Review and Evaluation of Green River Solar, LLC Siting Assessment Report

FINAL REPORT

Final Report

September 29, 2021

Review and Evaluation of Green River Solar, LLC Siting Assessment Report

Prepared for

Kentucky State Board on Electrical Generation and Transmission Siting
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Table of Contents

SECTION A.

General Statement

SECTION A.
General Statement

This document provides a review of the Site Assessment Report (SAR) for the proposed Green River Solar merchant electric generating facility submitted to the Kentucky State Board on Electrical Generation and Transmission Siting (the Siting Board). Green River Solar submitted an administratively complete document titled "Application of Green River Solar, LLC For a Certificate to Construct an Approximately 200 Megawatt Merchant Solar Electric Generating Facility in Breckinridge County and Meade County, Kentucky, Case No 2020-00387" (the "Application") to the Siting Board in June 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 Green River Solar's SAR and complete this report:

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

- Reviewed the contents of Green River Solar's SAR and Application;

- Identified additional information we considered useful for a thorough review, and submitted questions to the applicant through the Siting Board Staff's requests for information;

- Conducted the required site visit, including obtaining oral information supplied by the applicant, in September 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, Green River Solar has not finalized the precise layouts of the solar arrays and some other project infrastructure. The SAR, and this review, are based on the best available information at this time.

SECTION B.

Executive Summary

SECTION B.
Executive Summary

This report documents the evaluation of a Site Assessment Report (SAR) in compliance with KRS 278.704 and KRS 278.708. The Kentucky State Board on Electrical Generation and Transmission Siting (the Siting Board) received an application from Green River Solar, LLC for approval to construct a commercial, photovoltaic solar merchant electric generating facility in Meade and Breckinridge Counties, Kentucky, in June 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 Green River 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. Additional detail on each topic was provided in the applicant's responses to the First and Second Request for Information from the Siting Board Staff during the SAR review process.

The proposed Green River Solar facility would be a 200-megawatt alternating current (MWac) photovoltaic electricity generation facility, situated on a site encompassing approximately 1,100 acres of land in Breckinridge County and 650 acres in Meade County. The proposed site is located 50 miles southwest of the city of Louisville. Project facilities would include crystalline solar panels, racking, inverters, transformers, electrical collection systems, one substation and transformer, and associated wiring and structures. Conclusions with respect to other descriptive elements of the facility follow:

- **Surrounding land use** — Residential parcels comprise 62 percent of the total 230 parcels adjoining the proposed Green River project, while parcels zoned for agriculture comprise 28 percent. By acreage, most adjoining land is agricultural (86 percent), while 7 percent is residential. Commercial and industrial are the primary remaining land uses. Three local parks and one elementary school lie within 2,000 feet of the boundary, as do portions of the City of Irvington.

There are two residential neighborhoods[1] (including the western portion of Irvington) within 2,000 feet of the project boundary—both in Breckinridge County—and there are some single dwellings that lie closer to the boundary in each county. Five occupied residences lie within 500 feet of the nearest solar equipment, with the closest at a distance of 280 feet.

- **Proposed access control and security —** Page 1 of the SAR states that the project boundary will be enclosed by a security fence compliant with the National Electrical Safety Code and that Green River Solar will ensure that all site entrances and boundaries have adequate signage, particularly in locations visible to the public and local residents. As shown in Exhibit 3 of the SAR (Preliminary Site Layout), the project footprint consists of eight non-contiguous sections of solar equipment; each section will be securely fenced and will have its own points of access.

- **Utilities —** Flat Run Solar does not propose to require utilities on site during the operational life of the proposed project. During construction, Green River will acquire electrical service from the Meade County RECC. For dust mitigation, Green River may request a water line tap with the Meade County Water District if it is not possible to obtain water from an on-site well within the project boundary.

- **Setback requirements —** There are two residential neighborhoods (as defined by KRS 278.700 (6)) within two thousand (2,000) feet of the project. Breckinridge County does not have any applicable zoning or setback requirements that would apply to a commercial solar facility such as Green River. However, Meade County has recently enacted an ordinance for SES facilities—to which the proposed Green River Solar facility conforms—and in the SAR, Green River proposes to apply the Meade County SES ordinance to the portion of the project that lies in Breckinridge County. Green River has not yet lodged a formal request for deviation from the statutory setback requirements laid out in KRS 278.704(2). Meade County's setback requirements for SES equipment are summarized here:

    - Minimum 50 feet from perimeter property boundaries
    - Minimum 250 feet from any residence, nursing home, church, or school
    - Solar panels not to exceed a height of 25 feet

- **Other facility site development plan descriptions provided in the SAR —** Legal boundaries; right-of-way agreements; location of facility buildings, transmission lines, structures; and location of access roads, internal roads, and railways are addressed in the SAR. Noise levels are briefly addressed and then evaluated more fully in a subsequent section of the SAR. When considered alongside additional information supplied by Green River in their RFI responses during the review process, these materials appear to meet the informational requirements identified in KRS 278.708.

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

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, BBC visited the proposed Green River Solar project site in September 2021 to review the site and its surroundings.

The proposed Green River Solar site is primarily composed of flat or gently rolling agricultural land. Most solar equipment would border rural farmland. One portion of the project area in Breckinridge County is in close proximity to the western portion of the City of Irvington (population approximately 1,200), and some of the project's solar arrays are proposed to be constructed behind residences owned by the Housing Authority of Irvington. The primary roadways near the project site are US 60, which runs east-west along the southern boundary of the proposed project footprint, and KY 79, which runs north-south through Irvington.

The proposed project's solar arrays appear in eight non-contiguous patches across the local landscape rather than in a single block. The dispersion of solar panels across a large acreage could serve to somewhat dilute the impact on the viewshed, though it also creates more linear feet of borders with adjacent, non-participating properties. The applicant has proposed to plant a total of 26,000 feet of vegetative buffers (a mix of trees and shrubs) in areas adjacent to residential properties around the project's boundary. Proposed locations of vegetative screens are depicted in the Preliminary Site Layout maps in SAR Exhibit 3.

Vegetative screening is required by the Meade County SES ordinance to reduce visual impacts to residences on lots adjacent to the project. Green River has drafted its vegetative screening plan to apply standards from the Meade County ordinance across all sections of the project footprint, including those in Breckinridge County.

In general, BBC concurs with Green River's conclusion that the proposed facility would not be incompatible with its surroundings from a scenic standpoint, particularly with the completion of the proposed vegetative screening plans. This assessment reflects the topography of the site, which limits its visibility from some of the nearby homes, the proposed screening plan, and 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 landowners will change as a result of development and operation of the proposed Green River Solar facility. Exhibit 1 of the applicant's SAR (Property Value Impact Study) provides a comparative study of property values in proximity to 11 solar facilities in the Midwest, Southeast, and Eastern states of the US. The study also reviews published studies and draws on discussions with market participants and experts, including County Property Value Administrators in Kentucky. The section draws its conclusions regarding the impacts of the

proposed facility on adjacent property values based on market analysis of sale value impacts from properties adjacent to the select solar facilities compared with sales from properties in many control areas.

The Property Value Impact Study states, "We analyzed 37 adjoining property sales and over 238 comparable sales, collectively, for the identified eleven solar farms (detailed in the Primary Report), over the past five years. We note that proximity to the solar farms has not deterred sales of nearby agricultural land and residential single-family homes, nor has it deterred the development of new single-family homes on adjacent land" (SAR Exhibit 1, page 3). The Property Value Impact Study concludes that there is likely no impact on the value of adjoining properties.

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 more rural settings such as the areas surrounding the proposed Green River 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 Impact Assessment (Exhibit 4 of the SAR). The applicant proposes that construction noise and activity will be time-constrained from 6:00 AM to 6:00 PM and that notices will be sent to all potentially impacted neighbors prior to the start of construction.

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 noise assessment finds that the noise from the pile driver would be about 80 dBA at 280 feet,

which is the distance to the closest residence. This is within the National Institute for Occupational Safety and Health (NIOSH) recommended daily exposure limit of 85 dBA.[2]

During the operational lifetime of the Green River Solar project, the primary sources of noise would be the facility's inverters and substation transformer. The highest noise level resulting from the aggregate operation of all 89 project inverters as well as the transformer was 50.4 dBA at the nearest receptor, which is roughly equivalent to the sound of light traffic.

BBC concurs with the findings of the Noise Impact Assessment that noise level increases during project construction will be temporary, intermittent, and within a reasonable range. Noise levels during operation of the proposed Green River Solar facility are unlikely to be disruptive to local residents.

Impacts on Transportation

The Traffic and Dust Study (Exhibit 6 of the SAR) describes the existing road network near the project site and the proposed project's 10 site entrances:

Two major roadways are present in the proposed project's vicinity. US Highway 60 (US 60) runs east to west connecting the city of Irvington to Fort Knox to the east and Hardinsburg to the west. Kentucky Highway 79 (KY 79) runs north to south connecting Irvington to the city of Brandenburg.

On the southwestern part of the project, two proposed site entrances are located on minor collector Webster Basin Spring Road and local O.L. Norton Road. These two roads connect to US 60. Similarly, in the center of the project, one proposed site entrance is located on local Mount Merino Cemetery Road that connects to KY 79. In the north part of the project, three proposed site entrances are located on minor collector Sandy Hill Road, Midway Road, and Dooley Road. These three roads connect with KY 79. Four other site entrances of the project are located on KY 79. (SAR Exhibit 6, page 1)

Currently, US 60 and KY 79 are underutilized relative to their available capacity, and even with the addition of delivery and commuter vehicles (up to 300 workers on site daily during a 4- to 6-month construction peak), the roadways will continue to perform at a high level of service, though the increase in traffic is likely to be noticeable to local residents. However, most of the project's site entrances would be abrupt, right-angle turnoffs from the highway, along which vehicles generally travel at high speeds. High speeds, minimal roadway shoulders, and an increase in daily traffic all necessitate a strategic traffic management plan.

