Review and Evaluation of Rhudes Creek Solar, LLC Siting Assessment Report Case Number: 2021-00127

FINAL REPORT

Final Report

December 20, 2021

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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 Rhudes Creek Solar merchant electric generating facility submitted to the Kentucky State Board on Electrical Generation and Transmission Siting (the Siting Board). Rhudes Creek Solar, LLC submitted an administratively complete document titled "Rhudes Creek Solar, LLC Generation Application" (the "Application") to the Siting Board in early September 2021. The Siting Board assigned the case number 2021-00127 to the Rhudes Creek Solar application. The proposed generating facility and its short, accompanying non-regulated transmission line are 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 Rhudes Creek 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, and Seebree Solar facilities which have been reviewed in 2021;
- Reviewed the contents of Rhudes Creek 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 November 2021;
- Completed interviews and data collection with a number of outside sources as sourced in this document; and
- Compiled and incorporated all of the foregoing in the analysis.

Report Format

This report is structured to be responsive to KRS 278 and 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 Rhudes Creek 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, Rhudes Creek Solar has not finalized the precise layouts of the solar arrays and some other project infrastructure.

Rhudes Creek Solar is currently completing more detailed noise and traffic studies. Those studies were not available by the date this report was required to be filed, so BBC has relied upon the more summary noise and traffic-related information provided in the Application and the SAR and Rhudes Creek Solar's responses to requests for information from the Siting Board. This review is based on the best available information at this time.

SECTION B.

Executive Summary

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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 Rhudes Creek Solar, LLC for approval to construct a commercial, photovoltaic solar merchant electric generating facility in Hardin County, Kentucky, in early September 2021. Siting Board staff retained BBC Research & Consulting (BBC), a Denver-based firm, to review the SAR. BBC was directed by the staff to review the SAR for adequacy, visit the site, conduct supplemental research where necessary and to provide recommendations about proposed mitigation measures.

This is the summary of BBC's final report, which encompasses the SAR review, establishes standards for evaluation, summarizes information from the applicant, notes deficiencies, offers supplemental information and draws conclusions and recommendations related to mitigation. Issues outside the scope of KRS 278.708 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 Rhudes Creek Solar facility in terms of surrounding land uses, legal boundaries, access control, utility service, setback requirements, visual impacts, impacts on surrounding property owners, noise levels and traffic impacts. Additional detail on each topic was provided in the applicant's responses to the First and Second Request for Information from the Siting Board Staff during the SAR review process.

The proposed Rhudes Creek Solar facility would be a 100-megawatt alternating current (MWac) photovoltaic electricity generation facility situated near the unincorporated community of Cecelia in Hardin County, approximately 7 miles southwest of Elizabethtown and 50 miles southwest of the City of Louisville. The proposed site would be situated on 11 parcels of land totaling 1,072 acres, while the proposed project footprint would utilize between 700 and 750 acres. The facility would be situated in a rural area of primarily agricultural and some residential land. The project would connect at a new switchyard to the existing 138 kV Black Branch – Hardinsburg transmission line. Project facilities would include solar photovoltaic arrays, inverter stations, a substation, electrical cabling, and related infrastructure.. The project would also include a proposed non-regulated transmission line that would "span approximately 1.5

miles along a 100-foot-wide transmission easement on three properties" entirely within Hardin County.[1] Conclusions with respect to other descriptive elements of the facility follow:

- **Surrounding land use** — Overall, agricultural land comprises 62 percent of adjoining acres, while 30 percent is zoned agricultural/residential, and 8 percent is solely residential. Measured in terms of the number of properties rather than their acreage, residential uses make up 61 percent of adjoining parcels, while 22 percent of adjoining parcels are used in agriculture, and 17 percent are large lot agricultural/residential parcels. Four residential neighborhoods lie within a two-mile radius of the proposed facility, as well as the Cecelia Valley Elementary School, the South Hardin Sports Complex and two additional schools. Ten occupied residences lie within 500 feet of the nearest solar equipment (excluding the homes of landowners participating in the project), with the closest located at a distance of 304 feet from the nearest solar panel

- **Proposed access control and security —** The Rhudes Creek Solar SAR briefly describes proposed access control measures: "A security fence meeting the National Electrical Safety Code requirements will enclose the facility. Project entrance gates are anticipated to be approximately 8 feet high and 12 feet wide to allow for emergency and maintenance access. Project entrance gates will also be secured while not in use."[2].

- **Utilities —** According to the SAR, Rhudes Creek Solar does not anticipate requiring external utilities on site during typical plant operation. Rhudes Creek further states that "If electricity service is required during construction or operation of the Project, it will be contracted with the local electric utility, Nolin RECC. If water service is required during construction or operation, the Project is within the Hardin County Water District #2 service territory."[3] . In response to a question posed in the Siting Board's Second Request for Information, Rhudes Creek Solar clarified that the eastern portion of the project area is actually within Kentucky Utility's (KU's) service area and that if electricity is required in this portion of the project area, Rhudes Creek Solar will contract with KU for that service.[4]

- **Setback requirements —** Hardin County is actively engaged in evaluating the proposed project. The County has approved a change in zoning that would accommodate the project, but has not yet approved a CUP for the project. It is expected that the Board of Adjustments will consider the CUP application in early January of 2022. Presumably the Hardin County CUP would establish setback requirements deemed appropriate by the County. Under KRS 278.704 (3) these locally-established setback requirements would appear to have primacy over the State's statutory setback requirements.

[1] Transmission Line Application. Rhudes Creek Solar, LLC. Page 3.

[2] SAR page 3.

[3] SAR page 3.

[4] Second RFI, question 16.

- **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 Rhudes Creek Solar in their RFI responses during the review process, these materials appear to meet the informational requirements identified in KRS 278.708. The applicant's separate, non-regulated transmission line application provides the information required under KRS 278.714(2)(b).

Compatibility with Scenic Surroundings

The applicant did not include a formal visual assessment in the SAR. However, BBC visited the proposed Rhudes Creek Solar project site in November 2021 to review the site and its surroundings.

The proposed Rhudes Creek Solar site is primarily composed of flat or gently rolling agricultural land. Most solar equipment would border rural farmland, though a number of smaller residential properties also lie adjacent to the proposed facility In their SAR, Rhudes Creek Solar notes that "The Project has taken an iterative design approach in working with Hardin County Planning and Development Commission and local adjoining neighbors to minimize and mitigate visual impacts of the proposed solar facilities."[5]

In general, BBC concurs with Rhudes Creek 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 some of the smaller residential properties adjacent to the project. 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.

Based on our site visit, it does not appear the proposed 1.5 mile long non-regulated transmission line would have a significant adverse impact on the scenic assets of Kentucky, or that there would have been any alternative alignments for the transmission line that would have been substantially shorter than the proposed route, or less impactful to the surrounding scenery.

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 Rhudes Creek Solar facility. Rhudes Creek 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

[5] SAR page 6.

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." Kirkland Appraisals also states 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.[6]

It is noteworthy, however, that previous assessments of potential effects on property values from proposed commercial solar facilities in Kentucky by Kirkland Appraisals, and by Cohn Reznick, LLP which is the other firm frequently retained by solar developers in Kentucky to assess this concern, have been criticized by Mary McClinton Clay, a Kentucky-based real estate appraiser whose practice is primarily focused on litigation and zoning support. Ms. Clay has argued that flaws in the methodologies used by Kirkland Appraisals and Cohn Reznick, as well as their frequent retention by solar developers, render their conclusions "fundamentally flawed and noncredible" and has stated that they "should not be relied upon for decision-making purposes."[7]

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.[8]

About eight percent of the land adjacent to the proposed Rhudes Creek Solar facility is considered residential, and fifteen of the 46 adjacent properties are residential homes on smaller than five acre lots.[9] 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. In general, the two econometric studies by academic researchers indicate larger effects on the values of nearby residential properties than the comparative sales studies conducted by the real estate appraisers working on behalf of the solar developers, but smaller effects than estimated by Ms. Clay in her re-analyses of data from those comparative sales studies.

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[6] SAR Attachment 6, page 1.

[7] See case files for McCracken County Solar case 2020-00392 and Seebree Solar case 2021-00072.

[8] 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.

[9] Rhudes Creek Solar, Site Assessment Report, Attachment 6 – Property Value Impact Study, page 6.

Given the predominantly rural setting for the proposed Rhudes Creek 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 the values of 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. New or existing vegetative screening near these properties may reduce this risk.

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). The noise assessment in Section 4 was conducted internally by Rhudes Creek Solar engineers. While Rhudes Creek Solar is currently conducting a more detailed noise assessment[10], that assessment was not available in time to be incorporated in BBC's review.

In our review of the noise-related information provided in the SAR, BBC found that the pile driving noise level estimate made by Rhudes Creek Solar is lower than the estimates used in previous solar projects and is not within the standard published range of pile driver noise generation estimates. If the actual noise from piledriving is 101 dBA at 50 feet – as estimated in the other site assessment reports summarized in Section C of this report– rather than the 90 dBA estimate provided by Rhudes Creek Solar, the maximum sound experienced at a dwelling located 300 feet from the pile driving activity would be approximately 85.4 dB rather than the 74.4 dB estimated by Rhudes Creek Solar.

During construction, noise from the pile drivers will have the most substantial impact on the nearest noise receptors, but the maximum noise level at the nearest receptor (which Rhudes Creek Solar estimates as 74.4 dB at 300 feet, and which BBC estimates could be as high as 85.4 dB at 300 feet) is not dangerous and does not exceed the NIOSH recommended daily exposure limit as long as the noise is not continuous for a period of more than eight hours. During normal operation of the proposed Rhudes Creek Solar facility, noise levels from inverters and the substation transformer are unlikely to be disruptive to local residents.

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. Like the noise assessment described previously, the transportation impact evaluation in the SAR was conducted internally by Rhudes Creek Solar. And, again like the noise assessment, Rhudes Creek Solar is currently waiting on a more complete, independent evaluation – which was not available in time for this siting review. BBC's conclusions regarding transportation impacts are based on information available from the SAR, from responses to the two Requests for Information from the Siting Board, and our own independent research.

[10] Responses to Siting Board's First RFI and Second RFI.

