

**Review and Evaluation of
Russellville Solar, LLC
Siting Assessment Report
Case Number: 2021-00235**

REPORT

Report

June 9, 2022

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Siting Assessment Report
Case Number: 2021-00235**

Prepared for

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SECTION A.

General Statement

SECTION A.

General Statement

This document provides a review of the Site Assessment Report (SAR) for the proposed Russellville Solar merchant electric generating facility submitted to the Kentucky State Board on Electrical Generation and Transmission Siting (the Siting Board). Russellville Solar, LLC submitted an administratively complete document titled “Russellville Solar, LLC Generation Application” (the “Application”) to the Siting Board in early March 2022. The Siting Board assigned the case number 2021-00235 to the Russellville Solar application. 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 Russellville 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, Martin County Solar, Horus Kentucky 1, McCracken County Solar, Rhudes Creek Solar and Seebree Solar facilities which were reviewed in 2021;
- Reviewed the contents of Russellville 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 May 2022;
- 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 BBC's contract. It begins with this general statement that introduces the review. In Section B of the report, we present the executive summary and list all of the mitigation measures recommended by BBC. Section C offers detailed findings and conclusions of the study, and provides context for BBC's recommended 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 previously provided review and guidance in this context.

While BBC has thoroughly reviewed the information provided in Russellville Solar's Application and Site Assessment Report and raised questions with the applicant regarding some apparent inconsistencies in that information, we have not conducted an audit of the information and data provided in those documents. Information regarding the layout and features of the proposed project and the surrounding area provided by the applicant are assumed to be accurate for purposes of this review. At this point in the planning process, Russellville Solar has not finalized

the precise layouts of the solar arrays and some other project infrastructure. This review is 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 Russellville Solar, LLC for approval to construct a commercial, photovoltaic solar merchant electric generating facility in Logan County, Kentucky, in early March 2022. 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 including electricity market or transmission system effects and broader environmental issues were not addressed in this engagement. This report does evaluate and consider the regional economic impacts of the proposed project and plans for future decommissioning.

Description of the Proposed Facility/Site Development Plan

The SAR provides a description of the proposed Russellville 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 Requests for Information from the Siting Board Staff during the SAR review process.

The proposed Russellville Solar facility would be a 173-megawatt alternating current (MWac) photovoltaic electricity generation facility situated just southwest of Russellville, the county seat of Logan County. The proposed site is approximately 30 miles southwest of Bowling Green and 20 miles north of Kentucky's border with Tennessee.

The proposed site would be situated on four properties totaling 1,569 acres, while the proposed facility would utilize 1,088 acres. The facility would be situated in a rural area of primarily agricultural land, with some mixed agricultural/residential use and a smaller amount of solely residential land (SAR Exhibit A, page 5). The proposed site is bordered by the RJ Corman railroad line on the northwestern edge. The rail line (which the applicant states will not be used by the project) runs roughly parallel with and just south of US 79 (Clarksville Road). The greatest housing density in the proximity of the project is along this corridor.

The project's proposed substation, switchyard, and point of interconnection are near Joe Montgomery Road in the northeastern portion of the footprint. The proposed Russellville Solar facility would utilize a short transmission line within the project footprint to interconnect to the

existing Tennessee Valley Authority (TVA) Springfield-Logan Aluminum 161-kV transmission line¹, thereby supplying energy to TVA. Conclusions with respect to other descriptive elements of the facility follow:

- **Surrounding land use** — Overall, agricultural land comprises 51 percent of adjoining acres, while 45 percent is zoned agricultural/residential, and approximately 4 percent is solely residential. Measured in terms of the number of properties rather than their acreage, residential uses comprise 46 percent of adjoining parcels, while 37 percent of parcels are used in agriculture, and 14 percent are mixed use agricultural/residential parcels. The composition of surrounding land uses — where residential parcels comprise the largest share of adjacent parcels but a much smaller proportion of the total adjacent land area — is typical among the proposed solar facilities that BBC has reviewed for the Siting Board.
- **Proposed access control and security** — The SAR briefly describes proposed access control measures, noting the use of locked, double-swing site access gates that would control ingress to and egress from the site and that the project site would be accessible only to TVA, Russellville Solar, and their agents and contractors. In response to subsequent requests for information from the Siting Board, Russellville Solar initially identified up to 12 potential access points, which were subsequently reduced to seven anticipated points of access: two along Watermelon Road, two along AP Miller Road and an adjacent private road, two along Joe Montgomery Road in proximity to the project substation and one north of Joe Montgomery Road that would provide access to the northwestern portion of the project footprint.
- **Utilities** — In the SAR, Russellville Solar describes the sources of external utilities that may be required on site: *The project components needing external power would be serviced either by an existing Pennyrile Rural Electric Cooperative Corporation TL along Joe Montgomery Road or the adjacent TVA TL. There is also potential that a private well and/or a traditional or pump-out septic system would be installed on site to serve the facility. These options are being evaluated for feasibility as well as environmental effects.*²
- **Setback requirements** — As discussed in the SAR, Logan County recently amended its ordinance pertaining to commercial solar facilities, *Logan County Ordinance No. 19-920-06, An Ordinance Establishing Minimum Setback Requirements for Solar Farm Installations in Logan County*. The amended ordinance establishes setbacks of 100-feet between solar panels, inverters and other generating, storage and distribution components and adjacent property lines and 250-foot setbacks between solar equipment and adjacent residences. The setback distances specified in Logan County Ordinance 19-920-06 are comparable to those required by other Kentucky county ordinances for some previous solar facility applications to the Siting Board that BBC has reviewed in the past two years.

¹ SAR page 5.

² SAR page 4.

The ordinance also requires a vegetative buffer between the solar facility and adjacent properties, but allows existing vegetation to satisfy the buffering requirement (where applicable) and allows homeowners to waive the vegetative buffer installation requirement adjacent to their properties if they wish to do so. Russellville Solar worked with the County during the process of amending the ordinance, and its proposed facility layout would meet the requirements under the ordinance. Under KRS 278.704 (3) these locally-established setback requirements would appear to have primacy over the State's statutory setback requirements.

- **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 addressed in Section 4 of the SAR. When considered alongside additional information supplied by Russellville Solar in their RFI responses during the review process, these materials appear to meet the informational requirements identified in KRS 278.708.

Compatibility with Scenic Surroundings

The applicant did not include a formal visual assessment in the SAR. However, Section 2 of the SAR states that the project's PV panels will have anti-reflective coatings and that visual impacts from nearby vantage points are expected to be minimal. BBC also visited the proposed Russellville Solar project site in early May 2022 to review the site and its surroundings.

As discussed in the SAR, long-range views into the site from some of the nearby homes and roadways (particularly those along Watermelon Road, Joe Montgomery Road, US 79, Marian Acres Road, and Kees Road) are at least partly obscured by existing mature trees and other vegetation. Long-range views from other areas – particularly A.P. Miller Road, Green Downs Road, and RJ Corman Railroad – are generally unobscured.

Logan County Ordinance 19-920-06 requires new vegetative screening equivalent to a double row of eight-foot-high trees in order to provide a visual screen and protect the local viewshed. With the February 2022 amendment to that ordinance, existing vegetation can take the place of new plantings, if the existing vegetation is sufficient. In its response to the Siting Board's First RFI, Russellville Solar states:

Where existing vegetative buffers are thin or may have gaps along the tree line, fence screening would also be used in order to better match the sufficiency of the new proposed vegetative plantings and appropriately screen the facility from views.

In general, BBC concurs with Russellville Solar's conclusion that the proposed facility would not be incompatible with its surroundings from a scenic standpoint, though our assessment is contingent on successful completion of the proposed vegetative screening plans to reduce visual impact – particularly from areas where views into the site are currently relatively unobstructed by topography or existing vegetation. 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 Russellville Solar facility. Russellville Solar engaged Kirkland Appraisals, LLC—which has conducted property value impact studies for several previous solar applications to the Siting Board—to examine the proposed project’s potential impact on property values.

In a summary statement, Kirkland Appraisals 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. Kirkland Appraisals further states that *“The adjoining properties are well set back from the proposed solar panels and most of the site has good existing landscaping for screening the proposed solar farm. Additional supplemental vegetation is proposed to supplement the areas where the existing trees are insufficient to provide a proper screen.”*³

Kirkland Appraisals further concludes that *“The matched pair analysis shows no impact on home values due to abutting or adjoining a solar farm as well as no impact to abutting or adjacent vacant residential or agricultural land where the solar farm is properly screened and buffered.* In addition, the property value assessment notes that *“Data from the university studies, broker commentary, and other appraisal studies support a finding of no impact on property value adjoining a solar farm with proper setbacks and landscaped buffers.”*⁴

To date, only a small handful of 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. Those negative effects appear to be more likely in suburban settings, rather than more rural settings. Another recent econometric study (at the University of Georgia) focused on solar facilities in North Carolina found no impacts on the value of nearby agricultural land, but did find statistically significant negative effects to the value of smaller residential properties close to solar facilities.⁵

Given the predominantly rural setting for the proposed Russellville 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 most adjacent properties, but might affect the values of some smaller lot, adjacent residential properties located in closest proximity to nearby solar panels. New or existing vegetative screening near these properties may reduce this risk.

³ SAR Exhibit A, page 1.

⁴ SAR Exhibit A, page 1.

⁵ Abashidze, Nino. *Essays on Economic and Health Effects of Land Use Externalities.* (Under the direction of Dr. Harrison Fell). Page 71. University of Georgia, 2019.

Expected Noise from Construction and Operation

Noise levels generated by facility construction and operation are addressed in Section 4 of the SAR (Anticipated Noise Levels at Property Boundary) and in SAR Exhibit E (Noise and Traffic Study, conducted by HDR). Section 4 provides an overview of nearby noise receptors and the expected noise generation during construction of the proposed facility.

The Noise and Traffic Study states that there are 113 noise sensitive receptors within a half-mile radius of the project site – primarily residences, residential farm complexes, associated outbuildings, and nonresidential agricultural complexes.⁶ The distance from a solar panel to the nearest noise receptor ranges from less than 250 feet to approximately 2,640 feet. Section 4 of the SAR states that the closest receptor is a residence on AP Miller Road, approximately 250 feet from the nearest solar panel. Subsequently, in response to the Siting Board’s First RFI, HDR updated the count of noise-sensitive receptors around the project site. The original estimate of 113 noise-sensitive receptors with a half-mile radius of the proposed project site, was revised to 49 receptors, to exclude offices, barns, and garages which are not considered noise sensitive in environmental noise analyses.

During construction, noise from the pile drivers could have a substantial impact on the nearest noise receptors. HDR’s worst case estimate of 96 dBA at the nearest receptor would provide 100 percent of the NIOSH recommended maximum daily noise dose within 45 minutes. However, it is very unlikely that 10 piledrivers would be operating simultaneously in the same location (as assumed in the HDR analysis to provide a conservative noise estimate), and it is also important to note that the noise analysis did not account for noise buffering from intervening vegetation (e.g., buffers) or topography.

During normal operation of the proposed Russellville Solar facility, noise levels from panel tracking motors, inverters, and the substation transformer are unlikely to be disruptive to local residents. While the noise level of panel tracking motors at the closest receptors could be high enough to be noticeable if it were continuous (up to 69 dBA), the intermittent operation of the tracking motors is likely to make the noise less apparent.

Impacts on Transportation

Section 5 of the SAR (Effect on Road, Railways, and Fugitive Dust) supplies information from the applicant regarding anticipated impacts on transportation at and around the proposed project site during construction and operation. Exhibit E of the SAR (Noise and Traffic Study) provides the traffic study conducted by HDR for the proposed Russellville Solar project.

The proposed Russellville Solar site has three adjacent local roads that will be transited during the construction and operation phases of the project: Watermelon Road, AP Miller Road, and Joe Montgomery Road. During the construction phase, the primary major roadways for trucks, construction equipment, deliveries, and workers arriving in the area would be US 79 (Clarksville

⁶ SAR Exhibit E, page 7.

Road) on the northern edge of the project; US 431 (Russellville Bypass) approximately 1 mile northeast of the project site; and Watermelon Road, along the western boundary of the project.

During construction, daily deliveries on semi-truck trailers and workforce commuter traffic will substantially increase the amount of traffic on primary roadways near the project site, particularly along the half-mile stretch of Watermelon Road that connects US 79 with AP Miller Road and the western side of the proposed project site. Deliveries and traffic along AP Miller Road may be challenging given the width of the road, as discussed in communications with the Logan County Roads Department Foreman and illustrated by BBC's photographs taken during the site visit in Section C of this report.

Delivery of the substation transformer will likely present challenges given the load ratings of surrounding roadways. These challenges can be overcome with careful advance planning and an appropriate traffic management plan.

The operational phase of the Russellville Solar facility will have little impact on local traffic conditions as the proposed project will not have any permanent employees and infrequent vehicle trips to site will occur only for periodic site inspection and maintenance of the solar facility and livestock management for the anticipated sheep ranching operation.

Russellville Solar plans to reduce the number of single occupant worker vehicles during construction by offering per-diems for workers to stay in the local area and providing worker shuttles on-site.

Other Considerations

Applicant economic impact study. Attachment G to the Russellville Solar Application (Economic Impact Report), contains a study of the projected economic impacts from the proposed facility. The study was conducted by Dr. Paul A. Coomes, a consulting economist and emeritus professor of economics at the University of Louisville.⁷

Key findings from Dr. Coomes analysis include:

- The applicant is likely to invest approximately \$150 million in Logan County to develop the proposed project;
- There will be a one-time spike in construction-related employment over about a 12-month period. The spike will include about 415 direct jobs and about 114 indirect and induced jobs. The direct construction jobs are expected to pay an average of about \$50,000 per year;
- Ongoing economic impacts (e.g., jobs and payroll) from operations will be “very small” including about six permanent jobs.

