screening mitigation plan to reduce the visual impact on some of the nearby homes and for drivers along Hobson Road and Saloma Road.

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

- Existing vegetation between the solar arrays and nearby roadways and homes should be left in place to the extent feasible to help minimize visual impacts and screen the project from nearby homeowners and travelers.
- Flat Run Solar should carry out the screening plan proposed in their application and SAR and make sure the proposed new vegetative buffers are successfully established and develop as expected over time.
- If requested by any of the five non-participating residences within 350 feet of the proposed project along segments of the project boundary not currently proposed to have vegetative buffers, Flat Run Solar should provide additional vegetative screening in these areas.

### **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. Attachment 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, the Property Value Impact Study states that the closest home to the proposed facility site is 150 feet away from the nearest solar panel, and that the average distance to nearby homes is 524 feet. The study then 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.

Lastly, the 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. There is no stigma attached to solar facilities, and they are in harmony with the surrounding agricultural and rural residential landscapes. According to the study, "The only category of impact of note is appearance, which is addressed through setbacks and landscaping buffers." (SAR Attachment B, page 107).

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 Attachment B, page 1)*

### **Supplemental Investigations, Research, and Analysis**

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.<sup>3</sup> 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.”
- “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 home within 100 feet of a 20 MW solar installations and a 5 percent decline in value for homes within 100 feet of a 102 MW solar facility.

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<sup>3</sup> *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.

- “The results also suggest that experience assessing near a solar installation is associated with a much less negative estimate of impact.”<sup>4</sup>

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<sup>5</sup> had no statistically significant impact on home prices.<sup>6</sup>

## 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 setting for the proposed Flat Run project, we conclude that the proposed solar facility is unlikely to have adverse impacts on nearby residential property values.

**Recommended mitigation.** BBC does not recommend any mitigation for the specific purpose of preserving local property values. However, Flat Run Solar’s visual screening plans (discussed earlier) may also serve to help ensure that the proposed facility will not have an adverse impact on local property values.

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<sup>4</sup> *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.

<sup>5</sup> 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 Flat Run facility would sit in the unincorporated community of Saloma on the outskirts of the Taylor County seat of Campbellsville. Attachment B of the SAR (Property Value Impact Study) calculates the density of the Saloma CCD as approximately 36 residents per square mile. This density figure corresponds to 2019 ACS data from the Census Bureau.

<sup>6</sup> *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/](https://works.bepress.com/cory_lang/33/)

## **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 Flat Run 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**

Section 4 of the SAR summarizes the findings from the more detailed Noise and Traffic Study (Attachment F to the SAR). The applicant proposes that construction noise and activity will be time-constrained and that notices will be sent to all potentially impacted neighbors in advance of construction processes. Additionally, the applicant proposes noise level limits for both the construction and operational phases of the proposed project.

The Noise and Traffic Study was conducted for the applicant by GAI Consultants, who evaluated the sound impact to the local sound environment during both the construction and operation phases of the proposed Flat Run project. To begin, the study states:

*The existing local sound environment is currently and expected to continue being dominated by several existing significant sources of sound, which may be classified as sources of noise by sensitive receptors. These existing sources primarily consist of primary and secondary roadways including State Routes 289, 744, and 527. In addition, there is a Tennessee Gas Pipeline Compressor Station*

*(Campbellsville 96) located northwest of the proposed site which would also have a significant contribution to the ambient sound level environment. (Attachment F, page 2)*

The study goes on to define the residences of non-participatory landowners as Noise Sensitive Areas, but does not count the residences of project landowners as noise sensitive receptors. However, any neighbors or nearby residents can be affected by construction or operation noise, regardless of their affiliation with the project, and so it would be appropriate for the applicant to assess and be cognizant of noise levels at all possible receptors rather than only a selection.

In calculating the anticipated noise produced by the loudest piece of construction equipment on site (a pile driver for installing the racking poles on which the solar panels are mounted), the study finds that the noise from the pile driver at 150 feet (which is the distance to the closest 'non-participatory' residence) is 91 dba. At 300 feet, it would be approximately 85 dba. Flat Run Solar proposes a noise limit of 95 dBA, as measured at 150 feet from source, during the construction phase of the project.