During the project's construction phase, Green River Solar anticipates a total of 2,500 semi-truck trailer deliveries to the site. The substation transformer will be the largest and heaviest load, at approximately 125 tons (250,000 pounds).

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

BBC conducted further research on the weight limits and vehicle classes permitted to travel on specific roadways in Kentucky. US 60 and KY 79 are major highways rated for 88,000 pounds (KYTC Truck Weight Classification). Any vehicle loads exceeding these limits could subject the roadways and shoulders to damage or degradation. Additionally, any local roads used by delivery trucks may be more susceptible to degradation from heavy loads. However, the challenges of delivery, such as for the substation transformer, can likely be overcome with careful advance planning and coordination with the Kentucky Transportation Cabinets and the Meade and Breckinridge County road departments.

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

Recommendations

Green River Solar has provided the required information for the site assessment, including responses to BBC's questions (included in the requests for information from Siting Board Staff) following our review of their SAR. The Green River Solar site appears to generally be well selected in terms of compatibility with the surrounding area and access to transmission infrastructure. However, Green River Solar has yet to apply formally for a deviation from setback requirements to allow their proposed application of Meade County setbacks to the Breckinridge County portions of the project. This application of the Meade County setbacks in Breckinridge County would be required in order to develop the full set of solar arrays laid out in Green River Solar's application.

Mitigation recommendations. Green River Solar proposes the following mitigation measures.

Green River Solar will plant vegetative buffers to mitigate viewshed impacts to sensitive receptors, primarily residences. Vegetative screens will be planted primarily in areas with no existing vegetation. Existing vegetation between solar equipment and neighboring residences will remain in place to the extent practicable.

BBC supports this proposed mitigation, and further recommends that Green River Solar be required to use solar panels with anti-reflective coating to reduce glare – as indicated in their response to Siting Board Staff's Second Request for Information

Green River Solar proposes to cultivate at least 2 acres of native pollinator-friendly species within the project area.

BBC supports this proposed mitigation.

Green River Solar proposes the following setbacks for solar equipment, including inverters, solar panels, and additional ancillary solar equipment:

- Minimum 50 feet from perimeter property lines
- Minimum 250 feet from any residence, nursing home, church, or school

BBC supports these proposed setback requirements, with some additional modifications:

- BBC recommends that the minimum setback for central inverters should be increased to 450 feet from the nearest residence. 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.

- If allowed to use the Meade County setbacks in Breckinridge County, Breckinridge County should also be provided with the other protections incorporated in the Meade County Solar Ordinance, including being given the opportunity for the County Fiscal Court to formally review and vote on the proposed project plan in Breckinridge County (if they wish to do so). Breckinridge County should also be provided with the same type of Surety Bond or other security against site abandonment as Meade County and given the opportunity to review and approve the project's decommissioning plan.

- As stated and shown in Green River Solar's Response to the Siting Board Staff's Second Request for Information, Green River Solar should modify their original plan for developing "Array Group A" to exclude building above ground facilities within the city limits of Irvington.

Green River Solar has committed to use low-sulphur diesel trucks and equipment to the extent practicable during the construction phase, in addition to using down lighting where lighting is required.

BBC supports this proposed mitigation.

Green River Solar has committed to using down lighting during project operations where lighting installation is required.

BBC supports this proposed mitigation.

Green River Solar will notify residents and businesses in the vicinity of the project a month in advance regarding the start of construction, potential noise, and mitigation plans. Notifications will include contact information for receiving complaints.

BBC supports this proposed mitigation.

Green River Solar will deploy erosion and sediment control devices and best management practices (BMPs) around sensitive resources prior to and during construction.

BBC supports this proposed mitigation.

Green River Solar will seed disturbed areas with native and/or non-invasive grasses after construction. Erosion and sediment control devices will be maintained until vegetation on disturbed areas has returned to pre-construction conditions or the site is stable.

BBC supports this proposed mitigation.

Green River Solar will obtain permits and applications from the appropriate regulatory agencies regarding environmental permitting and activities pertaining to state and federally regulated wetlands and watercourses, as well as stormwater discharge.

BBC supports this proposed mitigation.

Green River Solar will meet all decommissioning requirements under the Meade County SES ordinance, including posting of a surety bond, submittal of a decommissioning plan, and restoration of the property to substantially similar physical condition that existed prior to construction.

BBC supports this proposed mitigation.

Green River Solar's access control strategy will include signage to warn potential trespassers, and all site entrances and boundaries will have adequate signage, particularly in location visible to the public, local residents, and business owners. Access control will be provided per NERC, NFPA, and OSHA guidelines.

BBC supports this proposed mitigation, and further recommends that Green River Solar or its contractor should control access to the site during construction and operation. All entrances should be gated and locked when not in use. Signage* should conform to the *American National Standards Institute (ANSI) Z535 Safety Sign Standards for Electric Utility Power Plants and Substations. According to National Electric Safety Code regulations, the security fence must be installed prior to any electrical installation work.

Green River Solar will develop a traffic management plan to minimize impacts of traffic increases and keep traffic safe. The project will use appropriate signage to aid construction traffic. Necessary permits will be obtained prior to delivery of heavy loads. The traffic management plan will include protocols to give immediate access to local fire departments if needed.

BBC supports this proposed mitigation, and further notes that Green River Solar may need to use flaggers, in addition to signage, to adequately warn and slow traffic along KY 79 in the vicinity of its site delivery entrances from that highway during construction.

BBC recommends the following additional mitigation measures 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 Green River 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.***

- ***Green River 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, Green River 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.***

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

- ***As part of the traffic management plan, Green River Solar should implement ridesharing between construction workers (as feasible, given safety protocols for Covid-19), use appropriate traffic controls, or allow flexible working hours outside of peak hours to minimize any potential delays during AM and PM peak hours.***

- ***Green River Solar should consult with the Kentucky Transportation Cabinet and the Meade County and Breckinridge County road departments 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 US 60 and KY 79.***

- ***Green River 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.***

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 Green River Solar generation project regarding scenic compatibility, property values, noise or traffic.

SECTION C.

Findings and Conclusions

SECTION C.
Findings and Conclusions

This section provides detailed review and evaluation of each element of the Green River 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 Green River 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 Green River Solar Generation facility and site development plan is mainly set forth in Exhibit 11, Attachment A of the Application (the Site Assessment Report), Section 1 (Description of Proposed Project Site), and Exhibit 1 of the Application (Description of Proposed Site). Other related or supplementary information comes from various other sections of the SAR and other attachments included with the Application.

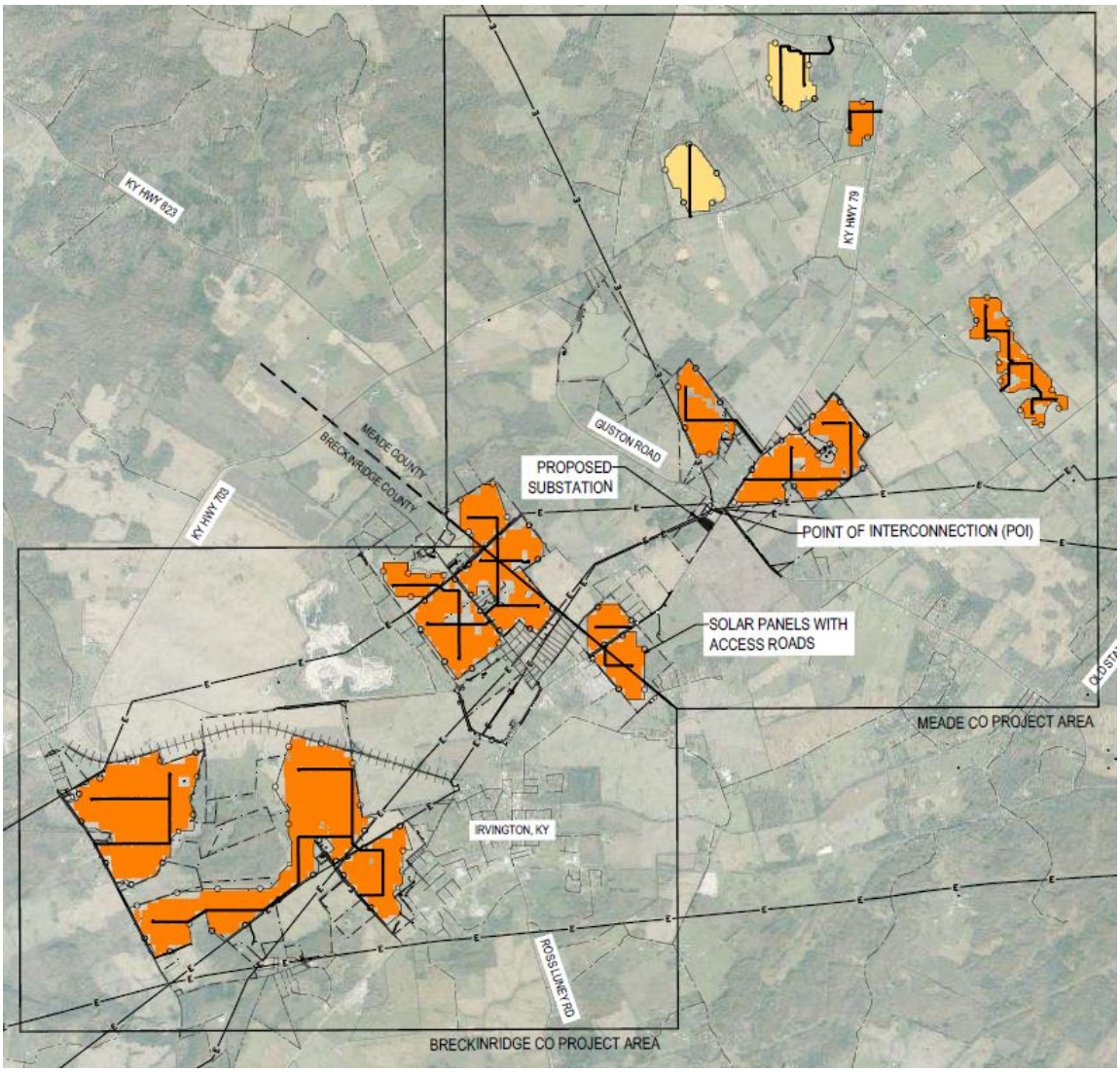
Overview of proposed facility. Section 1 of the SAR (Description of Proposed Project Site) supplies an overview of the project. Green River is an affiliate of NextEra Energy Resources (NEER), a wholesale power generator. The proposed Green River Solar facility would be a 200-megawatt alternating current (MWac) photovoltaic electricity generation facility, situated on a site encompassing approximately 1,100 acres of land in Breckinridge County and 650 acres in Meade County. The proposed site is located 50 miles southwest of the city of Louisville. The Breckinridge County City of Irvington (population approximately 1,200) is adjacent to the proposed site. Power generated by the facility would be collected and transmitted to the nearby 161 kV Meade Substation, where it would interconnect with the transmission system owned by the Big Rivers Electric Corporation.

