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**Kentucky State Board on
Electric Generation and
Transmission Siting**
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March 29, 2021

TO: FILINGS DIVISION

RE: Case No. 2020-00208
ELECTRONIC APPLICATION OF NORTHERN BOBWHITE SOLAR LLC FOR A
CERTIFICATE OF CONSTRUCTION FOR AN APPROXIMATELY 96
MEGAWATT MERCHANT SOLAR ELECTRIC GENERATING FACILITY IN
MARION COUNTY, KENTUCKY PURSUANT TO KRS 278.700 AND 807 KAR
5:110

Please file in the administrative record of the above-referenced case the attached copy of the final report of Harvey Economics, "Review and Evaluation of the Northern Bobwhite Solar, LLC Site Assessment Report," dated March 29, 2021.

Sincerely,

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

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

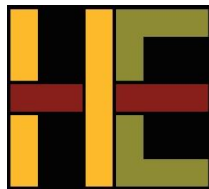
Attachment

cc: Parties of Record

Review and Evaluation of the Northern Bobwhite Solar, LLC Site Assessment Report

**Kentucky Public Service Commission and
Kentucky State Board on Electrical Generation and
Transmission Siting**

March 29, 2021





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March 29, 2021

Mr. Quang Nguyen
Assistant General Counsel
Kentucky Public Service Commission
211 Sower Blvd.
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**Re: Harvey Economics' Review of Northern Bobwhite Solar, LLC's Site
Assessment Report for Solar Facilities in Marion County, Kentucky**

Dear Mr. Nguyen,

Harvey Economics is pleased to provide you with our final report, *Review and Evaluation of the Northern Bobwhite Solar, LLC Site Assessment Report*.

Yours truly,

Edward F. Harvey
Principal

Report

March 29, 2021

Review and Evaluation of the Northern Bobwhite Solar, LLC Site Assessment Report

Prepared for

Kentucky Public Service Commission and
Kentucky State Board on Electrical Generation and Transmission Siting
211 Sower Boulevard
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Harvey Economics

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SECTION 1

Introduction

This document provides a review of the Site Assessment Report (SAR) for the proposed Northern Bobwhite Solar Facility (Project) submitted to the Kentucky State Board on Electric Generation and Transmission (Siting Board). The SAR was submitted to the Siting Board by Northern Bobwhite Solar, LLC on December 22, 2020. Siting Board staff retained Harvey Economics (HE) to perform a review of the SAR. Northern Bobwhite Solar, LLC (Bobwhite or Applicant) has submitted the SAR as part of its application for a construction certificate to construct a merchant electric generating facility under KRS 278.706 and 807 KAR 5:110. Requirements specific to the SAR are defined under KRS 278.708.

Statutes Applicable to the SAR Review

KRS 278.706 outlines the requirements for an application for a certificate to construct a merchant electric generating facility. Section (2)(1) of that statute requires the applicant to prepare a SAR, as specified under KRS 278.708. The Bobwhite SAR is the main focus of HE's review. However, the Siting Board also requested that HE review the economic impact report prepared by the Applicant; the economic impact report is a requirement of the application under KRS 278.706(2)(j), separate from the SAR.

KRS 278.708(3) states the following:

A completed site assessment report shall include:

- (a) A description of the proposed facility that shall include a proposed site development plan that describes:
 1. Surrounding land uses for residential, commercial, agricultural, and recreational purposes;
 2. The legal boundaries of the proposed site;
 3. Proposed access control to the site;
 4. The location of facility buildings, transmission lines, and other structures;
 5. Location and use of access ways, internal roads, and railways;
 6. Existing or proposed utilities to service facility;
 7. Compliance with applicable setback requirements as provided under KRS 278.704(2), (3), (4), or (5); and
 8. Evaluation of the noise levels expected to be produced by the facility.

- (b) An evaluation of the compatibility of the facility with scenic surroundings;
- (c) The potential changes in property values and land use resulting from the siting, construction, and operation of the proposed facility for property owners adjacent to the facility;
- (d) Evaluation of anticipated peak and average noise levels associated with the facility's construction and operation at the property boundary; and
- (e) The impact of the facility's operation on road and rail traffic to and within the facility, including anticipated levels of fugitive dust created by the traffic and any anticipated degradation of roads and lands in the vicinity of the facility.

KRS 278.708(4) states that “the site assessment report shall also suggest any mitigating measures to be implemented by the applicant to minimize or avoid adverse effects identified in the site assessment report.”

KRS 278.706(2)(j) states that a completed application shall include “an analysis of the proposed facility's economic impact on the affected region and the state.”

KRS 278.706(2)(d) addresses specific setback requirements, as related to distances from adjacent property owners of various types (i.e., residential neighborhoods, schools, hospitals, nursing homes).

SAR Review Process and Methodology

HE completed the following tasks as part of the review of the Bobwhite SAR and certain other components of the Bobwhite application:

- Review of the contents and information provided in the site assessment report, application and other documents provided by the Applicant;¹
- Brief review of secondary data sources to obtain background information and geographic setting for the Bobwhite Project;
- Limited review of relevant evaluation criteria to identify potential issues and assessment approaches to serve as benchmarks for the adequacy review;
- Identification of additional information we deemed useful for a thorough review, and submittal of questions to the Applicant via Kentucky Public Service Commission Assistant General Counsel;

¹ Northern Bobwhite Solar, LLC has submitted a motion for deviation from the setback requirements. That document includes a 16-page letter from Northern Bobwhite Solar, LLC counsel, along with two Exhibits: (a) Vicinity Map; and (b) Cumulative Environmental Assessment.

- Review of additional information supplied by the Applicant in response to first submitted HE questions, and discussion of responses with Siting Board staff;
- Completion of interviews and data collection with outside sources as identified in this document;
- Review of additional information supplied by the Applicant in response to a second set of questions submitted by HE, and discussion of responses with Siting Board staff;
- Participation in a site visit, including a tour of the Project site with an Applicant representative;
- Completion of analyses and evaluation of the impacts upon each of the previous identified resources; and
- Preparation of this report, which provides HE's conclusions as to potential Project impacts and mitigation recommendations.

Components of the Bobwhite Solar Facility SAR

Northern Bobwhite Solar, LLC's application to the Siting Board consists of fifteen exhibits.