The proposed Rhudes Creek Solar site has two primary access roads: Hardinsburg Road (KY-86), running east-west near the northern project boundary, and South Black Branch Road, running southwest-northeast through the middle of the project footprint. Rhudes Creek Solar states that "*KY-86 will be the primary route for access to the property for the construction and subsequent operation of the facility […] During the construction phase of the Project, equipment, material deliveries, and operations crews will access the site through KY-86. Traffic is expected to temporarily increase during the one-year construction period between the working hours of 6 AM and 9 PM from Monday to Friday. There will be up to 150 construction employees and parking will be onsite. Furthermore, for equipment and construction material deliveries, up to 20 heavy duty trucks and 10 light duty trucks are expected. With a heavy vehicle adjustment, the construction of the facility could add up to 200 passenger car equivalent vehicles per day.*[11]

BBC found that since Hardinsburg Road currently has capacity and a high baseline level of service, it is unlikely that the addition of an equivalent of 200 passenger vehicles per day would be grossly disruptive. However, the size, weight, and class of delivery trucks could make specific deliveries to site more challenging or disruptive than others. The operational phase of the Rhudes Creek 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.

Rhudes Creek Solar plans to encourage car and van-pooling to the site during construction to reduce the number of vehicle trips and anticipates contractors will use five or six vans per day for this purpose. In response to a question in the Second RFI from the Siting Board, Rhudes Creek solar indicated that the primary incentive to discourage the use of single occupancy vehicles will be the limited number of parking spaces available for construction contractor workers.[12]

Rhudes Creek Solar will not use rail service during the construction or operation of the proposed facility, but does intend to utilize an existing driveway road crossing over rail lines within a portion of the proposed project area. The applicant has engaged in conversations with Omega Rail Management [which manages the real estate and right-of-way for the railroad] and has received direction from them regarding safety and operations related to the rail crossing.[13]

Finally, Rhudes Creek Solar anticipates minor fugitive dust impacts from construction, but these should be modest as the project plans to retain most of the existing site topography and new earthworks would be minimal. The applicant proposes several practices to minimize fugitive dust impacts, including retention of natural windbreaks, cover of open trucks, reduced speed on site, frequent water applications, and others.

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[11] SAR page 12.

[1212] Second Siting Board RFI, question and response #3.

[13] SAR pages 12-13.

Other Considerations

Applicant economic impact study. Attachment K to the Rhudes Creek Solar Application, "Economic 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.[14]

Key findings from Dr. Coomes analysis include:

- The applicant is likely to invest over $100 million in Hardin 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 240 direct jobs and about 72 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 three permanent jobs.
- However, Dr. Coomes also notes that "The company and the County government are negotiating a financial agreement in support of an industrial revenue bond in which the company will make annual payments in lieu of taxes (PILOT) to local government jurisdictions, in addition to other property and income-related taxes due." Dr. Coomes estimates that the company will pay about $2.35 million to state and local governments in property taxes and payments in lieu of taxes over a 35-year operating period, or about $67,000 per year. Dr. Coomes further states that "these payments can be compared to the few thousand dollars per year currently paid by landowners of the site (almost all of which is assessed at its agricultural land value.)"[15]

The level of investment in Hardin County projected by Dr. Coomes appears to be consistent with industry standards for a solar project of the size of the proposed Rhudes Creek Solar facility. Dr. Coomes estimate of direct employment during construction (240 jobs) is larger than the estimate by Rhudes Creek Solar in their evaluation of transportation of "up to 150 construction employees."[16]

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.

The only reference BBC found to decommissioning in the Rhudes Creek Solar Application and SAR was on page 6 of the SAR. That page states that "The collaborative planning process [with the Hardin County Planning Director] beginning in February 2020 cumulated with design

[14] Application. Attachment K. Economic Report.

[15] Ibid.

[16] Ibid.

elements that are fully incorporated into the site plans. These include, but are not limited to: … Preparation of a decommissioning plan to reclaim, revegetate, and restore the properties consistently with zoning classifications."[17]

Summary Findings

Rhudes Creek 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. It is unfortunate that the more detailed, independent noise and traffic studies currently ongoing on behalf of Rhudes Creek Solar were not available prior to completion of this review, but – with the exception of some specific information noted earlier and in more detail in Section C – the summary assessments of these issues included in the SAR are generally consistent with findings from other solar facility reviews for the Siting Board.

The Rhudes Creek Solar site appears to generally be well selected in terms of compatibility with the surrounding area and access to transmission infrastructure. Stormwater drainage is an important issue in this area, but Rhudes Creek has worked with Hardin County to develop a detailed stormwater management plan.

At this point in time, it is unclear whether the site plan provided in Rhudes Creek Solar's Application and SAR will be consistent with the setback requirements that would be established in the Conditional Use Permit from Hardin County – since the CUP has yet to be fully developed and approved.

Mitigation Recommendations

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

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

1. Rhudes Creek 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. Rhudes Creek 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.

[17] SAR, page 6.

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.

4. Rhudes Creek Solar should continue to work with the Hardin County Planning and Development Commission to reach a resolution on zoning and a CUP, and to ensure that the proposed setbacks for the project adhere to the County's requirements and do not negatively impact the County or its residents. Rhudes Creek Solar should promptly and fully meet any provisions or conditions in the CUP with Hardin County. Presumably, if Rhudes Creek Solar is granted a CUP, that permit will establish the setback requirements deemed necessary by the County.

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

5. 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.

6. Rhudes Creek Solar should execute the screening plan proposed in their application and SAR and make sure the proposed new vegetative buffers are successfully established and develop as expected over time. Plantings should reach eight feet high within four years. Should the vegetation used as buffers die over time, Rhudes Creek Solar should replace them to maintain the visual buffer.

7. Rhudes Creek Solar should cultivate at least two acres of native pollinator-friendly species onsite.

8. Rhudes Creek Solar should use panels with anti-reflective coating to reduce glare and corresponding visual impacts.

9. Rhudes Creek 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 Customer Resolution Program described further in mitigation recommendation #17 on the following page.

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

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

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

11. Rhudes Creek 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 established by Hardin County in the CUP for the proposed solar facility.

12. Similar to other recent solar facility applications reviewed by the Siting Board, construction activity at the Rhudes Creek 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.

13. Rhudes Creek Solar should follow through with the plan to 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, and provide a more 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.

14. Rhudes Creek 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.

15. If pile driving activity occurs within 1,500 feet of a sensitive noise receptor (e.g., residence), Rhudes Creek 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) as required in other recent Siting Board orders.

16. During construction Rhudes Creek Solar should locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as practicable from neighboring residences.

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

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

18. Rhudes Creek 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. Rhudes Creek 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, Rhudes Creek Solar should implement their proposed ridesharing between construction workers, as appropriate and feasible due to the COVID-19 pandemic;

use appropriate traffic controls; or allow flexible working hours outside of peak hours to minimize any potential delays during AM and PM peak hours.

20. Rhudes Creek Solar and its construction contractors should comply with all laws and regulations regarding the use of roadways.

21. Rhudes Creek Solar should obtain permits from the KYTC and local road authorities as needed for Class 21 vehicle transport to the site and comply with all permit requirements, continuing to coordinate with the KYTC District 4 Permits Engineer and the Hardin County Road Department as needed.

22. Rhudes Creek 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. Rhudes Creek 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.

24. Rhudes Creek 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 established by Hardin County in the CUP for the proposed solar facility.

Regarding project decommissioning and other issues –

25. As applicable to individual lease agreements, Rhudes Creek Solar, its successors, or assigns must abide by the specific land restoration commitments agreed to by individual property owners, as described in each executed lease agreement.

26. Rhudes Creek Solar should file a full and explicit decommissioning plan with the Siting Board. This plan should commit Rhudes Creek 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. Rhudes Creek Solar should file a bond with the Hardin County Fiscal Court, equal to the amount necessary to effectuate the explicit or formal decommissioning plan naming Hardin 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 Hardin 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, Hardin County should be the primary beneficiary of the decommissioning bond for that portion of the project. The bond(s) should be filed with the Hardin 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 Hardin 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 Rhudes Creek 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 Hardin 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. Rhudes Creek 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. Rhudes Creek Solar should commit to removing the debris and replaced facility components from the Project site and Hardin 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 Hardin County. However, if the replaced facility components remain in Hardin County, Rhudes Creek Solar should inform the Siting Board of where the replaced facility are being disposing of.

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.

30. Rhudes Creek Solar should implement the Final Stormwater Prevention Plan as approved by Hardin County, and

31. Rhudes Creek solar should implement the agreed upon construction phasing plan which limits ground disturbance to 225 acres at a time.[18]

Subject to the foregoing mitigation measures, and subject to approval of a Conditional Use Permit by Hardin County, 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 Rhudes Creek Solar generation project regarding scenic compatibility, property values, noise or traffic.

[18] SAR, page 14.

SECTION C.

Detailed Findings and Conclusions

SECTION C.
Detailed Findings and Conclusions

This section provides detailed review and evaluation of each element of the Rhudes Creek 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 Rhudes Creek 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 Rhudes Creek Solar facility and site development plan is mainly set forth in the Site Assessment Report Section 1 (Proposed Site Development Plan) 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 (Proposed Site Development Plan) supplies an overview of the project. The proposed Rhudes Creek Solar facility would be a 100-megawatt alternating current (MWac) photovoltaic electricity generation facility situated near the unincorporated community of Cecelia in Hardin County, approximately 7 miles southwest of Elizabethtown and 50 miles southwest of the City of Louisville.

The proposed site would be situated on 11 parcels of land totaling 1,072 acres, while the proposed project footprint would utilize between 700 and 750 acres. The facility would be situated in a rural area of primarily agricultural and some residential land. The project would connect at a new switchyard to the existing 138 kV Black Branch – Hardinsburg transmission line. Figure C-1 is excerpted from SAR Attachment 1 (Site Development Plan) and shows a high-level view of the project

footprint, including the gen-tie transmission route to the point of interconnection which sits north of the solar panel arrays.

Figure C-1.
Overall Site Map for Rhudes Creek Solar Project

Rhudes Creek Solar has lodged a separate application with the Siting Board for the project's proposed transmission line. As required under KRS 278.714(2)(b), the transmission line application includes:

"A full description of the proposed route of the electric transmission line or the carbon dioxide transmission pipeline and its appurtenances. The description shall include a map or maps showing:

> *1. The location of the proposed line or pipeline and all proposed structures that will support it;*
>
> *2. The proposed right-of-way limits;*
>
> *3. Existing property lines and the names of persons who own the property over which the line or pipeline will cross; and*
>
> *4. a. The distance of the proposed electric transmission line from residential neighborhoods, schools, and public and private parks within one (1) mile of the proposed facilities…"*[1]

The proposed non-regulated transmission line would "span approximately 1.5 miles along a 100-foot-wide transmission easement on three properties" entirely within Hardin County. "There are no residential neighborhoods, schools, and public and private parks within 1 mile of the proposed gen-tie line."[2]

Figure C-1 on the preceding page also depicts roadways adjacent to the proposed project, including SR 86 (Hardinsburg Road) which runs east-west near the northern edge of the proposed project, between the project's solar panel arrays and the gen-tie line route. The other roads pictured are local roads, such as South Black Branch Road, which bisects the project footprint. Also shown in Figure C-1 (label added by BBC) is a railroad that runs through the southeastern portion of the proposed project.