*The pile driving phase of the work requires the associated equipment to move around the site. Once each pile is installed, the pile driver moves to the next and does not stay in each area of the Project site for long periods of time. This results in short term impacts associated with construction to the surrounding area at each location.*

*Construction sound levels other than the pile driving are not expected to exceed 120 dBA at source. As such, the impact to the local sound environment due to construction is anticipated to be minor and temporary. (Attachment F, page 3)*

During the operational phase of the proposed Flat Run project, noise will be generated by the substation (71 dba measured at 3 feet); energy storage systems (80 dba measured at 3 feet); and inverters (74 dba for string inverters, or 85.6 dba for central inverters).

The noise study provides further information regarding the expected noise levels from these components at various distances. The projected noise level from the substation at 800 feet (90 feet closer than the nearest home) is expected to be about 22.5 dba – which is very quiet. The expected noise level from the energy storage systems at 400 feet (50 feet closer than the setback recommended by BBC on page C-12) is expected to be about 37.5 dba – less than the sound of bird calls at a distance.<sup>7</sup> The expected noise level from the central inverters (if used) at 450 feet would be less than 45 dba, while the expected noise level from the string inverters (if used) at 150 feet would be about 40 dba. These inverter noise levels at the nearest receptor would be less than the sound of light traffic at 100 feet and should not prove objectionable to nearby residents. The noise study does not provide information on the expected noise levels from solar array tracking motors.

The study then summarizes the impact of operational equipment on the local sound environment and nearby noise receptors, concluding that most of the facility's equipment components would not alter the ambient sound level of the existing environment when measured at the distance of neighboring residences. The exception would be in the case of central inverters, if they were incorporated into the proposed project's final site design. Central inverters would add approximately 1.5 dba to the

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<sup>7</sup> Noise Study submitted to Siting Board by Unbridled Solar, 2020.

existing ambient noise levels, when measured at 300 feet. The study’s authors conclude that noise impacts during the operational phase of the proposed project would be negligible.

### Supplemental Investigations, Research, and Analysis

BBC researched sound attenuation principles and the logarithmic dBA scale to understand the impacts to neighboring residences from construction and operations noise.

Across an open area with neither reflective surfaces nor absorbent barriers, sound attenuates at approximately 6 dB for every doubling of distance and can be estimated using the inverse square law.<sup>8</sup> At 150 feet (closest non-participatory residence), BBC estimates that sound from the pile drivers during the Project’s construction phase will be approximately 91 dBA, which is consistent with the calculations from the Noise and Traffic Study. This exceeds the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit of 85 dBA (note that decibels are measured on a logarithmic scale).<sup>9</sup> Figure C-12 identifies the time that it takes for a person to reach their full daily noise dose based on differing levels of noise exposure.

**Figure C-12.**  
**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 91 dBA—the estimated noise level of a pile driver as measured at 150 feet—daily noise dose for noise-sensitive receptors could be reached within 2 hours, and hearing damage could occur for exposure beyond 2 hours. While most pile driving activity will occur at distances greater than 150 feet from nearby homes, even at greater distances there is a risk to neighboring residents of reaching a maximum daily noise dose depending on the duration and location of the pile driving activity.

BBC also reviewed other recent solar facility applications to the Siting Board to estimate the potential sound from the solar panel tracking motors (which was not included in the noise assessment submitted by Flat Run Solar). The noise level from tracking motors at 150 feet should be less than 48 dba, which is less than the sound of light traffic at 100 feet and is unlikely to be objectionable to nearby residents.<sup>10</sup>

**Supplemental questions to applicant.** In the first Request for Information, BBC asked Flat Run Solar to describe which health or regulatory agency resources (e.g., NIOSH; OSHA; the CDC) were

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<sup>8</sup> Estimating Sound Levels with the Inverse Square Law. Georgia State University. <http://hyperphysics.phy-astr.gsu.edu/hbase/Acoustic/isprob2.html>

<sup>9</sup> Noise and Hearing Loss Prevention. The National Institute for Occupational Safety and Health. <https://www.cdc.gov/niosh/topics/noise/default.html>

<sup>10</sup> Noise study submitted to Siting Board by Unbridled Solar, 2020.

consulted in developing their proposed limit of 95 dBA as measured at 150 feet. In their response, the applicant states that they did not include analysis from any health or regulatory agencies in developing the proposed limit, and that, “the OSHA website ‘does not have any regulations that apply to residential properties.’” Additionally, they stated that “the proposed 95 dBA limit is measured from outside the home and not inside the home where noise levels may be lower” (Flat Run Solar, Response to BBC First Request for Information, page 4).

