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Commonwealth of Kentucky
Kentucky State Board on Electric Generation and Transmission Siting
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Michael J. Schmitt
Chairman

March 17, 2021

TO: FILINGS DIVISION

RE: Case No. 2020-00242
ELECTRONIC APPLICATION OF UNBRIDLED SOLAR, LLC FOR A CERTIFICATE OF CONSTRUCTION FOR AN APPROXIMATELY 160 MEGAWATT MERCHANT ELECTRIC SOLAR GENERATING FACILITY AND NONREGULATED ELECTRIC TRANSMISSION LINE IN HENDERSON AND WEBSTER COUNTIES, KENTUCKY

Please file in the administrative record of the above-referenced case the attached copies of the final reports of BBC Research and Consulting, entitled “Review and Evaluation of Unbridled Solar LLC Site Assessment Report” and “Evaluation of Proposed Unregulated Transmission Line for Unbridled Solar Generating Project,” both of which are dated March 16, 2021.

Sincerely,

Linda C. Bridwell, PE
Executive Director
Public Service Commission *on behalf* of the Kentucky State Board on Electric Generation and Transmission Siting

Attachments

cc: Parties of Record

BBC RESEARCH & CONSULTING

Review and Evaluation of Unbridled Solar LLC Site Assessment Report

FINAL REPORT

Final Report

March 16, 2021

Review and Evaluation of Unbridled Solar LLC Site Assessment Report

Prepared for

Kentucky State Board on Electrical Generation and Transmission Siting
211 Sower Blvd.
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Prepared by

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BBC RESEARCH & CONSULTING

Table of Contents

SECTION A.

General Statement

SECTION A.
General Statement

This document provides a review of the Site Assessment Report (SAR) for the proposed Unbridled Solar (Unbridled) merchant electric generating facility submitted to the Kentucky State Board on Electrical Generation and Transmission Siting (the Siting Board). Unbridled Solar, LLC (Unbridled) submitted an administratively complete document titled "Application of Unbridled Solar, LLC for Certificates of Construction for an up to 160-Megawatt Merchant Electric Solar Generating Facility and Nonregulated Electric Transmission Line in Henderson and Webster Counties, Kentucky" (the "Application") to the Siting Board in early December 2020. The proposed generating facility is subject to review by the Siting Board under KRS 278.700 *et seq.* (the Act), passed by the General Assembly of the Commonwealth of Kentucky in 2002. Board staff retained BBC Research & Consulting (BBC) to perform this review. Unbridled's proposed nonregulated transmission line has been evaluated in a separate report.

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 Unbridled's SAR and complete this report:

- Reviewed prior SAR reviews prepared for the Siting Board by BBC and others for proposed fossil fuel generating facilities and more recent reviews of proposed commercial solar generating facilities – including the proposed Turkey Creek and Glover Creek solar facilities which were reviewed in 2020;
- Reviewed the contents of Unbridled's SAR and Application;
- Identified additional information we considered useful for a thorough review, and submitted questions to the applicant;
- Conducted the required site visit, including obtaining oral and written information supplied by the applicant, on February 19, 2021;
- Completed interviews and data collection with a number of outside sources as sourced in this document; and
- Compiled and incorporated all of the foregoing in the analysis.

Report Format

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

Certain Limitations

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

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

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

SECTION B.

Executive Summary

SECTION B.
Executive Summary

This report documents the evaluation of a Site Assessment Report (SAR) in compliance with KRS 278.704 and KRS 278.708. The Kentucky State Board on Electrical Generation and Transmission Siting (the Siting Board) received an application from Unbridled Solar, LLC (Unbridled) for approval to construct a commercial, photovoltaic solar merchant electric generating facility in Henderson County and Webster County, Kentucky, on December 8, 2021. Siting Board staff retained BBC Research & Consulting (BBC), a Denver-based firm, to review the SAR. BBC was directed by the staff to review the SAR for adequacy, visit the site, conduct supplemental research where necessary and to provide recommendations about proposed mitigation measures. This is the summary of BBC's final report, which encompasses the SAR review, establishes standards for evaluation, summarizes information from the applicant, notes deficiencies, offers supplemental information and draws conclusions and recommendations related to mitigation. Issues outside the scope of KRS 278.708 such as regional economic impact, electricity market or transmission system effects and broader environmental issues were not addressed in this engagement.

Description of the Proposed Facility/Site Development Plan

The SAR provides a description of the proposed Unbridled facility in terms of surrounding land uses, legal boundaries, access control, utility service, setback requirements, visual impacts, impacts on surrounding property owners, noise levels and traffic impacts. The proposed Unbridled generating facility would be located in northwestern Kentucky, about twelve miles south of the City of Henderson and about 30 miles west of the City of Owensboro. The proposed facility would be a 160-megawatt alternating current photovoltaic (PV) electricity generation facility, situated on agricultural and industrial lands. Facility equipment will consist of tempered glass solar panels, inverters, a new substation, associated wiring and a 3-mile, nonregulated transmission line (evaluated in a separate report). Conclusions with respect to other descriptive elements of the facility follow:

- **Surrounding land use —** Currently, approximately 85 percent of the land within the project boundary is used for agriculture. Eighty-two percent of the total proposed project acreage is used for crops while 3 percent is used for pasture. There are 63 scattered residential parcels near the site, but the only "neighborhoods"[1] are the Town of Robards just north of the site in Henderson County and the Town of SeeBree in Webster County over a mile south of the site. The nearest adjacent residences in Henderson County are located from 135 to 200 feet from the closest proposed solar panels. The southwestern portion of the site includes parcels that lie within the 4 Star Industrial Park Planning Parcels. The Big Rivers

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

Electric Corporation coal-fired power plant is located across Interstate 69, about two miles from the southeastern portions of the site.

- **Proposed access control and security —** Exhibit B to Unbridled's Application provides a general description of access control around the site boundary, stating that any access points from public roads will have locked gates and down-lit security lighting, and that the project will have security cameras. Unbridled also stated that "the Project will be surrounded by a 7-foot-tall fence, consisting of 6 feet of chain-link and topped by 1 foot of barbed and/or smooth wire for security, which meets the National Electric Code Article 110 and Henderson County Zoning Ordinance, Article XXX, Section 30.02.D, Solar Energy Systems requirement."

  Unbridled's Application and SAR did not specify the number or locations of the access points, but in response to the First Request for Information from Siting Board staff and BBC, Unbridled provided a new map showing a total of 15 access points.

- **Utilities —** Unbridled's SAR states that "Electric and water/sewer services will likely be required by the O&M building." In their response to Siting Board staff's and BBC's First Request for Information, Unbridled clarified that water service would be provided by the City of Henderson's water system and a septic system would be used for wastewater disposal because municipal wastewater service is not available at the site. Unbridled did not specify which utility (if any) would provide electric service to the facility.

- **Setback requirements —** The site of the proposed project is in both Henderson and Webster Counties and must comply with the setback requirements of each county. In Henderson County, Level 3 Solar Energy Systems (SES), such as the proposed Unbridled facility must comply with the Henderson County Zoning Ordinance Art. XXX. Section 30.02 of the Zoning Ordinance requires that equipment must be at least 25 feet from the outer property lines of the project area and all SES equipment must be at least 100 feet from any residential structure. There are no local zoning codes that apply to the Webster County portions of the site. In Webster County, the applicable requirement from KRS 278.704(2) is that "… all proposed structures or facilities used for generation of electricity are two thousand (2,000) feet from any residential neighborhood, school, hospital, or nursing home facility." There are no residential neighborhoods, schools, hospitals or nursing homes within 2,000 feet of the proposed facilities or structures in Webster County.

- **Other facility site development plan descriptions provided in the SAR —** Legal boundaries; location of facility buildings, transmission lines, structures; location of access roads, internal roads and railways are all addressed in the SAR. Noise levels are briefly addressed and then evaluated more fully in a subsequent section of the SAR. These materials appear to meet the informational requirements identified in KRS 278.708.

Compatibility with Scenic Surroundings

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

The applicant did not include a formal visual assessment in the SAR, although it did provide a glare study. In response to a request from BBC, Unbridled provided visual simulations of the proposed facility from key observation points at two neighboring properties adjacent to the northwest portion of the site.

The Henderson County Zoning Ordinance related to solar generating systems referenced earlier does contain provisions related to reducing visual impacts, stating:

"All Level 3 SES shall be screened with a seven (7) foot tall fence and, to the extent reasonably practicable, a visual buffer that provides reasonable screening to reduce the view of the SES from residential dwelling units on adjacent lots (including those lots located across a public right of way). A vegetation screening plan to reduce the view of the SES from residential dwelling units on adjacent lots will be submitted for approval of the Henderson City-County Planning Commission."[2]

In general, BBC concurs with Unbridled's statements that the proposed facility would not be incompatible with its surroundings from a scenic standpoint. This assessment reflects the topography of the site, which limits or eliminates its visibility from some of the nearby homes, forested areas in some portions of the site which break up the views – including on nonparticipating properties – and the industrial character of the southeastern portion of the site. It also recognizes that solar facilities have a relatively low profile – similar to or lower than most single-family homes – and Unbridled has agreed to an extensive plan of installing numerous vegetative buffers to help screen the site from nearby homeowners, as well as committed to obtaining signed screening agreements with nearby neighbors.

Potential Changes in Property Values for Adjacent Property Owners

The central issue related to property values is whether or not, and to what extent, property values of other land owners will change as a result of development and operation of the proposed Unbridled facility. Attachment D of the applicant's SAR (Property Value Impact Report) provides a paired sales analysis focusing on ten existing solar facilities (two in Florida, three in North Carolina and one each in Georgia, Indiana, Minnesota, Michigan and Virginia.) In total, sales of 36 properties adjacent to these facilities were compared to 222 sales of similar properties in the same real estate markets that were not located adjacent to a solar facility. The study also included examination of three "before and after analyses" which compared "sales of adjoining properties prior to the announcement of the solar farm to sales of adjoining properties after announcement and subsequent development of the solar farm" (SAR Attachment D, page

[2] Unbridled Solar Application, Exhibit E, Attachment.

24). The study uses an analysis of comparable home values design that is similar to the approach by which appraisers commonly appraise residential property values.

All existing solar facilities included in the analysis were smaller than the proposed 160 MW Unbridled facility, though two of them (one in Georgia and one in Minnesota) were 100 MW or larger. The study found "no measurable and consistent difference in property values" for properties adjacent to solar facilities. (SAR Attachment D, page 4).

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

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

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

Expected Noise from Construction and Operation

Section 4 of the SAR summarizes the findings from the Noise and Traffic Study (Attachment B to the SAR). The noise assessment for the project's operational phase focuses primarily on the tracking motors and inverters, as well as noise emitted from the substation and concludes that "The nearest sensitive sound receptors will be 100 feet from solar panels and 200 feet from inverters. At this distance, the sound from Project operation will be quieter than an air conditioning unit and close to the sound generated by light traffic."

The noise assessment for the construction phase concludes that "Because of the size of the Project and the distance to the nearest receptors, construction will not contribute to a significant sound increase when compared to sound currently occurring onsite (i.e., the operation of farming and crop harvesting equipment) and baseline ambient sound levels." However, the noise assessment also highlights the sound that will occur during construction from the pile drivers which drive the rack support foundations. This sound will be loud, estimated at 101 dBA at 50 feet.

At 100 feet (closest residence), BBC estimates that sound from the pile drivers during the project's construction phase will be approximately 95 dBA, or roughly as loud as a subway train or a motorcycle engine. The CDC estimates that sound at 95 dBA can potentially damage hearing

after about 50 minutes of exposure, and a 95 dBA sound is 10 times louder than the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit of 85 dBA (note that decibels are measured on a logarithmic scale).

BBC concludes that although noise levels similar to existing conditions applies to most of the construction activity, the pneumatic pile drivers are an important exception. The noise from the pile drivers will be substantial for residences even further than 100 feet from the solar arrays. Based on sound attenuation estimates across open space, a residence would need to be at least 400 feet from the nearest pile driver in order to experience a sound of 83 dBA, just below the NIOSH recommended exposure limit.