⁷ Application, Attachment G.

- However, Dr. Coomes also notes that “the company will pay about \$14.52 million to state and local governments in property taxes and payments in lieu of taxes over at least the first 30 years of the operating period, and the increased property tax payments would continue for a further decade. Dr. Coomes further states that “This is approximately twenty times larger than current property tax payments from the farmland.”⁸

The level of investment in Logan County projected by Dr. Coomes appears to be consistent with industry standards for a solar project of the size of the proposed Russellville Solar facility. Dr. Coomes estimate of peak employment during construction (415 jobs) is somewhat larger than the revised estimate by Russellville Solar in their response to the Siting Board’s Second RFI of 350 workers, but of the same general magnitude.

Some information that would provide a more complete picture but which is not quantified in the applicant’s economic study includes the direct, indirect and induced economic benefits from the current use of the land in agriculture; the economic benefits from the anticipated sheep ranching operation on the site during solar operations, and the potential induced economic benefits from the additional income received by participating landowners if at least a portion of that income is spent locally. BBC does not believe these other economic effects would fundamentally change the conclusions of the economic impact analysis.

Facility Decommissioning. In prior solar projects reviewed by the Siting Board, plans and assurances for decommissioning the sites at the end of their functional lives have been an important issue of concern to both the Siting Board and local governments.

BBC did not find reference to a decommissioning plan in the Russellville Solar Application or Site Assessment Report. However, decommissioning is addressed in the four lease agreements that Russellville Solar has executed with the participating landowners – which commit the solar company to remove its equipment and restore the properties at its own expense at the end of solar operations.⁹

Summary Findings

Russellville Solar has generally 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 Russellville Solar site appears to generally be well selected in terms of compatibility with the surrounding area and access to transmission infrastructure. The setback requirements and vegetative and visual buffering requirements in the Logan County solar ordinance should help the facility be compatible with the surrounding area.

⁸ Application Attachment G. Economic Impact Report.

⁹ See pages 12 and 13 of Russellville Solar’s response to the Siting Board’s First RFI for an example of these terms.

Mitigation Recommendations

Including mitigation identified by Russellville Solar in their Application and SAR, BBC recommends the following mitigation measures:

Regarding KRS 278.708 (3) (a)– description of the proposed facility –

1. Russellville Solar should provide a final site layout plan to the Siting Board when site design is finalized. Any change in project boundaries or site layout from the information reviewed during this evaluation—including changes to the locations of solar panels, inverters, transformers, the substation, the transmission line or other project facilities should be clearly documented and submitted to the Siting Board for review.
2. Russellville 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 include adequate signage at all site entrances and boundaries—particularly in locations visible to the public, local residents, and business owners—to warn potential trespassers.
3. According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work. Further, the substation must have its own separate security fence, with locked access.

Regarding KRS 278.708 (3) (b)– compatibility with scenic surroundings –

4. 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.
5. Russellville Solar should execute the screening plan required under the Logan County commercial solar ordinance and make sure the proposed new vegetative buffers are successfully established and develop as expected over time. Plantings should reach eight feet high within four years. Should the vegetation used as buffers die over time, Russellville Solar should replace them to maintain the visual buffer.
6. Russellville Solar should cultivate at least two acres of native pollinator-friendly species onsite.
7. Russellville Solar should use panels with anti-reflective coating to reduce glare and corresponding visual impacts.
8. Russellville Solar should be open to communication with adjacent landowners regarding viewshed impacts and the implementation of strategic additional vegetative screening, if needed. Communication regarding viewshed impacts and concerns should be incorporated into the Complaint Resolution Program described further in mitigation recommendation #17 later in this section.

9. If disagreements arise between Russellville Solar and an adjacent landowner regarding the sufficiency of existing vegetation in screening in an area, Russellville Solar should seek an opinion from the Logan County Fiscal Court on the screening requirements for that specific area.

Regarding KRS 278.708 (3) (c)– potential changes in property values and land use –

10. Russellville Solar’s viewshed screening plan should incorporate particular efforts to reduce impacts on the views from the nine smaller lot residential properties (smaller than five acres) adjacent to the proposed project.

Regarding KRS 278.708 (3) (d)– noise impacts –

11. If pile driving activity occurs within 1,500 feet of a sensitive noise receptor (e.g., residence), Russellville Solar should implement a construction method that will suppress the noise generated during the pile driving process (i.e., semi-tractor and canvas method, sound blankets on fencing surrounding the solar site, or other comparable methods).
12. Russellville Solar should place panels, inverters and substation equipment no closer to homes and project boundaries than indicated in the site development plan submitted with its Application and SAR and reviewed herein. The placement of these features should also be consistent with any setbacks required by Logan County Ordinance 19-920-06.
13. Similar to other recent solar facility applications reviewed by the Siting Board, construction activity at the Russellville 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. Non-noise causing and non-construction activities such as field visits, planning meetings, surveying, mowing, etc. can take place on site between 7 AM and 10 PM Monday through Saturday.
14. Russellville Solar should prioritize vegetative screen planting before commencing construction activity. This will not only mitigate noise but also allow for the growth of the tree screens during the construction phase, providing an established visual screen to protect the viewshed before the facility begins operation. It may also help mitigate against impacts to the property values of the smaller residential properties adjacent to the proposed facility.
15. Russellville Solar should notify residents and businesses within 2,400 feet of the project boundary about the construction plan, the noise potential and mitigation plans one month prior to the start of construction.
16. During construction Russellville Solar should locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as practicable from neighboring residences.
17. Russellville Solar should implement a Complaint Resolution Program to address any complaints from surrounding landowners. Russellville Solar should submit an annual status

report on the Complaint 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.

Regarding KRS 278.708 (3) (e)– transportation impacts and fugitive dust –

18. Russellville Solar should submit a final construction schedule, including revised estimates of on-site workers and commuter vehicle traffic, to the Siting Board prior to commencement of construction.
19. Russellville 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, Russellville Solar should implement the measures they identified in response to the Siting Board’s First RFI to minimize commuting traffic, including encouraging ridesharing during new worker orientation, providing on-site bus shuttles and providing reasonable per-diems to allow workers to stay in relatively close proximity to the site. Russellville Solar and its contractors should also use appropriate traffic controls; or allow flexible working hours outside of peak hours to minimize any potential delays during AM and PM peak hours.
20. Russellville Solar and its construction contractors should comply with all laws and regulations regarding the use of roadways.
21. Russellville Solar should obtain permits from the KYTC and local road authorities as needed for overweight and overdimensional vehicle transport to the site and comply with all permit requirements, continuing to coordinate with the KYTC District Permits Engineer and the Logan County Road Department as needed.
22. Russellville 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.
23. Russellville Solar should properly maintain construction equipment and follow best management practices related to fugitive dust throughout the construction process. Dust impacts should be kept to a minimal level.

Regarding economic impacts, project decommissioning and other issues –

24. Russellville Solar should complete its payments in lieu of taxes agreements (PILOT) with local government jurisdictions to ensure the proposed project provides a positive net fiscal benefit for those entities.
25. As applicable to individual lease agreements, Russellville Solar, its successors, or assigns should abide by the specific land restoration commitments agreed to by individual property owners, as described in each executed lease agreement.

26. Russellville Solar should file a full and explicit decommissioning plan with the Siting Board. This plan should commit Russellville Solar to removing all facility components, above-ground and below-ground, regardless of depth, from the project site. Upon its completion, this plan should be filed with the Siting Board or its successors. The decommissioning plan should be completed at least one month prior to construction of the Project.
27. Russellville Solar should file a bond with the Logan County Fiscal Court, equal to the amount necessary to effectuate the explicit or formal decommissioning plan naming Logan County as a third-party obligee (or secondary, in addition to individual landowners) beneficiary, in addition to the lessors of the subject property insofar as the leases contain a decommissioning bonding requirement, so that Logan County will have the authority to draw upon the bond to effectuate the decommissioning plan. For land in which there is no bonding requirement otherwise, Logan County should be the primary beneficiary of the decommissioning bond for that portion of the project. The bond(s) should be filed with the Logan County Treasurer or with a bank, title company or financial institution reasonably acceptable to the county. The acceptance of the county of allowing the filing the bond(s) with an entity other than the Fiscal Court, through the Logan County Treasurer, can be evidenced by a letter from the Judge-Executive, the Fiscal Court, or the County Attorney. The bond(s) should be in place at the time of commencement of operation of the Project. The bond amount should be reviewed every five years at Russellville Solar's expense to determine and update the cost of removal amount. This review should be conducted by an individual or firm with experience or expertise in the costs of removal or decommissioning of electric generating facilities. Certification of this review should be provided to the Siting Board or its successors and the Logan County Fiscal Court. Such certification should be by letter and should include the current amount of the anticipated bond and any change in the costs of removal or decommissioning.
28. Russellville Solar or its assigns should provide notice to the Siting Board if during any two-year (730 days) period, it replaces more than 20 percent of its facilities. Russellville Solar should commit to removing the debris and replaced facility components from the Project site and Logan County upon replacement. If the replaced facility components are properly disposed of at a permitted facility, they do not have to be physically removed from Logan County. However, if the replaced facility components remain in Logan County, Russellville Solar should inform the Siting Board of where the replaced facility components are being disposed.
29. Any disposal or recycling of Project equipment, during operations or decommissioning of the Project, should be done in accordance with applicable laws and requirements.

Subject to the foregoing mitigation measures, and subject to Russellville Solar meeting the requirements of the Logan County commercial solar ordinance, 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. If these presumptions are correct, and based upon the information available to BBC at the time of this report, there are unlikely to be

significant unmitigated impacts from construction and operation of the Russellville Solar generation project regarding scenic compatibility, property values, noise or traffic.

SECTION C.

Detailed Findings and Conclusions

SECTION C.

Detailed Findings and Conclusions

This section provides detailed review and evaluation of each element of the Russellville Solar Site Assessment Report (SAR) as prescribed in Section 5 of KRS 278.708. It is organized into six 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;
5. Impacts on Transportation; and
6. Other Issues – Economic Impacts, Project Decommissioning and Site-Specific Considerations

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

In evaluating these components of the SAR, 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 Russellville 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.

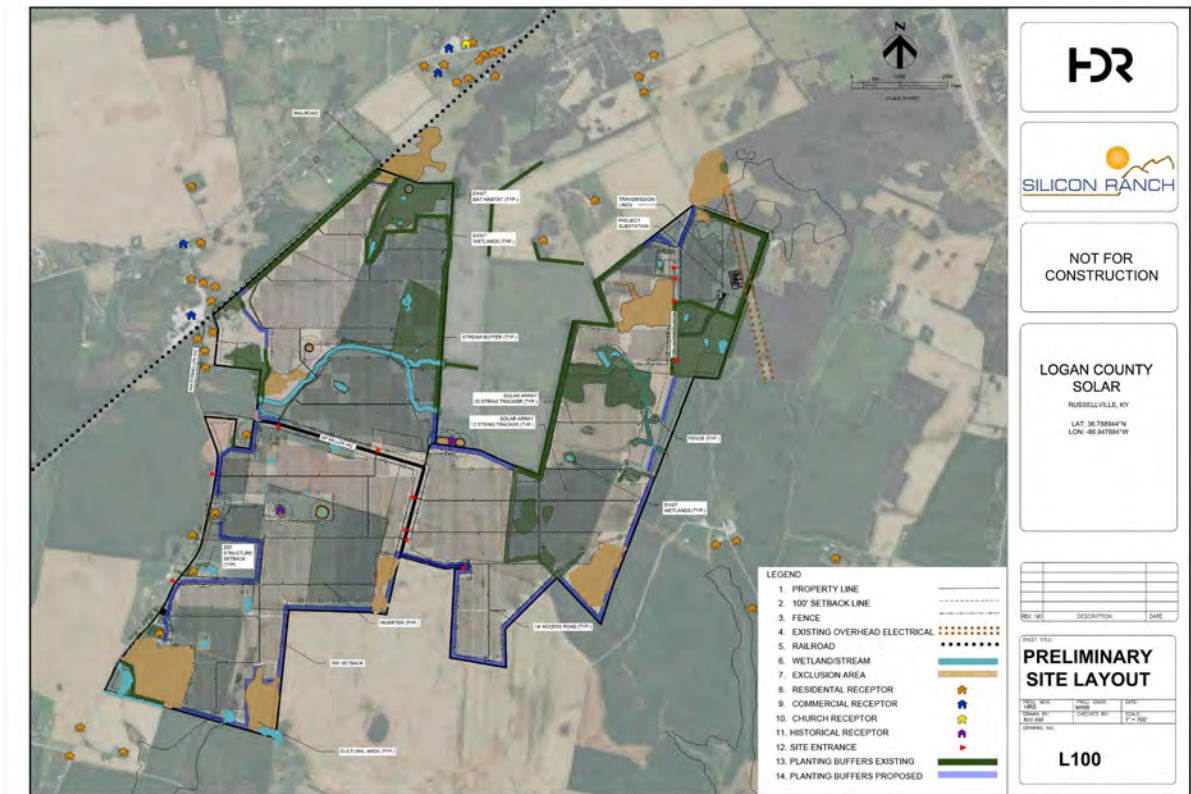
Information Provided in the Applicant's SAR

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

Overview of proposed facility. Section 1 of the SAR (Description of Proposed Site) supplies an overview of the project. The proposed Russellville Solar facility would be a 173-megawatt solar photovoltaic (PV) electricity generation facility situated just southwest of Russellville, the county seat of Logan County. The proposed site is approximately 30 miles southwest of Bowling Green and 20 miles north of Kentucky's border with Tennessee.