Environmental Consulting and Technology (ECT), on behalf of Green River Solar, describes the project elements in more detail in the SAR:

Photovoltaic (PV) solar panels will be mounted on racking, which will fix the solar panels to the ground. Additional infrastructure at the Project will consist of central electric inverters and transformers, underground electrical collection systems, electrical collector substation, point of interconnection, switchyard, interconnection facilities, a solar meteorological station, supervisory control, data acquisition (SCADA) hardware, control house, and associated facilities, private gravel access roads with gated ingress/egress points and security fencing. (SAR, page 1)

Exhibit 3 of the SAR (Preliminary Site Layout) presents several maps of the proposed project site overlaid with drawings depicting site boundaries, solar arrays, and other components of the solar generation facility. Figure C-1 is excerpted from Exhibit 3 and shows a high-level view of the project footprint across both Meade and Breckinridge Counties.

Figure C-1.
Preliminary Site Layout for Green River Solar Project



In Figure C-1, proposed solar arrays are depicted in orange while 'alternate' solar array locations are in yellow.

The proposed facility's solar equipment is laid out in eight non-contiguous sections (not including the alternate locations), with each individual section fenced and secured. Interior access roads are drawn in black within each section. An existing railway (not associated with the project) is shown just west of the city of Irvington, within the Breckinridge County project area. Electrical collection systems and transmission lines connect solar arrays to the proposed project substation, which is shown in the Meade County project area, adjacent to the point of interconnection with the existing transmission system owned by Big Rivers Electric. Note that the proposed project substation is distinct from the existing Meade Substation; the project substation transformer will step up the collected solar power to the 161 kV required for interconnection with the existing transmission system at the Meade Substation.

Approximately 20 additional maps in Exhibit 3 of the SAR (Preliminary Site Layout) provide greater detail on each section of the proposed facility, including the locations of inverters, solar panels, occupied and unoccupied nearby structures (e.g., residential homes), wetlands, surface waters, proposed vegetative buffers, property lines, proposed setback lines, transmission lines/easements, and other relevant features.

A complementary high-level view of the proposed project is included in the Application, Volume 1, Exhibit 1, Attachment A (Project Map). This figure provides context for the proposed site and surrounding area; it is excerpted in part as Figure C-2 below.

Figure C-2.
Site Context for Green River Solar Project

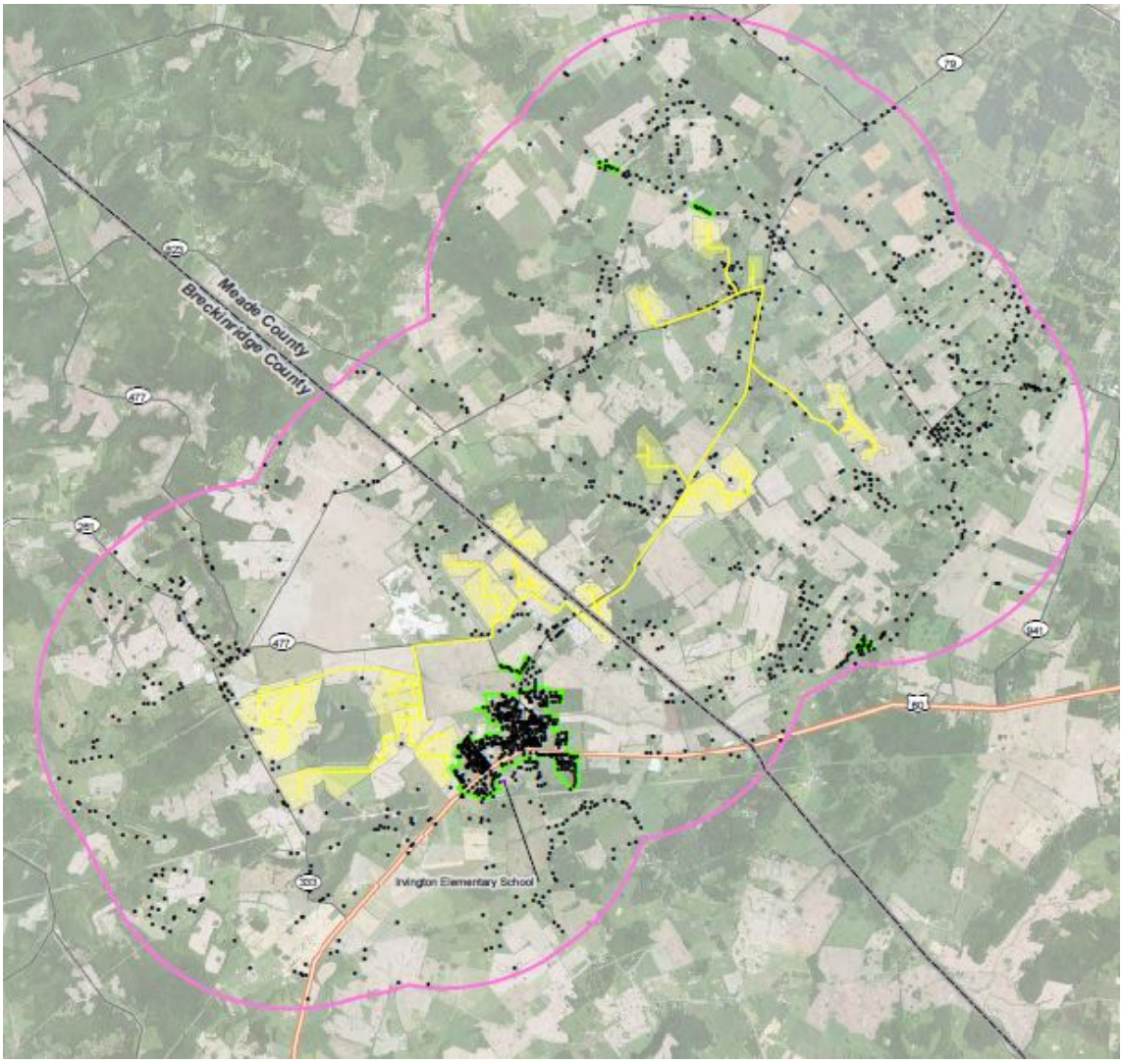


Figure C-2 shows the proposed project footprint in yellow, with yellow lines indicating the underground electrical collection wiring. Five residential neighborhoods are outlined in green, while individual residential structures are denoted as black dots. A 2-mile project radius boundary (showing the area within two miles of the project array areas) is outlined in pink. This map also shows the location of the Irvington Elementary School. The primary roadways near the project site are US 60, which runs east-west along the southern boundary of the proposed project footprint, and KY 79, which runs north-south through the city of Irvington and through the middle of the project's proposed solar array locations.

Some details on project components and project setting are missing from the SAR and its attachments, such as locations of underground wiring rights-of-way (ROW); details of the project's meteorological tower; and a thorough description of the purpose and status of the 'alternate' solar array locations shown in the Meade County project area in Figure C-1. BBC and the Siting Board

requested additional information on these elements in the Initial Request for Information (RFI) to Green River Solar.

Surrounding land uses. Page 1 of the SAR states, "Project parcels are predominately bordered by agricultural farmland and scattered rural homesteads," and page 2 of the SAR refers to SAR Exhibit 1 (Property Value Impact Study) for more detail of the surrounding land uses.

Page 7 of the Property Value Impact Study by CohnReznick states, "The Project will be situated on land parcels utilized for agricultural and forestry purposes […] The Project parcels are bordered by agricultural farmland and rural homesteads." However, the study does not provide details on the proportion of agricultural, residential, or other land types in the area surrounding the proposed project. BBC requested this information from the applicant in the Initial RFI.

Other pertinent information about surrounding land uses includes the proximity of residential communities, schools, parks, or other relevant community buildings. The Project Map included in the Application (and excerpted in Figure C-2) shows the location of the Irvington Elementary School within the 2-mile project radius boundary. The SAR and Application materials do not indicate the existence of any parks or community buildings within the 2-mile project radius. The Siting Board and BBC requested further information on this topic from the applicant in the Initial RFI.

Legal boundaries. Exhibit 2 of the applicant's SAR (Legal Property Descriptions) provides legal descriptions for the parcels associated with the proposed Green River Solar project. The documents within the exhibit appear thorough and correct. However, Green River Solar does not provide a boundary survey map or parcel map to identify the parcels associated with the project. In the Initial RFI, Green River was asked to supply a parcel map as well as some additional information to complement the legal descriptions in SAR Exhibit 2.