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

The equipment onsite will consist of solar photovoltaic arrays, inverter stations, a substation, electrical cabling, and related infrastructure. The racking system, which is used to fix the solar panels to the ground, has a small footprint that does not use any concrete, and the panels are not considered impervious as rainwater can travel over and around the panels. The installation of solar arrays will allow most of the natural topography of the site to be maintained. A fence meeting the National Electrical Safety Code requirements will enclose the facility. Where there are visual impacts created by the facility, 300-foot setbacks from adjoining residential dwellings and landscaping will create a visual buffer to screen the solar farm from the surrounding area. Wooded areas that provide beneficial buffers will be retained.[3]

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[1] KRS 278.714(2)(b)

[2] Transmission Line Application. Rhudes Creek Solar, LLC. Page 3.

[3] Application, page 4.

Other sections of the SAR contain additional specifics regarding the proposed project's equipment. In Section 4 of the SAR, the applicant states, "The Project plans to install up to 27 small-scale, above ground inverter and transformer stations located throughout the solar arrays." (SAR, page 10)

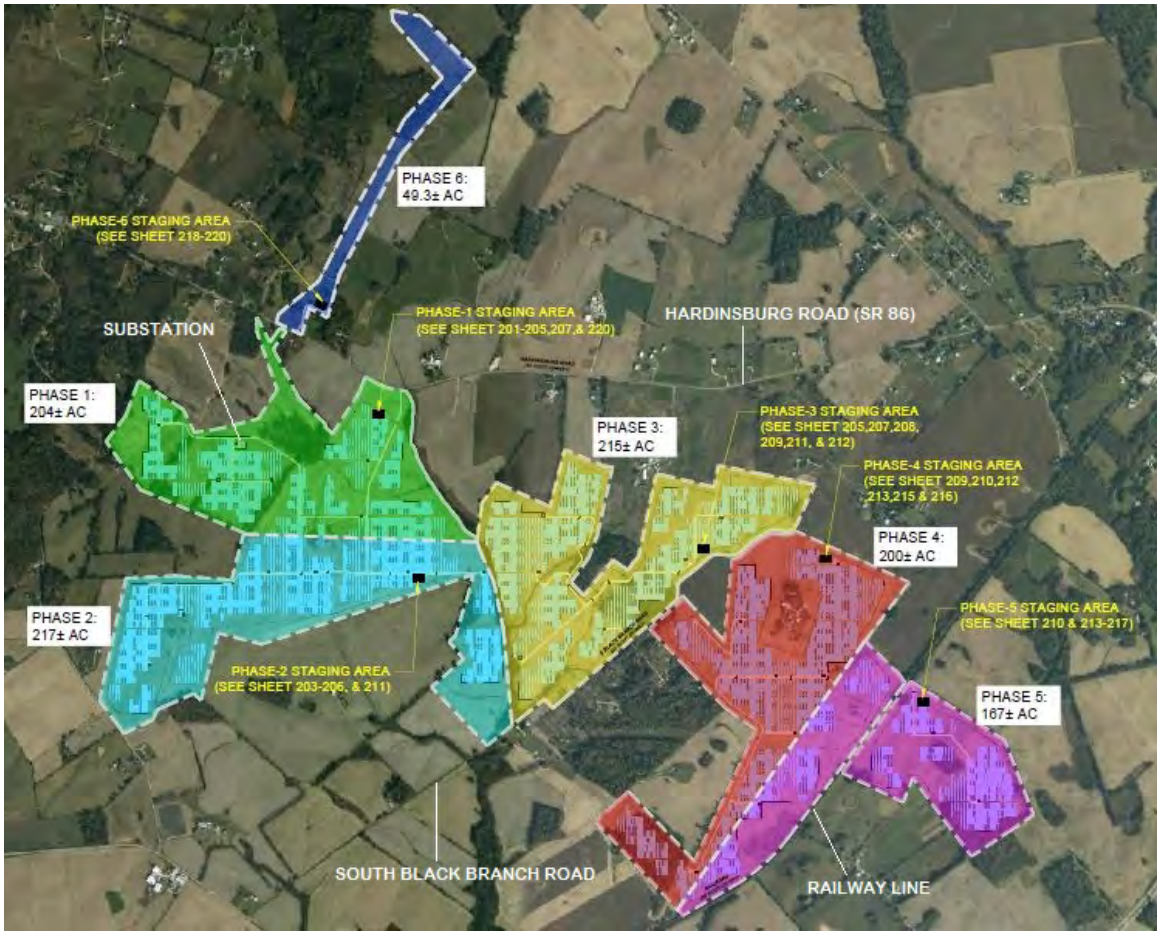
Another high-level view of the proposed project is included in the Application, Attachment A (Two-Mile Vicinity Map). This figure provides some context for the proposed site and surrounding area; it is excerpted in part as Figure C-2.

Figure C-2.
Two-Mile Vicinity Map of Rhudes Creek Solar Project

Figure C-2 shows the proposed project footprint in blue (excluding the proposed transmission line). The dotted white line indicates the project's two-mile radius. Several residential neighborhoods are marked in green, and three nearby schools and one local sports complex are also indicated on the map. In the Siting Board's First Request for Information (RFI), BBC requested that Rhudes Creek Solar provide an updated high-level map with additional features, such as varying radius measurements. BBC also requested a description and 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.

The applicant plans to construct the Rhudes Creek Solar facility in six phases. Figure C-3 is excerpted from SAR Attachment 1 (Site Development Plan). Labels in white text were added by BBC.

Figure C-3.
Map of Construction Phases for Rhudes Creek Solar Project



The proposed project's construction phases would progress from west to east within the project boundary, beginning with Phase 1 (shown in green), which includes the facility substation. The sixth and final phase of construction would be the gen-tie transmission line and switchyard on the north side of the project (shown in dark blue).

SAR Attachment 1 also contains magnified detail for subsections of the project map. The project footprint is divided into 20 subsections, each of which appears twice in the Site Development Plan. Two types of site maps are included, both of which depict important features like roads/railway, project boundaries, property lines, dwellings, and hydrological features of the site. The difference in the two map types is described below:

- 20 aerial maps show existing conditions (including topography, relief, and landscape features) as well as site demolition plans (e.g., some current features of the site—such as several wooded areas, a barn, and two existing access roads—would be demolished).

- 20 complementary site plan maps show the project's engineering drawings, including the proposed locations of solar arrays, equipment pads, substation, gen-tie line, project roads, and staging areas for each of the proposed six phases of construction.

The final component of SAR Attachment 1 (Site Development Plan) is the landscape plan, which comprises approximately 15 aerial maps with an overlay of the proposed locations of project arrays and vegetative screens of evergreen trees. Three complementary images simulate the relative elevation and cone of vision towards the project area for a vehicle traveling on Hardinsburg, Hansborough, or South Black Branch Road.

Surrounding land uses. Page 2 of the SAR states that the surrounding area is primarily agricultural and residential. Attachment 6 of the SAR (Property Value Study) provides greater detail on the composition of the surrounding land. Figure C-4, excerpted from the property value study, summarizes the use of land adjoining the proposed project.

Figure C-4.
Adjoining Parcel Land Use for Rhudes Creek Solar Project

Adjoining Use Breakdown

	Acreage	Parcels
Residential	7.76%	60.87%
Agricultural	62.03%	21.74%
Agri/Res	30.21%	17.39%
Total	**100.00%**	**100.00%**

Overall, agricultural land comprises 62 percent of adjoining acres, while 30 percent is zoned agricultural/residential, and 8 percent is solely residential. Measured in terms of the number of properties rather than their acreage, residential uses make up 61 percent of adjoining parcels, while 22 percent of adjoining parcels are used in agriculture, and 17 percent are agricultural/residential parcels.

Other pertinent information about surrounding land uses includes the proximity of residential communities, schools, parks, or other relevant community buildings. The Two-Mile Vicinity Map included with the Application as Attachment A (and excerpted in Figure C-2) shows the location of several residential neighborhoods in the eastern portion of the proposed project's two-mile radius.

Also within the two-mile radius are the Cecelia Valley Elementary School and the South Hardin Sports Complex; two additional schools and residential neighborhoods outside the radius are shown south of the project. Rhudes Creek Solar does not provide a count of the residential neighborhoods nor a written description of the surrounding residences or schools. BBC requested additional information on this topic from the applicant in the First RFI.

Legal boundaries. Page 2 of the SAR notes that deeds enclosed in Attachment 18 of the SAR (Legal Description of Property) and the American Land Title Association (ALTA) survey enclosed in Attachment 9 of the SAR (Boundary and Topographic Surveys) comprise the description of the proposed site's legal boundaries. The documents in Attachments 9 and 18 appear thorough and correct. Additionally, the maps in SAR Attachment 1 (Site Development Plan) include parcel boundaries and ownership labels that correspond to information from Attachments 9 and 18.

Access control. The Rhudes Creek Solar SAR briefly describes proposed access control measures:

Anticipated points of access to the project site on Ky-86 (Hardinsburg Road) and South Black Branch are depicted in the site development plan enclosed as Attachment 1. A security fence meeting the National Electrical Safety Code requirements will enclose the facility. Project entrance gates are

anticipated to be approximately 8 feet high and 12 feet wide to allow for emergency and maintenance access. Project entrance gates will also be secured while not in use.[4]

BBC examined the maps and engineering drawings included in Attachment 1 of the SAR (Site Development Plan). They are highly detailed and include the locations of existing fencing as well as proposed chain link perimeter security fencing. Seven security gates are denoted in the project perimeter fencing.

Location of buildings, transmission lines, and other structures. Page 3 of the SAR states that the location of buildings, transmission lines, and other structures are depicted in the maps included in Attachment 1 of the SAR (Site Development Plan).

BBC examined the maps and drawings in Attachment 1. These plans depict the proposed transmission line, substation, equipment pads, staging areas for construction phases, as well as features such as nearby buildings (i.e., residential dwellings).