The proposed site would be situated on four properties totaling 1,569 acres, while the proposed facility would utilize 1,088 acres. The facility would be situated in a rural area of primarily agricultural land, with some mixed agricultural/residential use and a smaller amount of solely residential land (SAR Exhibit A, page 5). Figure C-1 is excerpted from SAR Exhibit D (Preliminary Site Layout) and shows a high-level view of the project footprint.

Figure C-1.
Preliminary Site Layout for Russellville Solar Project



The proposed site is bound by the RJ Corman railroad line on the northwestern edge, shown in Figure C-1 as a black dotted line. The rail line (which the applicant states will not be used by the project) runs roughly parallel with and just south of US 79 (Clarksville Road). The greatest housing density in the proximity of the project is along this corridor, as shown by the gold-colored house icons in Figure C-1. In the Siting Board’s First Request for Information (RFI), BBC requested clarification from Russellville Solar regarding the meaning of the color coding for house icons in the preliminary site layout map.

US 79 is the major transportation route adjoining the proposed site, but additional local roadways that help delineate the proposed site include Watermelon Road, which is the site’s western boundary, as well as AP Miller Road, which bisects the project footprint on its western half, and Joe Montgomery Road, which runs north-south through the easternmost section of the project site.

The project’s proposed substation, switchyard, and point of interconnection are near Joe Montgomery Road in the northeastern portion of the footprint, as labeled in Figure C-1. The proposed Russellville Solar facility would utilize a short transmission line within the project footprint to interconnect to the existing Tennessee Valley Authority (TVA) Springfield-Logan Aluminum 161-kV transmission line¹, thereby supplying energy to TVA. While Figure C-1 shows much of the proposed

¹ SAR page 5.

site layout, close detail of project features is viewable in full in Exhibit D of the SAR (Preliminary Site Layout), including proposed locations of boundary fencing, existing and proposed vegetative buffers, a 100-foot setback line (pertinent to the Logan County setback requirements, discussed later in this report), and solar arrays. In the Siting Board's First RFI, BBC asked Russellville Solar to provide an updated site map including all site access points.

Section 2 of the Application (Description of Proposed Site) provides a brief overview of the project components, equipment, and necessary structures:

The solar facility would consist of a solar array proposed to contain crystalline silicon or thin film PV panels attached to ground-mounted single-axis trackers, central inverters, several medium voltage transformers and main power transformers, substation, switching station, battery energy storage system, operations and maintenance building, access roads, and all associated cabling and safety equipment. The placement of the facility components would avoid and minimize impacts to environmental resources to the maximum extent possible.²

Additional facility components referenced in the SAR include project lighting,³ although the applicant did not provide details on the placement or number of lighting elements. BBC requested information regarding project lighting in the First RFI.

Another high-level view of the proposed project is included in the Russellville Solar Application as Attachment A (Map of Surrounding Residential Neighborhoods). This figure provides some context for the proposed site and surrounding area; it is excerpted in part as Figure C-2. (Note that an updated version of this figure is provided later in this section, as Figure C-5.)

² Application page 5.

³ SAR page 6.

Figure C-2.
Map of Surrounding Residential Neighborhoods, Russellville Solar Project

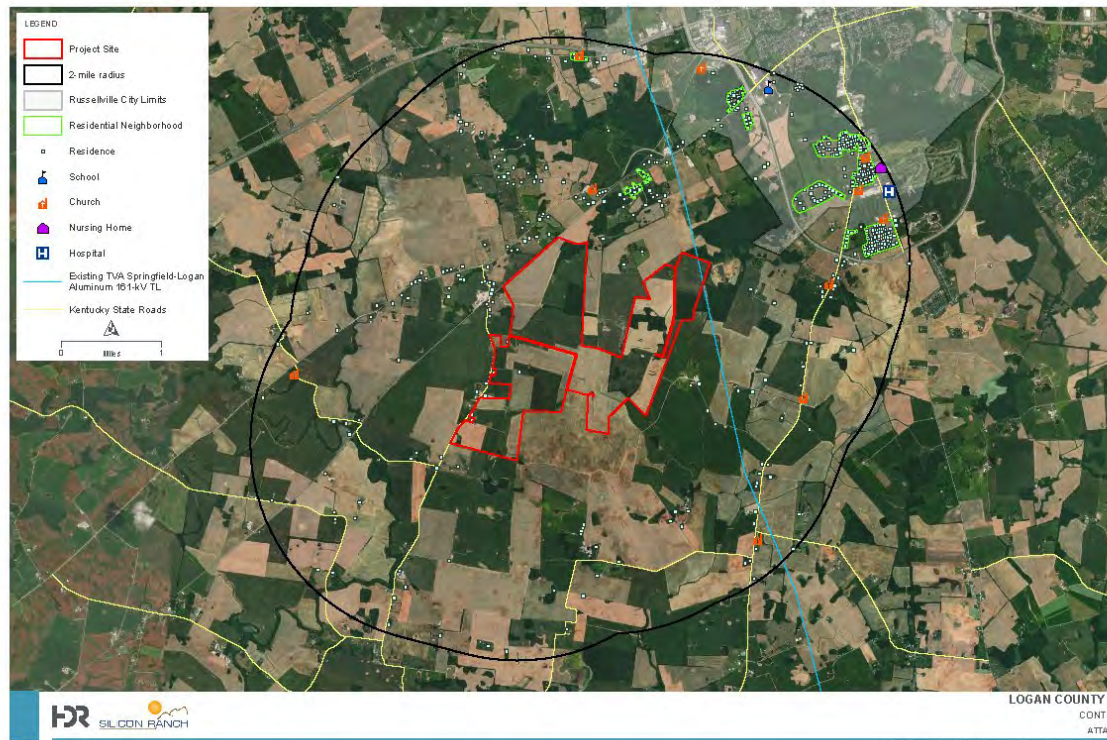


Figure C-2 shows the proposed project footprint outlined in red, with a two-mile radius encircling the project in black. The blue line running north-south is the existing TVA Springfield-Logan Aluminum 161-kV transmission line (TL); the planned location of the Russellville Solar substation, switchyard, and project transmission line is where the TVA TL intersects the project footprint at the northeast corner.

Ten residential neighborhoods are marked in green in the northern and northeastern portions of the map, and white dots depict individual homes in proximity of the proposed project. One school, one nursing home, and one hospital sit near the Russellville city limits and just within the two-mile radius of the proposed Russellville Solar site; these are marked with blue, purple, and “H” icons, respectively.

In the Siting Board’s First RFI, BBC requested that Russellville Solar provide an updated high-level map with additional features, such as varying radius measurements around the proposed project boundary. BBC also requested a count of the residential neighborhoods identified according to KRS 278.700, which states that a residential neighborhood is a populated area of five or more acres containing at least one residential structure per acre.

Surrounding land uses. Page 3 of the SAR states that the proposed project is situated within a rural agricultural area, with some residential and commercial land uses northeast of the project site. Exhibit A of the SAR (Property Value Impact Report) provides greater detail on the composition of the surrounding land. Figure C-3, excerpted from Exhibit A, summarizes the use of land adjoining the proposed project.

**Figure C-3.
Adjoining Parcel Land Use for Russellville
Solar Project**

Adjoining Use Breakdown		
	Acreage	Parcels
Residential	3.52%	45.71%
Agricultural	51.30%	37.14%
Agri/Res	45.06%	14.29%
Religious	0.12%	2.86%
Total	100.00%	100.00%

Overall, agricultural land comprises 51 percent of adjoining acres, while 45 percent is zoned agricultural/residential, and approximately 4 percent is solely residential. Measured in terms of the number of properties rather than their acreage, residential uses comprise 46 percent of adjoining parcels, while 37 percent of parcels are used in agriculture, and 14 percent are mixed use agricultural/residential parcels.

Other pertinent information about surrounding land uses includes the proximity of residential communities, schools, parks, or other relevant community buildings. The Map of Surrounding Residential Neighborhoods included with the Application as Attachment A (and excerpted in Figure C-2) shows the location of several residential neighborhoods in the northeastern portion of the proposed project’s two-mile radius. Also within the two-mile radius are Russellville High School, Logan Memorial Hospital, and a nursing home. Russellville Solar did not provide a count of the residential neighborhoods nor a written description of the surrounding neighborhoods or community buildings in their SAR or Application. BBC requested some additional information on this topic from the applicant in the First RFI.

Legal boundaries. Page 4 of the SAR states that Exhibit B (Legal Description of Site) contains the boundary survey and is the legal description of the proposed site. Exhibit B describes properties belonging to four unique owners, with a total of 10 unique parcel IDs included. The combined acreage of all properties listed in Exhibit B is approximately 1,600 acres – comparable to the 1,569 total acres stated by the applicant.

Access control. The SAR briefly describes proposed access control measures:

The proposed facility layout is presented in Exhibit D. The layout identifies the location of locked, double-swing site access gates that would provide ingress to and egress from the site. The project site would be accessible only to TVA, Russellville Solar, and their agents and contractors.⁴

BBC examined the map in Exhibit D of the SAR (Preliminary Site Layout) and did not find any clear indicators of either access points or gate locations. In the Siting Board's First RFI, BBC asked the applicant to provide an updated site map that clearly denotes all project access points.

Location of buildings, transmission lines, and other structures. Page 4 of the SAR states that the location of buildings, transmission lines, and other structures are depicted in the maps included in Exhibit D of the SAR (Preliminary Site Layout). However, while the TVA TL and project substation are labeled in Exhibit D, a mapped location of the proposed project's operations and maintenance building is not disclosed, although Russellville Solar states that it would be constructed in the eastern portion of the site, along Joe Montgomery Road. BBC requested more information from the applicant in the First RFI.

Location and use of access ways, internal roads, and railways. Page 4 of the SAR states that the location of access ways, internal roads, and railways are depicted in the maps included in SAR Exhibit D. BBC examined Exhibit D and did not find access ways depicted on the map; in the First RFI, the applicant was asked to provide updated maps as necessary.

A written description of access points to the proposed site is provided in Exhibit E of the SAR (Noise and Traffic Assessment) as follows:

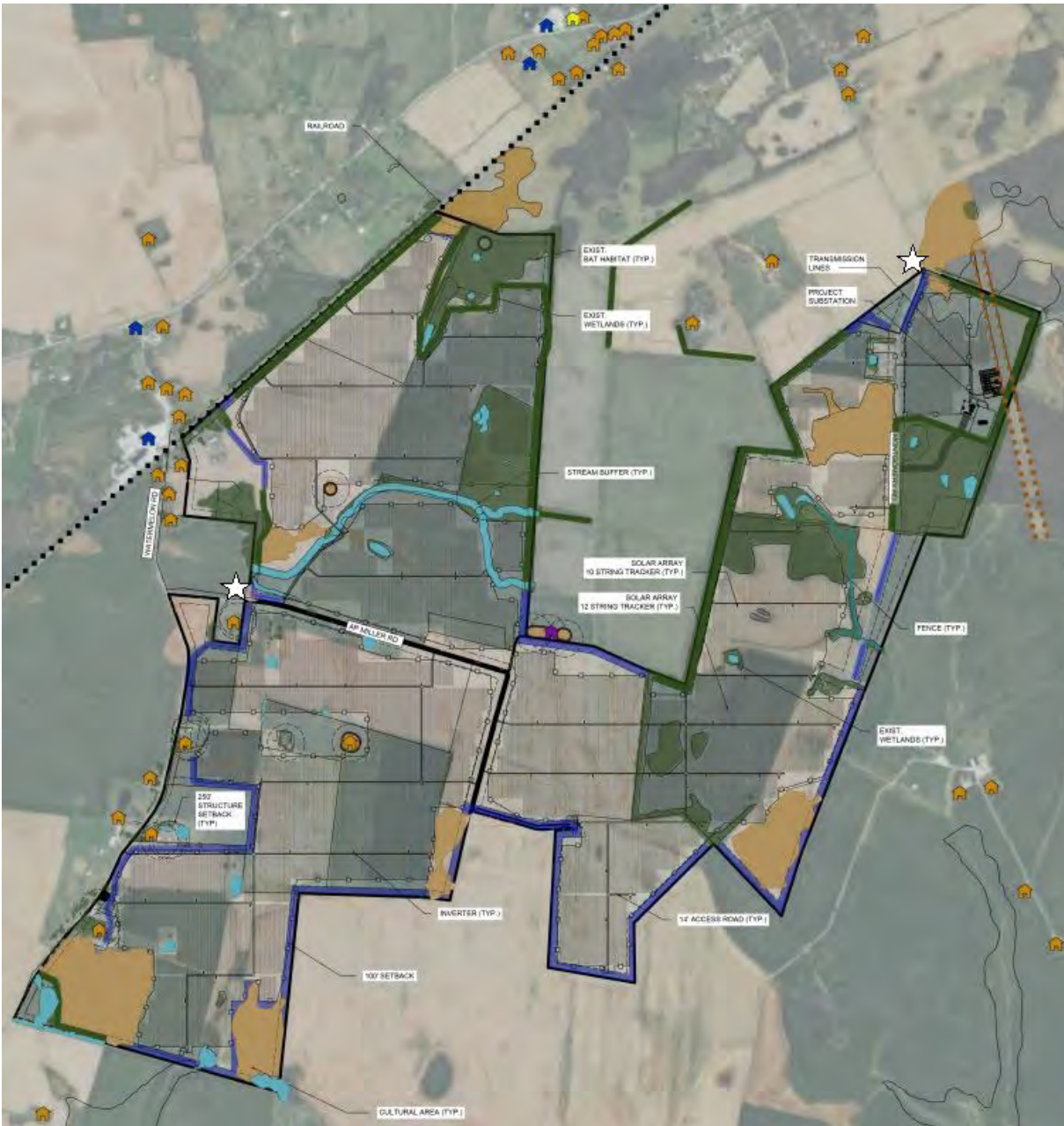
A.P. Miller Road provides access to the Project site through its connection with Watermelon Road. Joe Montgomery Road, a two-lane road with paved and gravel portions traverses north-south through eastern portions of the Project site. Joe Montgomery Road provides access to the Project site through its connection with US 79.⁵

BBC has modified the applicant's preliminary site layout map to mark the presumed access points to the proposed site, based on the written description in Exhibit E. These are marked with white stars in Figure C-4. BBC requested clarification regarding access ways in the First RFI and further detail regarding access points is provided later in this section. An updated version of this figure is provided later in this section as Figure C-6.