Access control. Page 1 of the SAR states that project facilities will be enclosed by a 7-foot security fence, in compliance with the National Electrical Safety Code (NESC) and including an additional 1-foot of barbed wire where permissible (i.e., barbed wire will not be included along facility security fences that border residential properties, as per the Meade County Zoning Ordinance). The applicant also states:

> *Access control strategy will also include appropriate signage to warn potential trespassers. The Project will ensure that all site entrances and boundaries have adequate signage, particularly in locations visible to the public, local residents, and business owners.* (SAR, page 1)

The proposed facility requires a comprehensive access control and safety plan, particularly given the number of access points across the project footprint, as each section of solar arrays will be individually fenced and have multiple access points. The Preliminary Site Layout maps (SAR Exhibit 3) depict proposed access points and internal roads across the project footprint.

Location of buildings, transmission lines, and other structures. Maps provided in Exhibit 3 of the SAR (Preliminary Site Layout), show the proposed locations of the project's 2.72-acre substation, solar arrays, inverters, security fencing, and overhead transmission lines and easements. The locations of other proposed structures—such as the meteorological tower as described on page 1 of the SAR—is not clear. BBC requested further information from Green River Solar in the Initial RFI.

Location and use of access ways, internal roads, and railways. Access ways and internal roads are depicted on maps in Exhibit 3 of the SAR (Preliminary Site Layout). Each section of the facility's solar arrays will be individually fenced with secure access points, which makes the footprint of this project unusual when compared with other solar facility applications reviewed by BBC and the Siting Board during the past two years.

One railway line runs through the project footprint. The project itself will not use the railway for construction or operation activities, but there will be brief intermittent delays on site during the construction phase when the railway is active. Exhibit 6 of the SAR (Traffic and Dust Study) states that two freight trains run each day along the line – one between 6am and 6pm, and one between 6pm and 6am.

Existing or proposed utilities. The applicant does not propose to require external utilities on site during "typical plant operation" (SAR, page 2). In the Initial RFI, the applicant was asked to clarify whether external utilities are required during the construction phase.

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."

Discussion of the setback requirements applicable to this project is found in both the Application and in the SAR. Green River Solar's application states:

Although Meade County has adopted a solar ordinance that prescribes setback requirements applicable to the Project that are less than those set for in KRS 278.704(2), Breckinridge County does not have an ordinance prescribing a lesser setback requirement for solar electric generating facilities […]

[…] Green River respectfully requests the Siting Board to grant a deviation from the minimum setback requirements set forth in KRS 278.704(2) based upon the Project's compliance and consistency with the statues enumerated in KRS 278.704(4). To maintain consistency across the Project, Green River proposes to use the same setback requirements that are set forth in the Meade County Solar Ordinance for the Breckinridge County portion of the Project. (Application, pages 5-6)

The current Meade County Solar Energy Systems (SES) ordinance, adopted in May 2021, requires that solar panels not exceed a height of 25 feet, and that components of the facility—including inverters, solar panels, and ancillary solar equipment—will have a setback of 50 feet from any perimeter property boundaries as well as a setback of 250 feet from any residence, nursing home, church, or school.

Green River Solar proposes to apply the Meade County SES ordinance to the portion of the project that lies in Breckinridge County, and the applicant has made a request for deviation within the Application materials. However as of September 2021 the applicant has not lodged a separate Motion to Deviate from Setback Requirements with the Siting Board, according to the applicant's case files on the Public Service Commission's Siting Board website.

Evaluation of noise levels. Sections 1 and 4 of the SAR summarize the findings from the more detailed Noise Impact Assessment conducted by DNV Energy Systems (Exhibit 4 of the SAR). During the construction phase of the project, activities on site will generate intermittent noise at the nearest receptors (nearby residences). The duration of the construction phase is expected to be between 18 and 24 months. During the operational life of the project, the noise levels of the facility components are not expected to add substantially to background noise.

[Maximum] sound pressure levels at nearby receptors are expected to be less than 80.0 A-weighted decibels (dBA) during Project construction and less than 50.4 dBA during Project operations. Noise levels during construction are anticipated to be similar in magnitude with other sources that may be active in rural agricultural environments, such as farm machinery. Modeled levels during operation are considered to be equivalent to a quiet rural environment. (SAR, page 3)

Noise levels and the details of the Noise Impact Study (Exhibit 4) 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 the proposed facility and site development plan more fully.

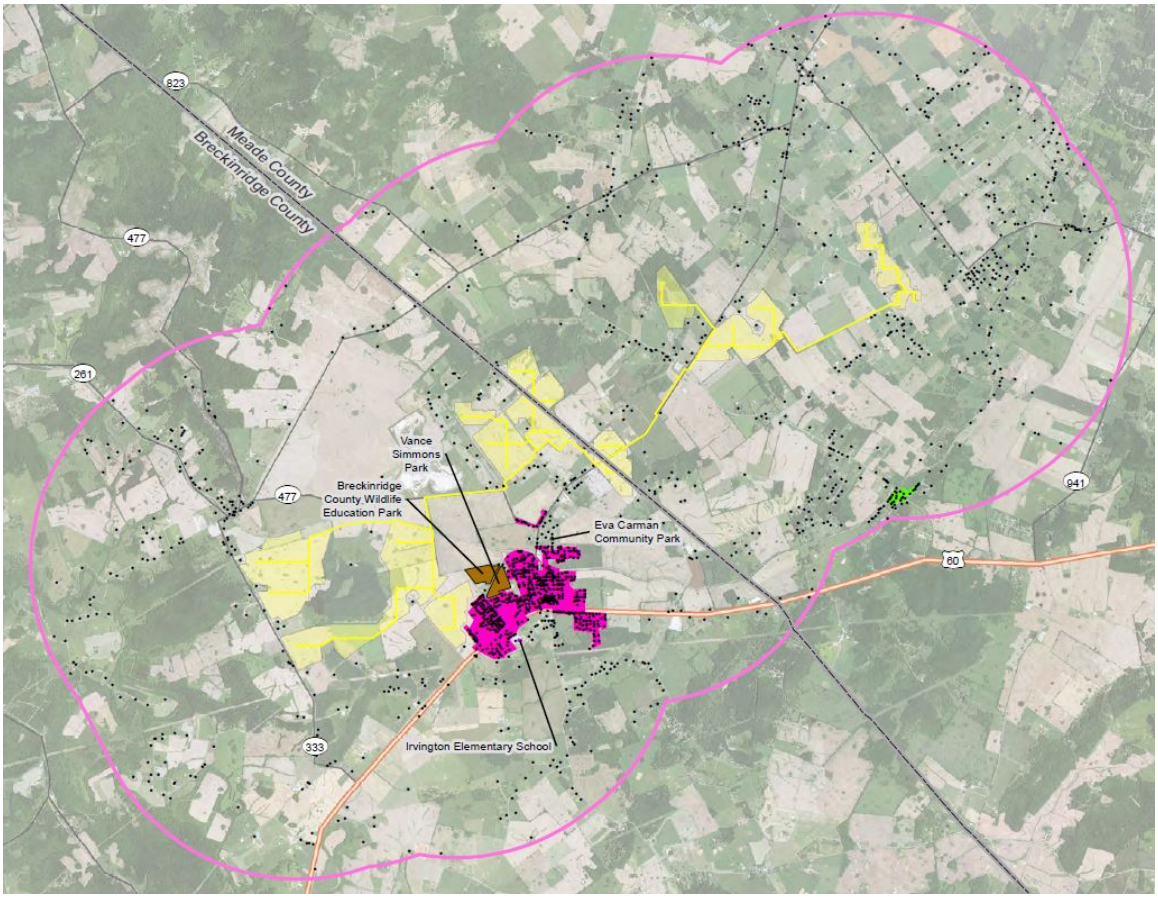
Overview of proposed facility. Both BBC and the Siting Board requested additional information from the applicant regarding the proposed project and site.

Project footprint. In Green River Solar's Responses to Siting Board Staff's First Request for Information, the applicant stated that the 'alternate' solar array locations have been removed from the application and no longer need to be considered by the Siting Board.[1]The removal of the alternate solar arrays from the project application reduces the project's footprint, and two residential neighborhoods previously identified in the SAR no longer fall within the 2-mile buffer.

To illustrate the alterations to the project boundaries and context, Green River Solar provided several updated maps of the project site, including the image excerpted in part as Figure C-3.

[1] Responses to Siting Board Staff's First Request for Information to Green River Solar, LLC Dated August 11, 2021. Response 1.b.

Figure C-3.
Updated Site Context for Green River Solar Project



In Figure C-3, the updated project footprint is shown in yellow, and the 2-mile project radius boundary is outlined in pink. Three residential neighborhoods (as defined by KRS 278.700) exist within this buffer – two are within 2,000 feet of the proposed SES equipment and highlighted in magenta (Breckinridge County), and another neighborhood is more than 2,000 feet away from proposed SES equipment, highlighted in green (Meade County).

Another change to the project context map in Figure C-3 is the addition of three local parks (shown in brown and labeled on the map), as per the Siting Board's request in the Initial RFI.

Right-of-way (ROW) agreements. In response to a request from the Siting Board, Green River Solar provided updated project maps depicting the underground wiring collection routes required for the proposed project.

Green River Solar has executed collection easements with property owners for the planned routes of underground wiring collection shown in [the updated Preliminary Site Plan maps]. The underground wiring collection easement across Big Rivers switchyard land, adjacent to the project substation location, will be agreed upon via Big Rivers' normal easement process. (Green River Solar Responses to Initial RFI, page 36)

In addition, Green River Solar submitted confidential documentation to the Siting Board listing the executed ROW agreements and easements with property owners that are not part of the leases for the proposed facility's solar arrays.

Surrounding land uses. The Siting Board and BBC requested detailed information from the applicant regarding surrounding land use (e.g., agricultural, residential) as a percent of adjacent parcels and adjacent acreage. In their response to the Initial RFI, Green River Solar provided a summary table using data from the Meade County and Breckinridge County Property Valuation Administrators (PVAs).