- Exhibits A – N include:
 - Numerous maps of the project area;
 - Proof of notice of application;
 - Public involvement documents;
 - Certificates of compliance with local regulations;
 - Generation interconnection feasibility studies, system impact study reports, and various service agreements;
 - Economic Impact Report – this report was performed by Smith Management Group (SMG); and
 - A memorandum of the industrial revenue bond agreement and a letter of support from David Daugherty (Marion County Judge Executive).
- Exhibit O is the SAR, which includes the following appendices:
 - Appendix A: Property Value Impact Report – this is the Kirkland Appraisals, LLC report (Kirkland report);

- Appendix B: Description of Legal Boundaries – narrative description and map of property;
- Appendix C: Site Plans;
- Appendix D: Noise Assessment – this assessment was performed by SMG;
- Appendix E: Traffic Assessment – this assessment was performed by SMG;
- Appendix F: Phase I Site Assessment Report – Part 1 of this report was prepared by Terracon Consultants, LLC (Terracon), and Part 2 of this report was prepared by Environmental Design & Research, D.C.P.;
- Appendix G: Wetland Delineation Assessment – this report was performed by Terracon.
- Appendix H: Threatened and Endangered Species Assessment – this assessment was performed by Terracon; and
- Appendix I: Conceptual Visual Mitigation Planting Plan.

In addition to the application, Northern Bobwhite Solar, LLC also provided the Siting Board with a document titled NBW Motion for Deviation from Setback Requirements, which HE reviewed and considered as part of the evaluation of the proposed site development plan.

Additional Information Provided by the Applicant

Once HE reviewed the contents of the SAR, HE and Siting Board staff independently developed a first list of detailed questions, either requesting additional data and information about specific topics or asking for clarification about items in the SAR. The Siting Board staff submitted the first request for information, including questions from HE, on February 1, 2021; Bobwhite provided written responses on February 15, 2021.

After HE and Siting Board staff reviewed Bobwhite’s responses to the first request for information, HE and Siting Board staff independently developed a second list of detailed questions. The Siting Board staff submitted the second request for information, including questions from HE, on March 1, 2021. Bobwhite provided written responses to the second request for information on March 15, 2021.

HE and certain representatives from the Siting Board met with the Applicant for an in-person meeting on February 24, 2021 to conduct a site visit. During this site visit, the group discussed aspects of the Project, drove around the proposed Project site, visited access points, and stopped to review locations where the solar panels might be located.

Report Format

This report is intended to support the Siting Board in its decision making process related to granting a construction certificate to Northern Bobwhite Solar, LLC. The report is structured

to respond to the requirements for a SAR as outlined in KRS 278.708, the economic analysis described in KRS 278.706(j) .

This section of the report, Section 1, introduces the purpose and process of the SAR review and HE's work. Section 2 offers a summary and conclusions as to the results of HE's SAR evaluation. Section 3 describes the Bobwhite Project and the proposed site development plan. Section 4 provides a brief profile of Marion County's economic and demographic characteristics as context for the Project setting. Section 5 offers detailed findings and conclusions for each resource area reviewed and Section 6 presents recommendations concerning mitigation measures and future Siting Board actions.

Caveats and Limitations

Review limited to resource areas / issues enumerated in the statutes. HE's evaluation of the Bobwhite Project is contractually limited to review of the SAR and associated materials, as well as the economic impact analysis. Statutes dictate the issues to be covered in the SAR; HE focused on those specific topic areas, which are addressed in this report. The Siting Board might have additional interests or concerns related to the construction, siting, or operation of the Project; those may be addressed in other documents or by other parties.

Level of review detail determined by expert judgement. KRS 278.708 identifies the required components of an SAR; however, the level of scrutiny and detail of the evaluation depends upon expert judgement as to what information is relevant and what level of detail is appropriate. This level generally relates to the assessment methodologies, geographic extent of impacts and the degree of detailed information about the Project as requested by the consultant in follow-up inquiries. Given our experience related to project impact assessments and evaluation of impacts on various socioeconomic and natural resource components, HE believes that we have performed a thorough and comprehensive review of the Bobwhite SAR, which will meet the needs of the Siting Board.

Assumption of accurate Applicant data. HE reviewed all the data and information provided by the Applicant as part of the SAR and associated documents, including responses to two sets of inquiries and an in-person meeting. Although we evaluated that data for consistency and clarity as part of our review, we did not perform any type of audit to confirm the accuracy of the provided information. We assume that the Applicant has provided an honest representation of the Project, based on the best data available at the time.

In instances where the Applicant was unsure about certain aspects of the Project, such as exactly where the solar panels would be placed, HE assumed a "worst case" for the purposes of the impact analysis. Should the actual project development deviate in a manner that materially changes the Project magnitude or location of impacts, or affected parties, the Applicant can be required to notify the Board for it to evaluate such a deviation and take appropriate action as deemed necessary. See mitigation recommendations.

SECTION 2

Summary and Conclusions

Northern Bobwhite Solar, LLC (Bobwhite or Applicant) proposes to construct the Northern Bobwhite Solar Facility (Project), a 96 megawatt (MW) alternating current photovoltaic electricity generation facility in unincorporated Marion County, KY, north of the City of Lebanon. In December 2020, Bobwhite applied to the Kentucky State Board on Electric Generation and Transmission Siting (Siting Board) for a construction certificate to construct a merchant electric generation facility. Bobwhite’s application responded to the statutory requirements set forth by the State of Kentucky in KRS 278.706 and 278.708.

The Siting Board retained Harvey Economics (HE) to review and evaluate the Site Assessment Report (SAR) included in the Bobwhite application, as well as other supporting information provided by the Applicant. In addition to the topic areas included in the SAR, HE also addressed the Applicant’s economic impact analysis and the topic of decommissioning. The summary and conclusions of HE’s review and evaluation are provided below. Recommended mitigation measures are offered in Section 6 of this report.

Facility Description and Site Development Plan

The Project site encompasses a total of about 1,700 acres with solar components (solar arrays and Project substation) covering over 900 acres.² This acreage has historically been used for agriculture and includes some residential homes. Solar infrastructure will include about 325,000 solar panels, 42 inverters, the racking system and a Project substation. The Project will interconnect to the transmission system via the existing Marion County 161 kilovolt (kV) substation, located adjacent to the Project’s southwestern boundary line.

- ***Surrounding land uses*** – The area around the Project site can be generally described as rural agricultural, with rolling hills and some trees. Acreage surrounding the Project site is largely residential agriculture, with additional smaller sections of solely agricultural land or residential properties. Altogether, 60 individual parcels of land, varying in size from less than one acre to more than 300 acres, are located adjacent to the Project site.
- ***Proximity to homes and other structures*** – A total of 46 residential structures, three commercial or industrial structures, and 65 “other” structures (including barns and garages) would be located within 1,200 feet of the solar panels. Five homes would be located within 300 feet of the solar panels and 32 homes would be located within 300 feet of the Project boundary.³

² The Application states that the Project will be situated on about 1,300 acres of land. That estimate was later revised by the Applicant.

³ In many areas of the Project site, the solar panels are located well within the Project boundary line and are not adjacent to the boundary line.