⁴ SAR page 4.

⁵ SAR Exhibit E, page 9.

Figure C-4.
Preliminary Site Layout for Russellville Solar Project, Potential Site Access Points Added by BBC



One railway line runs along the northwestern boundary of the project footprint. Russellville Solar does not plan to utilize the railway for any construction or operation activities.

Existing or proposed utilities. On page 4 of the SAR, Russellville Solar describes the sources of external utilities that may be required on site:

The project components needing external power would be serviced either by an existing Pennyrile Rural Electric Cooperative Corporation TL along Joe Montgomery Road or the adjacent TVA TL. There is also potential that a private well and/or a traditional or pump-out septic system would be

installed on site to serve the facility. These options are being evaluated for feasibility as well as environmental effects.⁶

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.” However, locally established setback requirements, such as those stipulated by a county ordinance, would have primacy over the KRS setback requirements.

Discussion of the setback requirements and zoning applicable to this project is found in both the Application and in the SAR. Page 7 of Russellville Solar’s application states:

Currently, the setback requirements pertaining to the proposed solar facility are contained in the Logan County Ordinance No. 19-920-06, An Ordinance Establishing Minimum Setback Requirements for Solar Farm Installations in Logan County and the subsequent amendment to Ordinance No. 19-920-06 (Attachment C). Logan County stipulates the following setbacks for solar facilities or “solar farms,” meaning “any device, structure or part of a device or structure (i.e., array, panel, etc.) installed for the sole purpose of the collection, inversion, storage and distribution of solar energy”:

- *100 feet from adjacent property boundary lines and municipal roadway or railway ROWs*
- *250 feet from residences, schools, churches, hospitals, nursing facilities, and cemeteries*

In addition to the aforementioned setbacks, Ordinance No. 19-920-06 stipulates that access to the site must be controlled by a fence and vegetative buffer to shield facilities from view. The ordinance was amended on February 22, 2022 to allow existing vegetation along the project perimeter to satisfy the vegetative buffer requirement and allow adjoining landowners to waive the vegetative buffer and/or visual screening.

The setback distances specified in Logan County Ordinance 19-920-06 are comparable to those required by other Kentucky county ordinances for some previous solar facility applications to the Siting Board that BBC has reviewed in the past two years.

In the First RFI, BBC requested detail from the applicant regarding Russellville Solar’s level and nature of engagement with Logan County during their drafting of the solar farm ordinance.

Evaluation of noise levels. Section 4 of the SAR (Anticipated Noise Levels at Property Boundary) provides Russellville Solar’s summary of the noise levels that will be generated during the construction and operation of the proposed facility. A more detailed noise assessment is in Exhibit E of the SAR (Noise and Traffic Assessment), conducted by HDR for Russellville Solar.

During the construction phase of the project, activities on site will generate intermittent noise at the nearest receptors (nearby residences). The existing ambient sound environment is typical of an

⁶ SAR page 4.

agricultural setting, with noises from farm machinery, wind, wildlife, moderate traffic, and occasional trains.

The construction phase is expected to last approximately 18 months⁷ and the applicant has identified 113 sensitive noise receptors located within a half mile of the project site:

[The] closest single-family residence [is] located on A.P. Miller Road approximately 60 feet west of the project boundary and approximately 250 feet from the proposed solar panels. The majority of the sensitive noise receptors are located along Watermelon Road and US 79.

[...] Several residences and residential and non-residential agricultural complexes would temporarily experience heightened noise during construction, primarily from pile-driving activities [...] during the construction of the array foundations, which would be completed in approximately six months. Standard construction pile drivers are estimated to produce between 90 and 95 dBA at a distance of 50 feet.⁸

During the operational life of the project, Russellville Solar anticipates that noise levels at the project site would return to current levels: the project's central inverters would produce noise at 65 dBA measured at 33 feet and the substation would emit noise at 50 dBA as measured at 300 feet. The applicant states that there are no noise receptors within 33 feet of inverter locations or within 300 feet of the substation.

Past solar facility applications submitted to the Siting Board have included noise estimates for the panel tracking motors that tilt the PV panels along an axis (east to west) throughout the day. The applicant states that the moving parts of the arrays would produce little noise but provides no tailored estimate.⁹ Panel tracking motors are likely to be the noise-producing solar equipment in closest proximity to any nearby receptors. In the Siting Board's First RFI, Russellville Solar was asked to provide noise level estimates for the panel tracking motors as audible from the nearest receptors.

The proposed Russellville Solar project is unique among solar facility applications that BBC has reviewed for the Siting Board over the past two years in that the applicant plans to keep the project land in use in livestock production. Sheep grazing operations would occur at the project site in tandem with the facility's primary activity of electricity generation. The impact of sheep operations on traffic and noise at the project site—as well further detail of the noise assessment in SAR Exhibit E—is discussed in greater depth later in this section of BBC's report (Expected Noise from Construction and Operation).

⁷ SAR Exhibit E page 3.

⁸ SAR page 9.

⁹ Page 4 of SAR Exhibit E (Noise and Traffic Assessment) states that panel tracking motors typically produce a sound of 78 decibels, but does not state at what distance this is measured nor the implications for noise sensitive receptors in proximity of the proposed project boundary.

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. In the First RFI, BBC and the Siting Board requested additional information from the applicant regarding the proposed project and site.

Russellville Solar and its consultant HDR provided an updated Context Map with additional radii measurements, location of facility components, and other features. There are 11 neighborhoods (as defined by KRS 278.700) within the two-mile radius surrounding the proposed project; two of these are within one mile.

Figure C-5.
Updated Context Map, Russellville Solar Project Site



In Figure C-5, the project's one-mile radius is depicted in purple and two-mile in blue. Within the red outline of the project footprint, black lines traversing the grey solar panel arrays indicate internal gravel access roads.

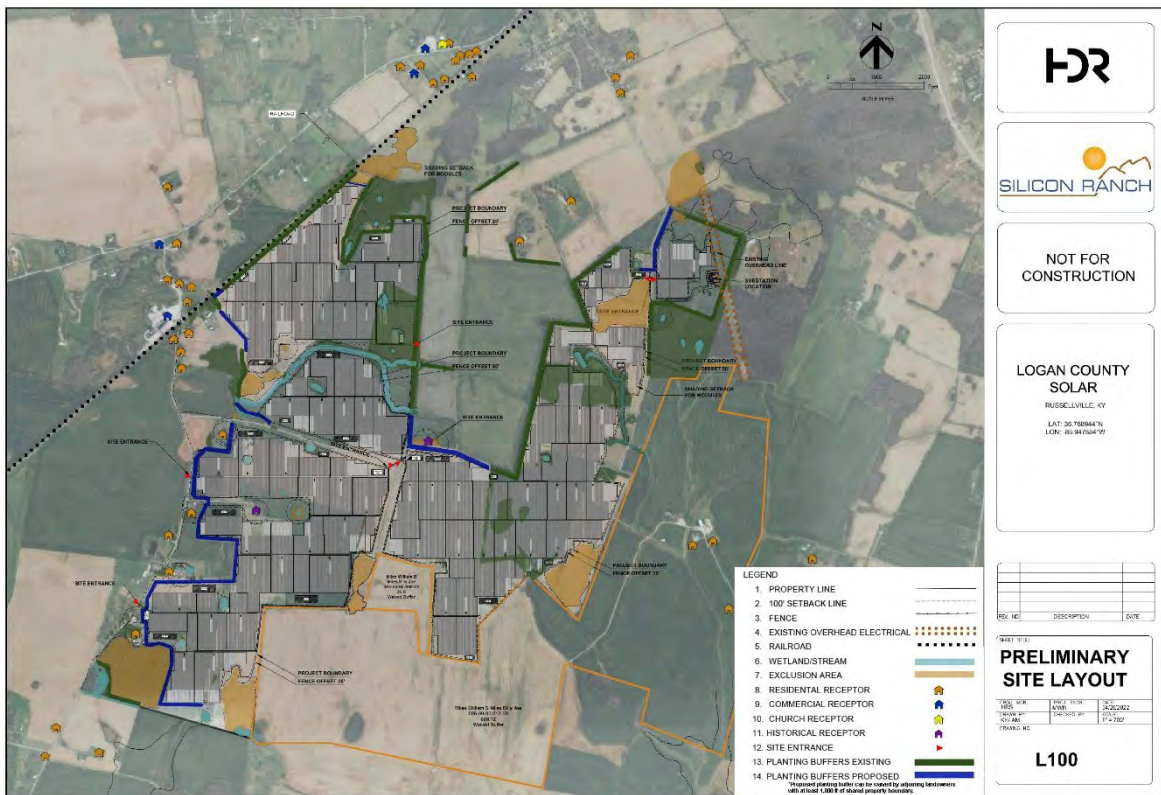
Surrounding land uses. The composition of surrounding land uses — where residential parcels comprise the largest share of adjacent parcels but a much smaller proportion of the total adjacent land area — is typical among the proposed solar facilities that BBC has reviewed for the Siting Board.

Location of buildings, transmission lines, and other structures. In the First RFI, BBC asked for the location of the operations and maintenance building referenced in the Russellville Solar Application. This is now included in the updated context map. While not easy to see in Figure C-5, the O&M

building is located in the central-eastern portion of the project footprint, southwest of the point of interconnection with the existing TVA TL. The O&M building, substation and transmission line are more clearly seen in Figure C-6 on the following page.

Location and use of access ways, internal roads, and railways. In response to a question from BBC in the First RFI, Russellville Solar provided an updated preliminary site layout map showing 12 potential access points. Further information provided verbally during the site visit indicated Russellville Solar expected to reduce the number of access points, and Russellville Solar provided a further refined figure showing seven access points in response to questions in the Siting Board’s Second RFI, as shown in Figure C-6.

Figure C-6.
Updated Preliminary Site Layout, Russellville Solar Project Site



Site access points are marked with red arrows. In total, there are seven access points shown: two along Watermelon Road, two along AP Miller Road and adjacent private road, two along Joe Montgomery Road in the proximity of the project substation and one north of Joe Montgomery Road that would provide access to the northwestern portion of the project footprint.

Compliance with applicable setback requirements. In the First RFI, BBC asked the applicant to describe the nature of input that Russellville Solar provided to Logan County regarding the February 2022 amendment to Ordinance 19-920-06. The amendment allowed for sufficient existing vegetation to obviate the need for new vegetative buffers and additionally allowed adjacent landowners with more than 1,000 feet of shared boundary with the project to waive the vegetative screening requirement. In their Responses to the First RFI, Russellville Solar stated:

Russellville Solar provided feedback to Judge/Executive Chick and the Logan County Fiscal Court over a period of approximately six months regarding a potential amendment and the reasons why the Project was seeking an amendment, starting with project update meetings in September 2021 through February 2022, when an ordinance amendment was passed. The Project sought an amendment to Ordinance No. 19-920-06, which was passed in 2019 (when the project was owned by another developer), because the landscape buffer language within the ordinance was such that it would create significant redundancy in visual buffering of the project to mitigate the visual effects of the Project on visual receptors around the project. There were several existing tree lines and berms throughout the project perimeter that would already buffer the project from visual receptors. The language would have called for over 62,000 linear feet of both new vegetation and visual fence screening for the same mitigation impacts that could have been achieved with one of the two solutions and limited vegetation. This form of buffer plan would have been unprecedented in Silicon Ranch's experience with solar projects. Additionally, there were adjacent landowners who did not want new buffers installed.¹⁰

In the six months leading up to the February 2022 amendment, representatives from Russellville Solar provided feedback to the Logan County Judge/Executive in person (3 occasions) and in phone calls (5 phone calls). Amended proposed buffer plans were shared with the local community in a December 2021 meeting; the applicant states that no concerns were reported. A site walk of the project perimeter with two Logan County Magistrates took place in January 2022. The amendment was approved February 22, 2022.

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

Conclusions and Recommendations Regarding the Description of the Proposed Facility and Site Development Plan

Based upon review of the applicant's SAR, subsequent conversations with the applicant, and additional data collected by the BBC team, we conclude that the applicant has generally complied with the legislative requirements for describing the facility and site development plan.