However, even the 95 dBA limit applies only to the non-participating residences adjacent to the project, as residences owned by three landowners leasing land to the project will sit closer than 150 feet from the project boundary. Depending on the exact distance between the residence and the pile driver, these homeowners could experience damaging noise levels from inside their homes. For example, 15 minutes of exposure to a 100 dBA noise would put the resident at 100 percent of their daily noise dose (Figure C-12).

BBC asked the applicant about their communication with neighboring landowners regarding noise levels during construction and operation. A portion of their response is excerpted here:

*No landowners or members of the public asked about noise produced by the Project during construction. Carolina Solar Energy, the owner of Flat Run, has experience permitting utility scale solar projects in rural communities in North Carolina and Virginia. In our prior experience, construction noise has not been a concern for regulatory bodies such as Planning Boards, Boards of Commissioners, planning departments, or neighboring property owners, including in counties that already had solar projects installed when our project was being permitted. For this reason, we did not speak more directly to construction noise in our outreach to neighboring property owners.* (Flat Run Solar, Response to BBC First Request for Information, page 6).

In their response to an additional question related to construction noise, the applicant notes that:

*[...] It will not be possible to completely eliminate noise emissions or reduce them below a level that a particular individual might find “too loud” or “annoying” [...] Flat Run has proposed the 95 dBA maximum noise level at a receptor in order to ensure the Project is able to be built.* (Flat Run Solar, Response to BBC First Request for Information, page 7).

Carolina Solar Energy, Flat Run Solar’s parent company, has experience with utility-scale solar facility construction and operation in several states and locations, and is pragmatic in acknowledging that complete noise mitigation is not possible. However, the proposed 95 dBA maximum noise level is not the actual proposed maximum at the nearest noise receptor; rather it is the maximum proposed noise level only at the nearest non-participating home. The homes belonging to project landowners will experience noise levels higher than 95 dBA – potentially substantially higher, depending on their precise distance from the pile driver. It would be appropriate for Flat Run Solar to raise this topic directly with these landowners and provide them with straightforward information about noise levels, hearing protection, and any available mitigation measures.

## **Conclusions and Recommendations**

During construction, noise from the pile drivers will have substantial impact on residences even at a distance greater than 150 feet, Residences closer than 150 feet to the pile drivers (i.e., homes

belonging to participating project landowners) will experience noise levels greater than 95 dBA, with the potential for that noise to damage hearing, dependent on a variety of factors.

Noise levels during operation of the proposed Flat Run facility are unlikely to be disruptive to local residents.

**Recommended mitigation.** Flat Run should clarify precisely where pile driving will occur and identify the distances to each affected home to appropriately mitigate hazardous or annoying noise as necessary. Further:

- As recommended on page C12, Flat Run Solar should be required to provide at least a 450-foot setback between central inverters and energy storage systems and the nearest non-participating residence.
- Similar to other recent solar facility applications reviewed by the Siting Board, construction activity at the Flat Run 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.
- Flat Run 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.
- Where pile driving will occur within 1,500 feet of any nearby home or business, Flat Run Solar should implement a construction method to suppress the noise from the pile driving process – i.e., semi-tractor and canvass method, sound blankets on the permanent fencing surrounding the site or temporary fencing surrounding the immediate pile driving area, or other comparable methods.
- Flat Run Solar should implement a Customer Resolution Program to address any complaints from surrounding land owners. Flat Run 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 land owner.