Location and use of access ways, internal roads, and railways. Page 3 of the SAR states that the location of access ways, internal roads, and railways are depicted in the maps included in Attachment 1 of the SAR (Site Development Plan).

BBC examined the maps and drawings in Attachment 1. These maps show the location of the project's five access driveways, two on Hardinsburg Road (SR 86) and three on South Black Branch Road. Internal roads are clearly indicated.

One railway line runs through the southeast portion of the project footprint. The railroad is clearly marked in each applicable figure of the Site Development Plan (i.e., pages 15 and 18-21 of SAR Attachment 1). An existing ground level rail crossing (page 19) will be maintained. Rhudes Creek Solar does not plan to utilize the railway for any construction or operation activities.

Existing or proposed utilities. According to the SAR, Rhudes Creek Solar does not anticipate requiring external utilities on site during typical plant operation. The applicant further states:

If electricity service is required during construction or operation of the Project, it will be contracted with the local electric utility, Nolin RECC. If water service is required during construction or operation, the Project is within the Hardin County Water District #2 service territory.[5]

In response to a question posed in the Siting Board's Second RFI, Rhudes Creek Solar clarified that the eastern portion of the project area is actually within Kentucky Utility's (KU's) service area and that if electricity is required in this portion of the project area, Rhudes Creek Solar will contract with KU for that service.[6]

[4] SAR page 3.

[5] SAR page 3.

[6] Second RFI, question 16.

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

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

Hardin County has established setback requirements in Agricultural Zone (A-1) to be 70 feet for the front yard and 100 feet for the side and back yards. The Project will be in compliance with these setbacks as it proposes a minimum 100-foot setback for exterior perimeter boundaries and 300-foot setback for equipment (excluding roads and fences) to adjoining residential dwellings […]

The Project is within the jurisdiction of the Hardin County Planning and Development Commission and will have specific setback requirements set by the zoning ordinance or conditional use permit. Accordingly, the setback requirements identified in KRS 278.704(2) and KRS 278.706(2)(e) do not apply to this Project. The Project will comply with those setback requirements. As such, no motion for deviation is anticipated. (Application pages 7-8)

BBC has not previously reviewed a solar application to the Siting Board that proposed to apply local setback requirements for agricultural land to the project site. However, in other parts of the SAR and attachments, it is clear that Rhudes Creek Solar has frequently engaged in discussions with Hardin County about the project and zoning. From page 6 of the SAR.

Rhudes Creek Solar was the first utility-scale project proposed in Hardin County, and the County's local ordinance did not have any specifications or requirements related specifically to solar development. Therefore, the development and engineering teams regularly met and discussed site development plans with the Hardin County Planning Director. The collaborative planning process beginning in February 2020 cumulated with design elements that are fully incorporated into the site plans. These include, but are not limited to:

- *100' setbacks from road right-of-way and exterior perimeter property lines*
- *20' maximum height requirements for solar arrays*
- *300' distances between from adjoining residential dwellings […]*

In the First RFI, BBC and the Siting Board requested more information from the applicant regarding the ongoing correspondence or project permit status with the Hardin County Planning and Development Commission. Supplemental research by BBC and additional information from Rhudes Creek Solar are discussed in a subsequent section of this report (Supplemental Investigations, Research, and Analysis).

Evaluation of noise levels. Section 4 of the SAR (Anticipated Noise Levels) provides Rhudes Creek Solar's assessment of the noise levels that will be generated during the construction and operation of the proposed facility. During the construction phase of the project, activities on site will generate intermittent noise at the nearest receptors (nearby residences). The construction phase is expected to last approximately 1 year and the operation phase 35 years.

The applicant anticipates a maximum noise level of 74.4 dB at the nearest residence during the loudest part of construction (pile driving during solar array installation). During the operational life of the project, Rhudes Creek Solar anticipates a maximum noise level of 45 dB from the inverter stations when measured at the nearest residence. The noise generated by the project's substation and high-voltage step-up transformer is estimated at 32.0 dB as measured at the nearest residence. During the operational lifetime of the proposed project, noise impacts from inverters and the substation transformer are expected to be minimal or negligible (SAR, page 10).

Unlike other proposed solar facilities reviewed by BBC, the SAR did not include a formal, detailed noise study. Noise levels and the details of the applicant's noise assessment are discussed in greater depth and detail later in this section of BBC's report (Expected Noise from Construction and Operation).

Supplemental Investigations, Research, and Analysis

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

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

BBC requested an augmented vicinity map of the proposed project site, including the addition of 1,000-foot, 2,000-foot, and one-mile radius boundaries. Rhudes Creek Solar provided an updated map in the Responses to Siting Board's First RFI, and a corrected map in its Responses to Siting Board's Second RFI.

Due to the size and detail of the map imagery requiring a larger format page to display, BBC has included the map at the end of this section of our report. The dotted yellow line represents a one-mile radius from the project footprint, while the pink and orange dotted lines represent the 2,000-foot and 1,000-foot radii. In the northeastern and eastern sections of the map, the residential neighborhoods within one mile of the project are marked in green. Note that the closest residential neighborhoods are more than one-half mile from the proposed project areas.

BBC requested a written description of the number of residential neighborhoods identified by Rhudes Creek Solar in accordance with the definition in KRS 278.700. In response, the applicant states:

There were a total of four residential neighborhoods identified. These include the neighborhood surrounding Main Street in the town center of unincorporated Cecilia; the Leitchfield Loop neighborhood west of US-62/Leitchfield Road; the Cecilia Smiths Mill Road neighborhood northwest of Western Kentucky Parkway; and the Stephensburg neighborhood adjacent to West Hardin Middle School and Lakewood Elementary School.[7]

[7] Responses to Siting Board's First Request for Information, page 1

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

Location and use of access ways, internal roads, and railways. In response to a question from BBC in the First RFI, Rhudes Creek Solar clarified that among the site's proposed five access driveways (two on Hardinsburg Road and three on South Black Branch Road), two would be upgrades of existing driveways, while three are new access driveway locations.[8]

Compliance with applicable setback requirements. BBC examined minutes from previous meetings of the Hardin County Planning and Development Commission in order to understand the depth and breadth of the Commission's engagement with Rhudes Creek Solar about the proposed project.

Meeting minutes from November 17, 2020 show that a representative from ibV Energy Partners was in attendance and gave a presentation about the proposed Rhudes Creek Solar facility. At this meeting, the Commission Director proposed Resolution #2020-011, to allow for solar facilities greater than 1 acre in size to be a non-listed use as outlined in Hardin County's existing zoning ordinance, which does not specifically cover solar facilities. The meeting notes indicate that any such solar facility would be considered on a case-by-case basis and would require a Conditional Use Permit (CUP) in A-1 (agricultural) and I-1 (industrial) zones in Hardin County.

In the First RFI, Rhudes Creek Solar was asked to describe the status of any applications for zoning changes or CUPs (both of which relate to setback requirements) required for the proposed project. The applicant's response is shown here in full:

The Hardin County Development Guidance System Zoning Ordinance sets for zoning regulations for Hardin County. The Hardin County Planning and Development Commission ("Planning Commission") adopted Ordinance 2020-011, whereby it authorized a solar facility greater than one acre to be considered as a conditional use on land designated in the A-1 (Agricultural), I-1, or I-2 (Industrial) zones. The Rhudes Creek Solar project is planned for land that is currently zoned as R-2 (Residential). Accordingly, the land will need to be re-zoned and receive a Conditional Use Permit ("CUP") prior to construction and operation.

Following the Hardin County ordinances, Rhudes Creek previously applied for a zone change and conditional use permit with the Planning Commission. A hearing on those applications was held on June 15, 2021, during which the Planning Commission unanimously voted to approve the zone change from residential to A-1 (with a condition that some of the land would remain R-2 if the CUP was denied) and subsequently voted to deny the CUP.

On July 15, 2021, Rhudes Creek Solar filed a Petition for Declaratory Judgment and Verified Complaint and Appeal ("Petition for Declaratory Judgment") in the Hardin Circuit Court. This case was docketed as Case No. 21-CI-994. In the Petition for Declaratory Judgment, Rhudes Creek Solar challenged a procedural defect that was created by a discrepancy between a state statute and the local ordinance. By judgment entered on September 13, 2021, the Court agreed and found that the Hardin

[8] Responses to Siting Board's First Request for Information, page 4

County ordinance failed to comply with KRS 100.203(6) because the ordinance failed to give the applicant for a zone change and CUP the opportunity to elect to have the CUP heard by the Board of Adjustments. Accordingly, the Court held that the prior proceedings before the Planning Commission are not valid. Hardin County did not appeal that decision.

ibV Energy Partners is communicating and coordinating with the Hardin County Attorney's Office and Planning Commission on the next steps in the process for potential approval of the zone change and CUP. Prior to the Planning Commission's consideration of the renewed application for a zone change, Hardin County sought to amend its zoning ordinance in order to comply with KRS 100.203. On October 19, 2021, the Planning Commission approved a recommendation for a text amendment to the zoning ordinance. The Hardin County Fiscal Court held a first reading of that ordinance on October 26, 2021. It is anticipated that the Fiscal Court will vote to approve the text amendment after a second reading of the ordinance at the November 9, 2021, meeting. Rhudes Creek Solar anticipates that the Planning Commission will consider the zone-amendment application at the regular meeting scheduled for December 7, 2021. If the Planning Commission approves the zone amendment, Rhudes Creek Solar anticipates that the Board of Adjustments will consider the application for CUP at its regular meeting on January 6, 2022.[9]

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 reach the following conclusions concerning the description of the facility and the proposed site development plan:

- The applicant has generally complied with the legislative requirements for describing the facility and site development plan.
- The applicant's separate transmission line application provides the information required under KRS 278.714(2)(b).
- Hardin County is actively engaged in evaluating the proposed project. The County has approved a change in zoning that would accommodate the project, but has not yet approved a CUP for the project. It is expected that the Board of Adjustments will consider the CUP application in early January of 2022.
- Presumably the Hardin County CUP would establish setback requirements deemed appropriate by the County. Under KRS 278.704 (3) these locally-established setback requirements would appear to have primacy over the State's statutory setback requirements.

[9] Responses to Siting Board's First Request for Information, pages 41-42

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):

- Rhudes Creek 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.

- Rhudes Creek 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.

- 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.

- Rhudes Creek Solar should continue to work with the Hardin County Planning and Development Commission to reach a resolution on zoning and a CUP, and to ensure that the proposed setbacks for the project adhere to the County's requirements and do not negatively impact the County or its residents. Rhudes Creek Solar should promptly and fully meet any provisions or conditions in the CUP with Hardin County. Presumably, if Rhudes Creek Solar is granted a CUP, that permit will establish the setback requirements deemed necessary by the County.