Recommended mitigation. Based on our review of the SAR and Application, the applicant's responses to the RFIs 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):

- Russellville Solar should provide a final site layout plan to the Siting Board when site design is finalized. Any change in project boundaries or site layout from the information reviewed during this evaluation—including changes to the locations of solar panels, inverters, transformers, the substation or other project facilities—should be clearly documented and submitted to the Siting Board for review.
- Russellville 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

¹⁰ Russellville Solar Responses to Siting Board's First RFI, page 329.

applicant's access control strategy should include adequate signage at all site entrances and boundaries—particularly in locations visible to the public, local residents, and business owners—to warn potential trespassers.

- According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work. Further, the substation must have its own separate security fence, with locked access.

Compatibility with Scenic Surroundings

This section of the SAR review addresses the compatibility of the proposed Russellville 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.¹¹

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:

¹¹ 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.

- 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.

In this instance, the second framework is appropriate. While there is no formal visual resource system, Logan County Ordinance 19-920-06 (*An Ordinance Establishing Minimum Setback Requirements for Solar Farm Installations in Logan County*), requires that any solar projects use fencing and vegetative buffer (with minimum height and density requirements) to shield facilities from view.

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. The SAR describes some of the potential visual impacts from observation points in the surrounding area:

Long-range views from visual resources near the project site, primarily along or off of Watermelon Road, Joe Montgomery Road, US 79, Marian Acres Road, and Kees Road are generally partially obscured by mature trees as well as those framing fields and/or roads nearby. Long-range views from locations near the project site along A.P. Miller Road, Green Downs Road, and RJ Corman Railroad are generally unobstructed. The project would likely be more visually intrusive in the morning and late afternoon, when the panels would be facing east or west, respectively, at their maximum tilt, with the upper edge of the panels about eight feet from the ground. This effect would be least at midday when the panel profile would be lying flat and about five feet tall. The anti-reflective PV panel surfaces would minimize glare and reflection, and visual impacts from these vantage points are expected to be minor due to the visibility of relatively small portions of the project elements.¹²

While the applicant states that visual impacts from glare are expected to be minor, there is no formal glare assessment included in the attached SAR exhibits. BBC requested this information from Russellville Solar in the First RFI.

The proposed Russellville Solar project would be a large, commercial solar facility similar in size to several previous solar projects reviewed by BBC and other consultants for the Siting Board, As with

¹² SAR page 6.

these similar projects, much of the project’s compatibility with the scenic surroundings will depend on a strategic and well-executed vegetative screening plan. Fencing and vegetative buffers for the project are required by Logan County Ordinance 19-920-06 (*An Ordinance Establishing Minimum Setback Requirements for Solar Farm Installations in Logan County*) and its amendment. As stated in Section 2 of the SAR:

The ordinance establishes setback requirements for “solar farms,” [including] setbacks of 100 feet from adjacent property boundary lines and municipal road and railroad ROWs and 250 feet from residences, schools, churches, hospitals, nursing facilities, and cemeteries.

In addition to the aforementioned setbacks, Ordinance No. 19-920-06 stipulates that access to the site must be controlled by a fence and vegetative buffer to shield facilities from view. The ordinance was amended on February 22, 2022 to allow existing vegetation along the project perimeter to satisfy the vegetative buffer requirement and allow adjoining landowners to waive the vegetative buffer and/or visual screening. Vegetative buffer composed of a double row of eight-foot-high trees would be planted in a staggered pattern around the perimeter of the site approximately 10 feet from the project site boundaries where existing natural buffers are not sufficient in shielding views of the facility. A screen would be added to the security fence for additional visual buffering. Both the vegetative buffer and screen can be waived by landowners having at least 1,000 continuous feet of property adjacent to the project site, as approved by the Logan County Fiscal Court.¹³

Unlike several previous solar facility applications to the Siting Board that BBC has reviewed in the past two years, the Russellville Solar application does not include any landscaping plans or visual representations of views of the project from local roads, properties, or KOPs with and without vegetative screening. In the Second RFI, BBC asked the applicant to provide any available photographs or visual representations from nearby vantage points, including any relevant overlays of proposed facility equipment and vegetative screens (e.g., before-and-after visualizations).

Supplemental Investigations, Research, and Analysis

Vegetative buffer. Logan County Ordinance 19-920-06 requires new vegetative screening equivalent to a double row of eight-foot-high trees in order to provide a visual screen and protect the local viewshed.

With the February 2022 amendment to that ordinance, existing vegetation can take the place of new plantings, if the existing vegetation is sufficient. In the First RFI, BBC asked Russellville Solar to describe the process by which existing vegetative screening buffers are determined to be sufficient or insufficient. In their response, Russellville Solar states:

Where existing vegetative buffers are thin or may have gaps along the tree line, fence screening would also be used in order to better match the sufficiency of the new proposed vegetative plantings and appropriately screen the facility from views.

¹³ SAR page 6.

*Russellville Solar will make best efforts to identify where existing vegetative buffers may be too thin or insufficient to properly screen the facility from views and will supplement the existing buffer with fence screens in these areas. If an adjacent landowner should question the sufficiency of existing vegetation in screening in an area not previously identified, Russellville Solar proposes to seek an opinion from the Logan County Fiscal Court on the specific area before adding an additional screen.*¹⁴

The applicant also clarified that they have not compensated, nor do they intend to compensate, any eligible neighboring landowner who wishes to waive the vegetative buffer requirements (a right to waive requirements is part of the amendment to Ordinance 19-920-06).

Glare assessment. Section 2 of the SAR states that the project’s PV panels will have anti-reflective coatings and that visual impacts from nearby vantage points are expected to be minimal. In the First RFI, BBC asked Russellville Solar to describe the nature of the glare assessment that was conducted for the proposed project—whether internally or by a consultant on glare—and the results of any such assessment. In their Responses to the First RFI, the applicant stated:

*The Project was reviewed by an engineer who specializes in assessment of solar glare on airports, as well as by environmental scientists and planners for visual effects, including those deriving from glare. Because there are no overpasses or viewing locations from roads that would be above the facility and the Project would employ anti-reflective PV panels, and due to the requirement for the Project to retain or plant perimeter vegetative buffer to shield views of the facility, the consulting environmental scientists and engineer concluded that impacts from glare and visual effects, generally, would be minimal to non-existent. These conclusions corroborate with the updated 2021 FAA guidance on the potential for glare on airports, which states: "Initially, FAA believed that solar energy systems could introduce a novel glint and glare effect to pilots on final approach. FAA has subsequently concluded that in most cases, the glint and glare from solar energy systems to pilots on final approach is similar to glint and glare pilots routinely experience from water bodies, glass-facade buildings, parking lots, and similar features."*¹⁵

Visual assessment. BBC visited the proposed Russellville Solar project site in May 2022 to review the site and its surroundings.

Figure C-7 provides a view to the east into the proposed project area from the western boundary of the site along Watermelon Road. The home in the left foreground is a non-participating residence. Solar arrays would be located beyond the trees in the fields in the right side of the photo.

¹⁴ Russellville Solar Responses to Siting Board’s First RFI, page 328.

¹⁵ Russellville Solar Responses to Siting Board’s First RFI, page 331.

Figure C-7. View east into site from Watermelon Road.



Figure C-8 provides another view into the proposed site from further south on Watermelon Road. Solar panels would be located beyond the barn.

Figure C-8. View into site from further south along Watermelon Road.



Figure C-9 shows the closest home to the proposed solar arrays. Located along the southern end of Watermelon Road, the proposed arrays would be 250 feet from this non-participating residence.

Figure C-9. Closest home to proposed solar arrays.



Figure C-10 shows a potential site entrance from Watermelon Road, south of AP Miller Road. The resident in the partly obscured home on the right side of the photo has requested that no additional buffer be installed to screen their home from the potential views into the site.

Figure C-10. Potential site entrance.



Figure C-11 provides a view into the site from an area with little existing vegetative buffering, near the southwest corner of the site.

Figure C-11.
Area along western edge of site with little existing screening.



In contrast to the preceding image, Figure C-12 shows another area in the western portion of the site where existing vegetation would provide a substantial visual screen.

Figure C-12. Area in western portion of the site with substantial existing vegetative screening.



One of the important roads to access the site from the west is AP Miller Road. As shown in Figure C-13, this is a narrow gravel road.

Figure C-13. AP Miller Road.



Figure C-14 shows the existing TVA transmission line and the area in the northeastern corner of the site where the project substation would be built to connect into that line.

Figure C-14. Transmission line and substation area.



Conclusions and Recommendations Regarding Compatibility with Scenic Surroundings

The proposed Russellville 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.
- Russellville Solar should execute the screening plan required under the Logan County commercial solar ordinance and make sure the proposed new vegetative buffers are successfully established and develop as expected over time. Plantings should reach eight feet high within four years. Should the vegetation used as buffers die over time, Russellville Solar should replace them to maintain the visual buffer.
- Russellville Solar should cultivate at least two acres of native pollinator-friendly species onsite.

- Russellville Solar should use panels with anti-reflective coating to reduce glare and corresponding visual impacts.
- Russellville Solar should be open to communication with adjacent landowners regarding viewshed impacts and the implementation of strategic additional vegetative screening, if needed. Communication regarding viewshed impacts and concerns should be incorporated into the Complaint Resolution Program described further later in this section in regard to noise mitigation.
- If disagreements arise between Russellville Solar and an adjacent landowner regarding the sufficiency of existing vegetation in screening in an area, Russellville Solar should seek an opinion from the Logan County Fiscal Court on the screening requirements for that specific area.

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

Russellville Solar engaged Kirkland Appraisals, LLC—which has conducted property value impact studies for several previous solar applications to the Siting Board—to examine the proposed project’s potential impact on property values. Exhibit A of the SAR (Property Value Impact Report) provides a comparative study of property values in proximity to solar facilities in Kentucky and in other states across the US, using a matched pairs design. The study draws its conclusions regarding the impacts of the proposed facility on adjacent property values based on market analysis of value impacts from numerous other solar facilities.

Exhibit A states that the closest adjoining dwelling will be 250 feet from the nearest solar panel and that the average distance from solar arrays to adjoining homes will be 1,058 feet. In a summary statement, Kirkland Appraisals 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:

The adjoining properties are well set back from the proposed solar panels and most of the site has good existing landscaping for screening the proposed solar farm. Additional supplemental vegetation is proposed to supplement the areas where the existing trees are insufficient to provide a proper screen.

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

Data from the university studies, broker commentary, and other appraisal studies support a finding of no impact on property value adjoining a solar farm with proper setbacks and landscaped buffers.¹⁶

Supplemental Investigations, Research, and Analysis

To obtain further perspective on this issue, BBC reviewed recent studies regarding solar facility effects on nearby property values. As commercial scale solar facilities become more prevalent in the

¹⁶ SAR Exhibit A, page 1.

central and eastern portions of the United States, the research and information concerning potential impacts on property values is also continuing to evolve.

In 2018, a study of the potential effects of commercial solar farms on nearby property values was 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 asking their opinion on the likelihood that a solar farm would impact nearby residential property values. Among the findings of that study were that:

- “The majority of responses suggested either no impact (66 percent of all estimates) on home prices, or a positive impact (11 percent of all estimates), as a result of proximity to solar installations.”
- “However, some respondents did estimate a negative impact on home prices associated with solar installations.” In the 23 percent of cases where negative impacts on value were estimated, the negative effect was estimated to increase with closer proximity and larger scale solar installations. Respondents who had actual experience in assessing homes near solar installations estimated a 3 percent decline in value for 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.”¹⁷

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 in Rhode Island and Massachusetts —under certain conditions. Of the studies BBC has reviewed, this study appears to be the most robust in the sense that it covers a wide and diverse geographic area, observes hundreds of thousands of home sales transactions over a long period of time pre- and post-solar farm development, and has results that are robust to many different model specifications.

The study, based on “over 400,000 transactions within three miles of a solar site”, found that residential property values in suburban areas within one mile of a solar facility declined by 1.7 percent (on average) compared to surrounding properties, with larger effects on home values within 0.1 miles (500 feet) of a solar site (-7.0 percent). However, solar sites in industrial or rural areas¹⁸ had no statistically significant impact on home prices.¹⁹

Another recent contribution to the research on this topic is the 2019 PhD Dissertation of Dr. Nino Abashidze, an economist at the University of Georgia. Dr. Abashidze used the hedonic pricing model

¹⁷ *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.

¹⁸ In the study by Gaur and Lang cited below, “rural” is defined as areas with municipal population density of less than 850 people per square mile. The proposed Russellville Solar facility would sit near the City of Russellville (population density of 661 people per square mile at the 2020 Census), and the surrounding area has a low population density.

¹⁹ *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/

approach and econometric regression analysis to evaluate the effects from proximity to solar farms on both agricultural land values and residential property values in North Carolina. Dr. Abashidze found that proximity to solar farms had no discernable effect on *agricultural* land values (properties 30 acres or larger in size). However, Dr. Abashidze did find statistically significant, negative impacts on *residential* property values. Dr. Abashidze's econometric analysis found that (on average) homes within one mile of solar facilities experienced an estimated nine percent decrease in value, while homes closer to the facilities (within one-half mile) experienced an estimated 12 percent decrease in value. It is also important to note, however, that most of the residential properties in Dr. Abashidze's analysis were located on relatively small lots (average lot size of 0.9 acres, sample standard deviation in lot size of 1.6 acres) and that the study was based on a relatively small number of home sales transactions compared to the University of Rhode Island study.²⁰

Conclusions and Recommendations

With the proliferation of commercial solar facilities across the U.S., there is an 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 use appraisal techniques, which may be more subjective than the statistical techniques used in econometric studies, to 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, relatively few studies have been conducted by academic researchers or other "third-party" analysts, but the body of research is slowly growing. Using different methods, and different data sources, recent studies by professors at the LBJ School of Public Affairs (University of Texas) and the University of Rhode Island have found that there could be small, negative impacts on property values from proximity to commercial solar facilities. However, those negative effects appear to be more likely in suburban settings, rather than rural settings. Another recent study by a University of Georgia economist of impacts to property values from solar farms in North Carolina – using a hedonic pricing model and econometric approach similar to the University of Rhode Island study – found that solar facilities did not impact nearby *agricultural land* values, but did reduce nearby *residential* values (within one mile) by nine to 12 percent, on average. Overall, the two econometric property value studies indicate that the likelihood of adverse impacts on property values from nearby solar facilities increases with proximity to the solar site and with residential density, and decreases in more rural, agricultural settings. The duration of adverse effects on nearby residential property values has yet to be established by the econometric research studies.