## Impacts on Transportation

This portion of the SAR review examines the impacts of the proposed Flat Run 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 Noise and Traffic Study (Attachment F to the SAR) describes the existing road network near the Project site and current traffic levels:

*The proposed Flat Run solar facility, location shown on Figure 1, will be located near the community of Saloma, around five miles northwest of Campbellsville. The facility will be constructed along the east side of KY Route 527, west of KY Route 289, and along both sides of KY Route 774 (which intersects both KY Route 527 and KY Route 289).*

*The construction access points along KY Route 744 and Squires Road are all anticipated to use existing driveways or current field access points, and the access point along KY Route 527 is anticipated to be new. All state highways surrounding the Flat Run site are classified as Collectors and are not on the National Highway System (NHS). KY Route 289 is a major collector and KY Route 527 and 744 are minor collectors. (Attachment F, page 7)*

The construction phase of the proposed project is anticipated to take eight to 12 months to complete, and Flat Run proposes workday limits of 7am to 9pm. Up to 150 workers could be on site each day—and parking passenger vehicles on site—and deliveries will occur throughout the day.

*Site traffic is assumed to follow general traffic trends in the area. A distribution of existing background vehicular traffic is shown in Figure 5. Assuming the same traffic pattern, a distribution of the anticipated 165 daily vehicles during construction is shown in Figure 6. This shows a maximum typical daily traffic increase of up to 50 vehicles per day (100 trips per day) per roadway. Two-way peak hour traffic volumes along nearby state highways average around 100 vehicles per hour and are all under 200 vehicles an hour, which is fewer than four vehicles per minute. Due to this low background traffic volume, no adverse traffic impacts are anticipated as a result of additional trips due to facility construction. (Attachment F, page 8)*

Up to 15 Class 9 trucks are expected to deliver equipment and supplies each day, carrying weights up to 20 tons. Additionally, approximately 11 Class 21 truck trips will be required to deliver the substation transformer and solar lulls.

### **Supplemental Investigations, Research, and Analysis**

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 Project site—SR 744 and SR 527—are rated for 62,000 pounds and 44,000 pounds, respectively (KYTC Truck Weight Classification). Any vehicle loads exceeding this limit could subject the roadway and shoulder to damage or degradation. Additionally, potential routes to the site may also include local county roads, which would be 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.*

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. Using approximate dimensions for the delivery of a power transformer of 60 to 70 tons, 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 Flat Run, 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. In its First Request for Information, the BBC team asked the applicant to describe what contact had been made with the Taylor County Road Department. Flat Run Solar's response is included here:

*Flat Run has not reached out to the KY Transportation Cabinet or the Taylor County road department at this stage of development, nor have we been contracted by either agency regarding loads to be delivered to the site. Flat Run and its contractors will comply with the conditions of all required transportation permits. Permits for heavy or oversized loads will be obtained by the construction contractor or in the case of the transformer by the manufacturer, as applicable. (Flat Run Solar, Response to BBC First Request for Information, page 9).*

## **Conclusions and Recommendations**

During construction, the anticipated 100 trips per day to the Flat Run Solar site could represent a 25 to 50 percent increase in traffic relative to current levels. Given the low traffic levels at present, this increase is likely to be noticeable to local residents, but is unlikely to impact the level of service on the nearby roadways.

The anticipated construction entrances on Hobson Road (KY 744) and Saloma Road (KY 527) — the northern and western boundaries of the site — are each abrupt, right angle turns from roadways where traffic currently moves at high rates of speed (50 MPH or greater). Proactive traffic management will be needed in order to assure the safety of the construction workers and other travelers along these roadways.

Delivery of the 60-to-70-ton power transformer to the construction entrance along Saloma Road (KY 527) will likely present challenges given the existing rating of the road for up to 44,000 pounds (22 tons). 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:

- Flat Run 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, Flat Run Solar should implement ridesharing between construction workers, use appropriate traffic controls or allow flexible working hours outside of peak hours to minimize any potential delays during AM and PM peak hours.
- Flat Run Solar should consult with the Kentucky Transportation Cabinet and the Taylor 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 SR 744 and SR 527. Flat Run Solar should obtain any necessary permits from these agencies.
- Flat Run 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 to.

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