Impacts on Transportation

The Noise and Traffic Study (Attachment B to the SAR) describes the existing road network near the project site and current traffic levels. The primary roads near the site are KY-416 and KY-283. Both roads are very lightly travelled, with average daily traffic (ADT) of between 261 and 800 vehicles per day. The Watkins School Road, also near the site, has even less traffic – 145 vehicles per day.

An average of 75 to 100 employee vehicles are expected per day, along with 10 to 20 semitrucks per day, during construction. The study notes that "increased traffic may be perceptible to area residents", which appears likely given the low volume of traffic currently occurring. The study also states, however, that the "…slight increase in volume is not expected to affect traffic function." The study does note that "Slow-moving construction vehicles may also cause delays on smaller roads."

In Unbridled's Supplement to Response to the First Request for Information, the applicant states that the two Main Power Transformers (MPTs) will be the largest deliveries to site, and will each weigh between 250,000 and 450,000 lbs. The primary roads located near the proposed project site (SR 416 and SR 283) are rated at 44,000 pounds (KYTC). Any vehicle loads exceeding this limit could subject the roadway and shoulder to damage or degradation. Additionally, potential routes to site may also include local county roads, which could be susceptible to degradation from heavy loads.

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

Recommendations

Unbridled has provided the required information for the site assessment, including responses to BBC's questions following our review of their SAR. The proposed Unbridled facility would be the largest commercial solar facility developed in Kentucky up to this point in time. The proposed site is complex, spanning portions of two counties – with different setback requirements – and includes a number of nonparticipating parcels that are surrounded, or nearly surrounded, by the proposed project. However, Unbridled has done considerable advance work, including extensive communication with local residents and authorities and developing a substantial vegetative screening plan.

Additional information needed from the applicant. If the applicant will require service from an existing electric utility for their O&M building, they should identify and communicate with that utility. More importantly, Unbridled should determine their proposed route for delivering the MPTs from nearby rail to the proposed substation within the project site, and should communicate their proposed route to Henderson and Webster county road departments and the KYTC.

Mitigation recommendations. Unbridled has put considerable effort into developing a screening mitigation plan to help mitigate visual impacts on nearby residential properties, noting:

- "Unbridled prepared a screening plan, presented in Exhibit K, Sheet UNB-L-900-01, to mitigate potential visual impacts to the landowners' property."
- "An estimated 41 [vegetation] buffers are planned, each ranging from 15 feet to 5,500 feet in length."
- "Unbridled also prepared visual renderings of the Project with the proposed screening plan that was reviewed by and discussed with the interested landowners."
- "Screening plan agreements with these landowners will be finalized prior to construction."

Exhibit B of the Unbridled Application states that "To limit light reflection, solar panels are constructed of dark, light-absorbing materials with anti-reflective coatings." Such coatings will serve to reduce potential glare from the solar panels.

BBC supports the foregoing mitigation identified by Unbridled, and recommends that:

- Unbridled should complete screening plan agreements with nearby homeowners as stated in Section 2.2.1 of the SAR (and described on Section C, page 15 of this report);
- Unbridled should also submit their screening plan for approval of the Henderson City-County Planning Commission, as required under the Henderson County Zoning Ordinance; and
- Unbridled should carry out the screening plan and make sure the proposed new vegetative buffers are successfully established and develop as expected over time.

To help mitigate the most significant noise impacts during construction, BBC recommends that Unbridled should clarify precisely where and when pile driving will occur across the site and consider the distances to each home within 500 feet of this activity to appropriately mitigate hazardous or annoying noise as necessary. Further:

- Unbridled should contact homes within 500 feet of any pile driving activity and notify them in advance of the upcoming activity, its timing and anticipated duration, rather than waiting for complaints from those residents. It should also provide the opportunity for residents to ask questions or provide feedback, if desired.

- Unbridled should respond to any noise-related complaints from residents adjacent to the project boundary, and work with those residents to reduce noise-related concerns through careful scheduling or other means to the extent feasible.

To help mitigate impacts on traffic and the local road network, BBC recommends:

- Unbridled should contact the Kentucky Transportation Cabinet as soon as feasible to discuss the transportation requirements and the KYTC's restrictions on SR 283 and SR 416. If the MPT delivery route requires on-site assessment by KYTC before approval and permitting, Unbridled should allow as much time as possible for that process to occur.

- Unbridled should contact the road departments of Henderson and Webster counties as soon as feasible. Any overweight or overdimensional loads on local roads should be approved by the relevant county, and it is likely that county roads could be more vulnerable to damage or degradation than state routes.

- Unbridled should develop a detailed and site-tailored traffic management plan for the construction phase as soon as feasible. Given the number of access points to the site (15) as shown in the applicant's amended Exhibit K, it is likely that the site will require extensive signage and coordination of traffic management personnel during construction activity.

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

SECTION C.

Findings and Conclusions

SECTION C.
Findings and Conclusions

This section provides detailed review and evaluation of each element of the SAR as prescribed in KRS 278.708. It is organized into five subsections:

1. Description of Proposed Facility/Site Development Plan;

2. Compatibility with Scenic Surroundings;

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

4. Expected Noise from Construction and Operation; and

5. Impacts on Transportation.

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

Within each subsection identified above, BBC has followed a consistent structure:

- First (where applicable), 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**).

- Second, we summarize relevant information that was included in the Application and SAR (**Information Provided in the Applicant's SAR**).

- Third, we describe supplemental information about the proposed Unbridled solar generating facility, along with other information BBC obtained about the project and its impacts (**Supplemental Investigations, Research, and Analysis**).

- Finally, BBC draws our 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

The primary purpose of this initial component of the SAR review is to ensure the applicant has provided the required information to the Siting Board and to assess that information.

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 utilities to service the facility;
- Subsection 7—compliance with applicable setback requirements as provided under KRS 278.704(2), (3), and (5); 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 facility and site development plan is mainly set forth in Exhibit I (the SAR), Section 1 (Description of Proposed Site) and in Exhibit B of the Application (Description of Proposed Solar Generation Facility Site). Other related or supplementary information comes from various other sections of the SAR and other exhibits included with the application.

Overview of proposed facility. As described in Section 1 of the SAR, the proposed Unbridled facility would be a 160-megawatt alternating current photovoltaic (PV) electricity generation facility, situated in a rural setting on approximately 1,680 acres of contiguous property in Webster County (540 acres) and Henderson County (1,140 acres) in northwestern Kentucky, about 30 miles west of Owensboro.

Project facilities would include solar modules, inverters, tracking racking, fencing, access roads, a substation, an operations and maintenance (O&M) building, parking lot, below-and above-ground electrical collection lines, up to six weather stations (up to 20 ft tall), and temporary construction laydown yards. The applicant proposes to construct a new, approximately 3-mile-long, 161 kV transmission line to transmit electricity generated from the facility to the existing Big Rivers Electric Corporation's Reid Substation in Webster County, about two miles east of the project boundary. BBC has separately reviewed Unbridled's proposed, nonregulated transmission line.

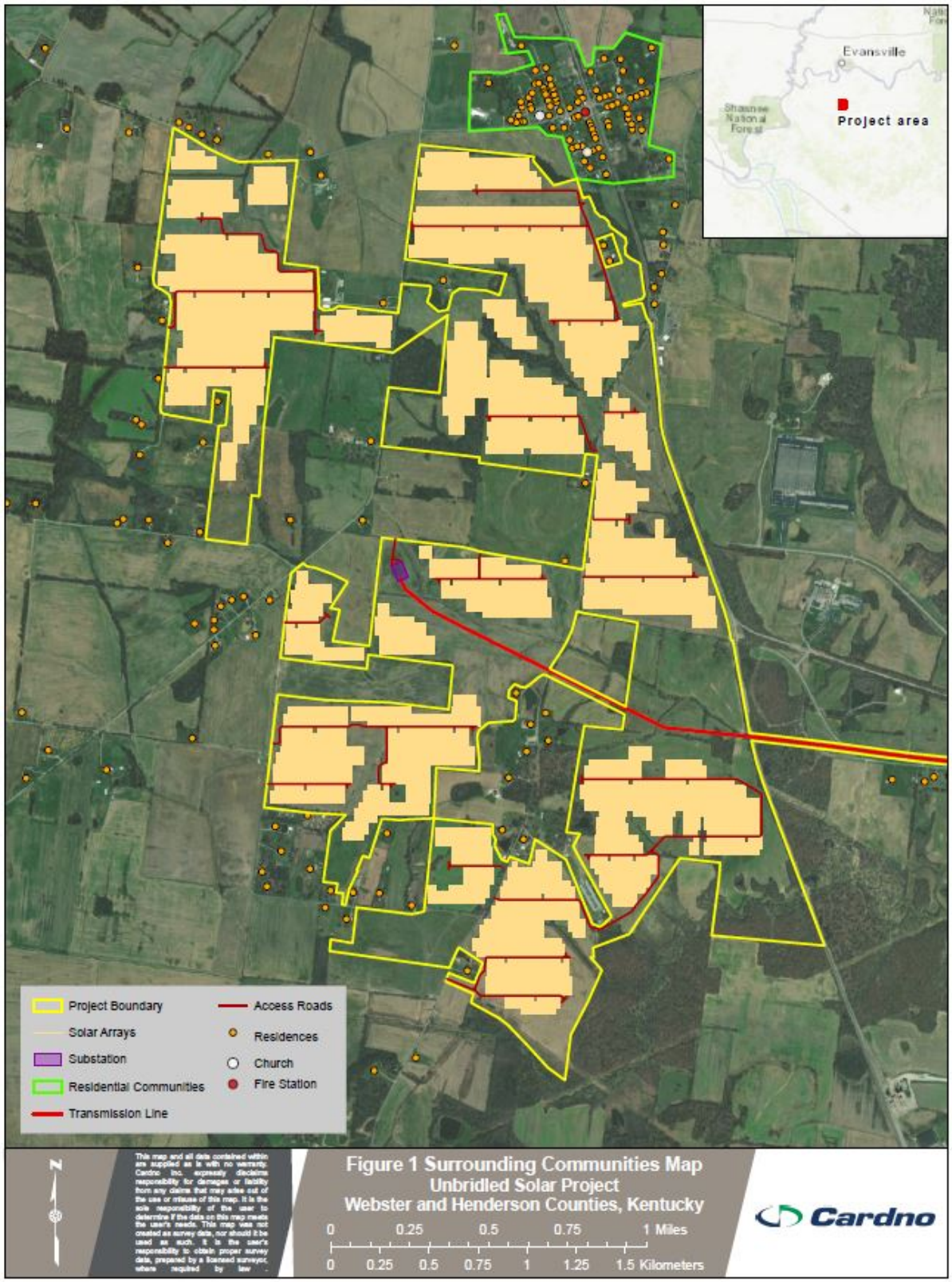
Surrounding land uses. Section 1.2.3 of the SAR provides site plan details, including a general description of surrounding land use. The applicant obtained data from the National Land Cover Database to describe land use within the proposed project boundary. Currently, approximately 85 percent of the land within the boundary is used for agriculture. Eighty-two percent of the total proposed project acreage is used for crops while 3 percent is used for pasture.

Of the land not currently used for agriculture or forest, the largest portion (67.5 acres) is described as "Developed, Open Space" (Exhibit I, Section 1.2.3, Table 1, page 3). USGS describes this category as "… large-lot single family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes."

The Unbridled SAR did not provide information on how much of this area, if any, currently functions as public or private park land. BBC sought clarification from the applicant on this point in the First Request for Information.

Other pertinent information about surrounding land uses includes the proximity of residential communities and community buildings. Figure C-1, excerpted from the applicant's SAR, provides an aerial view of the proposed site, with the project boundary outlined in yellow. Residential communities, individual residences, and other notable features are depicted according to the figure legend provided.