As shown earlier in Figure C-3, about 96 percent of the land use adjacent to the proposed Russellville Solar facility is considered to be either agricultural or large lot "agri/residential." These properties appear unlikely to experience a measurable adverse impact on their values from the proposed solar

²⁰ Abashidze, Nino. *Essays on Economic and Health Effects of Land Use Externalities*. (Under the direction of Dr. Harrison Fell). Page 71. University of Georgia, 2019.

facility. About 3.5 percent of the adjacent land is considered residential, and nine of the 35 adjacent properties are residential homes on smaller than five acre lots.²¹ These properties may be at risk of a reduction in value, though the findings from the economists at University of Rhode Island and at the University of Georgia are not entirely consistent in this regard.

Given the predominantly rural setting for the proposed Russellville 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 most adjacent properties, but might affect the values of some smaller lot, adjacent residential properties – particularly those with homes located in closest proximity to nearby solar panels.

Recommended mitigation. It is important to note that while the academic studies discussed above have documented negative impacts to home values, the cause of the impacts has not been well researched. The studies hypothesize that solar farms may act as a visual disamenity, which suggests there is potential to mitigate negative impacts through actions designed to buffer the view of solar facilities from nearby homes. Consequently, BBC believes that Russellville Solar’s vegetative screening plans may help to minimize any adverse impact on nearby residential property values and recommends the following mitigation.

- Russellville Solar’s viewshed screening plan should incorporate particular efforts to reduce impacts on the views from the nine smaller lot residential properties (smaller than five acres) adjacent to the proposed project.

²¹ SAR Exhibit A, page 6.

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 Russellville 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 levels generated by facility construction and operation are addressed in Section 4 of the SAR (Anticipated Noise Levels at Property Boundary) and in SAR Exhibit E (Noise and Traffic Study, conducted by HDR). Section 4 provides an overview of nearby noise receptors and the expected noise generation during construction of the proposed facility:

Approximately 113 sensitive noise receptors are located within a half mile of the project site, with the closest single-family residence being located on A.P. Miller Road approximately 60 feet west of the project boundary and approximately 250 feet from the proposed solar panels. The majority of the sensitive noise receptors are located along Watermelon Road and US 79.

[...] Construction noise would cause temporary and minor adverse impacts to the ambient sound environment around the project site vicinity. Several residences and residential and non-residential agricultural complexes would temporarily experience heightened noise during construction, primarily from pile-driving activities. However, when the agricultural complexes are active in the fall and early winter, these facilities likely produce ambient sounds that are at or higher than the typical 45 to 55 dBA

in the project area, and these existing noises would help make effects from the project more minimal. Additionally, construction would primarily occur during daylight hours, between sunrise and sunset; therefore, the project would not affect ambient noise levels at night during most of the construction period. Most of the equipment would not be operating on site for the entire construction period but would be phased in and out according to the progress of the project.²²

Exhibit E of the SAR (Noise and Traffic Assessment, conducted by HDR for Russellville Solar) states that there are 113 noise sensitive receptors within a half-mile radius of the project site – primarily residences, residential farm complexes, associated outbuildings, and nonresidential agricultural complexes.²³ The distance from a solar panel to the nearest noise receptor ranges from less than 250 feet to approximately 2,640 feet.

Figure C-15.
Noise Sensitive Receptors within a Half Mile of the Russellville Solar Facility



²² SAR page 9.

²³ SAR Exhibit E, page 7.

Figure C-15 shows the noise receptors (depicted as green dots) identified by the noise assessment. Section 4 of the SAR states that the closest receptor is a residence on AP Miller Road, approximately 250 feet from the nearest solar panel.

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. Maximum noise levels will occur during pile driving of the solar arrays, which is consistent with previous solar project noise impact studies reviewed by the Siting Board.

For the noise assessment during the operational life of the proposed project, Russellville Solar identified the primary sources of noise as the solar inverters and substation transformer. The Noise Assessment (Exhibit E) states:

The central inverters would produce noise levels of approximately 65 dBA at 33 feet, and the Project substation would each emit approximately 50 dBA at 300 feet. As no noise receptors are within 33 feet of the proposed inverter locations or within 300 feet of the Project substation, noise impacts from these Project components are anticipated to be minimal to negligible.²⁴

The applicant did not discuss any potential noise impact from tracking motors on the solar array panels. The HDR Noise Assessment does not provide any specific estimations of noise levels at the nearest noise receptors during construction or operation. In the First RFI, Russellville Solar was asked to provide additional information and detail regarding the proposed project's noise impacts to the surrounding environment.

Supplemental Investigations, Research, and Analysis

In the First and Second RFI, the Siting Board and BBC requested additional information on several topics relating to noise emissions for the proposed project.

Construction schedule. Russellville Solar was asked to provide hours of operation for construction activity during the construction phase of the proposed project. In response, the applicant stated that construction and deliveries would occur Monday through Saturday between 8 a.m. and 6 p.m., with exceptions only for non-noise activities such as field visits, planning meetings, mowing, and surveying.²⁵

Engagement with nearby noise receptors. In late March 2022, Russellville Solar received questions (via the First RFI submitted to the Siting Board) from potential noise receptors regarding the project's noise impacts. The applicant plans to respond to those individuals "in the coming weeks." Regarding their intention to notify nearby residents of construction activity, the applicant stated:

Russellville Solar intends to notify noise receptors of noise causing construction activities and expected duration of the activity at least two weeks prior to the construction activity. Russellville Solar

²⁴ SAR Exhibit E, page 8.

²⁵Russellville Solar Responses to Siting Board's First RFI, page 127.

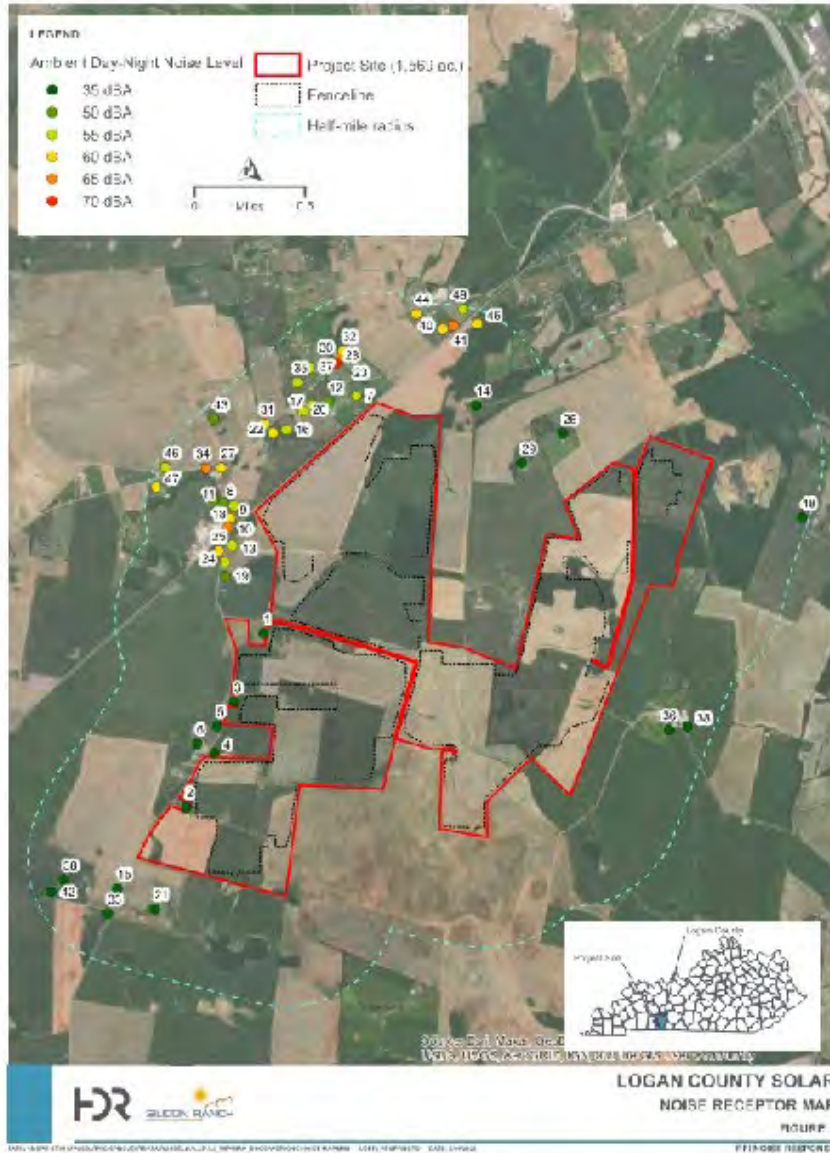
*will respond to any noise-related complaints from residents adjacent to the project boundary and will mitigate those effects to the extent feasible.*²⁶

Construction noise levels at nearby receptors. Russellville Solar did not estimate specific noise levels for nearby noise receptors in the original SAR and accompanying noise assessment by HDR. In their response to questions in the First RFI, the applicant supplied an updated noise memorandum by HDR which answered several of these questions.

HDR updated the count of noise-sensitive receptors around the project site. The original documents stated 113 noise-sensitive receptors with a half-mile radius of the proposed project site, but this was recalculated to 49, to exclude offices, barns, and garages which are not considered noise sensitive in environmental noise analyses. To resolve some confusion regarding the numbering of nearby receptors, Russellville Solar provided a second revised map in response to the Second RFI. Figure C-16 shows the updated map of noise-sensitive receptors, which consist primarily of residences, as well as any churches, schools, or hospitals.

²⁶ Russellville Solar Responses to Siting Board's First RFI, page 128.

Figure C-16. Noise Sensitive Receptors within a Half Mile of the Russellville Solar Facility, Updated



Color-coding of the receptor markers refers to the existing ambient day-night noise level, ranging from 35 dBA (dark green) to 70 dBA (red). HDR states that none of the 49 receptors marked in Figure C-16 belongs to landowners leasing land to the proposed project. Three receptors are less than 100 feet from the proposed project boundary. Note that this setback is not in conflict with setback

requirements in Ordinance 19-920-06, which mandates setbacks from “any device, structure or part of a device or structure (i.e., array, panel, etc.) installed for the sole purpose of the collection, inversion, storage and distribution of solar energy,” and does not include fences.

HDR estimated the maximum anticipated noise level at the property boundary to be 102 dBA, assuming that 10 impact pile drivers would operate simultaneously and side by side, 100 feet from the property boundary. For the five receptors that HDR identified as being less than 500 feet from pile driving activities, this results in modeled noise levels between 87 and 96 dBA, as shown in Figure C-17.

**Figure C-17.
Maximum Construction Noise
at Five Nearest Receptors**

Source: HDR Noise Memorandum, Russellville Solar Responses to First RFI

Pile Driving Noise Levels		
Receptor ID	Distance from Property Line (feet)	Modeled Leq* (dBA)
1	184	96
2	218	95
3	238	94
4	239	94
5	493	87

Operations noise levels at nearby receptors. During normal operations, the single greatest source of noise emission would be the substation in the northeastern portion of the proposed project site. Housing density is very low in this area, as seen in the maps of the proposed project that have been excerpted in this report.

Figure C-18 shows the anticipated range of noise levels experienced by the five noise-sensitive receptors nearest to the substation. The nearest receptors sit between 3,000 and 5,200 feet away from the substation and are expected to receive noise of 40 to 44 dBA (comparable to background noise in a library).

**Figure C-18.
Maximum Substation Noise at
Five Nearest Receptors**

Source: HDR Noise Memorandum, Russellville Solar Responses to First RFI

Receptor ID*	Distance (feet)	Modeled Leq (dBA)
27	3,008	44
20	3,306	44
21	3,381	42
19	5,103	40
18	5,181	40

An additional source of noise during standard operation would be the tracking motors that tilt the PV panels along a single axis periodically throughout the day. Tracking motors operate throughout the facility arrays wherever there are solar panels. Figure C-XX, provided by HDR in the updated noise memo, shows the anticipated noise levels from tracking motors at the five nearest receptors.

Figure C-19.
Maximum Tracking Motor Noise
at Five Nearest Receptors

Source: HDR Noise Memorandum, Russellville Solar Responses to First RFI

Tracking Motor Noise Levels		
Receptor ID	Distance from Property Line (feet)	Modeled Leq* (dBA)
1	194	69
2	218	68
3	236	68
4	239	68
5	493	63

These five non-participating residences would experience intermittent noise from the tracking motors throughout the daylight hours at a level between 63 and 69 dBA (comparable to a normal conversation).

Additionally, BBC requested more information about the operation of the tracking motors. The HDR Noise Memo provided with the Responses to the First RFI states that “tracking motors operate for a few seconds at a time,” but does not describe how often a motor engages in either times per hour or degrees of tilt. While a noise level of 69 dBA is not hazardous, it is noticeable and is louder than estimated tracking motor noise at nearest receptors for several previous solar facility applications that BBC has reviewed for the Siting Board in the past 24 months.