- **Locations of structures** – Solar panels, inverters and the racking system will be located throughout the property to avoid constrained areas, including ponds, streams and steep slopes. A main laydown yard and parking area will be established in the southwestern portion of the Project site. The Project substation, Gen-Tie line and an operations and maintenance (O&M) building will also be located in the southwestern portion of the Project site.
- **Locations of access ways** – Nine potential access points/access roads will allow access to different areas of the property during construction and operations. Those access points include one access point from Horan Road, east of Highway 55; two access points on Gene Campbell Road, in the vicinity of Green Valley Drive; one northern access point on Simstown Road; one eastern access point on Willis Trail; two access points from Radio Station Road; one southwestern access point from a private road off of Radio Station Road and one access point from Gene Campbell Road, north of the split with Shortline Pike Road.
- **Access control** – Access to the site will be controlled through secure (gated) access points. The perimeter of the property will be enclosed by a security fence. The chain-link security fence will be located immediately adjacent to the panels and will be a minimum of six feet tall. Barbed wire will be included on top of the fencing around the Project substation. Security cameras will be installed around the Project substation and the O&M facility after construction.
- **Utility service** – Electric service will be provided by either Inter County Energy Cooperative or Kentucky Utilities, depending on the location of the construction trailer. When electricity is needed at night, it will be provided via the transmission level connection with potential billing through Inter County Energy Cooperative. Sewage waste generated during the construction phase will be managed through the use of portable toilets provided by a certified contractor. Once the Project is operational, the O&M facility will require municipal water and sewer service, if available, or a water well and septic system if municipal service cannot be obtained. Water used for dust suppression will be hauled in as needed.
- **Project life**—The Applicant anticipates an approximately 35-year Project life.

Major Project construction is expected to last approximately 12 months, based on preliminary information provided by the Applicant. An estimated average of 200 workers will be on-site throughout the construction period, with a peak of 250 workers on-site over the course of several weeks. The Project construction schedule and description of construction activities is provided in Section 3.⁴

Setback requirements and requested deviation. As proposed, the Bobwhite Project does not meet existing setback requirements. The Applicant has entered a motion for a deviation

⁴ As described by the Applicant, the preliminary construction schedule and estimates of on-site workers are based on experience with other similar sized solar projects. That information may be revised when the final schedule is developed by the chosen engineering, procurement and construction (EPC) contractor.

from these requirements. HE reviewed this motion and believes that the Project meets the specific statutes of a setback deviation. The Siting Board must determine if these measures are sufficient.

Conclusions and recommendations. HE believes that the Applicant has generally complied with the legislative requirements for describing the facility and a site development plan, as required by KRS 278.708.

Project Setting

Marion County had a 2019 population of about 19,300 people. Population levels fluctuated slightly over the last 20 years but are projected to remain relatively stable into the future. The City of Lebanon has an estimated 5,600 residents. Income levels in Marion County are lower than the average of the Commonwealth and about 17 percent of County residents are living in poverty. Manufacturing and agriculture are the largest economic sectors in Marion County. The area around the Project site can be generally described as rural and agricultural.

Compatibility with Scenic Surroundings

The area surrounding the Project is agricultural and residential. Rolling hills and groups of trees will help mitigate against negative visual impacts to residents. The roads in the area are mostly in valleys, and the solar panels will be hidden from view for nearly all commuters. The Northern Bobwhite substation is not expected to be an eyesore, as it will be built close to the existing Marion County substation and this area already contains numerous power lines.

Scenic compatibility focuses on the solar panels with a height of six feet and ten feet above ground at full tilted angle. HE does not expect that the Project will be visible from Kentucky Route (KR) 55. Small portions of the Project may be visible for commuters along Radio Station Road, Gene Campbell Road, and St. Ivos Road, but these roads have little traffic. It is possible that a small portion of the Project may be visible from Horan Lane, but depending on where the panels are placed, these may be hidden from view for commuters.

The Applicant has pledged to implement vegetative buffers for 15 homes with line of sights within 500 feet of solar panels, and for 1.85 miles of road with line of sights within 300 feet of solar panels.

The Applicant has committed to addressing glare at sensitive receptors, such as a home, that experiences glare for more than 60 minutes a year. The Applicant will also implement measures to minimize potential glare, such as utilizing tracker motors and solar panels with an anti-reflective coating.

Potential Changes in Property Values and Land Use

The Applicant's consultant, Kirkland Appraisals, LLC (Kirkland), prepared an extensive data collection effort and analysis of property value impacts of solar facilities in diverse locations, concluding that the Project would have no effect on property values during construction or once in operation. To further assess potential property value impacts, HE: (1) reviewed existing

literature related to solar facility impacts; (2) conducted interviews with several local real estate professionals; and (3) prepared further analysis of the data from Kirkland.

The Marion County Property Valuation Administrator and local realtors did not express any specific concerns regarding potential effects on property values. One recent academic study indicated the potential for negative impacts to property values for homes in close proximity to solar facilities, however, most recent studies indicated no impacts to property values related to solar facilities. HE's further evaluation of the data provided by Kirkland also suggests that property values are unlikely to be affected by solar facilities, although some uncertainty exists. Mitigation of visual and other effects, with close property owner coordination, can minimize that uncertainty. This conclusion is predicated on the assumption that the mitigation strategies discussed in Section 6 are adopted by Bobwhite and the Siting Board.

Anticipated Peak and Average Noise Levels

As a rural, agricultural area the baseline conditions are relatively quiet noise levels. During construction, most of the noise from the Project site will be intermittent and not cause permanent ear damage to nearby residents. There are 113 residences within 2,400 feet of the proposed solar panels, and all of these homes will most likely experience some level of annoyance during the construction period.

Construction equipment, especially pile drivers, may produce noises that the World Health Organization (WHO) or Environmental Protection Agency (EPA) classifies as annoying for residences within a mile from construction activities. The peak noise period is anticipated to last 19 weeks, when the tamping process, by which posts are pounded into the ground, will be active throughout the Project area.

During operations, the solar panel components should not have a noticeable impact on residences. No residence is anticipated to experience noise levels that the WHO or EPA classifies as annoying. The proximity of homes to the tracking motors, inverters and substation (noise emitters) helps mitigate against any annoying noise pollution. The topography of the area also helps mitigate against any noticeable noise pollution, as many of the panels will be set on the opposite side of hills, which helps dissipate any noise. The vegetative mitigation to preserve scenic values will also help.

Road and Rail Traffic, Fugitive Dust and Road Degradation

Construction-related traffic has the potential to congest roads between Project parcels. Since the parcels are spread out and non-contiguous, no roads are expected to receive a large increase in construction-related traffic. The roads between Project parcels are also not very busy and should be able to handle the increase in construction worker commuter vehicles. There will be no noticeable traffic impacts during operations.