Figure C-1, Surrounding Communities Map.



Unbridled's application materials state:

- There are "63 landowners whose property borders the Unbridled Solar Facility (Project) site." (Application Exhibit D, page 1)

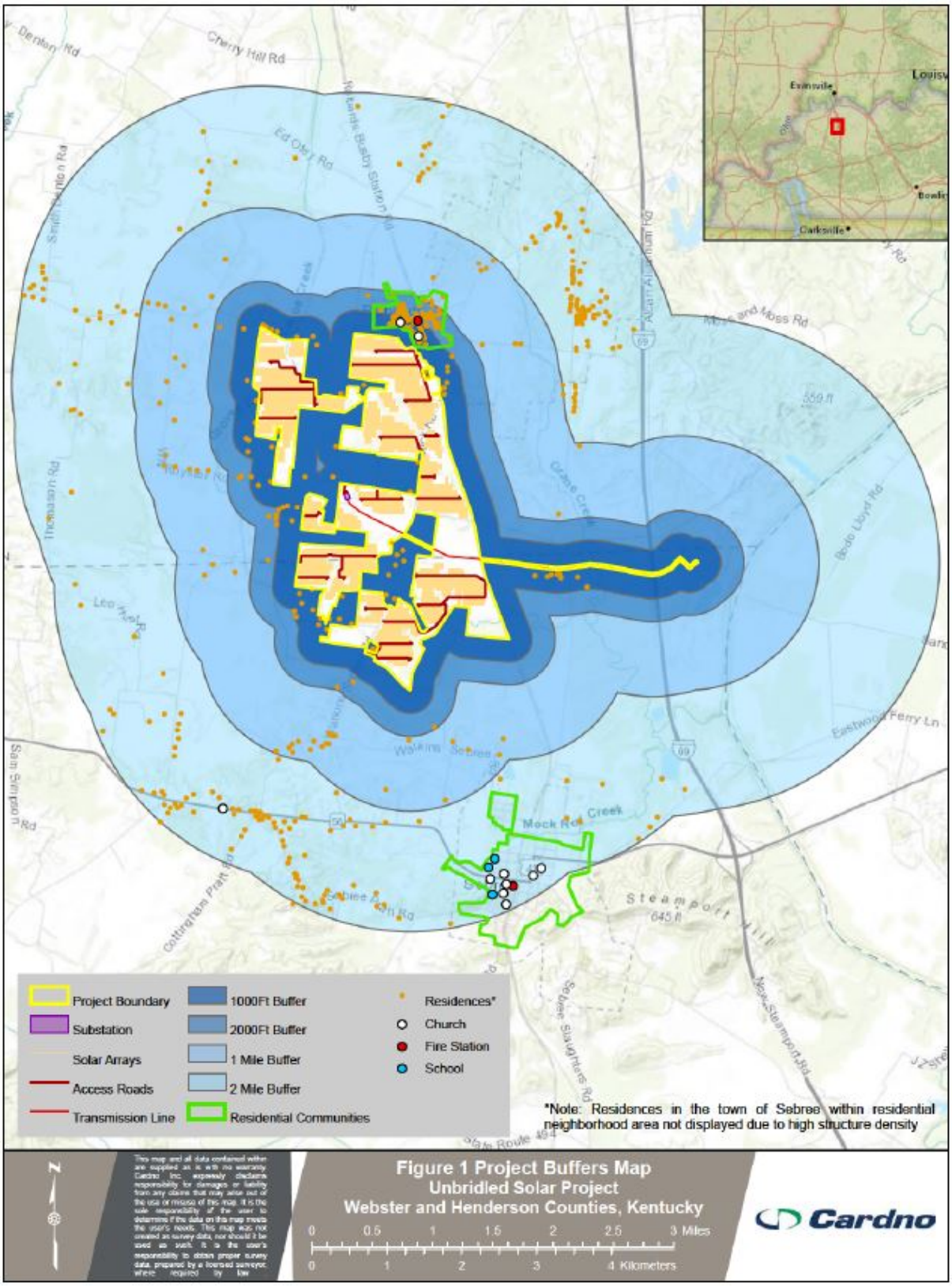
- "There are no schools, hospitals, or nursing home facilities within 2000 feet of any proposed Webster County structure or facility used for electric generation. There are two clusters of residences, one in Henderson County and one in Webster County, that arguably could meet the KRS 278.700(6) definition of a "residential neighborhood" and for which some generation facilities or structures in the Webster County portion of the Project are within 2000 feet of the residences' area." (Application, pages 6-7)

- "In the preliminary layout, the nearest peripheral residences in Henderson County are located from 135 to 200 feet from the closest proposed solar panels, exceeding the requirement of a minimum 100-foot residential buffer."[1] (Application Exhibit E, page 2)

An additional map of the proposed project is presented in Application Exhibit J, Figure 1, and inserted here as Figure C-2.

[1] The 100-foot residential buffer referred to by Unbridled is set forth in Henderson County Zoning Ordinance Article XXX, Solar Energy System (SES).

Figure C-2, Surrounding Communities Map.



The figure shows a "Residential Community" partly within 1000 feet and nearly entirely within 2000 feet of the site on the northeast corner in Henderson County (the Town of Robards). Based on the figure, two churches and one fire station are located within Robards and are within approximately 1000 feet of the site.

The dotted county line, which runs east to west roughly through the middle of the proposed site, separates Henderson County (north) from Webster County (south). The figure depicts a second "Residential Community," located in more distant proximity to the southeast corner of the site in Webster County. That community—the Town of Sebree—includes 7 churches, a fire station and 3 schools according to the figure. These features appear to be within two miles of the proposed site, but more than one mile away.

Beyond dots showing the location of homes within two miles, and churches/fire stations and schools as noted above, the figure does not delineate surrounding land uses in terms such as agricultural land, residential land, commercial land, recreational land and industrial land.

Some further information regarding surrounding land uses is provided in the Addendum Report to the Property Value Impact Study (Attachment D to the SAR). Page 19 of that addendum states "The Project is located in a stable area that is predominantly agricultural in nature with some residential homesteads. Local development has not been robust over the past twenty years, and the immediate land parcels have a future land use designation of agricultural…Local land and residential home prices have remained stable over the past five years and are anticipated to align in the future with macroeconomic changes. Overall, the proposed Project is considered a locally compatible use."

Legal boundaries. The Application Index submitted as part of the application refers the reader to Exhibit I (the SAR) Section 1 and Application Exhibit K (the large format Preliminary Plan Sets) in regard to all aspects of the description of the proposed facility and proposed site development plan, including the legal boundaries. Exhibit I Section 1 then also refers the reader to Exhibit K Application Plan Set for the legal boundaries (Section 1.2.3, page 3).

The Plan Set provided in Exhibit K does indicate the boundaries of the proposed site on a series of detailed large format aerial views. However, it does not provide a legal description of the site.

Access control. Exhibit B of the application (Description of Proposed Solar Generation Facility Site) notes that "Unbridled has minimized the amount of access roads for the Project," although the specific number of access points from public roads is not stated. The only indication of the number of access points is provided in the Noise and Traffic Study (Attachment B of the applicant's SAR) which references "…the two prospective entrances to the Project site." However, no further information, such as entrance locations, is provided.

Exhibit B provides a general description of access control around the site boundary, stating that any access points from public roads will have locked gates and down-lit security lighting, and that the project will have security cameras. None of Exhibit B, Exhibit I (the SAR), or Exhibit K (Preliminary Plan Set) clearly identifies the location of access points, locked gates, or security cameras. BBC requested further information from the applicant in the First Request for Information.

The applicant also states that "the Project will be surrounded by a 7-foot-tall fence, consisting of 6 feet of chain-link and topped by 1 foot of barbed and/or smooth wire for security, which meets the National Electric Code Article 110 and Henderson County Zoning Ordinance, Article XXX, Section 30.02.D, Solar Energy Systems requirement." However, Exhibit B notes that "fences at the periphery of residential properties will not use barbed or other forms of sharp-pointed fence material."

The facility's substation will be fenced in addition to the boundary fencing and will have "… a 6-foot-tall chain-link fence, topped with 1 foot of barbed wire for security and safety purposes."

Location of buildings, transmission lines and other structures. Exhibit B page 6 describes two associated building facilities involved in the project: a 150-ft by 150-ft Project Substation and an Operation and Maintenance (O&M) Building.

Exhibit I (the SAR), Section 1.2.3 (page 3) states that "the location of facility buildings, the transmission line, and other structures are presented in Exhibit K Sheets UNB-T-100-1 and UNB-E-500-03." The referenced sheets do show the substation and O&M building locations, as well as the proposed route for the transmission line. However, it may be easier to locate the proposed facilities in Exhibit J (Figures/Maps), Figure 2.10 and Figures 2.5 through 2.8 (Project Layout Maps).

Location and use of access ways, internal roads and railways. Exhibit B of the application (page 5) provides narrative information regarding access roads, noting that:

- "The Project will include approximately 10 miles of graveled access roads that connect the Project facilities to public roads."
- "These roads will be up to 16 feet wide along straight portions of the roads and wider along curves at internal road intersections (approximately 45 feet)."
- "Unbridled has designed access roads for effective and efficient access for O&M and for safe ingress and egress of employees, visitors, and emergency responders."

Within the SAR, Attachment A, Figure 1 (Surrounding Communities Map), provides a fairly clear depiction of the locations of the proposed internal roadways, though the delineation of access points to and from public roadways could be clarified, as noted in a previous section of this report in regard to access control.

Finally, Section 1.2.3 of the SAR (page 3), states that, "the Project will not use railways for any construction or operation activities."

Existing or proposed utilities. Section 1.2.3 of the SAR (page 3) notes that the applicant will construct a 161 kV nonregulated transmission line to the Big Rivers Electric Corporation's Reid Substation about 2 miles east of the project (evaluated separately for the Siting Board).

The same section of the SAR also notes that, "Electric and water/sewer services will likely be required by the O&M building." BBC sought clarification from the applicant regarding which entities would supply the required services.

Compliance with applicable setback requirements. Kentucky statute 278.704(2) states, in part, that "… no construction certificate shall be issued to construct a merchant electric generating facility unless the exhaust stack of the proposed facility and any wind turbine is at least one thousand (1,000) feet from the property boundary of any adjoining property owner and all proposed structures or facilities used for generation of electricity are two thousand (2,000) feet from any residential neighborhood, school, hospital, or nursing home facility."

The site of the proposed project is in both Henderson and Webster Counties and must comply with the setback requirements of the applicable county. In Webster County, there is no planning and zoning commission and no established setback requirements, making the applicable setback requirement KRS 278.706(2)(e) (Section III of Application, page 6). The application notes that there are "no schools, hospitals, or nursing home facilities within 2000 feet of any Webster County structure or facility used for electric generation." (Page 6 and 7 of Application).

Regarding Henderson County, however, Section III of the Application (page 6 of 11) notes that for the portions of the project located in Henderson County, the government requirements come from the Henderson County Zoning Ordinance, which allows substantially smaller distances between the project site and nearby residential neighborhoods than those outlined by KRS 278.704(2):

"The KRS 278.704(3) setback requirements established for the Henderson County portion of the facility site are for Level 3 Solar Energy Systems ("SES") of the Henderson County Zoning Ordinance Art. XXX (see Exhibit E). Section 30.02 of the Zoning Ordinance requires that equipment must be at least 25 feet from the outer property lines of the project area and all SES equipment must be at least 100 feet from any residential structure."

The Application goes on to note that "There are two clusters of residences – one in Henderson County and one in Webster County that arguably could meet the KRS 278.700(6) definition of a residential neighborhood and for which some generation facilities or structures in the Webster County portion of the Project are within 2000 feet of the residences' area. Unbridled will file a separate request for any deviation needed from the 2000-feet setback requirement as to those two clusters of residences." (Page 7).