Compatibility with Scenic Surroundings

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

Rhudes Creek Solar's separate Transmission Line Application is subject to review under KRS 278.714 (3). That statute states:

> *Action to grant the certificate shall be based on the board's determination that the proposed route of the line will minimize significant adverse impact on the scenic assets of Kentucky and that the applicant will construct and maintain the line according to all applicable legal requirements. In addition, the board may consider the interstate benefits expected to be achieved by the proposed construction or modification of electric transmission facilities in the Commonwealth. If the board determines that locating the transmission line will result in significant degradation of scenic factors or if the board determines that the construction and maintenance of the line will be in violation of applicable legal requirements, the board may deny the application or condition the application's approval upon relocation of the route of the line, or changes in design or configuration of the line.*

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. [10]

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

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

Each framework, in its own way, embodies explicit or implicit consideration of some or all of the standard measures of visual impact: viewer exposure and sensitivity; relative project size, quality, visibility, exposure, contrast and dominance; and prevailing environmental characteristics, such as

[10] 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.

season and light conditions. Local regulations especially focus on screening of facilities from public view and the effects of glare from outdoor lighting upon adjacent property.

In this instance, the visual impact evaluation followed the third, and least formal, of the three approaches listed above. The selected approach is appropriate given that there is no formal visual resource system, nor are there currently local ordinances specifically related to visual impacts in effect for the area surrounding the proposed facility, though the applicant's zoning and CUP negotiation with Hardin County is not yet finalized.

Information Provided in the Applicant's SAR

In compliance with KRS 278.708, Section 2 of the SAR summarizes the assessment of compatibility with scenic surroundings. Section 2 cites the findings from SAR Attachment 6 (Property Value Study), conducted by Kirkland Appraisals. The SAR describes the applicant's approach in ensuring minimal visual impacts to the surrounding area:

Visual impacts to the scenic surroundings and adjoining properties have been considered throughout the planning and development of the Project. The Project has taken an iterative design approach in working with Hardin County Planning and Development Commission and local adjoining neighbors to minimize and mitigate visual impacts of the proposed solar facilities.[11]

The proposed Rhudes Creek 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 these similar projects, much of the project's compatibility with the scenic surroundings will depend on a strategic and well-executed vegetative screening plan.

The landscaping plans included in SAR Attachment 1 (Site Development Plan) provide specific details on the approximate locations and lengths of the proposed vegetative screens of evergreen trees. Figure C-5 shows proposed vegetative screens at boundaries where the project footprint is near a dwelling. Vegetative screening is marked in dark green.

[11] SAR page 6.

Figure C-5.
Sample Landscape Vegetative Screening Plan for Rhudes Creek Solar Project

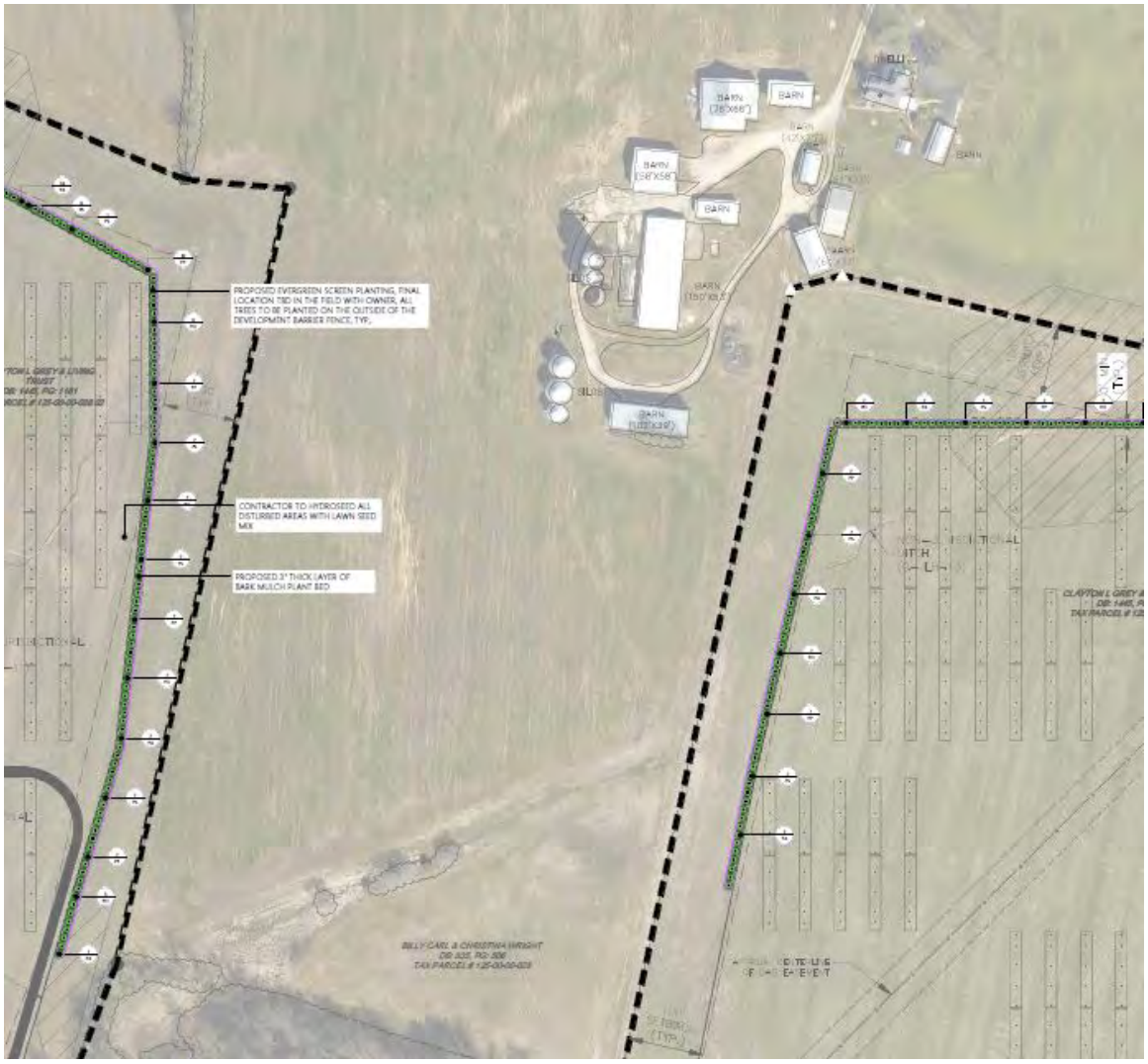
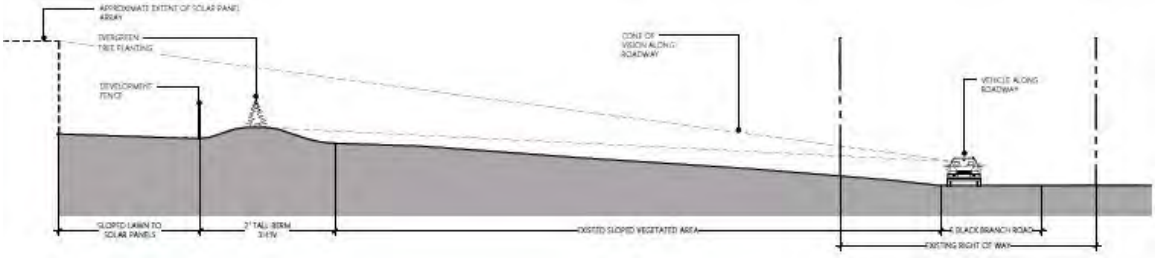


Figure C-6 depicts a vehicle traveling along South Black Branch Road, showing the layout of the berm vegetative screen and resulting cone of vision that obscures a direct view of the solar arrays.

C-6.
Cross-Section of the Cone of Vision for a Driver Traveling on South Black Branch Road



The applicant also supplied visual representations of the project's proposed vegetative screening as Attachment 17 of the SAR (Before and After Visualizations), which is excerpted in part here as Figures C-7, C-8, and C-9.

Figure C-7.
Before Proposed Vegetative Screening

Figure C-8.
After Proposed Vegetative Screening (Year 1)

Figure C-9.
After Proposed Vegetative Screening (Year 5)

Rhudes Creek Solar also commissioned a glare analysis for the proposed project, which is included as SAR Attachment 7 (Glare Analysis). Conducted by ForgeSolar, the analysis was modeled on smooth glass without anti-reflective (AR) coating and finds that the proposed facility would produce some amount of yellow glare (potential to cause after-image) and green glare (low potential to cause after-image) from nearby points of observation.

Supplemental Investigations, Research, and Analysis

Visual assessment. BBC visited the proposed Rhudes Creek Solar project site in November 2021 to review the site and its surroundings.

Figure C-10 shows the view looking north toward the proposed future switchyard along the proposed gen-tie line access route. The transmission line towers would be approximately 80-feet in height.[12] During the site visit, BBC inquired whether or not the applicant had considered alternative routes to the one they have selected. Rhudes Creek Solar did initially consider an alternative route, but could not obtain agreement from the landowners of the parcels where they would have required easements.

Figure C-10.
View to North Along Proposed Transmission Line Easement from Just North of KY 86

Figure C-11 shows the existing Kentucky Utilities line that the Rhudes Creek Solar project would tie into at the proposed new switchyard. The existing line is in the distance, in front of the wooded ridge shown in the photo.

[12] Communication with Rhudes Creek Solar representatives during site visit, November 2021.

Figure C-11.
Existing KU Transmission Line that Would Carry Power from Rhudes Creek Solar

Figure C-12 on the following page is an image taken on the land of one of the participating landowners. The fields shown in the image would be covered with solar arrays.

Figure C-12.
Future Solar Array Area on Participating Landowner Property

Figure C-13, on the following page, shows some of the homes that would be closest to the proposed solar arrays. These homes are located on the south side of South Black Branch Road, between the third and fourth proposed phases of the project's development (see Figure C-3 shown earlier on page 6 of this section).

Figure C-13.
Adjacent Residences Located Between Project Phases 3 and 4, on South Side of South Black Branch Road.

Figure C-14 on the next page shows the existing driveway crossing the Paducah and Louisville Railway in the Phase 5 portion of the proposed project.

Figure C-14.
Existing Grade Level Railroad Crossing in Phase 5 of the Proposed Project.