Road degradation is most likely where heavy construction vehicles (such as freight trucks carrying solar panels and racking systems) exceed posted weight limits. Numerous roads in the area are rated at 44,000 pounds, and the Applicant is planning on utilizing freight trucks weighing more than 60,000 pounds. The heaviest vehicle, which will carry the main substation

transformer, is estimated to weigh 240,000 pounds. The Applicant will need to coordinate with Kentucky Transportation Cabinet (KTC) and Morgan County Road Department (MCRD) officials to ensure all permits are obtained and all routes are approved. The Applicant has pledged to fix any potential road degradation that may occur from construction vehicles.

One problematic issue is that the roads in the area are very narrow. Many roads are capable of only carrying 1.5 cars, and vehicles need to pull half-off the road in order to avoid oncoming traffic. For residential and construction-related commuter vehicles, this should not be an issue, but for heavy freight trucks, it is likely that commuter vehicles will need to turn around or into private drives to avoid oncoming freight trucks. Also, the narrow roads will make accessing proposed access points difficult, if not impossible. The stretch of road between Horan Lane and Kentucky Route (KR) 55 has two hairpin curves that may not be possible for freight trucks to navigate without road improvements or tree removal.

The Applicant has pledged to maintain construction equipment and follow practices related to fugitive dust throughout the construction process. This should keep dust impacts off-site to a minimal level.

Economic Impact Analysis

Construction and operation of the Bobwhite solar facility will provide limited economic benefits to Marion County and the Commonwealth. Construction employment and income opportunities will be temporary, but local hires will increase employment and incomes in an area that needs it. The bulk of construction purchases are likely to be made outside of Kentucky, limiting opportunities for local business activity or generation of additional sales tax.

Operational employment will be minimal, and purchases of materials or supplies will be small on an annual basis. Operational phase economic benefits will be confined mostly to property taxes. Annual property tax payments will be made to multiple Marion County taxing authorities; however, those payments will likely amount to a small percentage of total tax revenues. The Applicant has secured an Industrial Revenue Bond (IRB) with the Fiscal Court of Marion County, which includes PILOT payments to the local school district.

Socioeconomic impacts of the Bobwhite solar facility represent a positive, albeit small, contribution to the region.

Decommissioning

The Applicant proposes a 35-year useful life for the Bobwhite solar facility. Bobwhite has provided a general description of the decommissioning activities anticipated to occur at the end of the Project life and has also indicated that land restoration commitments have been made with landowners as part of the lease agreements. Land restoration will be completed with 24 months after the termination of the lease. HE did not review individual lease agreements.

Decommissioning the facility and returning the site to its original condition can be accomplished if all the components are removed. After reclamation, this would return the land to a productive use and property value, and eliminate long term Project-related impacts,

compared with simply shuttering the solar facility. This process will also add a modest, temporary positive economic stimulus to the region.

Public Involvement

The Applicant has pursued public involvement since early 2019, including several presentations to the Marion County Fiscal Court, development of a Project website, letters sent out to neighboring landowners, an informational open house and a public meeting. However, possibly due to COVID-19, public awareness of the Project is limited.

Conclusions and Recommendations

Based on our findings related to the specific siting considerations in the statutes and as addressed in this report, HE recommends that the Siting Board approve Northern Bobwhite Solar, LLC's application for a certificate to construct a merchant electric generating facility. This finding assumes that the Project is developed as described in the SAR and the supplemental information, and the mitigation measures set forth in Section 6 of this report are adopted.

SECTION 3

Project Overview and Proposed Site Development Plan

Project Overview

Northern Bobwhite describes the proposed Project as follows:

“The proposed Project will be a 96-megawatt alternating current (“MWac”) photovoltaic (“PV”) electric generating facility. The project is to be located in unincorporated Marion County, KY, north of the City of Lebanon, KY and east of Highway 55 at approximate coordinates 37°36’56.80” N, -85°13’45.57” W. Electricity generated by the Project will be sold through the PJM Regional Transmission Organization. The Project will interconnect to the transmission system via an existing substation adjacent to the Project.

The Project will be situated on up to 1,300 acres of land, which has historically been used for agriculture and farming.⁵ Project components will include photovoltaic solar panels, associated ground-mounted racking structure, access roads, inverters, medium voltage transformers, buried electrical collection cabling, a step-up substation, a short 161-kilovolt (“kV”) transmission line, security fencing, laydown areas, and an operations and maintenance (“O&M”) building. The Applicant has decided not to include storage facilities at this time.

The solar panels are attached to a racking system, which in turn secures the solar array to the ground. Piles are driven into the ground without the use of concrete and impact a very small footprint of the land beneath the solar panels. Vegetation will be planted beneath and between the rows of panels, which will allow for rainwater infiltration, improve water retention and prevent runoff. The electrical infrastructure will be enclosed by a security fence.”