Exhibit E of the Application reiterates the same information and provides a copy of the Henderson County Zoning Ordinance Article XXX, Solar Energy Systems. The Henderson County ordinance appears to have been finalized on December 23, 2019. The Exhibit also provides the additional information that in the preliminary layout for the proposed project, "the nearest peripheral residences in Henderson County are located from 135 to 200 feet from the closest proposed solar panels, exceeding the requirement of a minimum 100-foot residential buffer." (Exhibit E, page 2).

Of note, the Henderson County Ordinance also describes required fencing, required signage, limitations on "excessive lighting," and requires a vegetation screening plan to be approved by the Henderson City-County Planning Commission. It also requires a decommissioning plan to be filed at the time of development and posting of a Surety Bond to protect the County from abandonment without proper decommissioning of the site.

Evaluation of Noise Levels. Section 4 of the SAR summarizes the findings from the more detailed Noise and Traffic Study (Attachment B to the SAR). Noise levels are discussed in greater depth and detail in a subsequent section of this report (Expected Noise from Construction and Operation).

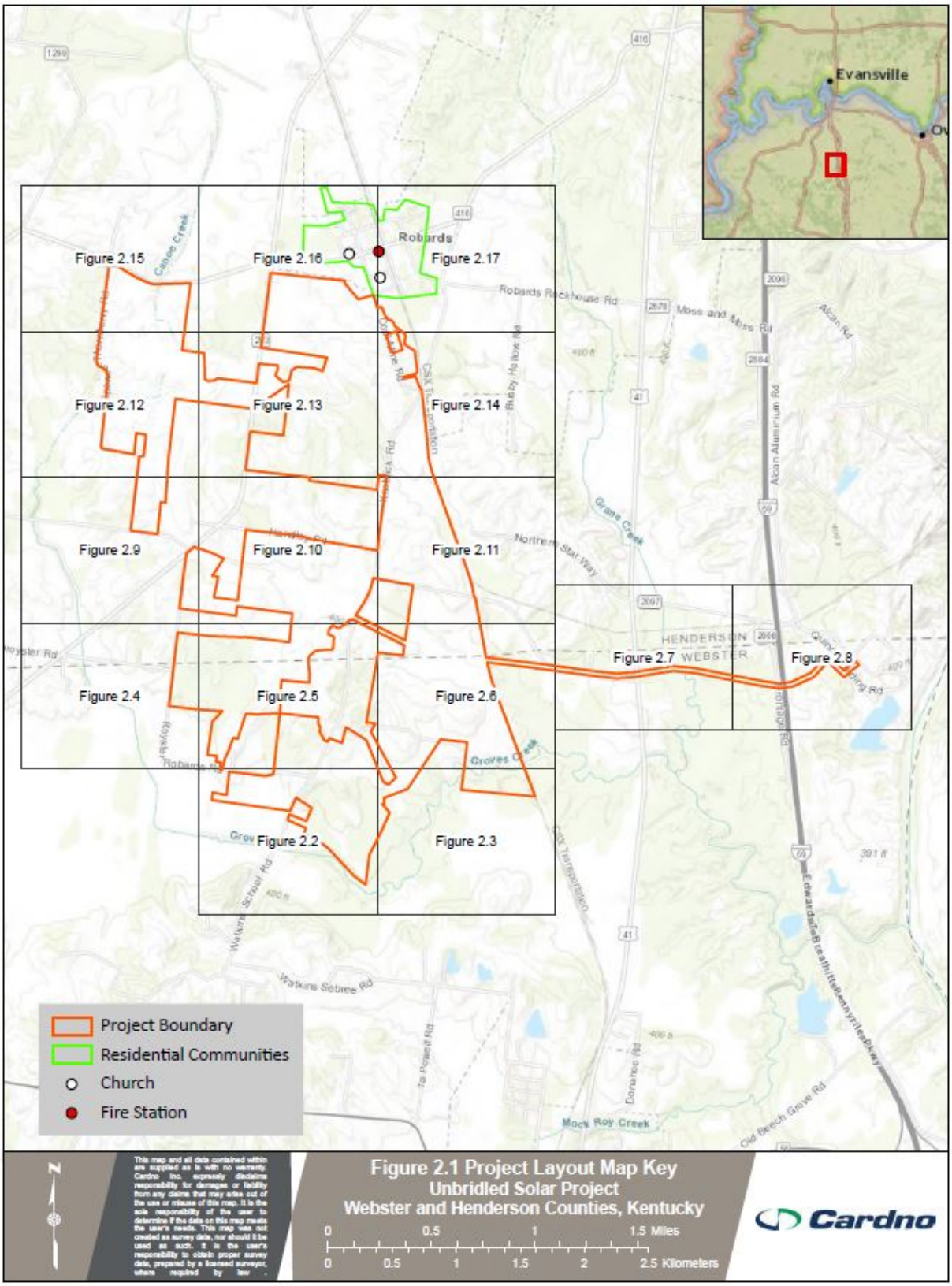
Supplemental Investigations, Research, and Analysis

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

Surrounding land uses. In response to Siting Board staff's and BBC's First Request for Information regarding nearby public or private park land, Unbridled clarified that there are no public or private parks within one mile of the proposed generating facility.

As part of the applicant's response to the First Request for Information, Unbridled provided an amended Exhibit J (Application Figures), including Figure C-3, inserted here, which depicts the single residential community adjacent to the proposed project boundary. Additional discussion of residential communities occurs in a subsequent subsection of this report (Compliance with applicable setback requirements).

Figure C-3, Project Layout Map.



Legal boundaries. In response to the First Request for Information from the Siting Board staff and BBC, Unbridled provided the county parcel numbers for each parcel of leased land and legal descriptions. Unbridled requested confidential treatment of the legal descriptions in their entirety.

Access control. In response to the First Request for Information, Unbridled submitted an amended Exhibit K (Preliminary Site Plan), which was updated to include the locations of the anticipated 15 access points to the project. Access points occur on state and local roads and are distributed across the site and boundary.

Location and use of access ways, internal roads and railways. While the Unbridled SAR initially alluded to two points of access, the amended Exhibit K provided in response to the First Request for Information depicts a total of 15 access points across the proposed project site, as described above regarding access control.

Utilities. In its response to BBC's request for information about the provision of electric and water/sewer services required by the project's O&M building, Unbridled stated that the Henderson County Water Department provides water services in the project area, and that the applicant will install a septic system as sewer services are not available. Unbridled did not indicate which electric utility(ies) would serve the O&M building. Potentially, the electricity required by the O&M building would be supplied by the project itself, but if any electricity is required from external providers, Unbridled should clarify the source.

Compliance with applicable setback requirements. In response to BBC's and Siting Board staff's request for further information and clarification about the two residential clusters (one in Henderson County within the project's 1,000-foot buffer, and the other in Webster County within a 2-mile buffer), Unbridled provided additional information, explaining that the application's initial intent to file a request for a deviation of setback requirements stemmed from "an abundance of caution." The applicant went on to state that, after further review, there are "no residential neighborhoods in either county within 2,000 feet of any of the proposed generating facilities or structures to be located in Webster County. It thus being evident that no deviation is needed from the statutory setback requirement, Unbridled filed a Notice to the Record on December 17, 2020, that it will not be filing a deviation request in this case."

BBC also requested the applicant clarify if it was involved in the development of the Henderson County Zoning Ordinance regarding Solar Energy Systems, which was adopted on December 23, 2019. Unbridled confirmed that it was involved in reviewing the draft ordinance, providing comments at a meeting of the Henderson City-Council Planning Commission, and attending additional related meetings and events in a non-participatory role.

Conclusions and Recommendations

Based upon review of the applicant's Application and 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.

- Additional information provided by the applicant in response to the First Request for Information from Siting Board staff and BBC clarified the legal boundaries of the proposed site and identified 15 anticipated access points to the site during construction.

- Further information provided in response to the First Request for Information from Siting Board staff and BBC clarified that there are no residential neighborhoods within 2000 feet of the proposed generating facilities in Webster County.[2] Consequently, the proposed site plan appears to meet the setback requirements under both the Henderson County Zoning Code and KRS 278.704.

Recommended mitigation. BBC recommends the following mitigation measures in regard to this portion of the Kentucky statutory requirements (KRS 278.708(3)(a)):

- During the construction phase, it is likely that traffic management for up to 15 access points will require extensive coordination and personnel, and that similar heightened attention will be required for security management across access points throughout the operational phase of the project.

- If the applicant will require service from an existing electric utility for their O&M building, they should identify and communicate with that utility.

Compatibility with Scenic Surroundings

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

Potential Issues and Standard Assessment Approaches

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

An example of a visual assessment methodology in use by a state power plant siting agency is the methodology employed by the staff of the California Energy Commission. In California siting assessments, the assessment of potential incompatibility between a project and its scenic

[2] As defined in KRS 278.700(6), a neighborhood consists of an area of five or more acres containing at least one residential structure per acre.

surroundings focuses on project structures, such as smoke stacks. 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. [3]

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

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

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

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. However, the Henderson County Zoning Ordinance related to solar generating systems does contain provision related to reducing visual impacts, stating:

"All Level 3 SES shall be screened with a seven (7) foot tall fence and, to the extent reasonably practicable, a visual buffer that provides reasonable screening to reduce the view of the SES from residential dwelling units on adjacent lots (including those lots located across a public right of way).

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

A vegetation screening plan to reduce the view of the SES from residential dwelling units on adjacent lots will be submitted for approval of the Henderson City-County Planning Commission."[4]

In compliance with KRS 278.708, Section 2 of the SAR summarizes the assessment of compatibility with scenic surroundings. As stated in Section 2.2.1, "Sections of the proposed Project will be adjacent to residential properties."

The applicant has put considerable effort into developing a screening mitigation plan for these properties, noting:

- "Unbridled prepared a screening plan, presented in Exhibit K, Sheet UNB-L-900-01, to mitigate potential visual impacts to the landowners' property."
- "An estimated 41 [vegetation] buffers are planned, each ranging from 15 feet to 5,500 feet in length."
- "Unbridled also prepared visual renderings of the Project with the proposed screening plan that was reviewed by and discussed with the interested landowners."
- "Screening plan agreements with these landowners will be finalized prior to construction."

Screening plans were developed with the assistance of visual simulations from neighboring points of view. These simulations were not included in the SAR or accompanying materials, so BBC made a request for inclusion of the simulations in the Siting Board staff's and BBC's First Request for Information.

Unbridled also prepared a Glare Report (Attachment C to the SAR). Glare modeling by Harris Miller & Hanson, Inc. found that glare from the solar panels would not cause an adverse impact for drivers along Route 416 or Route 283. This result was based on FAA standards for evaluating glare for aircraft approaches and appears to be a conservative result, given that no anti-reflective coating was assumed for the analysis. Exhibit B of the Application states that "To limit light reflection, solar panels are constructed of dark, light-absorbing materials with anti-reflective coatings."

There is no discussion of the project site's topography in either the Application or the SAR.

Supplemental Investigations, Research, and Analysis

Visual assessment. Unbridled's proposed solar generating facility is situated within gently rolling and sparsely populated agricultural land, with denser development immediately to the north in Henderson County (the Town of Robards) and more industrialized, though low density, development adjacent to the southeastern portions of the site (the 4 Star Industrial Park). The majority of the land within the project area has been previously cleared for agricultural use or industrial development, though portions of the leased lands may require clearing for solar panels and other facilities.

[4] Unbridled Solar Application, Exhibit E, Attachment.

In the applicant's response to the First Request for Information, Unbridled provided copies of the visual simulations showing the view of the proposed project site from neighboring properties closely adjacent to the proposed project's northwestern boundaries. Two simulations are inserted here as Figures C-4 and C-5, showing the vegetation screen at the project boundary at the time of installation and then at year 7 of operations.

Figure C-4, Visual Simulation of Vegetation Screen at Installation.

Figure C-5, Visual Simulation of Vegetation Screen at Year 7.