BBC's site visit occurred shortly following a substantial rain event. This circumstance allowed us to see first-hand some of the stormwater drainage issues that are prevalent in portions of the project area, as shown in Figure C-15 and C-16 on the following page.

Figure C-15.
Poor Stormwater Drainage in Project Area.

Figure C-16.
More Stormwater Drainage Issues

Conclusions and Recommendations Regarding Compatibility with Scenic Surroundings

The proposed Rhudes Creek 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.

Based on our site visit, it does not appear the proposed transmission line would have a significant adverse impact on the scenic assets of Kentucky, or that there would have been any alternative alignments for the transmission line that would have been substantially shorter than the proposed route, or that would have had less impact to the surrounding scenery.

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.

- Rhudes Creek Solar should execute the screening plan proposed in their application and SAR and make sure the proposed new vegetative buffers are successfully established and develop as expected over time. Plantings should reach eight feet high within four years. Should the vegetation used as buffers die over time, Rhudes Creek Solar should replace them to maintain the visual buffer.

- Rhudes Creek Solar should cultivate at least two acres of native pollinator-friendly species onsite.

- Rhudes Creek Solar should use panels with anti-reflective coating to reduce glare and corresponding visual impacts.

- Rhudes Creek 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 Customer Resolution Program described further later in this section in regard to noise mitigation.

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

Rhudes Creek 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. Attachment 6 of the SAR (Property Value Study) provides a comparative study of property values in proximity to solar facilities in Kentucky and in other states across the US, using a matched pairs design. The 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.

Attachment 6 states that the closest adjoining dwelling will be 305 feet from the nearest solar panel and that the average distance from solar arrays to adjoining homes will be 1,007 feet. Additionally, surrounding residential density is low and there are fewer than 35 dwellings within 1,000 feet of the proposed project's solar arrays and another approximately 40 dwellings that lie between 1,000 and 2,000 feet away from the project.

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.[13]

Supplemental Investigations, Research, and Analysis

Attachment 6 of the SAR (Property Value Study) provides a comparative study of property values in proximity to solar facilities in Kentucky and in other states across the US, conducted by Kirkland Appraisals, LLC 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.

Previous assessments of potential effects on property values from proposed commercial solar facilities in Kentucky by Kirkland Appraisals, and by Cohn Reznick, LLP which is the other firm frequently retained by solar developers in Kentucky to assess this concern, have been criticized by Mary McClinton Clay, MAI. Ms. Clay is a Kentucky-based real estate appraiser whose practice is primarily focused on litigation and zoning support.[14] Ms. Clay has argued that flaws in the methodologies used by Kirkland Appraisals and Cohn Reznick, as well as their frequent retention by

[13] SAR Attachment 6, page 1.

[14] Mary McClinton Clay resume. Attachment C. Solar Generation Siting Final Report – McCracken County Solar. KY State Board on Electric Generation and Transmission Siting Case Number 2020-00392. August 16, 2021.

solar developers, render their conclusions "fundamentally flawed and noncredible" and has stated that they "should not be relied upon for decision-making purposes."[15]

As is often the case with "dueling experts", there are two sides to this issue. Although we are not aware of any response to date regarding Ms. Clay's assertions from Kirkland Appraisals, Cohn Reznick has provided a detailed response reiterating their findings, along with a critique of Ms. Clay's analysis and findings.[16] While Ms. Clay is correct that Kirkland Appraisals and Cohn Reznick frequently work for solar firms and the solar industry, her resume suggests that she frequently works on behalf of plaintiffs alleging damages against corporations or government agencies. It appears that the experts on both sides of this issue have most commonly estimated property value impacts (or lack thereof) that align with their clients' interests.

BBC's investigation of additional research. 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 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

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[15] See, for example, the Wells Engineering site assessment reviews for case 2021-00072 Seebree Solar LLC and for case 2020-00392 McCracken County Solar, LLC.

[16] See Seebree Solar, LLC Response to Consultant's Report filed December 3, 2021.

[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.

Massachusetts —under certain conditions. Of the studies BBC has reviewed, this study appears to be the most robust in the sense that is 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 areas[18] 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 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.

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[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 Rhudes Creek Solar facility would sit near the unincorporated community of Cecelia, 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/

[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.

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-4, about 92 percent of the land use adjacent to the proposed Rhudes Creek 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 facility. About eight percent of the adjacent land is considered residential, and fifteen of the 46 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. In general, the two econometric studies by academic researchers indicate larger effects on the values of nearby residential properties than the comparative sales studies conducted by the real estate appraisers working on behalf of the solar developers, but smaller effects than estimated by Ms. Clay in her re-analyses of data from those comparative sales studies.

Given the predominantly rural setting for the proposed Rhudes Creek 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 Rhudes Creek Solar's vegetative screening plans may help to minimize any adverse impact on nearby residential property values and recommends the following mitigation.

[21] Rhudes Creek Solar, Site Assessment Report, Attachment 6 – Property Value Impact Study, page 6.

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

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 Rhudes Creek 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 is addressed in Section 4 of the SAR (Anticipated Noise Levels). The noise assessment in Section 4 was conducted internally by Rhudes Creek Solar engineers. Section 4 provides an overview of noise generation during construction of the proposed facility:

Construction noise levels will be temporary and limited within the 1-year construction phase […] Noise generated by heavy construction equipment ranges between 60 and 100 decibels at a distance of 50 feet […] The site preparation, clearing, and grading phase will use graders, dozers, loaders, and trucks that will have an estimated cumulative noise level of 85 decibels at a 50-foot distance. The solar array installation phase involves driving piles, building the racking structure, and mounting solar

modules. For this phase, equipment will include small pile drivers, mobile cranes, and pneumatic tools that will have an estimated cumulative noise level of 90 decibels at a 50-foot distance.[22]

Rhudes Creek Solar states that all adjoining residential dwellings are a minimum of 300 feet from the nearest construction activity on the project site. Figure C-17 shows the applicant's calculation of noise levels generated by two phases of construction activity (site preparation and solar array installation).

Figure C-17.
Noise Generated from Construction of Rhudes Creek Solar Facility

	Site Preparation	Solar Array Installation
Cumulative Noise Level at 50 feet (dB)	85.0	90.0
Minimal Distance to Adjoining Residential Dwellings (ft)	300	300
Noise Reduction at 300 feet (dB)	-15.6	-15.6
Distance Attenuated Noise Level at Adjoining Residential Dwellings (dB)	69.4	74.4

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. However, the applicant's estimate of the cumulative noise level of a pile driver at 50 feet is notably lower than BBC has seen in previous solar facility applications. This issue is discussed in greater detail on pages 37-38 in this section of BBC's report.

The closest noise receptor is located at 304 feet from sound origin (see Application, Attachment B), so the maximum noise level at the nearest receptor during construction would be about 74.4 dB according to Figure C-17.

For the noise assessment during the operational life of the proposed project, Rhudes Creek Solar identified the primary sources of noise as the solar inverters and substation transformer. The applicant did not discuss any potential noise impact from tracking motors on the solar array panels. Figure C-18 shows the estimated noise levels generated by inverters at selected dwellings.

[22] SAR page 9.

Figure C-18.
Noise Generated from Inverters During Operation of Rhudes Creek Solar Facility

	Adj. Res. Dwelling 1	Adj. Res. Dwelling 2	Adj. Res. Dwelling 3
Cumulative Noise Level at 33 feet (dB)	67.0	67.0	67.0
Distance to Adjoining Residential Dwellings (ft)	417	830	879
Noise Reduction at Distance to Adj. Res. Dwelling (dB)	-22.0	-28.0	-28.5
Distance Attenuated Noise Level at Adjoining Residential Dwellings (dB)	45.0	39.0	38.5

Based on Figure C-18, the highest noise level resulting from the operation of project inverters and would be 45.0 dB at the nearest receptor. This is considered faint to moderate noise, such as the background noise of a library.

Finally, Rhudes Creek Solar provides an estimate of the noise levels generated by standard operation of the project's substation transformer, located in the northwestern portion of the project's solar arrays and 1,765 feet from the closest adjoining residence (Figure C-19).

Figure C-19.
Noise Generated from Substation Transformer During Operation of Rhudes Creek Solar Facility

	Adj. Res. Dwelling 1	Adj. Res. Dwelling 2	Adj. Res. Dwelling 3
Cumulative Noise Level at 5 feet (dB)	83.0	83.0	83.0
Distance to Adjoining Residential Dwellings (ft)	1765	1801	2010
Noise Reduction at Distance to Adj. Res. Dwelling (dB)	-51.0	-51.1	-52.1
Distance Attenuated Noise Level at Adjoining Residential Dwellings (dB)	32.0	31.9	30.9

Rhudes Creek Solar estimates that the maximum noise level from the transformer as measured at the closest adjoining residence would be 32.0 dB, which is considered very quiet.

In the First RFI, BBC requested that the applicant provide the full noise study—if one was conducted—that supports the findings and conclusions of SAR Section 4.

Supplemental Investigations, Research, and Analysis

Rhudes Creek Solar full noise assessment study. In their response to BBC's question in the First RFI, the applicant states:

The anticipated noise level assessment was performed internally by ibV Energy Partners' Engineering & Planning Department and was based on professional engineering judgement, planned equipment specifications, and noise emission calculations. However, following the issuance of this

request for information, an independent engineer has been engaged to prepare an additional study. The study is expected to conclude by December 2021 and will be filed once completed.[23]

Rhudes Creek Solar has not yet provided the full noise assessment in response to the Siting Board's First or Second RFIs. Consequently, the current analysis in this Supplemental Investigations, Research, and Analysis section is based on information available from the Application, SAR and Rhudes Creek Solar's responses to the RFI's from Siting Board staff as of early December 2021.

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).[24] 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.

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 74.4 dBA—the estimated maximum noise level during construction, as measured at the proposed project's nearest receptor—daily noise dose would be reached in more than 8 hours. Additionally, pile driving (likely the greatest sole contributor to construction noise) will be an intermittent activity on site, and pile drivers will move regularly around the site to install the panel support systems.