BBC requested additional information regarding panel tracking motors in the Second RFI. In response, Russellville Solar stated that “The trackers will move approximately one-quarter inch every five minutes as the panels follow the sun. The tracker usually moves for approximately 15 seconds every five minutes during daylight hours. Based on this, hourly Leq at the receiver will be 12dBA lower than if the tracking motor operated continuously over the entire 60-minute period.”²⁷

Note that all of HDR’s noise level modeling assumes no noise absorption or mitigation from uneven topography, grass, or other vegetation.

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).²⁸ Figure C-20 identifies the time that it takes for a person to reach their full daily noise dose based on differing levels of noise exposure.

²⁷ Russellville Solar Responses to Siting Board’s Second RFI, page 40.

²⁸ Noise and Hearing Loss Prevention. The National Institute for Occupational Safety and Health. <https://www.cdc.gov/niosh/topics/noise/default.html>

Figure C-20.
Time to Reach 100 Percent of Daily Noise Dose

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

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

At 96 dBA—the estimated maximum noise level during construction, as estimated at the proposed project’s nearest receptor and shown previously in Figure C-18 — the daily noise dose would be reached in less than an hour. BBC recognizes that 96 dBA is a conservative estimate by HDR assuming 10 piledrivers operating simultaneously in the same location, that pile driving is an intermittent activity and that pile drivers move around on site frequently, but these are noise levels that require any feasible mitigation in order to lessen impacts on these nearby receptors.

Other noise-related information. BBC compared the projected construction and operational noise levels from the Russellville Solar project to previous estimates for other Kentucky solar projects we have reviewed for the Siting Board over the past two years.²⁹ We found that the Russellville Solar noise level estimates for pile driving activity are comparable with noise level projections from these other proposed solar facilities. Figure C-20 summarizes the pile driving noise levels estimated in these proposed solar facility applications.

²⁹ In addition to the proposed Russellville Solar project, BBC has also reviewed the proposed Turkey Creek, Unbridled, Ashwood, Flat Run, Martin County, Green River, and Rhudes Creek solar facilities.

**Figure C-20.
Estimated Noise Levels from Pile Driving, KY Solar
Project Proposals (dBA)**

Note:

*Russellville Solar’s noise study consultant, HDR, conservatively modeled noise generation assuming 10 pile drivers operating simultaneously side-by-side.

	Estimated noise level at 50 ft (dBA)
<i>Russellville Solar</i>	
Pile drivers (impact)*	102.0
<i>Rhudes Creek Solar</i>	
Pile driver & other equip.	90.0
<i>Green River Solar</i>	
Pile driver	94.9
<i>Martin County Solar</i>	
Pile driver (impact)	101.0
Pile driver (sonic)	95.0
<i>Flat Run Solar</i>	
Pile driver	100.6
<i>Ashwood Solar</i>	
Pile driver (impact)	101.0
Pile driver (sonic)	95.0
<i>Unbridled Solar</i>	
Pile driver (impact)	101.0
<i>Turkey Creek Solar</i>	
Pile driver (impact)	101.0
Pile driver (sonic)	96.0

Conclusions and Recommendations

During construction, noise from the pile drivers could have a substantial impact on the nearest noise receptors. HDR’s worst case estimate of 96 dBA at the nearest receptor would provide 100 percent of the NIOSH recommended maximum daily noise dose within 45 minutes. However, it is very unlikely that 10 piledrivers would be operating simultaneously in the same location (as assumed in the HDR analysis to provide a conservative noise estimate), and it is also important to note that the noise analysis did not account for noise buffering from intervening vegetation (e.g., buffers) or topography.

During normal operation of the proposed Russellville Solar facility, noise levels from panel tracking motors, inverters, and the substation transformer are unlikely to be disruptive to local residents. While the noise level of panel tracking motors at the closest receptors would be high enough to be noticeable to the closest receptors if it were continuous (up to 69 dBA), the intermittent operation of the tracking motors is likely to make the noise less noticeable.

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

- If pile driving activity occurs within 1,500 feet of a sensitive noise receptor (e.g., residence), Russellville Solar should implement a construction method that will suppress the noise generated during the pile driving process (i.e., semi-tractor and canvas method, sound blankets on fencing surrounding the solar site, or other comparable methods).
- Russellville Solar should place panels, inverters and substation equipment no closer to homes and project boundaries than indicated in the site development plan submitted with its

Application and SAR and reviewed herein. The placement of these features should also be consistent with any setbacks required by Logan County Ordinance 19-920-06.

- Similar to other recent solar facility applications reviewed by the Siting Board, construction activity at the Russellville 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. Non-noise causing and non-construction activities such as field visits, planning meetings, surveying, mowing, etc. can take place on site between 7 AM and 10 PM Monday through Saturday.
- Russellville Solar should prioritize vegetative screen planting before commencing construction activity. This will not only mitigate noise but also allow for the growth of the tree screens during the construction phase, providing an established visual screen to protect the viewshed before the facility begins operation. It may also help mitigate against impacts to the property values of the smaller residential properties adjacent to the proposed facility.
- Russellville Solar should notify residents and businesses within 2,400 feet of the project boundary about the construction plan, the noise potential and mitigation plans one month prior to the start of construction.
- During construction Russellville Solar should locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as practicable from neighboring residences.
- Russellville Solar should implement a Complaint Resolution Program to address any complaints from surrounding landowners. Russellville Solar should submit an annual status report on the Complaint 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 Russellville Solar facility on road transportation. This also includes traffic effects, such as congestion, safety, fugitive dust, and degradation of the transportation infrastructure. This component of the SAR corresponds to KRS 278.708(3)(e).

Potential Issues and Standard Assessment Approaches

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

Standard components of the evaluation of traffic-related impacts include:

1. Identification of access methods, and a description and visual portrayal of primary access routes to the site during construction and during operation.
2. Description of baseline traffic conditions: existing traffic counts, road capacity and level of service and any major existing constraints (e.g., bridge weight limitations, etc.).
3. Identification of any special transportation requirements during construction (e.g., the need to reinforce or "ramp over" existing bridges, detours, temporary closures, etc.).
4. Projection of traffic volumes related to construction and operation.
5. Determination of whether the additional traffic, during construction and operation, would lead to congestion, changes in the level of service of the existing road network or additional road maintenance costs.

Information Provided in the Applicant's SAR

Section 5 of the SAR (Effect on Road, Railways, and Fugitive Dust) supplies information from the applicant regarding anticipated impacts on transportation at and around the proposed project site during construction and operation. Exhibit E of the SAR (Noise and Traffic Study) provides the traffic study conducted by HDR for the proposed Russellville Solar project.

The proposed Russellville Solar site has three adjacent local roads that will be transited during the construction and operation phases of the project: Watermelon Road, AP Miller Road, and Joe Montgomery Road. During the construction phase, the primary major roadways for trucks, construction equipment, deliveries, and workers arriving in the area would be US 79 (Clarksville Road) on the northern edge of the project; US 431 (Russellville Bypass) approximately 1 mile northeast of the project site; and Watermelon Road, along the western boundary of the project.

Traffic monitoring stations maintained by the Kentucky Transportation Cabinet (KYTC) provide specific data on traffic flows in the area:

Existing traffic volumes on some of the roads in the Project area were determined using 2018 and 2019 Average Annual Daily Traffic (AADT) counts measured at existing Kentucky Transportation Cabinet (KYTC) stations (KYTC 2021). Three KYTC stations (Stations 506, B18, and B60) are located

within 1-mile of the Project site. The 2018 AADT count for Station 506, located on Watermelon Road approximately 1-mile southwest of the Project site, was 377 vehicles. The 2018 AADT count for Station B18, located on US 79 approximately 1-mile north of the Project site, was 4,441 vehicles. The 2019 AADT count for Station B60, located on US 431 (Russellville Bypass) approximately 1-mile northeast of the Project site, was 4,380 vehicles.³⁰

The applicant does not state the estimated number of vehicle trips expected during the construction phase of the proposed project; BBC requested this information in the First RFI. However, SAR Exhibit E states that there may be approximately 450 workers on site at the peak of construction.

Laborer commutes with passenger vehicles and trucks would occur daily with traffic peaks in the morning, at lunch, and at the end of the workday, whereas deliveries of equipment would occur on trailers, flatbeds, or other large vehicles periodically throughout the construction process at various times of day.³¹

The increase in traffic from baseline levels is likely to be disruptive along Watermelon Road in particular, and the size, weight, and class of delivery trucks could make specific deliveries to site more challenging or disruptive than others. In the Siting Board's First RFI, BBC requested that Russellville Solar provide information about the estimated number and class of delivery trucks anticipated on site throughout the construction phase; the projected peaks in equipment deliveries and number of workers on site; and the load weight of the substation transformer delivery.

Traffic impacts during the operational phase of the Russellville Solar facility would be minimal, although the presence of sheep operations onsite would require more frequent access to site than previous solar applications that BBC has reviewed.

Shepherds would be present onsite to tend to the needs of sheep herds. Therefore; maintenance will occur more frequently during the vegetative growing season. Employees would generally contribute less to vehicle traffic than a typical single-family home. Vehicular traffic on the Project site would be limited to typical weekday work hours and would not significantly contribute to additional traffic in the Project vicinity.³²

Finally, Russellville Solar anticipates minor fugitive dust impacts from construction, as internal roads would be compacted gravel which may increase airborne dust during dry conditions or when site traffic is heavy. However, the applicant proposes several practices to minimize fugitive dust impacts, including retention of and revegetation, cover of open trucks, and frequent water applications.

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

³⁰ SAR Exhibit E, page 10.

³¹ Ibid.

³² SAR Exhibit E, page 11.

route adjoining the proposed project site (US 79) is rated for 80,000 pounds.³³ Any vehicle loads exceeding this limit could subject the roadway and shoulder to damage or degradation. Additionally, local roads transited by delivery trucks—such as Watermelon Road or Joe Montgomery Road—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, overall BBC finds that the limitations and challenges of the primary roadways adjacent to the proposed Russellville Solar project site are comparable with those of several other recent solar facility applications reviewed and approved by the Siting Board within the past 18 months.

BBC expects that advance planning between Russellville Solar and the KYTC (as well as the Logan County road department, as applicable) can mitigate problems resulting from overweight and over-dimensional load delivery. In the Siting Board’s First RFI, BBC requested further information from the applicant regarding planning or correspondence between Russellville Solar and the KYTC or the Logan County road department.

Engagement with KYTC and Logan County Road Department. BBC asked Russellville Solar to describe any correspondence that the applicant had with the KYTC or the Logan County Road Department regarding road weight ratings for heavy deliveries to site as well as traffic impacts resulting from the proposed project.

Regarding their contact with KYTC, the applicant stated:

Russellville Solar contacted Joe Plunk, Chief District Engineer of the Kentucky Transportation Cabinet Highway District 3 on April 27, 2022. [...] The Project discussed expected weight of deliveries

³³ Kentucky Transportation Cabinet Truck Weight Classification Statewide Map.

and number of deliveries along State roads including Watermelon Rd and Clarksville Rd (KY 79). As a Controlled Access Highway, Clarksville Rd is a “AAA” rated highway (80,000 lbs.) while Watermelon Rd is a “A” rated Rural Highway (44,000 lbs.). Deviations from the weight ratings for heavy equipment, such as the substation transformer will require a proper permit submitted via the drive.ky.gov site. Russellville Solar and the selected EPC contractor would obtain the proper permits from this site for deliveries and coordinate with District 3 to minimize any road impacts.³⁴

Russellville Solar also contacted the Logan County Road Department and described that correspondence in their Responses to the First RFI (emphasis added by BBC):

AP Miller Rd. and J. Montgomery Rd. are Logan County Roads proposed as construction access points for the Project. Russellville Solar met with Kelly Wilson, Foreman of the Logan County Roads Department on April 26, 2022 to begin discussions on the project, potential traffic impacts and heavy deliveries to the site. The number of light and heavy duty trucks and frequency of expected deliveries were discussed with Mr. Wilson, including the weight of the substation transformer, expected to be approximately 177 tons and delivered via an extra-long semi-truck and trailer via J. Montgomery Rd. Mr. Wilson noted these roads should be able to sustain most of the deliveries without damage but mentioned the width of AP Miller Rd. may be problematic. Russellville Solar indicated that roads would be improved as needed and maintained to ensure minimal impacts to traffic during construction and road infrastructure. The Project team and EPC contractor propose to continue discussions with Mr. Wilson as designs would be finalized.³⁵

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 during construction. In their response to BBC’s questions about transportation impacts in the First RFI, Russellville Solar states:

During the construction phase Russellville Solar anticipates approximately 30 light duty trucks (Class 2 weight class) on site per day, not including personal vehicles. During deliveries, approximately 10 heavy duty trucks (Class 8) would be expected to deliver modules and tracker parts could be expected on site per day, until all the components are delivered. Deliveries are expected to be made over a period of approximately 3-4 months with variation in frequency of deliveries. Inverter deliveries would be made by 2-3 heavy duty trucks (Class 8) per day until delivery is completed.³⁶

BBC inquired about the weight of the substation transformer and the truck class necessary for its delivery. Russellville Solar responded that the substation transformer would be 177 tons (353,799 lbs) and would be delivered by an extra-long semi-truck and trailer.

Worker-related traffic during construction. Commuter traffic to site is dependent on the number of workers required throughout the 13- to 15 -month construction phase. In their Responses to the First RFI, the applicant states:

³⁴ Russellville Solar Responses to Siting Board’s First RFI, page 462.