BBC visited the proposed Unbridled project site in February 2021 with Siting Board and Unbridled representatives and Siting Board staff to help assess the project's visual setting.

Figure C-6 looks southeast into the proposed site from near the northwest corner. A residence is behind the camera and a vegetative screen would be planted in this location.

Figure C-6, View Southeast from Nearby Home Adjacent to Northwest Portion of the Project.

In some areas, existing vegetation or topography would screen nearby homes from solar panels and other project features. Figure C-7 shows nearby, but at least partly screened, homes from within the proposed project area.

Figure C-7, Proximate Homes with Existing Screening.

As evident from the maps provided by Unbridled (such as Figure C-1 earlier in this section), the proposed site is complex, with numerous non-participating properties within the overall footprint of the proposed generating facility. Figure C-8 shows one of these properties in the southern portion of the project area.

Figure C-8, Non-participating Property within Overall Project Footprint

Figure C-9 shows the approximate location of the proposed substation and O&M building.

Figure C-9, Substation and O&M Building Location

Figure C-10 shows the approximate location of the construction laydown yard.

Figure C-10, Proposed Laydown Area for Construction

Figure C-11 shows one of the tenants in the 4 Star Industrial Park, just east of the southern portion of the proposed project.

Figure C-11, 4 Star Industrial Park

Conclusions and Recommendations

The proposed Unbridled Solar generating facility would be located in an area of sparsely populated, predominantly agricultural lands with a more densely developed community (the Town of Robards) immediately to the north and existing industrial development to the southeast. The proposed facility is compatible with the scenic surroundings, provided the Applicant follows through with their screening mitigation plan to reduce the visual impact on some of the nearby homes and the Town of Robards.

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

- Unbridled should complete screening plan agreements with nearby homeowners as stated in Section 2.2.1 of the SAR (and described on Section C, page 15 of this report);
- Unbridled should also submit their screening plan for approval of the Henderson City-County Planning Commission, as required under the Henderson County Zoning Ordinance; and
- Unbridled must carry out the screening plan and make sure the proposed new vegetative buffers are successfully established and develop as expected over time.

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 substations—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 value effects 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 to the uses and values of nearby properties would be minimal. 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

Unbridled engaged a real estate valuation advisory firm (CohnReznick, LLP) to examine the proposed project's potential impact on property values.

Attachment D of the applicant's SAR (Property Value Impact Report) provides a paired sales analysis focusing on ten existing solar facilities (two in Florida, three in North Carolina and one each in

Georgia, Indiana, Minnesota, Michigan and Virginia.) In total, sales of 36 properties adjacent to these facilities were compared to 222 sales of similar properties in the same real estate markets that were not located adjacent to a solar facility.

The study also included examination of three "before and after analyses" which compared "sales of adjoining properties prior to the announcement of the solar farm to sales of adjoining properties after announcement and subsequent development of the solar farm" (SAR Attachment D, page 24).

All existing solar facilities included in the analysis were smaller than the proposed 160 MW Unbridled facility, though two of them (one in Georgia and one in Minnesota) were 100 MW or larger. The study found "no measurable and consistent difference in property values" for properties adjacent to solar facilities. (SAR Attachment D, page 4)

Those statistical findings were further supported by interviews with local real estate brokers who indicated "no difference in price, marketing periods or demand for homes directly adjacent to the solar farm facilities." Other support for these findings included interviews with "County and Township Assessors (with solar facilities in their districts)" and review of studies by "other real estate valuation experts that specifically analyzed the impacts of solar facilities on nearby property values."

Supplemental Investigations, Research, and Analysis

To obtain further perspective regarding potential effects on property values, BBC reviewed recent studies and articles related to potential concerns regarding solar facility effects on nearby property values.

In some cases, recent proposals to construct large scale commercial solar projects have met with substantial public opposition. Notable examples include the proposed 500 MW facility at Fawn Lake, in Spotsylvania County, Virginia and the proposed 120 MW facility in Madison County, Indiana.[5] Although concerns regarding nearby property values have been one of the issues raised by opponents of these projects, no data or analysis has been provided to substantiate that concern. The opposition may be more related to change in character of the land use (e.g., from agriculture to what some perceive as an industrial use) than to actual effects on property values.

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

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

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

- "However, some respondents did estimate a negative impact on home prices associated with solar installations." In the 23 percent of cases where are negative value was estimated, the negative effect was estimated to increase with closer proximity and larger scale solar installations. Respondents who had actual experience in assessing homes near solar installations estimated a 3 percent decline in value for home within 100 feet of a 20 MW solar installations and a 5 percent decline in value for homes within 100 feet of a 102 MW solar facility.
- "The results also suggest that experience assessing near a solar installation is associated with a much less negative estimate of impact."[6]

Most recently, a 2020 study published by economists from the University of Rhode Island using the hedonic pricing analysis approach described earlier identified statistically significant negative impacts on home prices due to proximity to commercial solar sites—under certain conditions. The study, based on "over 400,000 transactions within three miles of a solar site", found that property values within one mile of a solar facility declined by 1.7 percent, with larger effects on home values within 0.1 miles (500 feet) of a solar site (-7.0 percent). However, these findings were specific to solar sites in suburban areas. Solar sites in industrial or rural areas[7] had no statistically significant impact on home prices.[8]

Conclusions and Recommendations

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

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

To date, few studies have been conducted by academic researchers or other "third-party" analysts. Using different methods, and different data sources, recent studies by professors at the LBJ School of Public Affairs (University of Texas) and the University of Rhode Island have found that there could be

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[6] *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.

[7] In the study by Guar and Lang cited below, "rural" is defined as areas with municipal population density of less than 850 people per square mile. The nearest municipality to the proposed Unbridled Solar generation facility is the Town of Robards, which has a population density of less than 200 people per square mile.

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

small, negative impacts on property values from proximity to commercial solar facilities. However, those negative effects appear to be more likely in suburban settings, rather than rural settings.

Given the setting for the proposed Unbridled solar facility, we conclude that the proposed solar facility is unlikely to have adverse impacts on nearby residential property values. While no studies to date have focused on industrial property values near solar facilities, property values for this type of land use are usually based on proximity and access to transportation and other factors affecting the profitability of the land use. Industrial property values are very unlikely to be affected by proximity to a commercial solar facility.

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

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 Unbridled generating facility. This component of the SAR is identified in KRS 278.708(3)(d).

Potential Issues and Standard Assessment Approaches

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

A standard noise impact assessment focuses on several key factors:

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

Information Provided in the Applicant's SAR

Section 4 of the SAR summarizes the findings from the Noise and Traffic Study (Attachment B to the SAR). The application summarizes noise impacts during the construction phase:

- "Sound generated during construction is expected to only occur during daylight hours" (Exhibit I, page 8)

- "Because of the size of the Project and the distance to the nearest receptors, construction will not contribute to a significant sound increase when compared to sound currently occurring onsite (i.e., the operation of farming and crop harvesting equipment) and baseline ambient sound levels."

- The Noise and Traffic study does highlight the sound that will occur during construction from the pile drivers which drive the rack support foundations. This sound will be loud, estimated at 101 dBA at 50 feet (Table 2).

These last two points are in contradiction, as the noise from the pile drivers would be substantially louder than typical farm and harvesting equipment. However, the applicant notes that pile driving is only expected to occur for "up to 8 weeks across the entire Project."

The noise assessment for the project's operational phase focuses primarily on the tracking motors and inverters, as well as noise emitted from the substation:

- "The estimated sound produced by the loudest tracking motor option will be approximately 48 A-weighted decibels (dBA) at 100 feet, and sound produced by the loudest inverter option will be approximately 53 dBA at 100 feet. The nearest sensitive sound receptors will be 100 feet from solar panels and 200 feet from inverters. At this distance, the sound from Project operation will be quieter than an air conditioning unit and close to the sound generated by light traffic."

- Sound from the electrical transformers in the project substation will be a "humming or buzzing." Estimated sound levels 200 feet from the substation will be 46 dBA, but the nearest receptor will be approximately 800 feet away.

The more detailed Noise and Traffic Study (Attachment B to the SAR) provides further information, including tables showing the estimated volume of noise from the tracking motors and inverters at various distances:

- At 100 feet (distance to the nearest home), the tracking motors are projected to produce between 24 and 48 dBA (depending on the manufacturer), which is quieter than light traffic at 100 feet (per Table 3 and Table 1 of the study).

- At 200 feet (distance to nearest home), the inverters are projected to produce between 42 and 47 dBA, again quieter than light traffic at 100 feet (per Table 2 and Table 1 of the study).

Supplemental Investigations, Research, and Analysis

BBC researched sound attenuation principles and the logarithmic dBA scale to understand the impacts to neighboring residences from construction and operations noise. The impact to nearby residences is a particularly important consideration in Henderson County, where the local zoning ordinance requires that SES equipment be installed at least 100 feet from residential structures.

Across an open area with neither reflective surfaces nor absorbent barriers, sound attenuates at approximately 6 dB for every doubling of distance and can be estimated using the inverse square law.[9] At 100 feet (closest residence), BBC estimates that sound from the pile drivers during the project's construction phase will be approximately 95 dBA, or roughly as loud as a subway train or a motorcycle engine.

The CDC estimates that sound at 95 dBA can potentially damage hearing after about 50 minutes of exposure,[10] and a 95 dBA sound is 10 times louder than the National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit of 85 dBA (note that decibels are measured on a logarithmic scale).[11]

Conclusions and Recommendations

The sounds emitted during the operation of the proposed solar facility (from tracking motors, inverters and the proposed substation) will likely be 52 dBA (comparable to the sound of light traffic) or less at the closest home and even less for most of the homes adjacent to the proposed facility. These noise levels are similar to existing conditions and are unlikely to be annoying to local residents.

While noise levels similar to existing conditions also applies to most of the construction activity, the pneumatic pile drivers are an important exception. The noise from the pile drivers will be substantial for residences even further than 100 feet from the solar arrays. Based on sound attenuation estimates across open space, a residence would need to be at least 400 feet from the nearest pile driver in order to experience a sound of 83 dBA, just below the NIOSH recommended exposure limit.

Recommended mitigation. In Exhibit I (the SAR), Section 6.2 (page 11), the applicant states:

"Unbridled will remain in contact with nearby residents about any complaints related to noise levels and to ensure that noise levels are not unduly high once the pounding and placement of the solar panel racking begins. Any noise generator that creates noise levels in excess of 120 decibels at the property boundary will be considered unduly high."

However, the applicant does not supply reasoning for establishing 120 dBA as the threshold for "unduly high." The American Speech Language Hearing Association classifies 120 dBA as a dangerous

[9] Estimating Sound Levels with the Inverse Square Law. Georgia State University. http://hyperphysics.phy-astr.gsu.edu/hbase/Acoustic/isprob2.html

[10] Loud Noise Can Cause Hearing Loss. Centers for Disease Control and Prevention. https://www.cdc.gov/nceh/hearing_loss/what_noises_cause_hearing_loss.html

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

noise that is "not safe for any period of time."[12] Additionally, Attachment B of the SAR (Noise and Traffic Study) does not make any reference to what level of noise should be considered unduly high.

BBC recommends that Unbridled should clarify precisely where and when pile driving will occur across the site and consider the distances to each home within 500 feet of this activity to appropriately mitigate hazardous or annoying noise as necessary. Further:

- Unbridled should contact homes within 500 feet of any pile driving activity and notify them in advance of the upcoming activity, its timing and anticipated duration, rather than waiting for complaints from those residents. It should also provide the opportunity for residents to ask questions or provide feedback, if desired.

- Unbridled should respond to any noise-related complaints from residents adjacent to the project boundary, and work with those residents to reduce noise-related concerns through careful scheduling or other means to the extent feasible.

Impacts on Transportation

This portion of the SAR review examines the impacts of the proposed Unbridled generating 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.

[12] Loud Noise Dangers. American Speech Language Hearing Association. https://www.asha.org/public/hearing/loud-noise-dangers/

Information Provided in the Applicant's SAR

The Noise and Traffic Study (Attachment B to the SAR) describes the existing road network near the project site and current traffic levels.