Gen-Tie Line

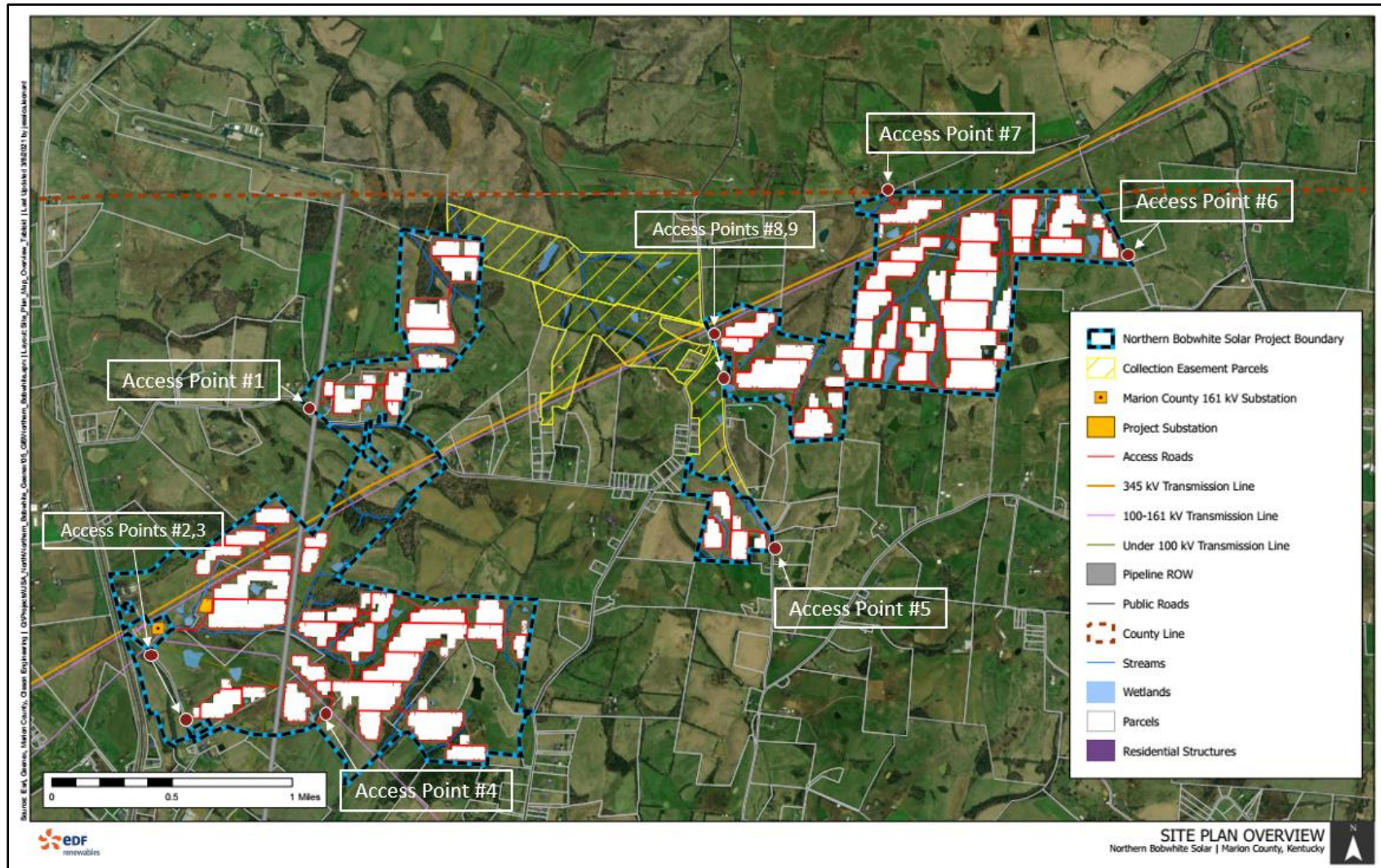
“The main power transformer in the Project substation will step-up power from the collector feeder lines from 34.5-kV to 161-kV. The Project substation will be connected to the point of interconnection, the Marion County Substation, via an approximately 700 to 1,000 foot 161-kV transmission line (the “Gen-Tie Line”). The Gen-Tie Line will be located on a parcel under lease to Bobwhite authorizing the placement of Project facilities, including transmission lines. The exact length and position of the Gen-Tie Line will be determined by the final placement of the Project substation and transmission line poles. Bobwhite currently assumes up to three poles will be placed along the transmission corridor. Poles will be made of wood or steel and approximately 70-100 feet in height. The Gen-Tie Line will be constructed and maintained in accordance with accepted engineering practices and the National Electric Safety Code.”

Exhibit 3-1 shows a map of the Project site within Marion County.

⁵ As noted in Section 2, the estimate of land within the Project boundary and of the acreage required for solar components was revised subsequent to submittal of the Application.

Exhibit 3-1.

Map of Proposed Northern Bobwhite Solar Project Site and Surrounding Area



Source: Northern Bobwhite Solar, LLC, March 2021.

The Project site is located approximately 67 miles south of the City of Louisville, the largest community in the region, and several miles north of the City of Lebanon.

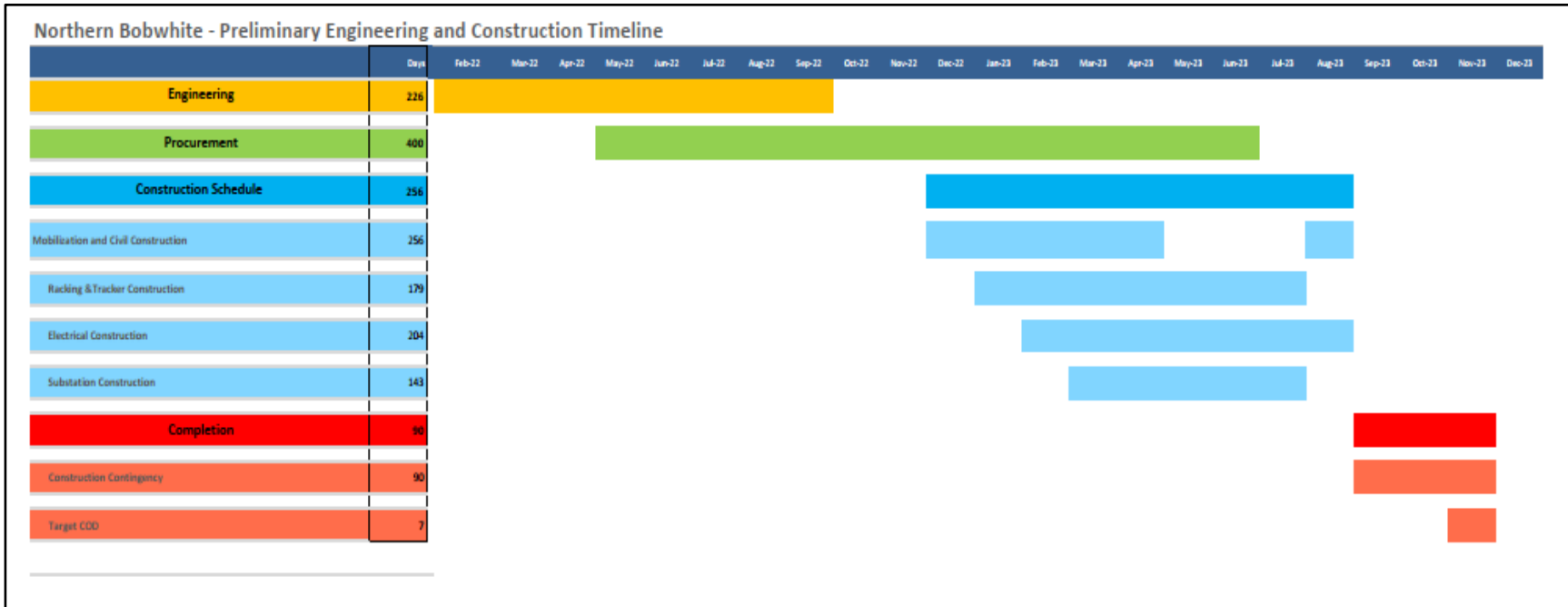
Construction Activities

Bobwhite's Application did not include a detailed description of construction activities, a construction schedule or consistent information about the on-site construction workforce or commuter vehicles. Upon request for that information, the Applicant initially stated that construction plan information could not be provided until detailed engineering and design were completed, which would occur after a Certificate of Construction was received from the Siting Board. After additional requests from HE, the Applicant stated that "A Project-specific construction schedule will not be completed until the engineering, procurement and construction (EPC) contractor is selected."⁶ However, Bobwhite has prepared a preliminary engineering, procurement and construction schedule based on its affiliates' experience with other similarly sized solar projects."