³⁵ Russellville Solar Responses to Siting Board’s First RFI, page 463.

³⁶ Russellville Solar Responses to Siting Board’s First RFI, page 460.

In the initial phase of construction from construction mobilization to the end of the civil stage and site work (approximately first 3 months) approximately 20 workers would be on site. This would ramp up by an additional 20-30 (50 total) for electrical and underground collection work over the next 4 months and then ramp up to a max peak manpower of approximately 250 when in full production of racking, trackers and module installation, with a steep decline after modules are installed. Modules would be installed over a period of approximately 5 months. After component installation, approximately 30 workers would be on site for civil reclaim and clean up.³⁷

BBC followed up this answer from Russellville Solar with an additional question in the Second RFI, as this estimated peak of 250 workers is just over half of the estimated peak workforce (450 workers) described in SAR Exhibit E (Noise and Traffic Assessment). In their response to the Second RFI, Russellville Solar revised the projected number of workers during the peak of construction to 350.³⁸

Also as part of the Siting Board's Second RFI, BBC asked whether employees would most often drive their own vehicles or carpool together in vans during construction – as well as what incentives or other measures would be used to encourage carpooling or discourage single-occupant vehicles. In their response, Russellville Solar provided the following information:

To encourage ridesharing for the construction phase of the project, carpooling will be strongly recommended and encouraged as part of the construction site orientation held by the EPC contractor. Once on-site, bussing will be available to shuttle workers to their areas of operation. Staff will be provided with very reasonable per diems so that they can use local accommodations close to site, thus reducing commutes and emissions. Those workers staying in common establishments will likely carpool to and from the job site.³⁹

Sheep operations during life of proposed project. As mentioned previously in this report, the proposed Russellville Solar project is unique among those that BBC has reviewed for the Siting Board in the past two years in that the landscape will retain an agricultural purpose, for sheep grazing. BBC requested greater detail on the nature and extent of the planned sheep operations in order to understand its impacts to traffic near the site. Russellville Solar responded:

Within [the project's] array fencing, temporary electric fence will be used to subdivide the array into various 'paddocks', where flocks of sheep are rotated rapidly through each paddock, typically spending 3-days or less in each paddock to avoid overgrazing. [...] Flock size varies throughout the year based on seasonal weather patterns and lambing schedule, with the resident flock size assumed to be between 1,000 and 2,000 sheep of various classes. Shepherds are onsite daily for livestock operations. Vehicle class would be typical of Kentucky's cattle and sheep industry, noise and traffic impacts are not expected to exceed those from previous land use. Mechanical 'finish mowing' is used as a support tool to manage vegetation to remain compliant with solar industry vegetation management performance specifications. Pollinator habitat established in shading buffers will be managed such that woody

³⁷ Russellville Solar Responses to Siting Board's First RFI, page 461.

³⁸ Russellville Solar Responses to Siting Board's Second RFI, page 56.

³⁹ Russellville Solar Responses to Siting Board's Second RFI, page 57.

*perennial species are prevented from establishing, while accommodating various habitat and nesting needs of wildlife.*⁴⁰

The additional use of the proposed project land for sheep operations is not incongruous with the existing character or use of land in the surrounding area, and would not negatively impact traffic flows around the project site during the operational lifetime of the facility.

Conclusions and Recommendations

During construction, daily deliveries on semi-truck trailers and workforce commuter traffic will substantially increase the amount of traffic on primary roadways near the project site, particularly along the half-mile stretch of Watermelon Road that connects US 79 with AP Miller Road and the western side of the proposed project site. Deliveries and traffic along AP Miller Road may be challenging given the width of AP Miller Road, as discussed by the Logan County Roads Department Foreman.

Delivery of the substation transformer will likely present challenges given the load ratings of surrounding roadways. These challenges can be overcome with careful advance planning and an appropriate traffic management plan.

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

- Russellville Solar should submit a final construction schedule, including revised estimates of on-site workers and commuter vehicle traffic, to the Siting Board prior to commencement of construction.
- Russellville 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, Russellville Solar should implement the measures they identified in response to the Siting Board's First RFI to minimize commuting traffic, including encouraging ridesharing during new worker orientation, providing on-site bus shuttles and providing reasonable per-diems to allow workers to stay in relatively close proximity to the site. Russellville Solar and its contractors should also use appropriate traffic controls; or allow flexible working hours outside of peak hours to minimize any potential delays during AM and PM peak hours.
- Russellville Solar and its construction contractors should comply with all laws and regulations regarding the use of roadways.
- Russellville Solar should obtain permits from the KYTC and local road authorities as needed for overweight and overdimensional vehicle transport to the site and comply with all permit requirements, continuing to coordinate with the KYTC District Permits Engineer and the Logan County Road Department as needed.

⁴⁰ Russellville Solar Responses to Siting Board's First RFI, page 456.

- Russellville 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.
- Russellville Solar should properly maintain construction equipment and follow best management practices related to fugitive dust throughout the construction process. Dust impacts should be kept to a minimal level.

Other Issues

While not specifically required under the statutes authorizing SAR reviews by consultants for the Siting Board (KRS 278.708), it has become customary to consider additional issues in these reviews, including economic impacts and project decommissioning. This final portion of this section of BBC's report includes these aspects.

Economic Impacts

Current economic conditions and trends. The Russellville Solar facility would be located in Logan County (population approximately 27,000) just southwest of its county seat of Russellville (population approximately 7,000). The county's population count has been relatively unchanged over the past decade, adding a total of about 600 new residents since 2010.

Per capita personal income in Logan County was \$40,963 in 2020, lower than the statewide average of \$47,339.⁴¹ The average annual unemployment rate in Logan County during 2021 was 3.8 percent, lower than the statewide average unemployment rate of 4.7 percent.⁴²

There are about 12,675 jobs located in Logan County as of 2020. The largest employment sector is manufacturing (3,250 jobs). The Logan Aluminum rolling mill in Russellville alone has more than 1,400 employees.⁴³ Other manufacturers include Ventra Plastics and Emerson Electric.

After manufacturing, retail trade (1,214), farming (1,173), and local government (1,034) make up the bulk of employment. These top four sectors comprise more than 50 percent of all jobs in the county.⁴⁴

There were about 196,000 acres of cropland in Logan County as of the last Census of Agriculture in 2017, making up about three percent of the more than 6.6 million acres of cropland across all of Kentucky. Cropland in Logan County decreased by just 2,000 acres (1%) over the ten-year period between the 2007 and 2017 Censuses of Agriculture. Across Kentucky as a whole, cropland decreased by about 650,000 acres (9%) over the same period.⁴⁵

Applicant economic impact study. Attachment G to the Russellville Solar Application (Economic Impact Report), contains a study of the projected economic impacts from the proposed facility. The

⁴¹ U.S. Bureau of Economic Analysis, Table CAINC1 Personal Income Summary and Table CAINC30 Economic Profile, April 2022.

⁴² U.S. Bureau of Labor Statistics.

⁴³ <https://www.logan-aluminum.com/>

⁴⁴ U.S. Bureau of Economic Analysis, Table CAEMP25N Total Full-Time and Part-Time Employment by NAICS Industry.

⁴⁵ 2017 Census of Agriculture and 2007 Census of Agriculture. County Data. U.S.D.A. National Agricultural Statistics Service.

study was conducted by Dr. Paul A. Coomes, a consulting economist and emeritus professor of economics at the University of Louisville.⁴⁶

Key findings from Dr. Coomes' analysis include:

- The applicant is likely to invest approximately \$150 million in Logan County to develop the proposed project;
- There will be a one-time spike in construction-related employment over about a 12-month period. The spike will include about 415 direct jobs and about 114 indirect and induced jobs. The direct construction jobs are expected to pay an average of about \$50,000 per year;
- Ongoing economic impacts (e.g., jobs and payroll) from operations will be “very small” including about six permanent jobs.
- However, Dr. Coomes also notes that “[There] will be three to four decades of new property-related tax payments to state and local jurisdictions in Logan County due to the increased value of real estate, machinery and tangible property installed at the site. The County is assessing the potential issuance of an Industrial Revenue Bond in support of the project. The company proposes making Payments in Lieu of Taxes (PILOT) to Logan County jurisdictions, including the public schools, of \$6 million over thirty years. The proposed PILOT payments average \$200,000 per year, but only covers tangible personal property. The taxable value of the land is expected to jump from around \$1,400 to \$9,500 per acre due to the development. Combined with the proposed PILOT payments, this means the project would result in an average of \$484,000 per year in property taxes to local jurisdictions, including the school system, for the first thirty years.” Dr. Coomes estimates that the company will pay about \$14.52 million to state and local governments in property taxes and payments in lieu of taxes over at least the first 30 years of the operating period, and the increased property tax payments would continue for a further decade. Dr. Coomes further states that “This is approximately twenty times larger than current property tax payments from the farmland.”⁴⁷

Review and assessment of applicant economic information. The level of investment in Logan County projected by Dr. Coomes appears to be consistent with industry standards for a solar project of the size of the proposed Russellville Solar facility. Dr. Coomes' estimate of direct employment during construction (415 jobs) is lower than the original estimate by Russellville Solar in their evaluation of transportation of “450 workers at the peak”, but higher than Russellville Solar's revised estimate in their response to the Siting Board's Second RFI indicating a peak workforce of 350 workers. Dr. Coomes' conclusions that the operating phase will have very modest economic impacts—but that the proposed solar facility will enhance local government revenue while requiring very few services—are consistent with the findings of other commercial solar economic impact studies.

⁴⁶ Application, Attachment G.

⁴⁷ Application Attachment G. Economic Impact Report.

Some information that would provide a more complete picture but which is not provided in the applicant's economic study includes the direct, indirect and induced economic benefits from the current use of the land in agriculture; the economic benefits from the anticipated sheep ranching operation on the site during solar operations, and the potential induced economic benefits from the additional income received by participating landowners if at least a portion of that income is spent locally. Dr. Coomes notes these other economic effects, but states that quantifying them is outside the scope of his analysis. Based on BBC's experience in conducting economic impact evaluations, we do not believe quantification and incorporation of these other economic effects would fundamentally change Dr. Coomes' conclusions.

Recommended mitigation. BBC recommends the following measures in regard to potential economic impacts:

- Russellville Solar should complete its payments in lieu of taxes agreements (PILOT) with local government jurisdictions to ensure the proposed project provides a positive net fiscal benefit for those entities.

Project Decommissioning

In prior solar projects reviewed by the Siting Board, plans and assurances for decommissioning the sites at the end of their functional lives have been an important issue of concern to both the Siting Board and local governments. BBC did not find reference to a decommissioning plan in the Russellville Solar Application or Site Assessment Report.

Decommissioning is addressed in the four lease agreements that Russellville Solar has executed with the participating landowners. Section 7 in the redacted copies of the lease agreements that Russellville Solar provided in response to the Siting Board's RFI, "Removal of Solar Equipment and Restoration of Property", includes provisions that commit Russellville Solar to remove equipment and restore the properties at the end of solar operations at the company's expense.

Recommended mitigation. Absent a decommissioning plan, BBC recommends the same type of mitigation measures related to decommissioning that have been included in recent orders by the Siting Board for other proposed solar facilities:

- As applicable to individual lease agreements, Russellville Solar, its successors, or assigns should abide by the specific land restoration commitments agreed to by individual property owners, as described in each executed lease agreement.
- Russellville Solar should file a full and explicit decommissioning plan with the Siting Board. This plan should commit Russellville Solar to removing all facility components, above-ground and below-ground, regardless of depth, from the project site. Upon its completion, this plan should be filed with the Siting Board or its successors. The decommissioning plan should be completed at least one month prior to construction of the Project.
- Russellville Solar should file a bond with the Logan County Fiscal Court, equal to the amount necessary to effectuate the explicit or formal decommissioning plan naming Logan County as a third-party obligee (or secondary, in addition to individual landowners) beneficiary, in addition to the lessors of the subject property insofar as the leases contain a decommissioning bonding

requirement, so that Logan County will have the authority to draw upon the bond to effectuate the decommissioning plan. For land in which there is no bonding requirement otherwise, Logan County should be the primary beneficiary of the decommissioning bond for that portion of the project. The bond(s) should be filed with the Logan County Treasurer or with a bank, title company or financial institution reasonably acceptable to the county. The acceptance of the county of allowing the filing the bond(s) with an entity other than the Fiscal Court, through the Logan County Treasurer, can be evidenced by a letter from the Judge-Executive, the Fiscal Court, or the County Attorney. The bond(s) should be in place at the time of commencement of operation of the Project. The bond amount should be reviewed every five years at Russellville Solar's expense to determine and update the cost of removal amount. This review should be conducted by an individual or firm with experience or expertise in the costs of removal or decommissioning of electric generating facilities. Certification of this review should be provided to the Siting Board or its successors and the Logan County Fiscal Court. Such certification should be by letter and should include the current amount of the anticipated bond and any change in the costs of removal or decommissioning.

- Russellville Solar or its assigns should provide notice to the Siting Board if during any two-year (730 days) period, it replaces more than 20 percent of its facilities. Russellville Solar should commit to removing the debris and replaced facility components from the Project site and Logan County upon replacement. If the replaced facility components are properly disposed of at a permitted facility, they do not have to be physically removed from Logan County. However, if the replaced facility components remain in Logan County, Russellville Solar should inform the Siting Board of where the replaced facility components are being disposed.
- Any disposal or recycling of Project equipment, during operations or decommissioning of the Project, should be done in accordance with applicable laws and requirements.