The primary roads near the site are KY-416 and KY-283. Both roads are very lightly travelled, with average daily traffic (ADT) of between 261 and 800 vehicles per day. The Watkins School Road, also near the site, has even less traffic – 145 vehicles per day.

Construction of the project will produce a "temporary increase in traffic volume associated with travel of construction laborers, delivery of construction equipment and materials, and delivery of solar panel components and equipment …" (Noise and Traffic Study, page 10)

More specifically, an average of 75 to 100 employee vehicles are expected per day, along with 10 to 20 semitrucks per day, during construction. The study notes that "increased traffic may be perceptible to area residents", which appears likely given the low volume of traffic currently occurring. The study also states, however, that the "…slight increase in volume is not expected to affect traffic function." The study does note that "Slow-moving construction vehicles may also cause delays on smaller roads."

The study states that "Overweight or oversize loads are unlikely" and "No damages to the existing roadway infrastructure are anticipated" (Attachment B, page 11). However, the application and exhibits do not supply details about the total vehicle or load weights that are expected to arrive on site during the construction phase.

The study further states that "Appropriate signage and traffic directing will occur as necessary to increase driver safety and reduce risk of collisions for approaching traffic." (Page 11.)

In terms of ongoing operations and maintenance, the study states "After construction is complete, traffic impacts during the operations phase of the Project will be negligible." (Page 11)

Supplemental Investigations, Research, and Analysis

BBC conducted further research on the weight limits and vehicle classes permitted to travel on specific roadways in Kentucky. The primary roads located near the proposed project site (SR 416 and SR 283) are rated at 44,000 pounds (KYTC). Any vehicle loads exceeding this limit could subject the roadway and shoulder to damage or degradation. Additionally, potential routes to the site may also include local county roads, which could be susceptible to degradation from heavy loads.

In Unbridled's Supplement to Response to the First Request for Information, the applicant states that the two Main Power Transformers (MPTs) will be the largest deliveries to site, and will each weigh between 250,000 and 450,000 lbs. A 2012 publication on Large Power Transformers (LPTs) by the U.S. Department of Energy states:

"Transporting an LPT is challenging – its large dimensions and heavy weight pose unique requirements to ensure safe and efficient transportation… When an LPT is transported on the road, it requires obtaining special permits and routes from the department of transportation of each state on the route of the LPT being transported. According to an industry source, obtaining these special

permits can require an inspection of various infrastructure (e.g., bridges), which can add delay. In addition, transporting LPTs on the road can require temporary road closures due to traffic issues, as well as a number of crew and police officers to coordinate logistics and redirect traffic."

BBC contacted the Kentucky Transportation Cabinet's Department of Overweight/Over-dimensional Vehicles regarding their permitting process. As a result of conversations with department representatives, BBC then utilized the KYTC Route Evaluation online tool to ascertain potential route restrictions for oversized deliveries. Using approximate dimensions for the delivery of a large power transformer of 125 to 225 tons, the BBC team input information for several sample configurations into the KYTC Route Evaluation tool and found that there could be problems with clearances that may make permit approval difficult for Unbridled, depending on the exact dimensions of the MPTs during transport.

Additionally, local roads that are not state routes are not covered by KYTC permits and approval must instead go through the appropriate county entity. BBC attempted to contact both the Henderson County and Webster County road departments to discuss the potential overweight/over-dimensional delivery of the LPTs, and was able to discuss this issue with the Webster County Road Department Supervisor. He indicated that he was aware of the proposed Unbridled project. At present, there is no permitting process and no permit required in Webster County, but they are currently considering establishing such a process. The Department Supervisor noted that the county is experiencing a fair amount of damage to local roads from logging trucks, for example – and the freeze/thaw cycles are making the damage worse. The road department would like to be able to recoup some of the road repair costs from the companies contributing to the damage. Such an order would have to go through the Webster County court.[13]

Conclusions and Recommendations

During construction, the traffic associated with the arrival and departure of construction workers and the delivery of materials and equipment to the site would have a noticeable effect on local traffic, particularly given the low levels of current traffic activity in proximity to the site and the large number of proposed access points to the site (15).

The delivery of the two MPTs to the site is likely to be challenging, and has the potential to damage local roads or require reinforcement or other special measures.

During facility operations, the proposed Unbridled solar facility would have little or no perceptible effect on local traffic or local roads.

Recommended mitigation.

- Unbridled should contact the Kentucky Transportation Cabinet as soon as feasible to discuss the transportation requirements and the KYTC's restrictions on SR 283 and SR 416. If the route requires on-site assessment by KYTC before approval and permitting, Unbridled should allow as much time as possible for that process to occur.

[13] Personal communication with Rob Mooney, Webster County Road Department Supervisor. March 8, 2021.

- Unbridled should contact the road departments of Henderson and Webster Counties as soon as feasible. Any overweight or overdimensional loads on local roads should be approved by the relevant county, and it is likely that county roads could be more vulnerable to damage or degradation than state routes.

- Unbridled should develop a detailed and site-tailored traffic management plan for the construction phase as soon as feasible. Given the number of access points to the site (15) as shown in the applicant's amended Exhibit K, it is likely that the site will require extensive signage and coordination of traffic management personnel during construction activity.

BBC RESEARCH & CONSULTING

Evaluation of Proposed Unregulated Transmission Line for Unbridled Solar Generating Project

FINAL REPORT

Final Report

March 16, 2021

Evaluation of Proposed Unregulated Transmission Line for Unbridled Solar Generating Project

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SECTION A.

Background and General Statement

SECTION A.
Background and General Statement

On December 8, 2020, Unbridled Solar LLC (Unbridled Solar) filed an application with the Kentucky State Board of Generation and Transmission Siting (Siting Board) to construct a 160-Megawatt merchant solar electric generating facility and non-regulated transmission line in Henderson and Webster counties. Under Kentucky statutes, the merchant generating facility and the non-regulated transmission line are evaluated separately by the Siting Board and are subject to different evaluation requirements. This report examines the siting of the non-regulated transmission line. A separate report evaluates the siting of the proposed generating facility.

Statutory Requirements

Kentucky Revised Statute (KRS) 278.700 *et seq.* (the Act), was passed by the General Assembly of the Commonwealth of Kentucky in 2002. The part of the Act entitled "Electric Generation and Transmission Siting" defined a class of merchant power plants and required them to obtain construction certificates as a prerequisite to the commencement of actual construction activity. Those statutes also created the Siting Board and gave it the authority to grant or deny construction certificates requested by individual applicants. The Siting Board is attached to the Kentucky Public Service Commission (PSC) for administrative purposes.

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

- The applicant files for a construction certificate and pays the fees. KRS 278.706.
- The applicant submits required items, including an Application and a Site Assessment Report (SAR). KRS 278.706 & KRS 278.708.
- If it wishes, the Siting 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 Siting Board can meet its own statutory decision deadline — 120 days or 180 days from receipt of an administratively complete application, depending upon whether the Siting Board will hold a hearing. KRS 278.710.

Specific to non-regulated transmission lines, KRS 278.714(2)(b) – (d) require that the applicant's site assessment report (SAR) include:

- *(2)(b). 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

- *(2)(c). With respect to electric transmission lines, a full description of the proposed line and appurtenances, including the following:*

  1. Initial and design voltages and capacities;

  2. Length of line;

  3. Terminal points; and

  4. Substation connections;

- *(2)(d). A statement that the proposed electric transmission line and appurtenances will be constructed and maintained in accordance with accepted engineering practices and the National Electric Safety Code*

KRS 278.714 (3) helps frame the decision to be made by the Siting Board for proposed non-regulated transmission lines:

- *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.*

Scenic Impact Assessment Overview

As indicated in KRS 278.714 (3) cited above, a key focus of the Siting Board review for non-regulated transmission lines is the potential impact on scenic assets, which can also be described as a scenic or visual impact assessment. 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.

A standard visual impact assessment 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 in the general viewshed vicinity of the project's structures or emissions.

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

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

Each framework, in its own way, embodies explicit or implicit consideration of some or all of the standard measures of visual impact: viewer exposure and sensitivity; relative project size, quality, visibility, exposure, contrast and dominance; and prevailing environmental characteristics, such as season and light conditions.[1] Local regulations especially focus on screening of facilities from public view[2] and the effects of glare from outdoor lighting upon adjacent property.[3]

Given the increasing development of renewable energy sources, and corresponding need to supplement the existing transmission system to accommodate generation from those sources, the potential visual impacts of transmission lines, and potential ways to mitigate those visual impacts have been examined in some detail. *Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands*, a 2013 report produced by the Department of Interior's Bureau of Land Management, discusses a number of potential

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[1] See California Energy Commission, op cit.; U.S. Forest Service. Landscape Aesthetics: A Handbook for Scenery Management. Agriculture Handbook Number 701. 1995; U.S Bureau of Land Management. Visual Resource Inventory. BLM Handbook H-8410-1; and U.S. Bureau of Land Management. Visual Resource Contrast Rating. BLM Handbook H-8431-1.

[2] Douglas County (Washington) Code, Chapter 18.80 - Conditional Use.

[3] Georgia Department of Community Affairs. Model Code: Alternatives to Conventional Zoning, Performance Standards for Off-Site Impacts [online]. April 2002.

strategies to reduce the visual impacts of transmission lines. Given the differences in the surrounding landscape between the generally little developed, and sometimes treeless Western lands administered by the BLM and the more developed and forested setting in Kentucky, not all of the recommended BMP's in the BLM report are applicable.

For the proposed non-regulated Unbridled Solar transmission line, the project features under consideration for scenic compatibility include the proposed towers to support the transmission line, the approximately 3.15-mile route of the transmission line from the expected substation location within the proposed Unbridled Solar generating facility to the terminus at the Big Rivers Electric Corporation's (BREC's) existing Reid Substation, and the cleared right of way for the transmission line.

Prior Non-regulated Transmission Line Reviews for the Siting Board

Subsequent to the implementation of KRS 278.714 in April 2002, the Siting Board has reviewed four prior applications for construction of non-regulated transmission lines in the Commonwealth. In two of those instances (the proposed ecoPower facility in 2009 and the proposed SunCoke facility in 2014), the transmission line review was integrated into the evaluation of the proposed generating facility and was more summary in nature. The other two instances were non-regulated transmission lines that were not associated with proposed merchant generating facilities. In those cases, a more detailed evaluation of the proposed transmission line was developed for the Siting Board. At the outset of the Unbridled Generation evaluation, PSC staff directed BBC Research & Consulting (BBC) to prepare separate reports for the proposed generating facility and the proposed transmission line.

In 2004, the Siting Board reviewed and approved an application by the Cincinnati Gas & Electric Company (CG&E) to construct a 138 kV transmission line to the Silver Grove Substation in Melbourne, Kentucky. The CG&E application included a total of 4.9 miles of transmission line located in Kentucky. The CG&E line involved an Ohio River crossing requiring large transmission towers. A study on behalf of the Siting Board conducted by MACTEC Engineering and Consulting, Inc. concluded that "No adverse visual impact is anticipated because of the proposed electrical transmission line project."

In 2010, the Siting Board reviewed and approved an application by Vectren Energy Delivery of Indiana (Vectren) to construct a 345 kV transmission line between the A.B. Brown Power Plant near Evansville, Indiana and the BREC substation south of Henderson, Kentucky (the same location proposed to be the terminus for the Unbridled Solar transmission line.) While a portion of the Vectren transmission line was to be constructed in Indiana, completion of the line required Siting Board approval of approximately 15 miles of the line located in Henderson County and Webster County, Kentucky. During the Siting Board review process, a conflict was identified between Vectren's proposed location for a key tower on the Kentucky side of the Ohio River and the location proposed for expansion of the water treatment plant serving the City of Henderson. Vectren modified their proposed route and their revised route was reviewed and approved by the Siting Board.