Based on information provided by the Applicant in the second round of inquiries, construction of the Northern Bobwhite facility is expected to occur over a period of approximately 12 months. Exhibit 3-2 offers a visualization of the construction schedule, provided by the Applicant.

⁶ According to the Applicant, the schedule will be influenced by many factors including labor availability, required commercial operations date, final system design, technology selection, weather and site conditions.

**Exhibit 3-2.
Estimated Northern Bobwhite Construction Schedule**



Source: Northern Bobwhite Solar, LLC, March 2021

Different construction tasks will overlap to some extent, but will generally occur in the following order:

- Engineering: 33 weeks.
- Procurement: 58 weeks.
- Construction: 37 weeks.
 - Mobilization and Civil Construction: 37 weeks.
 - Racking and Tracker Construction: 26 weeks.
 - Electrical Construction: 30 weeks.
 - Substation Construction: 21 weeks.
- Completion: 13 weeks.
- Construction Contingency: 13 weeks.
- Target COD: 1 week.

On average, 200 construction workers are estimated to be on-site each week, depending on the specific tasks and activities occurring at that time. Construction of the panels will not be sequential; many different construction activities may take place in different parts of the Project site at the same time (i.e., grading in one area, pile driving in a separate area, fixing panels to posts in another area, wiring panels together to the DC collection system and to the inverters, etc.).

Peak construction activity will most likely occur during the second quarter of the year, when civil construction, pile driving, solar panel installation, and wiring installation is concurrent. Peak construction activities may require as many as 250 workers to be on-site each day, though this period is estimated to only last two months.⁷

Life of the Project

The Northern Bobwhite solar facility is anticipated to operate for approximately 35 years. Project decommissioning (the process of closing the facility to retire it from service) is discussed in Section 5 of this report.

⁷ The Applicant notes that the number of average and peak workers will be determined by the final construction schedule, the availability of workers and equipment, and the extent to which certain activities overlap.

Proposed Site Development Plan

The following discussion addresses each of the SAR requirements for a proposed site development plan, as laid out in KRS 278.708(3)(a).

Surrounding land uses. Marion County in general, and the areas around Lebanon specifically, are rural residential areas, with low population density and an agricultural emphasis. Section 4 of this report provides a general overview of the County's demographic and economic characteristics.

As part of the SAR, the Applicant's consultant, Kirkland Appraisals, Inc., identified the acreage surrounding the Project site as a mix of residential and agricultural uses. A total of 60 properties are immediately adjacent to the proposed Project site; an additional 15 landowners are located with 300 feet of the Project boundary but are not adjacent. The Kirkland report shows that about 56 percent of the surrounding acreage is defined as agricultural/residential, and another 38 percent of the surrounding acreage is fully agricultural. The remaining six percent of the surrounding area is defined as residential (about five percent) or is land on which the Marion County Substation is located.

In response to HE's inquiries, the Applicant also provided a table describing the distances, in feet, between nearby residences and other structures and the closest solar panels. That information is provided in Exhibit 3-3.

Exhibit 3-3.

Distances between Residential Structures and the Closest Northern Bobwhite Solar Project Panels

Distance from Solar Panels (ft)	Residential Structures	Commercial/ Industrial Structures	Other Structures
0 - 299	5	0	21
300 - 599	18	0	21
600 - 899	12	1	12
900 - 1,199	11	2	11
1,200 - 1,499	20	0	25
1,500 - 1,799	19	0	22
1,800 - 2,099	21	1	21
2,100 - 2,399	<u>7</u>	<u>1</u>	<u>27</u>
Total Structures	113	5	160

Notes: Other structures includes barns and garages.
Source: Northern Bobwhite Solar, LLC, March 2021.

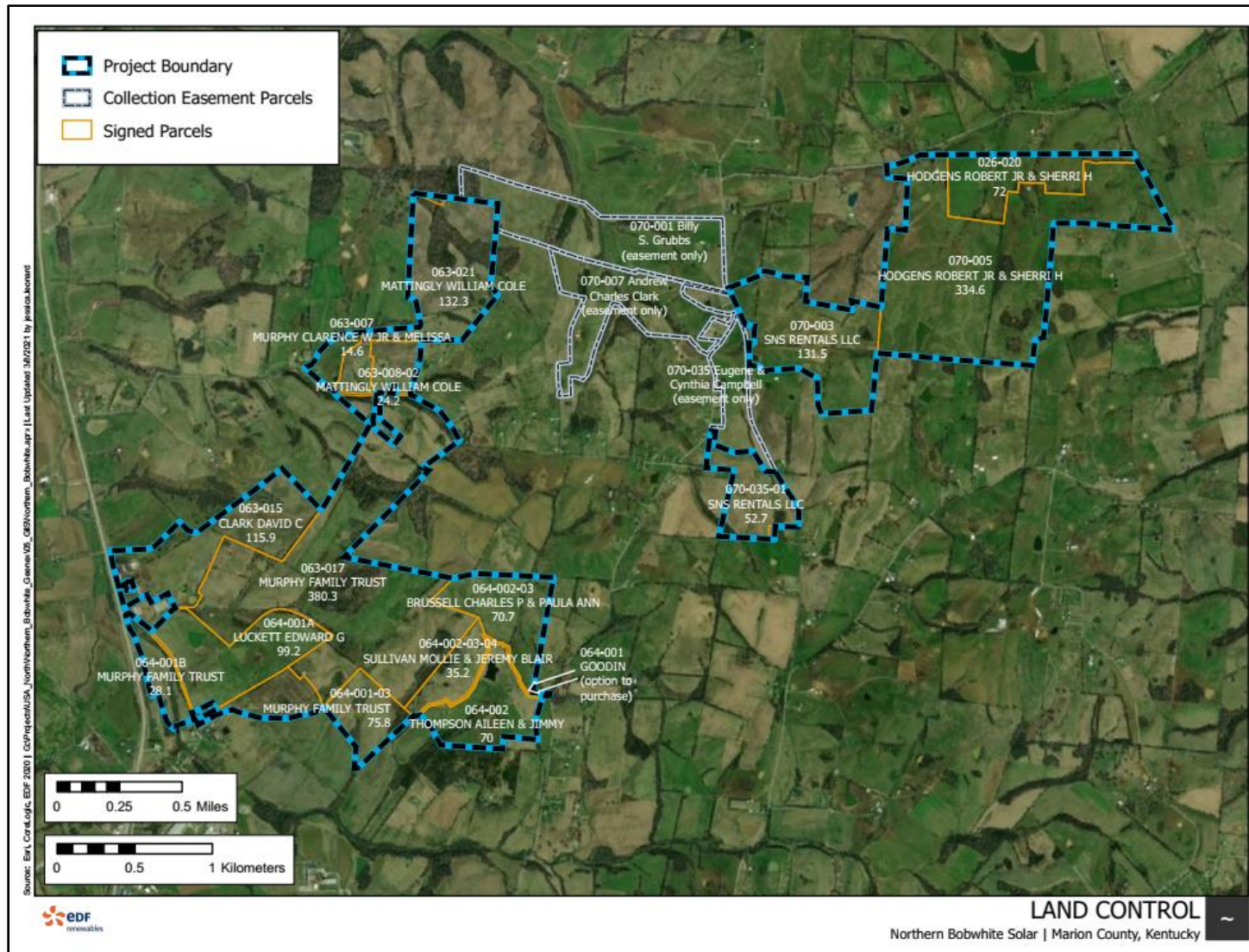
There are 46 residential properties within 1,200 feet of the solar panels and 113 residential properties within 2,400 feet of the solar panels. Five commercial or industrial structures and 160 other structures (barns and garages) are also located within 2,400 feet of the solar panels. No schools, hospitals or religious facilities are located with 2,400 feet of Project solar panels.