Figure C-4.
Adjoining Parcel Land Use for Green River Solar Project

Land Use	Number of Parcels	Percent of Parcels	Parcel Acreage	Percent of Acreage
Farm	65	28%	5241	86%
Quarry	2	1%	332	5%
Residential	142	62%	426	7%
Telecommunication	1	0%	6	0%
Mobile Home	5	2%	0	0%
Commercial	15	7%	110	2%
Total	**230**	**100%**	**6,115**	**100%**

Source: Green River Solar Responses to Siting Board Staff's First Request for Information. August 11, 2021.

Residential parcels make up 62 percent of the total 230 parcels adjoining the proposed project, while agricultural parcels comprise 28 percent. However, residential parcels comprise only 7 percent of the total acreage of adjoining parcels, while agricultural land constitutes 86 percent. This composition of surrounding land uses — where residential parcels comprise the majority of adjacent parcels but a small proportion of the total adjacent land area — is typical among the six proposed solar facilities that BBC has reviewed for the Siting Board. However, the total number of adjacent residential parcels (142) is larger than in most of the proposed facilities that BBC has reviewed, with the possible exception of the Unbridled Solar project.

In response to the Siting Board Staff's Second Request for Information to Green River Solar, the applicant confirmed that "a very small portion of the solar array within Array Group A in the Project's originally submitted plans was slightly within the city limits of the City of Irvington." The applicant further reported that they had "updated our plans to exclude building within the city limits of the City of Irvington."[2] As part of their response, Green River Solar also provided an updated set of maps for the proposed project. The revised Figure C2.12 shows the revised layout for the array area closest to the City of Irvington.

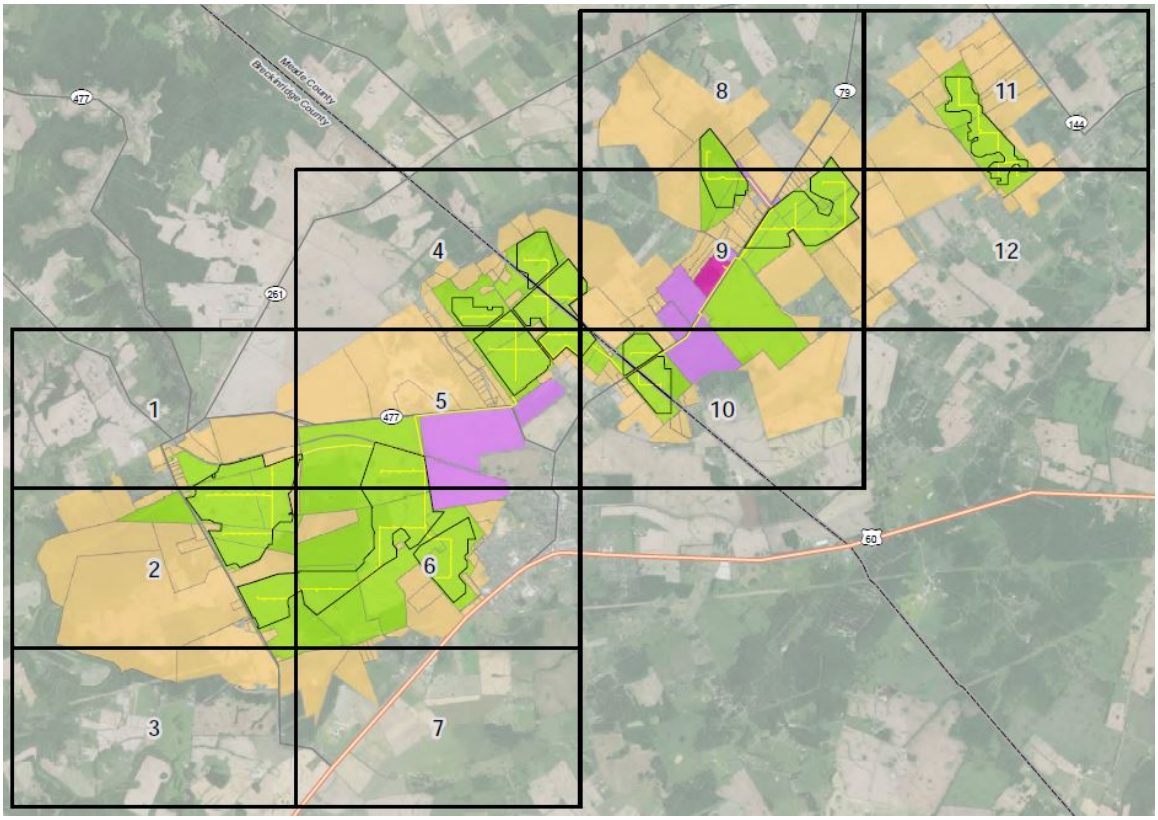
[2] Responses to Siting Board Staff's Second Request for Information to Green River Solar, LLC. Siting Board Request 5. September 23, 2021.

As noted in a previous section of this report, Green River Solar's updated project maps provided in their response to the Initial RFI also highlighted three local parks near to the proposed project (Figure C-3).

Legal boundaries. BBC closely reviewed the legal descriptions of the parcels that Green River would lease for the proposed project provided in the SAR. There are about 37 different parcels (including some parcels with multiple tracts) totaling at least 3,000 acres.[3] As discussed previously, the total land area for the project is described in the Application and SAR as about 1,750 acres. After deleting the "alternate array areas", the applicant revised the total area estimate down to 1,677 acres.[4] The larger total land area among the lease parcels (relative to the solar array area) indicates that the lessors are typically leasing a little more than half of their property to Green River Solar.

In their responses to the Initial RFI, the applicant supplied a map of parcels leased by and adjacent to the proposed project. This image is excerpted in part as Figure C-5.

Figure C-5.
Parcel Status Map for Green River Solar Project



[3] BBC's tabulation was confirmed in Green River's Responses to Siting Board Staff's First Request for Information, where response 1a indicates the total area of the leased parcels (including both leased and unleased land) is 3,012 acres.

[4] Responses to Siting Board Staff's First Request for Information to Green River Solar, LLC Dated August 11, 2021. Response 1.a.

In Figure C-3, parcels indicated in green are those that have been leased or purchased for the solar arrays or project substation. Those in purple are adjacent to the project footprint and are required for underground wiring ROW. Parcels in beige are all other adjacent parcels.

In addition to the above information, Green River Solar submitted confidential documentation to the Siting Board listing the lease agreements with property owners for land to be used for the solar arrays.

Location of buildings, transmission lines, and other structures. BBC requested details from the applicant regarding the project's meteorological tower. In their responses to the Initial RFI, Green River Solar stated that the tower will be 6 feet tall with a 20 by 20-foot base, and it will be sited behind a vegetative buffer to reduce visibility from nearby residences. The precise location of the tower is yet to be finalized, but given its relatively low profile compared to the solar panels themselves, its location is unlikely to be an important concern for nearby residents.

Utilities. In their responses to questions posed in the Initial RFI, the applicant states that there may be circumstances in which external utility services would be required during the construction phase of the project, such as for water for dust mitigation and electricity during facility construction:

Existing water wells will be utilized wherever available. If there are no existing water wells, the construction contractor will typically drill an on-site well for dust mitigation water. In the event the well does not provide adequate flow and pressure, the alternative is to request a water line tap with Meade County Water District […] Electric service during construction and commissioning will be obtained from the local electric distribution utility. The Project has confirmed with Meade County RECC that they are the sole electric utility provider in the project area, so electric service will be acquired from Meade County RECC during construction. (Green River Solar Response to Initial RFI, page 88)

Compliance with applicable setback requirements. In the Initial RFI, BBC asked Green River Solar to clarify what correspondence or consultation—if any—they had with Meade County in development of that SES ordinance.

In their response, the applicant clarified that Meade County's original SES ordinance was developed and adopted in 2020, prior to Green River Solar's involvement in this proposed project, and that Green River Solar did not consult with Meade County on the original ordinance. However, Meade County repealed the original ordinance in March 2021, and Green River Solar participated in working group meetings, phone calls, and email conversation regarding various elements of the new solar ordinance before its eventual finalization and adoption in May 2021.

In addition, Green River Solar has corresponded with Breckinridge County officials regarding the proposed project, including verbal communication of the proposed application of Meade County setback requirements to the Breckinridge County portion of the project. No formal presentation or correspondence regarding setback requirements has taken place with Breckinridge County, however, Green River Solar is not aware of any concerns held by Breckinridge County officials regarding the proposed project setbacks.

BBC spoke with the Breckinridge County Judge Executive to discuss Green River Solar's proposed deviation from the statutory setback requirements in that county. Breckinridge County is not necessarily opposed to allowing the less restrictive setbacks from the Meade County Solar ordinance

for the portions of the proposed Green River Solar project in Breckinridge County, but feels that Green River Solar should also follow the other components of the Meade County Solar ordinance within Breckinridge County. The Meade County ordinance also requires final approval of the solar development plan by a majority vote of the Meade County Fiscal Court, and that the developer post a Surety Bond or other security with the County to protect against potential abandonment of the site requiring the County to step in and remove the facility. The Meade County ordinance also requires a decommissioning plan from the developer prior to approval of the solar facility.[5]

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

Landowner notification. In response to a question from the Siting Board about notices sent to adjoining landowners regarding the proposed project, Green River Solar stated:

All landowners listed in [the attachment] were sent notification via certified mail, including participating landowners, adjoining landowners, and landowners with underground collection wiring […] Some of the certified mail was returned as undeliverable. [The attachment] includes the list of these landowners. For those individuals who chose not to go to the post office to receive the certified mailing once the initial delivery was unsuccessful, Green River Solar mailed the notice via first class mail. No additional efforts were made to reach out to the landowners who left no forwarding address. (Green River Solar Responses to Initial RFI, page 94)

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.