BBC evaluated the proposed Vectren line on behalf of the Siting Board and noted that the visual impact from Vectren's originally preferred option "would not be particularly significant due to

effects of the distance to the crossing from the Henderson waterfront, the dense vegetation along the shorelines and on Henderson Island, and the meandering geography of the shoreline, among other factors." BBC then noted that "the visual impact of the revised route will be further reduced by the route modifications. Vectren's revised route is a reasonable alignment for the proposed transmission line that will not result in significant degradation of scenic factors in Kentucky."

The primary focus of the Vectren transmission line review was on the Ohio River crossing which required towers up to 300-feet tall and would be visible from some portions of the City of Henderson. The Vectren review also considered the portion of the line which travelled through southern Henderson County and northern Webster County – the same general area that would be traversed by the proposed Unbridled Solar transmission line. The report noted "the revised route, like the previously proposed Route C, passes primarily through agricultural fields and industrial areas of Henderson. The changes to the viewshed from placing a transmission line in this area would be compatible with existing visual characteristics of the area." It should be noted, however, that the most of the route of the Vectren line from the southwestern edge of the City of Henderson through the Town of Robards and then southeast to the BREC substation abutted the right of way for an existing, smaller (161 kV) transmission line.

Review and Evaluation Methodology

BBC undertook the following tasks to review Unbridled Solar's proposed transmission line and complete this report:

- Examined prior non-regulated transmission line reviews prepared for the Siting Board, including reviews of the proposed CG&E line in 2005 and the proposed Vectren line in 2010;
- Reviewed the contents of Unbridled Solar's SAR and Application;
- Identified additional information we considered useful for a thorough review, and submitted questions to the applicant;
- Conducted the required site visit, including obtaining oral and written information from the applicant, on February 19, 2021;
- Completed interviews and data collection with outside sources as sourced in this document; and
- Compiled and incorporated all of the foregoing in our analysis.

Report Format

This report is structured to be responsive to KRS 278 and BBC's contract. It begins with this general statement and background that introduces the review. In Section B of the report, we examine and describe available information relevant to the statutory review requirements. Section C offers detailed findings and conclusions of the study, and BBC's recommendations concerning mitigation measures and future Siting Board actions.

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

At this point in the planning process, Unbridled Solar has not finalized the exact location of the transmission line and supporting structures (as described in Section B). This review is based on the best available information at this time.

SECTION B.

Summary of Information from Unbridled Solar and Other Sources

SECTION B.
Summary of Information from Unbridled Solar and Other Sources

As is common in the cases that come before the Siting Board, Unbridled Solar has submitted a substantial amount of information in response to the statutory requirements regarding merchant generating facilities and transmission lines. This section summarizes information relevant to the Siting Board's review of the non-regulated transmission line provided by Unbridled Solar and relevant information obtained from other sources.

Unbridled Response to Statutory Requirements

Kentucky Revised Statute (KRS) 278.714(2)(b) requires *"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;*

   The location of the proposed Unbridled Solar transmission line is shown in numerous figures in the Application and the SAR submitted by Unbridled Solar. The clearest depiction of the surrounding context is in the figures superimposed on aerial photographs in Exhibit J – Application Figures, particularly Figures 2.6, 2.7 and 2.8.

   The Amended Exhibit K provided with Unbridled Solar's responses to the first set of questions provided by PSC staff and BBC includes sheet number UNB-T-100-01, labelled "Overall Transmission Line Route Map." The map shows the route of the proposed line with symbols indicating locations of transmission line poles. At this point in time, BBC assumes the locations of the poles are approximate, pending actual construction conditions. Exhibit C to Unbridled Solar's Application states the poles would be" steel monopoles, 70 to 90 feet tall, spaced 300 to 500 feet apart."[1] (Ex. C, page 1)

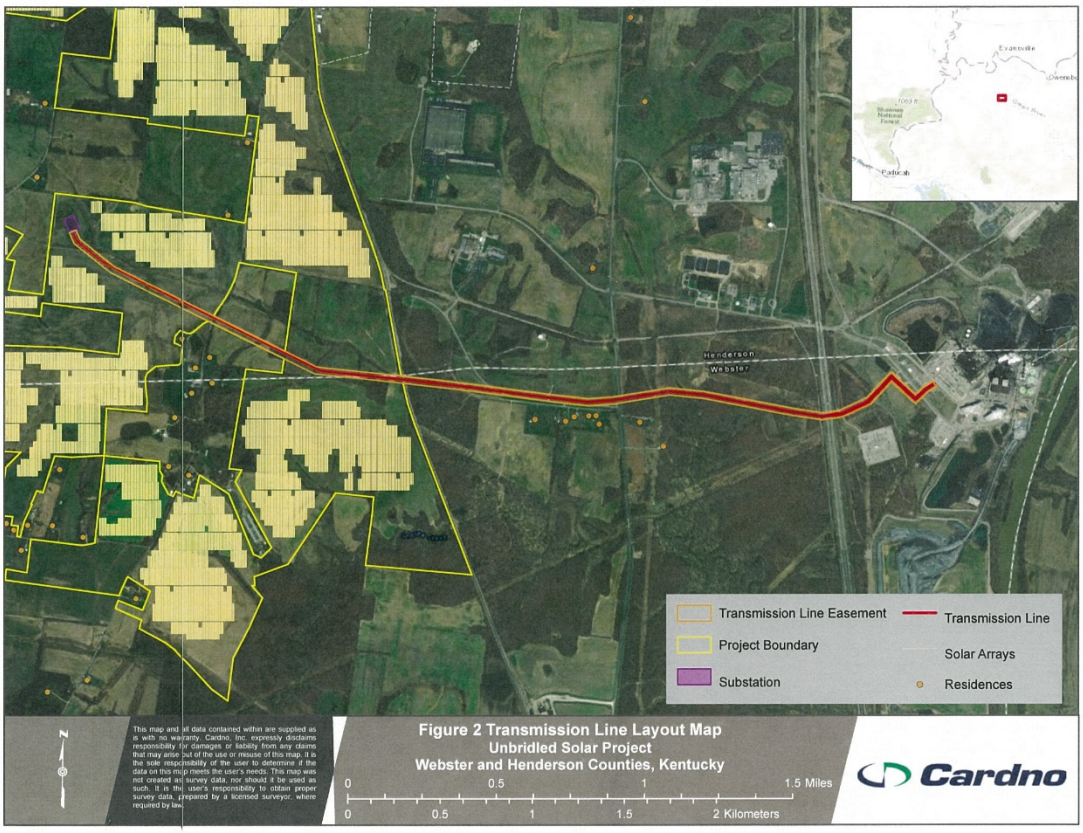
   It is important to note that the proponent has requested permission to deviate from the proposed line location by up to 500 feet.[2]

   Figure 1, on the following page, is a copy of Figure 2 in Attachment A of Unbridled Solar's SAR and shows the full route of the proposed transmission line.

[1] Unbridled Solar Application, Exhibit C, page 1.

[2] Unbridled Solar Application, Page 10.

Figure 1. Map of Transmission Line Route from Unbridled Solar SAR



2. *The proposed right-of-way limits;*

   The Overall Transmission Line Route Map referenced on the previous page also shows the proposed easement around the transmission line. Page 9 of the application indicates a proposed 125-foot-wide right of way.

3. *Existing property lines and the names of persons who own the property over which the line or pipeline will cross;*

   Amended Exhibit J – Figures (provided in response to PSC/BBC initial questions) shows the properties over which the line would cross, and a key indicating the names (redacted) and the parcel IDs for those properties. See Figure 3C: Corridor Property Owners. In total, the line would cross 10 "leased properties" between the generating project boundary and the BREC Reid Substation.

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;*

   There are no residential neighborhoods[3] within one mile of the proposed transmission line. Figure 2.7 Project Layout Map in Amended Exhibit J Figures does identify six more widely dispersed residences just west of US Highway 41 N that are located between approximately 250 feet and 500 feet from the proposed line along about a one-quarter mile length of the line. There are also no schools, public or private parks within one mile of the proposed transmission line.[4]

KRS 278.714(2)(c) requires:

With respect to electric transmission lines, a full description of the proposed line and appurtenances, including the following:

1. *Initial and design voltages and capacities;*

   The proposed line would be a 161 kV transmission line.[5]

2. *Length of line;*

   The proposed line would be approximately 3.15 miles long from the proposed Unbridled Solar generating project substation to the existing Reid Substation at the BREC plant.[6] Approximately one mile of the 3.15-mile route would be within the footprint of the proposed Unbridled Solar generating facility.[7]

3. *Terminal points;*

   As noted above, the line would connect a new substation proposed to be constructed as part of the Unbridled Solar generating facility and the existing Reid Substation.

4. *Substation connections;*

   See above.

[3] As defined by KRS 278.700(6), a residential neighborhood is a populated area of five or more acres containing at last one residential structure per acre.

[4] Unbridled Solar response to BBC question 8, February 2, 2021.

[5] Unbridled Solar Application, Exhibit C, page 1.

[6] Ibid.

[7] BBC estimate based on figures provided by Unbridled Solar.

KRS 278.714(2)(d) requires:

> *A statement that the proposed electric transmission line and appurtenances will be constructed and maintained in accordance with accepted engineering practices and the National Electric Safety Code.*
>
> In Unbridled Solar's Application, Exhibit C, page 2, the applicant states: *The proposed transmission line and its appurtenances will be constructed and maintained in accordance with accepted engineering practices and the National Electric Safety Code.*
>
> This statement is reiterated in the attachment at the end of Exhibit C, which is a signed and notarized statement of certification by Nathan Franzen, Vice President of National Grid Renewables, the parent company of Unbridled Solar.

Route Selection and Proposed Transmission Route

Page 2 of Exhibit C to Unbridled Solar's Application and Page 10 of the Application itself discuss the selection of the proposed route. Unbridled states that it considered alternative routes, and specifically considered interconnecting at the existing Reid to Hopkins 161 kV transmission line located about one mile southeast of the proposed solar generating plant boundary. However, Unbridled encountered resistance from some of the landowners whose property would have been crossed by that route.