Legal boundaries. The SAR included a legal description of each of the individual participating properties - those with lease or access agreements with Northern Bobwhite Solar, LLC. The Applicant also provided a map showing individual parcels and acreages leased from the participating landowners (noted as “Signed Parcels” in Exhibit 3-3) and parcels which have an easement agreement with Bobwhite (noted as “Collection Easement Parcels” in Exhibit 3-3). According to the Applicant, the Collection Easement parcels provide a contiguous link between the solar panel infrastructure on the eastern portion of the Project and the Project’s substation on the western portion of the Project. The legal description included in the SAR corresponds to the total acreage of the participating properties.⁸

Exhibit 3-4 presents a map of the parcels included in the legal boundary description.

⁸ The Project’s legal boundary includes certain “Do Not Disturb” areas, which are portions of parcels that landowners have specifically excluded from consideration in their agreements with Bobwhite.

**Exhibit 3-4.
Map of Project Parcels (Participating Landowners) within the Northern Bobwhite Solar Project Boundary**



Source: Northern Bobwhite Solar, LLC, March 2021

Access control. The Applicant's Site Plan maps (Appendix C of the SAR) indicate a total of nine access road points allowing entrance to different areas of the property during construction and operations. Exhibit 3-1 provides the Applicant's Site Plan Overview map, with all access road points identified. According to supplemental materials provided by the Applicant, all nine access points are anticipated to be used during construction. The Applicant also stated that "ultimately, the engineering, procurement and construction (EPC) contractor will determine which access points will be utilized for construction equipment, components and workers and will develop a schedule for site development." All nine access points are anticipated to remain active throughout the operations phase.

According to the application, "access to the site will be controlled through secure access points and the perimeter of the property will be enclosed by a security fence."

Supplemental materials provided by the Applicant state that the security fence, which will be generally located immediately adjacent to the panels and not along the larger Project boundary, will either be a standard galvanized steel chain-link, or comparable deer/ livestock fence. Fencing will be a minimum of six feet tall. The main laydown yard and temporary staging areas would be fenced within the Project boundary. The Project substation will have its own security fence and locked access. Barbed wire would only be included on top of the fencing around the Project substation to the extent necessary under the North American Electric Reliability Corporation standards. Security cameras will be installed around Bobwhite's substation and the O&M facility after construction. Fencing would not include any type of sight barrier.

Access points will be gated and locked at night or when not in use. During the construction phase, the site manager will closely monitor site access. The EPC contractor may elect to implement additional security measures, such as hiring a third-party security firm, however, such hiring is not currently expected.

Additionally, Bobwhite will notify emergency management and law enforcement agencies of major Project activities, including the start and completion of construction.

Location of buildings, transmission lines and other structures. Exhibit 3-1 illustrates the locations of the solar panels, the Project substation and transmission lines within the Project boundary. As shown, the solar panels will be located throughout the property, situated to avoid the Collection Easement parcels, landowner "Do Not Disturb" areas, surface water resources and steep slopes. The Project's estimated 80 inverters will also be spread throughout the Project site, as depicted in Exhibit 1 of the Noise Assessment (Appendix D of the SAR). The Project substation, O&M building and Gen-Tie Line will be located in the southwestern portion of the Project site. Perimeter fencing will be located around the solar infrastructure and the substation.

The Collection Easement parcels will be used to construct above and/ or below-ground 34.5 kV electrical collection lines and supporting infrastructure, such as poles, to connect the eastern portion of the Project with the Project substation. Several larger existing transmission lines run through the Project Site in a northeast direction.

The following setbacks and constraints are noted by the Applicant:

- Field Delineated Wetland (50 foot setback)
- FEMA Flood Zone (25 foot setback)
- Transmission Line (69 kV and above) (100 foot setback)
- Pipeline Right of Way (50 feet from Pipeline)
- Road Right of Way (120 feet from centerline to solar installation)
- Non-Participating Property (50 feet to solar installation)⁹
- Residence (200 foot setback to solar installation)
- Non-Participating Unoccupied Structure (100 foot setback to solar installation)

The Site Plan maps indicate the location of the main laydown yard and parking area in the southwestern portion of the Project site. Given the Applicant's current understanding of the Project's construction, that area is anticipated be approximately 3.5 acres. However, the Applicant has stated that the exact location and dimensions of the laydown area will be determined in consultation with the EPC contractor. Supplemental materials provided by the Applicant also state that other temporary staging areas may be designated inside of the Project fence line adjacent to active construction. Specific locations of temporary staging areas will be identified by the EPC contractor.

A pipeline right of way (ROW) runs in a north-south direction through a portion of the western side of the Project. According to the Applicant, the width of the ROW varies by parcel from 10 feet to 30 feet wide. Again, according to the Applicant, the Atmos Energy Corporation owns several distribution mains within that ROW, including an old high pressure distribution main that has been abandoned in place, a new high pressure distribution main that is in service and intermediate pressure mains feeding local residential customers.

Location and use of access ways, internal roads, and railways. As noted previously and as shown in Exhibit 3-1, nine access points / access roads will allow entrance to different areas of the property during construction and operations. Additional maps included as part of Appendix C to the SAR provide a more detailed view of different portions of the Project site, including the access points. The nine access points include the following:

- One access point from Horan Road, east of Highway 55
- Two access points on Gene Campbell Road, in the vicinity of Green Valley Drive

⁹ A non-participating property is a parcel that has not entered into a lease or purchase option with Bobwhite. Non-participating properties are not included in the Project boundary and Bobwhite has no rights to utilize those properties for the Project.