- Within the Application, Green River Solar has requested a deviation from the statutory setback requirements of a minimum of 1,000 feet between nearby residences and solar equipment and a minimum of 2,000 feet from the property boundary to the nearest residential neighborhood within the Breckinridge County portion of the project. The applicant proposes to apply setback requirements established by Meade County's SES ordinance to the entire project footprint. The Meade County ordinance, adopted in May 2021, requires that solar panels not exceed a height of 25 feet, and that components of the facility—including inverters, solar panels, and ancillary solar equipment—will have a setback of 50 feet from any perimeter property boundaries as well as a setback of 250 feet from any residence, nursing home, church, or school.

[5] Meade County Fiscal Court Ordinance: 2021-005, as provided in App. Vol. 1 – Tab 3 – Attach A

- The Meade County ordinance also contains additional provisions. These include the requirement that a Level 3 SES (such as Green River Solar proposes to develop) must be approved by the Meade County Planning and Zoning Commission and must receive final approval by the County Fiscal Court.

- Green River Solar has not yet filed a separate Motion to Deviate from Setback Requirements within Breckinridge County with the Siting Board.

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

- Green River 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.

- Green River 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. According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work.

- Green River Solar should submit a Motion for Deviation from Setback Requirements. The Motion should describe the applicant's proposed setbacks based on the distance estimates from facility components (e.g., solar panels) for all applicable adjoining residences and perimeter boundaries. The Motion should thoroughly explain all of the stipulations of the Meade County ordinance and their proposed applicability to the Breckinridge County portion of the project. Breckinridge County should also be provided with the other protections incorporated in the Meade County ordinance and be given the opportunity for the County Fiscal Court to formally review and vote on the proposed project plan in Breckinridge County (if they wish to do so). Breckinridge County should also be provided with the same type of Surety Bond or other security against site abandonment as Meade County and given the opportunity to review and approve the project's decommissioning plan.

Compatibility with Scenic Surroundings

This section of the SAR review addresses the compatibility of the proposed Green River 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. [6]

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

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

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.

[6] 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.

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 specifically related to visual impacts in effect for the area surrounding the proposed facility, though the Meade County solar ordinance's screening requirements are intended to create a visual buffer from nearby homes.[7]

Information Provided in the Applicant's SAR

In compliance with KRS 278.708, Section 2 of the SAR summarizes the assessment of compatibility with scenic surroundings. Section 2, in turn, cites the findings from SAR Exhibit 1 (Property Value Impact Study), conducted by CohnReznick. Page 4 of the SAR summarizes some of the findings of Exhibit 1 and Exhibit 4:

Compatibility with the surrounding land uses is discussed in the Property Value Impact Study [which determined that] "…the proposed Project would not be incompatible with surrounding [land] uses and would not negatively impact surrounding properties." Please refer to Pages 7 through 11 in Exhibit 1, which address setbacks, topography, and surrounding land use. The Project is located within flat and occasionally elevated farmlands. (SAR, page 4)

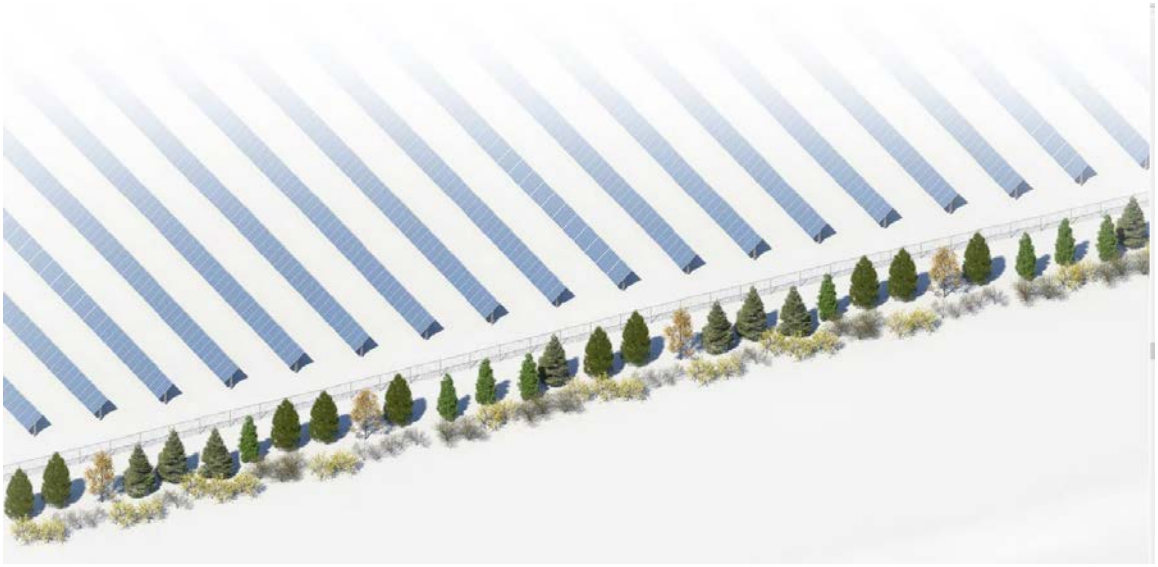
The proposed Green River Solar project would be a large, commercial solar facility. The facility would be larger than most of the previous solar projects reviewed by BBC for the Siting Board, though fairly similar in scale to the 160 MW Unbridled Solar project reviewed earlier this year (Siting Board Case 2020-00242). The Green River Solar project is more unusual in its placement of the solar arrays, which appear in patches across the local landscape (reflecting landowner choices regarding participation in the project) rather than in a single block. The dispersion of solar panels across a large acreage could serve to somewhat dilute the facility's impact on the viewshed, though it also creates more linear footage of borders with adjacent, non-participating properties. As with similar projects that have come before the Siting Board in the past 12 months, much of the project's compatibility with the scenic surroundings will depend on a strategic and well-executed vegetative screening plan. Green River Solar describes their proposed vegetative screening plan in the SAR and cites requirements laid out in the Meade County SES ordinance:

[A] proposed vegetative buffer, approximately 26,000 ft in total length, will be planted in areas adjacent to residential properties around the Project boundary if one does not already exist. Vegetative screening will be planted in accordance with regulations detailed in Section 4.3.7.3.d of the Meade County Zoning Ordinance and will include a naturalized mix of trees and shrubs suitable for the specific site conditions. As required in the Meade County Zoning Ordinance, vegetative screening shall reduce visual impacts from the proposed Project from "residential dwelling units on adjacent lots (including those lots located across a public right of way)." Because Breckinridge County does not have vegetative screening requirements for solar facilities, a vegetative screening compliant with the standards outlined in the Meade County Zoning Ordinance will also be implemented for portions of the Project within Breckinridge County. (SAR, page 4)

[7] Meade County Fiscal Court Ordinance: 2021-005, article 4.3.7.3.d. Adopted May 11, 2021.

The applicant supplies one visual representation of the project's proposed vegetative screening as Exhibit 5 of the SAR, which is excerpted in part here as Figure C-4.

Figure C-6.
Visual Representation of Proposed Vegetative Screening



Supplemental Investigations, Research, and Analysis

Visual assessment. BBC visited the proposed Green River Solar project site in September 2021 to review the proposed site and its surroundings. We also took a number of photos during that visit. Figure C-7 shows the location of the existing Meade Substation and the adjacent area to the southwest of that facility where the new Green River Substation Transformer would be constructed (between the existing substation and the group of trees in the photograph.)

Figure C-7.
Existing Meade Substation and Area to Southwest Where New Green River Substation Transformer Would be Built

Much of the land on which the solar facility would be built is either flat or gently rolling. Solar panels would be constructed in the agricultural fields in the Meade County portion of the project area shown in Figure C-8.

Figure C-8.
Potential Future Array Area in Meade County Portion of Project Area

Figure C-9 shows another proposed solar array area from the property of a participating landowner in Meade County.

Figure C-9.
Potential Future Array Area from Participating Landowner Residence in Meade County Portion of Project Area

A portion of the project area in Breckinridge County is in close proximity to the western portion of the City of Irvington. Solar panels would be constructed on the agricultural land shown to the left of Figure C-10, which is taken from near the western boundary of the city limits of Irvington.

Figure C-10.
Potential Array Area Near City of Irvington

Solar arrays are also proposed to be constructed behind the City of Irvington residences owned by the Housing Authority of Irvington, shown in Figure C-11.

Figure C-11. Irvington Home Near Future Array Area

Conclusions and Recommendations

The proposed Green River 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.

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.

- Green River 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.

- Green River Solar should use panels with anti-reflective coatings to reduce glare and corresponding visual impacts.[8]

- Green River Solar should be open to communication with adjacent landowners regarding viewshed impacts and the implementation of strategic additional vegetative screening, if needed.

[8] Although anti-reflective coatings were not mentioned in the Application or SAR, Green River Solar confirmed in their response to the Siting Board Staff's Second Request for Information that their solar panels will have such coatings to reduce glare (Response 6).

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 valuation advisory services firm (CohnReznick, LLP) to examine the proposed project's potential impact on property values. Exhibit 1 of the applicant's SAR (Property Value Impact Study) provides a comparative study of property values in proximity to 11 solar facilities in the Midwest, Southeast, and Eastern states of the US. The study also reviews published studies and draws on discussions with market participants and experts, including County Property

Value Administrators in Kentucky. The section draws its conclusions regarding the impacts of the proposed facility on adjacent property values based on market analysis of sale value impacts from properties adjacent to the select solar facilities compared with sales from properties in many control areas.