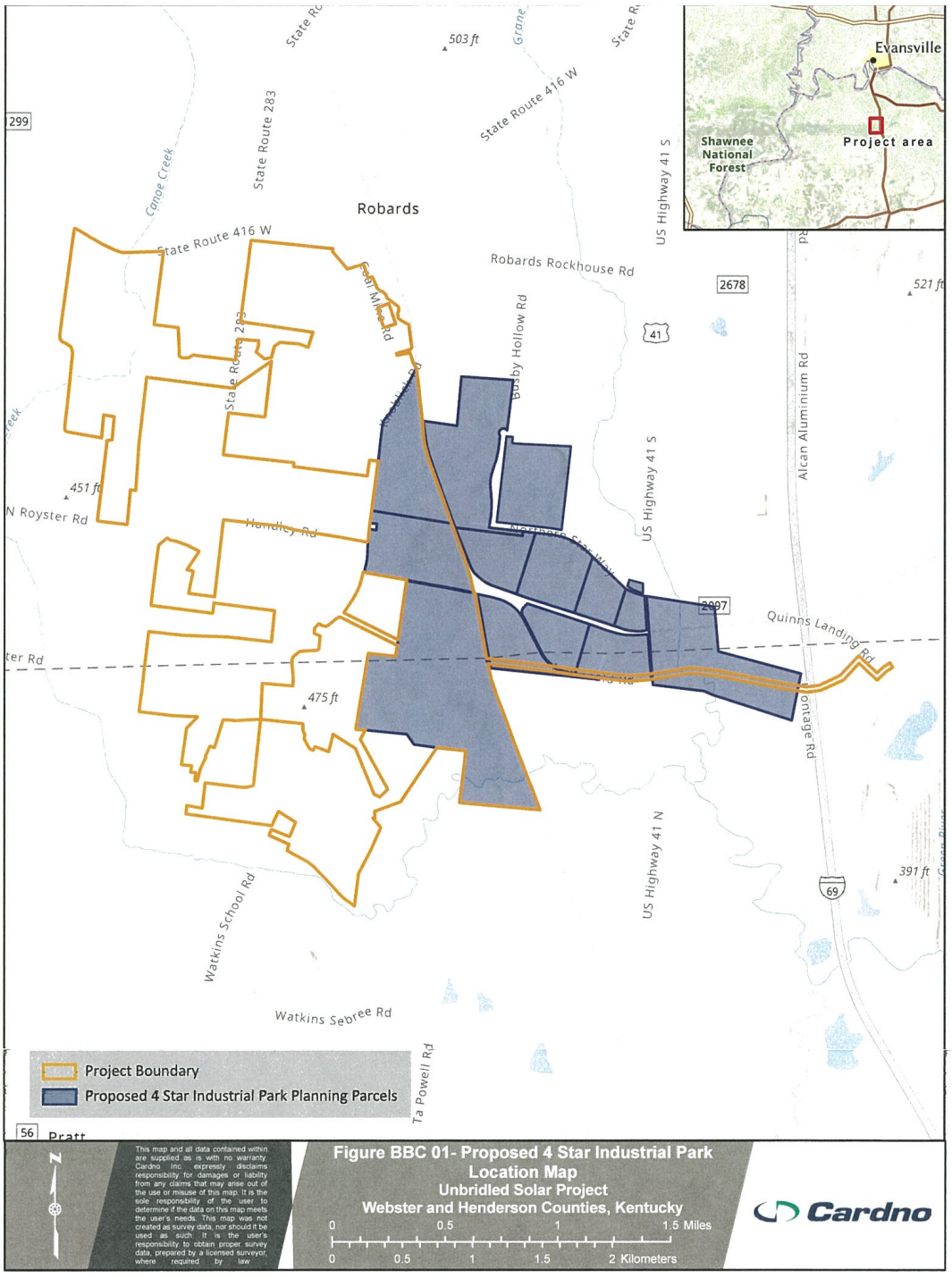
The route selected by Unbridled Solar is "the most direct path from the Project to the Reid Substation."[8] The applicant also states that they "designed the proposed transmission line route to minimize impacts to existing infrastructure, such as transmission lines, pipelines, railways and roadways …" and that they "conducted surveys of environmental and sensitive features and sited the transmission line to minimize impacts to these features."[9]

Nearly all of the selected route from the eastern edge of the proposed Unbridled Solar generating facility to the terminus at the Reid Substation is located on lands proposed for industrial use that lie within the Proposed 4 Star Industrial Park Planning Parcels, as shown in Figure 2 (copied from Unbridled Solar's responses to questions posed the Public Service Commission staff and BBC on behalf of the Siting Board).

[8] Unbridled Solar Application, Exhibit C, page 2.

[9] Ibid.

Figure 2. 4 Star Industrial Park Parcels in Relation to Proposed Unbridled Solar Generating Facility and Transmission Line



The route selection process described in Unbridled Solar's Application was relatively simple compared to the more complex GIS-based route optimization models that have been used in siting some previous transmission lines, such as the Vectren line reviewed by the Siting Board in 2010.[10] However, in this instance the proposed transmission line is very short and, as noted above, follows the most direct path from the proposed substation within the Unbridled Solar generating facility to the Reid Substation at BREC. Any alternative (except for the connection to the existing Reid to Hopkins line mentioned previously, which was ruled out because of landowner opposition) would likely have been longer and potentially more impactful.

Site Visit

On February 19, 2021 representatives from BBC, the Siting Board, and PSC staff visited the proposed sites for Unbridled Solar's generating facility and transmission line. The site visit served to confirm information previously provided by Unbridled Solar in their Application and SAR, and to help put that information in context for their reviewers.

Figure 3 shows the approximate location of the proposed substation within the Unbridled Solar generating facility, viewed to the southeast from Handley Road. The proposed transmission line would cross the field of view from right to left, nearly parallel with the road.

[10] Discussed in previous section.

Figure 3. Approximate Location for Proposed Unbridled Solar Substation and Operation and Maintenance Facility

The photograph shown in Figure 4, on the next page, was taken from a little south of the proposed transmission line route near the eastern edge of the proposed generating facility. Electric transmission and distribution lines are not an uncommon site in this area.

Figure 4. Existing Transmission and Distribution Lines Near Proposed Transmission Route

As noted earlier in regard to KRS 278.714(2)(b)4.a. (on page B4), there are six residences located within 500 feet south of the proposed transmission line along a quarter mile stretch between the eastern edge of the proposed Unbridled Solar generating facility and the terminus of the line at the Reid Substation. Figure 5 shows some of these homes. The proposed transmission line would be on the other side of the road from which this picture was taken (more distant from the homes).

The existing electric distribution line shown in the foreground is likely about 40-feet tall, approximately one-half the anticipated height of the poles supporting the proposed Unbridled Solar transmission line. However, the transmission line would be more distant from these homes.

Figure 5. Proximate Home South of Proposed Transmission Line

After the proposed transmission line passes to the east of the group of relatively nearby homes shown in the preceding figure, it would continue to pass through the 4 Star Industrial Park. Figure 6 shows one of the existing tenants within the industrial park in this general area.

Figure 6. Tenant in 4 Star Industrial Park

The last portion of the transmission line (from west to east) would cross Interstate Highway 69 and then connect to the BREC's Reid substation. The substation is visible in Figure 7, below the steam plume closer to the center of the photograph.

Figure 7. Terminus at Big Rivers Electric Corporation's Reid Substation

SECTION C.

Findings, Conclusions and Recommendations

SECTION C.
Findings and Conclusions

Access to the transmission system is an obvious requirement for commercial solar generating facilities. Often, as in the previously completed Siting Board reviews of the proposed Turkey Creek and Glover Creek solar facilities, the solar developer can access the system within the footprint of the proposed solar generating facility and a separate review of the proposed transmission line is not required. In the case of the proposed Unbridled Solar generating facility, internal access to the "grid" was not possible, and a short, new transmission line was required to reach the nearby BREC's Reid Substation – necessitating this non-regulated transmission line review by the Siting Board.

This section presents BBC's findings and conclusions based on information described in the previous sections of the report.

Unbridled Compliance with Statutory Requirements

As discussed in Section B of this report, the information provided by Unbridled Solar in its Application to the Siting Board, its SAR, and its responses to information requests from the Siting Board (through the PSC staff and BBC) complies with the requirements for non-regulated transmission lines set forth in KRS 278.714(2)(b) through (2)(d). This information includes maps and detailed descriptions of the proposed transmission line, its right of way, its substation connections, and the properties the line would cross.

Other statutorily required information provided by Unbridled Solar included the assurance that the proposed transmission line would be constructed and maintained in accordance with accepted practices and the National Electric Safety Code. That information is consistent with a portion of the direction to the Siting Board provided under KRS 278.714 (3) – in particular, the direction that: "*Action to grant the certificate shall be based on the board's determination … that the applicant will construct and maintain the line according to all applicable legal requirements."*

The other direction provided to the Siting Board under KRS 278.714 (3) is that "*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 …*" Elements of that determination could include the scenic impact assessment regarding the proposed transmission line and evaluation of the route selection made by the applicant.

Scenic Impact Assessment

The 3.15-mile-long route of the proposed transmission line is situated within gently rolling and sparsely populated agricultural land along most of the route, and within more industrialized land along the final mile or so of the route to the BREC's Reid Substation. The majority of the land crossed by the proposed line has been previously cleared for agricultural use or industrial

development, though portions of the right of way cross woodlands that may require clearing to establish and maintain the right of way.

Typically, visual impact assessment focuses on effects on the views from key observation points. There are no residential neighborhoods, parks or schools in proximity to the proposed transmission line route. The line would be visible to travelers along some of the roads near the eastern edge of the proposed generating facility, including U.S. Highway 41 and Interstate 69. These roads are already crossed by other electric transmission and distribution lines. The view from the Interstate in the vicinity of the proposed transmission line crossing is dominated by BREC's coal plant just east of the highway and the many electric transmission lines connected to the Reid Substation at the plant. The proposed line appears unlikely to have an impact on the scenic perceptions of travelers along these roads.

The most affected key observation points near the proposed transmission lines would likely be the six residences located within 500 feet south of the proposed line, west of U.S. Highway 41. The scenic impact from these homes is partly mitigated by the electric distribution line which is closer to them, though the wooden poles used by that line are not as tall as the steel monopoles that would be used for the Unbridled Solar transmission line. These homes are also in the same proximity to a portion of the 4 Star Industrial Park. Though those parcels have not yet been developed for industrial use, the expected future use of those lands would likely have more visual impact than the proposed transmission line.

Overall, the proposed transmission line would not have a significant adverse impact on the scenic assets of Kentucky, though some simple mitigation strategies could reduce the visual impact on the handful of nearby homes.

Route Selection

As discussed in Section B of this report, the selected route was Unbridled Solar's second choice after finding that a shorter route from the southeastern corner of the proposed generating facility connecting to an existing transmission line was not feasible due to lack of support from the landowners whose properties would have been crossed by that line.

The route selection process used by Unbridled Solar was less complex than the processes that have been used for some longer and larger transmission lines – such as the route for the Vectren Line reviewed by the Siting Board in 2010. However, the evaluation process resulted in a very direct route between the proposed solar generating facility and the Reid substation, which likely minimized the length of the transmission line. As noted in Section B of this report, Unbridled Solar appears to have done more work to "microsite" the proposed line based on surveys of environmental and sensitive features.

Overall, the selected route appears reasonable and the simplified route evaluation process is not inappropriate given the short length of the line and the logical result.

Unbridled Solar also requested the Siting Board's permission to deviate by up to 500 feet from the transmission line route shown on the maps and figures in its application if necessary due to subsurface conditions or other constructability issues.[1]

Mitigation

Unbridled Solar proposed mitigation for its generating facility, but has not proposed any specific mitigation for its transmission line. The applicant has proposed that its request to allow movement of the transmission line route by up to 500 feet in either direction would be conditioned on the line and its right of way remaining on the same properties and written agreement from the landowner(s) where the movement would occur.

As noted previously, the most affected key observation points near the proposed transmission lines would likely be the six residences located within 500 feet south of the proposed line, west of U.S. Highway 41. Based on Figure 2 from Unbridled Solar's Application (also presented as Figure 1 in Section A of this report), as well as Figure 2.7 in Unbridled "Amended Exhibit J Figures" provided in response to the initial information request from the PSC and BBC, the right of way for the proposed route abuts the road separating those residences from the leased properties just north of them that the line would cross. In other words, it does not appear that the line could move any closer to those residences than already proposed without crossing onto their properties. Movement of the line to the north would benefit these nearby properties.

In the Vectren merchant transmission line siting review in 2010, the applicant offered to use special coatings on the steel towers that rapidly weather over time and result in a color that is less intrusive than the shiny, uncoated metal. The *Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands* report mentioned in Section A, also emphasizes the value of appropriate color coating in reducing the visual impacts of transmission lines. BBC recommends that Unbridled Solar use these types of coatings for either the entire length of the proposed transmission line or at least the one quarter mile or so of the line just west of US 41 that is proximate to the six nearby residences.

Recommendations for the Siting Board

Based on the information provided by Unbridled Solar[2], BBC's visit to the site, and other information gathered by BBC, we recommend the Siting Board approve the proposed Unbridled Solar transmission line as proposed. We do recommend that the Board condition its approval on the conditions Unbridled Solar offered in regard to any movement of the transmission line relative to the route shown in its Application and SAR, and on the relatively simple mitigation measure of Unbridled Solar using appropriate coatings to minimize the visual impact of the transmission poles, particularly in the vicinity of the homes close to the line just west of US Highway 41.

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[1] Unbridled Solar Application, page 10.

[2] Including information from Unbridled Solar's Application, Site Assessment Report and response to the initial information request from the PSC and BBC.

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