Noise suppression methods. Rhudes Creek Solar was asked to describe any noise suppression construction methods that they plan to employ during pile driving, along with the associated reduction in noise and estimated additional costs of noise suppression methods. The applicant responded:

Internal controls [to ensure safe noise levels and minimal disruption] focus on the time of day when pile driving is allowed on site as well as limiting the continuous duration of driving activities to reduce exposure for on-site personnel. Pile driving can only occur from 8am to 5pm on site and each driver can only run for 1 hour at a time followed by a 15-minute safety stand down. Installation of vegetation buffers and plantings of trees on site are strategically planned for early-stage construction to reduce and muffle the potential for construction noise to make it off site. Rhudes Creek Solar has not estimated the additional cost for noise suppression methods.[25]

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[23] Responses to Siting Board's First Request for Information, page 39

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

[25] Responses to Siting Board's First Request for Information, page 55

Rhudes Creek Solar plans to prioritize vegetative screen planting early in the construction phase to mitigate noise levels at nearby sound receptors (i.e., dwellings) and will limit the daily window and hourly duration of pile driving during the installation of the project's solar arrays. However, in their response to the Siting Board's First RFI the applicant goes on to say that they have not considered building sound barriers or using other noise suppression methods as the estimated noise levels do not warrant such methods and the cost of barrier noise suppression outweighs the benefit.

Construction schedule. BBC asked the applicant to describe any correspondence between Rhudes Creek Solar and neighboring landowners regarding the proposed 6 AM to 6 PM hours of construction. In their response to the First RFI, the applicant states:

During the meetings [with invited landowners], ibV Energy Partners explained that during the 10-12 construction months that activities would take a bell-shaped curve. Mobilization would start in month one and build to a peak in month 6 and then slowly ramp down to completion in months 10-12. We discussed the majority of construction operations would take place during the daylight working hours, but some driving/hauling could take place in early morning or late afternoon/early evening. We discussed the types of construction activities to include grading, trenching, driving of piles, racking installation, module installation, inverter installation, transmission line construction as well as building the project substation.

The landowners present voiced concerns about noise involved with the operation of the inverters, viewshed concerns based on their "front porch" view, storm water runoff from the project site and overall heat increases from the volume of solar panels in the immediate area.[26]

Based on this information from the applicant, it appears that the primary concerns of neighboring landowners do not relate to the daily hours of construction work or the potential for some work to occur in early morning or evening, but rather to potential long-term impacts such as noise from inverters or viewshed impacts from the facility. Additionally, Rhudes Creek Solar clarified (in response to a separate question in the RFI, discussed above) that pile driving—which is the greatest single source of noise generation during construction—would only occur between 8 AM and 5 PM.

Other noise-related information. BBC compared the projected construction and operational noise levels from the Rhudes Creek Solar project to previous estimates for other Kentucky solar projects we have reviewed for the Siting Board over the past two years.[27] We found that the noise level estimates in the Rhudes Creek SAR for pile driving activity are lower than the noise level projections from these other proposed solar facilities. Figure C-21 summarizes the pile driving noise levels estimated in these proposed solar facility applications.

[26] Responses to Siting Board's First Request for Information, pages 32-33

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

Figure C-21.
Estimated Noise Levels from Pile Driving, KY Solar Project Proposals (dBA)

Note:

*Unlike other solar project proposals, Rhudes Creek did not provide a noise level estimate for the pile driver alone. The 90.0 dBA figure represents the applicant's estimate of the cumulative noise from "small pile drivers, mobile cranes, and pneumatic tools." (SAR, page 9)

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

The pile driver noise level estimate made by Rhudes Creek Solar is lower than the estimates used in previous solar projects (note that decibels are measured on a logarithmic scale) and is not within the standard published range of pile driver noise generation estimates.[28] BBC does not currently have confidence in the 90.0 dBA noise level estimate provided by Rhudes Creek Solar in their internal noise assessment, presented in Section 4 of the SAR. If the actual noise from piledriving is 101 dBA at 50 feet – as estimated in the other site assessment reports summarized in Figure C-21– rather than the 90 dBA estimate provided by Rhudes Creek Solar, the maximum sound experienced at a dwelling located 300 feet from the pile driving activity would be approximately 85.4 dB rather than the 74.4 dB estimated by Rhudes Creek Solar (shown previously in Figure C-17).

It is likely that the independent noise assessment which Rhudes Creek Solar has now commissioned—due for completion in December 2021—will rectify any potential errors or oversight present in the original noise assessment. However, this full noise assessment was not available to BBC in time to be included in our review of the SAR.

Finally, in the Siting Board's Second RFI, BBC inquired about potential noise from solar array tracking motors, which has been described in other proposed solar siting assessments. In their response to the Second RFI, Rhudes Creek representatives stated that "noise from panel tracking motors was deemed insignificant and had not been considered in the original noise assessment. However, the ongoing independent noise study will consider noise from panel tracking motors and will be submitted once finalized."[29]

[28] Construction Noise Impact Assessment, nrc.gov

[29] Responses to Siting Board's Second Request for Information. Question/response #6.

Conclusions and Recommendations

During construction, noise from the pile drivers will have the most substantial impact on the nearest noise receptors, but the maximum noise level at the nearest receptor (which Rhudes Creek Solar estimates as 74.4 dB at 300 feet, and which BBC estimates could be as high as 85.4 dB at 300 feet based on pile driving noise estimates from other reviews for the Siting Board), is not dangerous and does not exceed the NIOSH recommended daily exposure limit as long as the noise is not continuous for a period of more than eight hours.

During normal operation of the proposed Rhudes Creek Solar facility, noise levels from inverters and the substation transformer are unlikely to be disruptive to local residents. Although Rhudes Creek has not yet provided estimates of noise levels from solar panel tracking motors during operations, prior noise assessments for proposed solar facilities in Kentucky have consistently found that the tracking motors create less noise than the inverters – so noise from the tracking motors is unlikely to change the conclusions regarding operational noise effects.

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

- Rhudes Creek 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 established by Hardin County in the CUP for the proposed solar facility.

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

- Rhudes Creek Solar should follow through with the plan to 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.

- Rhudes Creek 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.

- If pile driving activity occurs within 1,500 feet of a sensitive noise receptor (e.g., residence), Rhudes Creek 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).

- During construction Rhudes Creek Solar should locate stationary noise-generating equipment, such as air compressors or portable power generators, as far as practicable from neighboring residences.

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

Impacts on Transportation

This portion of the SAR review examines the impacts of the proposed Rhudes Creek 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.

As discussed in earlier sections of this report and seen in Figures C-1 and C-3, the proposed Rhudes Creek Solar site has two primary access roads: Hardinsburg Road (KY-86), running east-west near the northern project boundary, and South Black Branch Road, running southwest-northeast through the middle of the project footprint.

KY-86 will be the primary route for access to the property for the construction and subsequent operation of the facility […] During the construction phase of the Project, equipment, material deliveries, and operations crews will access the site through KY-86. Traffic is expected to temporarily increase during the one-year construction period between the working hours of 6 AM and 9 PM from Monday to Friday. There will be up to 150 construction employees and parking will be onsite. Furthermore, for equipment and construction material deliveries, up to 20 heavy duty trucks and 10 light duty trucks are expected. With a heavy vehicle adjustment, the construction of the facility could add up to 200 passenger car equivalent vehicles per day.[30]

Traffic monitoring stations maintained by the Kentucky Transportation Cabinet (KYTC) provide specific data on traffic flows along Hardinsburg Road (KY-86):

Annual average daily traffic in 2018 for KY-86 Station 047753 (0.17 miles west of the primary site access driveway) and Station 047263 (3.1 miles east of the primary site access driveway) are 3,477 and 3,843 vehicles, respectively. Due to the low traffic volumes that exist near the Project, the increase in 200 vehicles per day during construction are not expected to adversely impact traffic and will be temporary.[31]

The current (as of 2018) daily traffic at the aforementioned Hardinsburg Road stations equates to approximately 360 vehicles traveling per hour, if travel primarily occurred within a 10-hour daylight window each day. As Hardinsburg Road currently has capacity and a high baseline level of service, it is unlikely that the addition of an equivalent of 200 passenger vehicles per day would be grossly disruptive. However, the size, weight, and class of delivery trucks could make specific deliveries to site more challenging or disruptive than others. BBC requested more information from the applicant in both the First RFI and the Second RFI.

The operational phase of the Rhudes Creek 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.

Regarding the existing railroad that runs through the southernmost part of the site, Rhudes Creek Solar states:

Omega Rail Management [which manages the real estate and right-of-way] *has provided clear instructions and requirements for safety and operating procedures during construction. The Project will not require freight service on this line during construction and operations. The impacts of the Project encroachments on the rail line are to be minimal leading up to and during construction. After the completion of the construction onsite, the crossing encroachments on the rail line will be only during periodic inspection and maintenance activities. These impacts will be negligible with proper safety and operational training for the operations and maintenance contractor of the solar facility.*[32]

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[30] SAR page 12.

[31] SAR page 12.

[32] SAR pages 12-13.

Finally, Rhudes Creek Solar anticipates minor fugitive dust impacts from construction, but these should be modest as the project plans to retain most of the existing site topography and earthworks would be minimal. The applicant proposes several practices to minimize fugitive dust impacts, including retention of natural windbreaks, cover of open trucks, reduced speed on site, frequent water applications, and others.

In the First RFI, BBC requested that Rhudes Creek Solar provide the full traffic study—if one was conducted—that supports the findings and conclusions of SAR Section 5. Additionally, BBC requested more information about the estimated number and class of delivery trucks anticipated on site and the load weight of the substation transformer delivery.

Supplemental Investigations, Research, and Analysis

Rhudes Creek Solar full traffic study. In their response to BBC's question in the First RFI, the applicant states:

The effect on road, railways, and fugitive dust was assessed internally by ibV Energy Partners' Engineering & Planning Department and was based on professional engineering judgement and assumptions for typical traffic loads and construction equipment. However, following the issuance of this request for information, an independent engineer has been engaged to prepare an additional study. The study is expected to conclude by December 2021 and will be filed once completed.[33]

Rhudes Creek Solar has not yet provided the full traffic study in response to the Siting Board's First or Second RFIs. Consequently, the current analysis in this Supplemental Investigations, Research, and Analysis section is based on information available from the Application, SAR and Rhudes Creek Solar's responses to the RFI's from Siting Board staff as of early December 2021.

Worker-related traffic during construction. 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.

Rhudes Creek Solar responded that construction workers would use a mixture of different modes to commute to the site with most entry-level workers and temporary laborers carpooling each day via the subcontractor-provided vanpool and other workers commuting primarily in their own vehicles. The incentive for contractors to have their employees carpooled to the site would be the limited number of on-site parking spots that would be available.[34]

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 route adjoining the proposed project site (SR 86) is rated for 62,000 pounds (KYTC Truck Weight Classification). Any vehicle loads exceeding this limit could subject the roadway and shoulder to

[33] Responses to Siting Board's First Request for Information, page 38.