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

We analyzed 37 adjoining property sales and over 238 comparable sales, collectively, for the identified eleven solar farms (detailed in the Primary Report), over the past five years. We note that proximity to the solar farms has not deterred sales of nearby agricultural land and residential single-family homes, nor has it deterred the development of new single-family homes on adjacent land. (SAR Exhibit 1, page 3)

Further in their final conclusions, CohnReznick states:

Based upon our examination, research, and analyses of the existing solar farm uses, the surrounding areas, and an extensive market database, we have concluded that ***no consistent negative impact has occurred to adjacent property that could be attributed to proximity to the adjacent solar farm****, with regard to unit sale prices or other influential market indicators. Additionally, in our workfile we have retained analyses of additional Test Area subjects, each with their own set of matched Control Area sales, which had consistent results, indicating no consistent and measurable impact on adjacent property values.* (SAR Exhibit 1, page 21)

Supplemental Investigations, Research, and Analysis

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

In some cases, recent proposals to construct large scale commercial solar projects have met with substantial public opposition. Notable examples include the proposed 500 MW facility at Fawn Lake, in Spotsylvania County, Virginia and the proposed 120 MW facility in Madison County, Indiana.[9] 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:

[9] *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 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 homes within 100 feet of a 20 MW solar installations and a 5 percent decline in value within 100 feet of a 102 MW solar facility.
- "The results also suggest that experience assessing near a solar installation is associated with a much less negative estimate of impact."[10]

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[11] had no statistically significant impact on home prices.[12]

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

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[10] *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.

[11] 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 Green River Solar facility would sit near the small city of Irvington, and the surrounding area has a low population density.

[12] *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/

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 predominantly rural setting for the proposed Green River Solar project—and acknowledging that the project's proposed vegetative buffers will help obscure the site's physical elements from nearby residences and neighborhoods—we conclude that the proposed solar facility is unlikely to have measurable adverse impacts on nearby residential property values. We do note, however, that the demographic data presented in the property value impact report included as part of the SAR (which is cited to ESRI) substantially understates the number of people living in proximity to the proposed solar facility.[13] The data presented indicate there are only 23 people living within one mile of the proposed facility – however, more detailed data included with the Noise Impact Assessment in the SAR shows there are 288 residences within 2,000 feet of the nearest solar equipment (and there would obviously be more within one mile). The Noise Impact Assessment data also show that there are 1,140 occupied homes within two miles of the nearest solar equipment, showing that the ESRI estimate of 638 households living within three miles is also a substantial underestimate.

Recommended mitigation. BBC does not recommend any mitigation for the specific purpose of preserving local property values. However, Green River Solar's vegetative screening plans may serve to help ensure that the proposed facility will not have an adverse impact on local property values.

[13] Application Volume 2, Attachment A, Exhibit 1, Page 10 of 170.

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 Green River Solar Generation facility. This component of the SAR is identified in KRS 278.708(3)(d).

Potential Issues and Standard Assessment Approaches

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

A standard noise impact assessment focuses on several key factors:

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

Information Provided in the Applicant's SAR

Noise generation from construction and operation is addressed in Section 4 of the SAR and in detail in the Noise Impact Assessment performed by DNV Energy Systems (Exhibit 4 of the SAR). As stated in the SAR:

During Project development, construction is anticipated to occur intermittently over the course of eighteen months to two years at different locations throughout the Project site. Noise-producing construction activities include pile driving for solar array panel racking as well as demolition and site preparation activities involving grading. During operational conditions, an estimated 99 total solar inverters, including 89 inverters plus 10 alternates, and one step-up transformer, located at the Project substation, were evaluated […] The Project anticipates that all construction, operation, and maintenance activities will generally occur from 6:00 AM to 6:00 PM. (SAR, page 7)

Noise level calculations by DNV were based on a distance of 280 feet to the closest noise receptor, and a total of 1,140 residential receptors within a 1-mile radius of a solar inverter or transformer

were included in the analysis. Receptors were modeled at a height of 5 feet, representing a one-story structure.

At the outset of the assessment, DNV provides a table of sound sources considered in the analysis, including construction equipment and vehicles, specified by phase. This table is excerpted here as Figure C-12.

Figure C-12.
Construction Equipment Sound Sources from Noise Impact Assessment

Phase	Equipment	Quantity	L_{max} at 50 ft [dBA]		Usage	Calculated L_{eq} at 50 ft	
			Individual	Total	Factor [%]	dBA	dB
Demolition/Site Preparation	Grader	2	85.0	88.0	40	84.0	90.0
	Dump Truck	4	84.0	90.0	40	86.0	93.8
	Water Truck	1	85.0	85.0	50	82.0	87.1
	Generator	4	82.0	88.0	50	85.0	90.3
	Semi-trailer	1	84.0	84.0	40	80.0	84.1
Pile Driving	Pile Driver	4	95.0	101.0	20	94.0	101.1
	Water Truck	1	85.0	85.0	50	82.0	87.1
	Generator	4	82.0	88.0	50	85.0	90.3
	Semi-trailer	1	84.0	84.0	40	80.0	84.1
Foundation Installation	Concrete Truck	2	85.0	88.0	40	84.0	89.0
	Water Truck	1	85.0	85.0	50	82.0	87.1
	Generator	4	82.0	88.0	50	85.0	90.3
	Semi-trailer	1	84.0	84.0	40	80.0	84.1

During the construction phase, vehicles and machinery such as trucks, bulldozers, excavators, and pile drivers will generate noise onsite while preparing the site and installing the facility's panels, racking, inverters, substation, and associated structures. The Noise Assessment calculates that maximum noise levels will occur during pile driving, which is consistent with previous solar project noise impact studies reviewed by the Siting Board. The results from DNV's calculated construction sound levels (at varying distances) is summarized in Figure C-13.

Figure C-13.
Calculated Sound Levels from Construction Equipment

Phase	A-weighted [dBA]			Unweighted [dB]		
Distance (ft)	50	280	1000	50	280	1000
Demolition and Site Preparation	90.9	75.9	64.9	97.2	82.2	71.2
Pile Driving	94.9	80.0	68.9	101.7	86.7	75.7
Foundation Installation	89.2	74.2	63.2	94.2	79.2	68.2

The closest noise receptor is located at 280 feet from sound origin, so the maximum noise level at the nearest receptor will be 80 dBA during the construction phase of the project. This roughly equates to the noise of a household garbage disposal, or a tractor at 50 feet.

For the noise assessment during the operational life of the proposed project, DNV identified the primary sources of noise as the solar inverters and substation transformer:

The sound pressure level at each receptor for the aggregate of all solar inverters and the main transformer associated with the Project were calculated using CadnaA acoustic modeling software based on the ISO 9613-2 method [1]. The simulation was performed using the maximum sound power level of the solar inverters and transformer. (SAR Exhibit 4, page 8)

The highest noise level resulting from the operation of project inverters and transformer was 50.4 dBA at the nearest receptor. This is roughly equivalent to the sound of light traffic or moderate rainfall.

The Noise Impact Assessment concludes that noise levels will increase during the construction phase of the project, but that the increases will be temporary, intermittent, and within a reasonable range. During the operational lifetime of the proposed facility, noise would be generated by the facility inverters and substation, however this noise would not be loud enough to be classed as damaging or annoying. Note that noise level calculations for both the construction and operation phases of the project were conducted without considering additional attenuation from foliage or topographical barriers, and that lower sound levels would be expected where vegetative buffers stood between project components and a noise receptor.

Supplemental Investigations, Research, and Analysis

Commonly accepted noise level exposure limits. BBC researched noise level exposure limits advocated by public health agencies such as the CDC and the National Institute for Occupational Safety and Health (NIOSH). NIOSH has a recommended exposure limit of 85 dBA (note that decibels are measured on a logarithmic scale).[14] Figure C-14 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-14.
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

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

At 80 dBA—the estimated noise level of a pile driver as measured at the proposed project's nearest receptor—daily noise dose would be reached in more than 8 hours. Additionally, pile driving will be an intermittent activity on site, and pile drivers will move regularly around the site to install the panel support systems.

Construction schedule. BBC asked the applicant to describe any correspondence between Green River Solar and neighboring landowners regarding the proposed 6 AM to 6 PM hours of construction. In their response to the Initial RFI, the applicant stated that the specific hours had not been discussed with neighboring landowners, but that "[given] that the Project will be constructed in a largely agrarian community, the anticipated work hours are expected to be within the normal experience of most local residents." (Green River Solar Responses to Initial RFI, page 81)

Noise suppression methods. Green River Solar was asked to describe any noise suppression construction methods that they plan to employ, along with the associated reduction in noise. The applicant responded that neighboring residents and businesses will be notified about the start of construction and potential noises at least a month prior to construction commencement, but that Green River Solar does not plan to employ any special construction methods for noise suppression.

Noise levels from construction, expanded. In the Initial RFI, the Siting Board requested the applicant provide an expanded table of noise levels generated during the construction phase, to include more distances. Green River Solar provided an additional table, excerpted here as Figure C-15.

Figure C-15.
Calculated Sound Levels from Construction Equipment, Expanded

Phase	A-weighted [dBA]					Unweighted [dB]				
Distance (ft)	50	280	500	800	1000	50	280	500	800	1000
Demolition and Site Preparation	90.9	75.9	70.9	66.8	64.9	97.2	82.2	77.2	73.1	71.2
Pile Driving	94.9	80	74.9	70.8	68.9	101.7	86.7	81.7	77.6	75.7
Foundation Installation	89.2	74.2	69.2	65.1	63.2	94.2	79.2	74.2	70.1	68.2

The Noise Impact Assessment provides a detailed listing of "receptor locations" (occupied homes) within one mile of the proposed solar equipment. Based on BBC's review of those data, there would be 288 occupied residences within 2,000 feet of the nearest solar equipment. There would be only five occupied residences within 500 feet of the nearest solar equipment (and the closest would be 280 feet away, as discussed earlier).