[34] Responses to Siting Board's Second Request for Information, question and response #3.

damage or degradation. Additionally, local roads transited by delivery trucks—such as South Black Branch 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 Rhudes Creek Solar project site are comparable with those of several other recent solar facility applications reviewed and approved by the Siting Board within the past 12 months.

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

Rhudes Creek Solar supplied a record of email correspondence with the KYTC District 4 Permits Engineer between March and June 2021, showing a detailed conversation about issues related to traffic safety, access driveway and ditch specifications, overhead crossings, and permit requirements and approvals.

Rhudes Creek Solar also supplied a record of email correspondence with two representatives of the Hardin County Road Department between March and April 2021, showing detailed conversation about proposed access driveways, sight distance requirements, and a reconfiguration of the proposed project plan to change access driveway locations and mitigate sight distance concerns identified by the road department.

Delivery and commuter 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 deliveries in the First RFI, Rhudes Creek Solar states:

The number and approximate weight classes of the trucks anticipated on site per day during the construction phase are as follows:

Five Class 2 trucks
Four Class 4 trucks
Four Class 6 trucks
Two Class 7 trucks
Ten Class 8 Tractor Trailers per day only during the two-month delivery phase

Deliveries will peak in the first 3 months of the project's construction phase, and the project's substation transformer will be a one-time 140-ton delivery via a Grove Rough Terrain Crane. Regarding commuter traffic, the applicant states that employees will arrive at and depart the site by carpooling in 5 to 6 vans daily.[35]

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. However, given the low traffic levels at present, traffic volume alone is unlikely to impact the level of service.

Delivery of the 140-ton substation transformer will likely present some 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:

- Rhudes Creek 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.

- Rhudes Creek 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, Rhudes Creek Solar should implement their proposed ridesharing between construction workers, as appropriate and feasible due to the COVID-19 pandemic; use appropriate traffic controls; or allow flexible working hours outside of peak hours to minimize any potential delays during AM and PM peak hours.

- Rhudes Creek Solar and its construction contractors should comply with all laws and regulations regarding the use of roadways.

- Rhudes Creek Solar should obtain permits from the KYTC and local road authorities as needed for Class 21 vehicle transport to the site and comply with all permit requirements, continuing to coordinate with the KYTC District 4 Permits Engineer and the Hardin County Road Department as needed.

[35] Responses to Siting Board's First Request for Information, page 6

- Rhudes Creek 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.

- Rhudes Creek 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, as well as storm water management – an issue that has specifically arisen in regard to the proposed Rhudes Creek Solar facility.

Economic Impacts

Current economic conditions and trends. As discussed previously, the Rhudes Creek Solar facility would be located in Hardin County, about 7 miles southwest of Elizabethtown. Ranked by population, Hardin County is the sixth largest county in Kentucky with about 111,000 residents as of 2020. The county's population has grown at a moderate pace over the past decade, adding about 4,300 new residents since 2010.

Per capita personal income in Hardin County was just under $47,900 in 2020, slightly higher than the statewide average of about $47,300.[36] The average annual unemployment rate in Hardin County during 2020 was 7.1 percent, a little higher than the statewide average unemployment rate of 6.6 percent.[37]

There are about 62,600 jobs located in Hardin County as of 2020. The largest employment sector is government (18,261 jobs), including a major presence of both Federal civilian employees (about 5,200) and Military personnel (about 5,400). This substantial Federal government employment is largely attributable to the nearby presence of Fort Knox. The largest private sector industries in Hardin County in 2020 were retail trade (about 7,000 jobs) and manufacturing (about 6,700 jobs). Hardin County's construction sector included over 2,200 jobs in 2020, while its farms employed over 1,300 people.[38]

There were about 110,000 acres of cropland in Hardin County as of the last Census of Agriculture in 2017, less than two percent of the more than 6.6 million acres of cropland across all of Kentucky. Cropland in Hardin County decreased by about 12,000 acres over the ten-year period between the

[36] U.S. Bureau of Economic Analysis, Table CAINC1 Personal Income Summary and Table CAINC30 Economic Profile. Downloaded December 14, 2021.

[37] U.S. Bureau of Labor Statistics.

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

2007 and 2017 Censuses of Agriculture. Across Kentucky as a whole, cropland decreased by about 650,000 acres over the same period.[39]

Applicant economic impact study. Attachment K to the Rhudes Creek Solar Application, "Economic 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.[40]

Key findings from Dr. Coomes analysis include:

- The applicant is likely to invest over $100 million in Hardin 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 240 direct jobs and about 72 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 three permanent jobs.
- However, Dr. Coomes also notes that "The company and the County government are negotiating a financial agreement in support of an industrial revenue bond in which the company will make annual payments in lieu of taxes (PILOT) to local government jurisdictions, in addition to other property and income-related taxes due." Dr. Coomes estimates that the company will pay about $2.35 million to state and local governments in property taxes and payments in lieu of taxes over a 35-year operating period, or about $67,000 per year. Dr. Coomes further states that "these payments can be compared to the few thousand dollars per year currently paid by landowners of the site (almost all of which is assessed at its agricultural land value.)[41]

  Review and assessment of applicant economic information. The level of investment in Hardin County projected by Dr. Coomes appears to be consistent with industry standards for a solar project of the size of the proposed Rhudes Creek Solar facility. Dr. Coomes estimate of direct employment during construction (240 jobs) is larger than the estimate by Rhudes Creek Solar in their evaluation of transportation of "up to 150 construction employees." 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.

  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; and the potential induced economic benefits from the additional income received by participating landowners if at least a portion of that income is

[39] 2017 Census of Agriculture and 2007 Census of Agriculture. County Data. U.S.D.A. National Agricultural Statistics Service.

[40] Application, Attachment K.

[41] Application. Attachment K. Economic Report.

spent locally. The former would at least slightly reduce the projected net economic benefits from ongoing operations of the facility, while the latter would likely increase those projected net benefits. Neither of these aspects would likely result in a material change to the results of the assessment conducted by Dr. Coomes.

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

- Rhudes Creek 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.

The only reference BBC found to decommissioning in the Rhudes Creek Solar Application and SAR was on page 6 of the SAR. That page states that "The collaborative planning process [with the Hardin County Planning Director] beginning in February 2020 cumulated with design elements that are fully incorporated into the site plans. These include, but are not limited to: … Preparation of a decommissioning plan to reclaim, revegetate, and restore the properties consistently with zoning classifications."[42]

Recommended mitigation. Absent further information on the decommissioning plan referenced above, 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, Rhudes Creek 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.

- Rhudes Creek Solar should file a full and explicit decommissioning plan with the Siting Board. This plan should commit Rhudes Creek 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.

- Rhudes Creek Solar should file a bond with the Hardin County Fiscal Court, equal to the amount necessary to effectuate the explicit or formal decommissioning plan naming Hardin 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 Hardin 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, Hardin

[42] SAR, page 6.

County should be the primary beneficiary of the decommissioning bond for that portion of the project. The bond(s) should be filed with the Hardin 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 Hardin 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 Rhudes Creek 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 Hardin 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.

- Rhudes Creek 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. Rhudes Creek Solar should commit to removing the debris and replaced facility components from the Project site and Hardin 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 Hardin County. However, if the replaced facility components remain in Hardin County, Rhudes Creek Solar should inform the Siting Board of where the replaced facility are being disposing of.

- Any disposal or recycling of Project equipment, during operations or decommissioning of the Project, should be done in accordance with applicable laws and requirements.

Stormwater Management

As noted earlier on pages 24 and 25 of this section, stormwater drainage issues are prevalent in portions of the proposed project area. Further, storm water runoff from the site has been raised as a concern by local landowners.[43]

Regarding this concern, Rhudes Creek Solar has stated "the post-development conditions vastly improve the ground cover compared to pre-development conditions."[44] When asked to elaborate further in the Siting Board's Second RFI, Rhudes Creek Solar stated "The transition from barren and dusty row crops to managed turf will greatly improve the land's ability to percolate stormwater. Grass growth all over the site and the accompanying root system will both soak up water and slow down any runoff flow previously experienced on this ground."[45]

Further, Rhudes Creek Solar has been engaged with Hardin County for some time regarding stormwater management. The SAR states "In March 2021, the development and engineering teams met with the County Planner and County Engineer for a site visit to discuss Project plans. During the field trip, much of the focus was regarding storm water runoff concerns and visual impacts to adjoining neighbors and roadway users." And "In May 2021, a third and final set of 90% site plans

[43] See Rhudes Creek Solar Application, page 12 and Responses to Siting Board's First RFI, page 34.

[44] SAR Attachment 13, Final Storm Water Pollution Prevention Plan, page 13.

[45] Responses to Siting Board's Second RFI, Question 10.

with site civil design, construction phasing, erosion control, landscaping, and storm water management was submitted for review and accepted by the County Planner and County Engineer with minor comments."[46] The reference to storm water management apparently refers to the Final Stormwater Prevention Plan, which was completed by TRC Engineers in May of 2021.[47]

Recommended mitigation. To mitigate this important concern, Rhudes Creek Solar should:

- Implement the Final Stormwater Prevention Plan as approved by Hardin County, and
- Implement the agreed upon construction phasing plan which limits disturbance to 225 acres at a time.[48]

[46] SAR, page 14.

[47] SAR, Attachment 13.

[48] SAR, page 14.

REVISION HISTORY

REV	DESCRIPTION	DATE	NAME
0	ORIGINAL DRAWING	04 NOV 2021	KAMTHANE
0	UPDATED PER COMMENTS	06 DEC 2021	KAMTHANE

1000 FEET RADIUS VICINITY		(S)	SCHOOL
2000 FEET RADIUS VICINITY		(P)	PARK
1 MILE RADIUS VICINITY		○	DWELLING
2 MILE RADIUS VICINITY			SOLAR TRACKERS
PROJECT BOUNDARY			

Exhibit DR 2-7

UNLESS OTHERWISE SPECIFIED
DIM ARE IN FEET

FIRST ANGLE PROJECTION

	NAME	DATE
PREPARED BY	KAMTHANE	04 NOV 21
CHECKED BY	CHANG	08 NOV 21
APPROVED BY	CHANG	08 NOV 21

ENGINEERING DESIGN
ibV Energy Partners
777 Brickell Ave,
Suite #500,
Miami, FL, USA.

ibV energypartners an ib vogt company

TITLE
RHUDES CREEK SOLAR PROJECT

PROJECT PERMITTING

SIZE E 34x44 | DRAWING NO USA.3210.M4.001. E . | REV 1

SCALE 1:40000 | SHEET 1 OF 1