Other noise-related information. BBC compared the projected construction and operational noise levels from the Green River Solar project to previous estimates for other Kentucky solar projects we have reviewed for the Siting Board over the past two years.[15] We found that the noise level estimates in the Green River SAR are roughly consistent with, although slightly lower than, the noise level

[15] In addition to the proposed Green River Solar project, BBC has also reviewed the proposed Turkey Creek, Unbridled, Ashwood, Flat Run and Martin County solar facilities.

projections from these other proposed solar facilities. Figure C-16 summarizes the pile driving noise levels estimated (all in A-weighted decibels) in these proposed solar facility applications.

Figure C-16.
Estimated Noise Levels from Pile Driving, KY Solar Project Proposals (dBA)

	Estimated noise level at 50 ft (dBA)
Green River Solar	
Pile driver	94.9
Martin County Solar	
Pile driver (impact)	101.0
Pile driver (sonic)	95.0
Flat Run Solar	
Pile driver	100.6
Ashwood Solar	
Pile driver (impact)	101.0
Pile driver (sonic)	95.0
Unbridled Solar	
Pile driver (impact)	101.0
Turkey Creek Solar	
Pile driver (impact)	101.0
Pile driver (sonic)	96.0

While the pile driver noise level estimate made by DNV in the Green River Noise Impact Assessment is slightly lower than the estimates used in previous solar projects for impact pile drivers, it is within the standard range. The DNV Noise Impact Assessment was more tailored and comprehensive than some of the noise impact studies that BBC has reviewed relating to past solar project proposals, and BBC does not consider the study's estimates of pile driver noise levels to be unduly low.

There are two other noise-related items worthy of note in regard to the proposed Green River Solar facility. First, as discussed earlier, Green River Solar has now dismissed the "alternate solar array" areas from their application. As a result, there would be a total of 89 solar inverters rather than the 99 inverters considered in the Noise Impact Assessment. For the same reason, there would also be somewhat fewer than the 1,140 residential receptors within one mile of the solar equipment identified in the Noise Impact Assessment. Also, during the site visit, BBC inquired about potential noise from solar array tracking motors which has been described in other proposed solar siting assessments. Green River Solar stated that their plan is to use fixed solar panels, so there would be no noise from panel tracking motors.

Conclusions and Recommendations

During construction, noise from the pile drivers will have the most substantial impact on the nearest noise receptors, such as the closest residence at 280 feet which will experience a maximum noise level of 80 dBA. Noise levels from inverters and transformer during normal operation of the proposed Green River Solar facility are unlikely to be disruptive to local residents.

Recommended mitigation. Green River Solar should clarify precisely where pile driving will occur and mitigate hazardous or annoying noise as necessary. Further:

- Similar to other recent solar facility applications reviewed by the Siting Board, construction activity at the Green River 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.

- Green River 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.

- As recommended in the Noise Impact Assessment within the SAR, during construction Green River Solar should "Locate stationary noise-generating equipment such as air compressors or portable power generators as far as practicable from neighboring houses."[16]

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

Impacts on Transportation

This portion of the SAR review examines the impacts of the proposed Green River 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.).

[16] App. Vol. 2 – Tab 11 – Attach. A – Exh. 4 -Page 13 of 48.

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

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

Information Provided in the Applicant's SAR

The Traffic and Dust Study (Exhibit 6 of the SAR), conducted by Integrated Engineering/Prime AE, describes the existing road network near the proposed project site and road segments evaluated in the study:

Two major roadways are present in the proposed project's vicinity. US Highway 60 (US 60) runs east to west connecting the city of Irvington to Fort Knox to the east and Hardinsburg to the west. Kentucky Highway 79 (KY 79) runs north to south connecting Irvington to the city of Brandenburg.

On the southwestern part of the project, two proposed site entrances are located on minor collector Webster Basin Spring Road and local O.L. Norton Road. These two roads connect to US 60. Similarly, in the center of the project, one proposed site entrance is located on local Mount Merino Cemetery Road that connects to KY 79. In the north part of the project, three proposed site entrances are located on minor collector Sandy Hill Road, Midway Road, and Dooley Road. These three roads connect with KY 79. Four other site entrances of the project are located on KY 79. (SAR Exhibit 6, page 1)

Integrated Engineering compiled data from the Kentucky Transportation Cabinet (KYTC) to establish an existing traffic baseline using the annual average daily traffic metric for roadways adjoining each of the 10 site entrances. The Traffic Study also incorporates traffic collision data from the Kentucky State Police website and concludes that a traffic management plan must be developed by Green River Solar or its construction contractor in order to mitigate potential traffic delays, hazards, or collisions.

[*Increased] traffic is associated with travel of construction workers, deliveries of construction equipment and material, and delivery of solar panel components and equipment. The construction workers will create trips along the roadways in the morning and evening as they come and go from work. During the construction phase, 150 to 300 workers will be employed for the project. At the beginning of construction, heavy machinery will be delivered to the sites. Throughout the construction process deliveries of equipment and materials will occur on trailers, flatbeds, or other large vehicles periodically at various times of day. Green River Solar, LLC will inform and obtain permits from State and local road authorities as needed for Class 21 vehicle transport to the sites.* (SAR Exhibit 6, pages 3-4)

The operational phase of the Green River Solar facility will have little impact on local traffic conditions as only up to two employees will make site visits a few times per week.

The Traffic Study concludes that the primary roadways (US 60 and KY 79) are underutilized, and existing daily traffic is much less than the roadway capacity. Even with the addition of both delivery and commuter vehicles (up to 300 workers on site daily, during a 4- to 6-month construction peak) to the project site during the construction phase, the roadways will continue to perform at a very high level of service.

Supplemental Investigations, Research, and Analysis

Vehicle load weights and compatibility with local roadways. BBC conducted further research on the weight limits and vehicle classes permitted to travel on specific roadways in Kentucky. The primary routes located near the proposed project site (US 60 and KY 79) are major highways rated for 88,000 pounds (KYTC Truck Weight Classification). Any vehicle loads exceeding these limits could subject the roadways and shoulders to damage or degradation. Additionally, any local roads used by delivery trucks may be more susceptible to degradation from heavy loads.

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

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

BBC contacted the Kentucky Transportation Cabinet's Department of Overweight/Over-dimensional Vehicles regarding their permitting process. BBC then utilized the KYTC Route Evaluation online tool to ascertain potential route restrictions for oversized deliveries. The BBC team input information for several sample configurations into the KYTC Route Evaluation tool and found that there could be problems with load clearances, particularly during delivery of the power transformer, dependent on the exact configuration of the delivery load.

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

However, BBC finds that the primary roadways adjacent to the proposed Green River Solar project site are major highways with higher load ratings than seen in several other recent solar facility applications reviewed and approved by the Siting Board within the past 12 months. BBC expects that advance planning between Green River Solar and the KYTC (as well as the Meade and Breckinridge County road departments, as applicable) can mitigate problems resulting from overweight and over-dimensional load delivery. In the Initial RFI, BBC requested further information from the applicant regarding planned logistics for the transformer delivery and any correspondence between Green River Solar and the KYTC.

Delivery vehicles. The SAR and Application documents did not offer an estimate of the number or weight of delivery vehicle loads that will arrive at the project site. In their response to BBC's questions in the Initial RFI, Green River Solar states:

During the construction phase, it is expected that the Project would have a total of 2,500 delivery trucks, most of which are standard semi-truck trailers. The heaviest load is the substation transformer at approximately 250,000 pounds without oil. Due to the substation being located along a

major road, it is not expected side roads or streets will need to be utilized. The anticipated delivery route is [primarily along US 60 and KY 79]. (Green River Solar Responses to Initial RFI, page 67)

Conclusions and Recommendations

During construction, daily deliveries on semi-truck trailers and a peak daily workforce of 300 will substantially increase the amount of traffic on primary roadways near the project site. However, given the low traffic levels at present, traffic volume alone is unlikely to impact the level of service.

Most of the proposed site entrances are from KY 79 and would be abrupt, right-angle turnoffs from the highway. Although this road does not have heavy traffic volume for a state highway, during BBC's site visit we observed that traffic moves at high rates of speed along this road and there generally are minimal shoulders alongside the roadway. These conditions suggest that a careful traffic management plan and the use of flag persons will be important to maintain traffic safety during the 18 months to two years of construction.

Delivery of the 125-ton substation transformer will likely present some challenges given the existing 88,000-lb load rating of US 60 and KY 79. These challenges can be overcome with careful advance planning with the KYTC and an appropriate traffic management plan.

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

- Green River 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, Green River Solar should implement ridesharing between construction workers as appropriate and feasible due to the COVID-19 pandemic; use appropriate traffic controls; or allow flexible working hours outside of peak hours to minimize any potential delays during AM and PM peak hours. Green River Solar will also likely need to use flaggers to reduce the speed of traffic along KY 79 during the construction period.

- Green River Solar should consult with the Kentucky Transportation Cabinet as soon as feasible to discuss the anticipated construction-related traffic and the transportation requirements for the power transformer and any restrictions on US 60 and KY 79. Green River Solar should obtain any necessary permits from appropriate agencies. As stated in the Traffic and Dust Study, "Green River Solar, LLC will inform and obtain permits from State and local road authorities as needed for Class 21 vehicle transport to the sites. Road officials will help identify any special transportation requirements for heavy trucks during construction (e.g., the need to avoid existing bridges, the need to reinforce or ramp over existing bridges for which there is no detour, detours of highway traffic, or temporary closures). Green River Solar, LLC will comply with all permit requirements and will coordinate with designated road officials as needed."[17] (App. Vol. 2 - Tab 11 - Attach. A - Exh. 6 Pages 5-6 of 12)

[17] App. Vol. 2 - Tab 11 - Attach. A - Exh. 6 Pages 5-6 of 12.

- Green River 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. In the Traffic and Dust Study, Integrated Engineering stated that ""Green River Solar, LLC will adhere to all local and state requirements related to repair of road infrastructures following construction."[18]

[18] App. Vol. 2 – Tab 11 – Attach. A - Exh. 6 Page 6 of 12.