- A northern access point on Simstown Road
- An eastern access point on Willis Trail
- Two access points from Radio Station Road
- A southwestern access point from a private road off of Radio Station Road
- One access point from Gene Campbell Road, north of the split with Shortline Pike Road.

Approximately 320,000 feet, or 60 miles, of internal roads are currently planned to be constructed for traveling within the Project boundaries. However, the Applicant expects the actual length of new roadways to be reduced in the final construction layout after further site design and engineering work has been completed. Internal roadways will be gravel roads.

No railroads are located within or near the Project site.

Existing or proposed utilities to service facility. The Application states that “the Project does not need electricity during normal daytime operations. During construction, the Project will require electric service, which will be provided either by Inter County Energy Cooperative, a Touchstone Energy Cooperative, or Kentucky Utilities depending on the location of the construction trailer. A small portion of the Project near the existing EKPC Marion County substation is located in the Kentucky Utilities service territory. When electricity is needed at night for the Project, it will be provided via the transmission level connection with potential billing through Inter County Energy Cooperative.”

Applicant materials state that water used for dust suppression will be hauled in as needed and that sewage waste generated during the construction phase will be managed through the use of portable toilets provided by a certified contractor.

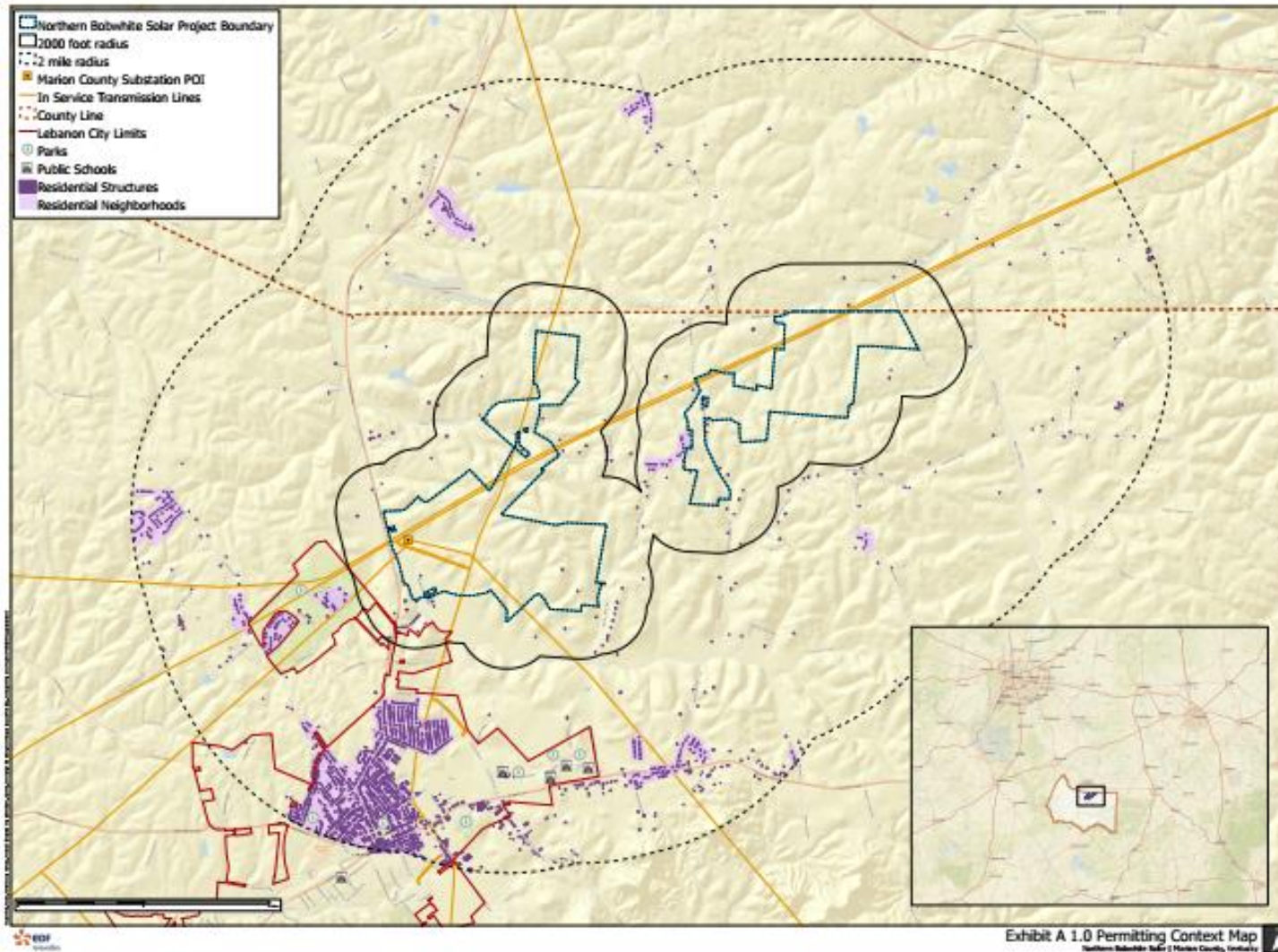
In response to HE’s second set of inquiries, the Applicant stated that “the Project O&M facility will also require municipal water and sewer once the Project is operational.” Bobwhite has not yet contacted any municipal or sewer providers for those services and has stated that if they are unable to obtain municipal water or sewer service, they will pursue all necessary permits to install a water well and septic system. Alternatively, Bobwhite might consider leasing a warehouse space in the surrounding community to accommodate the O&M facility.

Compliance with applicable setback requirements. Applicable portions of the setback statute (KRS 278.706(2)(e)) require that Bobwhite Project facilities be located at least 2,000 feet from any residential neighborhood, school, hospital or nursing home facility.¹⁰ One residential neighborhood is located within 2,000 feet of project facilities, and therefore, the Applicant is seeking a deviation from the setback requirements. Exhibit 3-5 illustrates the location of the residential neighborhood within the 2,000 foot boundary.

¹⁰ According to KRS 278.700(6), a residential neighborhood is a populated area of five or more acres containing at last one residential structure per acre.

The Applicant has stated that the solar panels have been arranged within the Project boundary in a manner to maximize the energy produced, minimize costs and avoid sensitive areas such as streams and ponds. Existing constraints with the Project boundary include existing transmission lines, pipelines, ponds, streams, areas with steep slopes and portions of parcels that landowners have specifically excluded from consideration in their agreements with Bobwhite (“Do Not Disturb” areas). Appropriate buffers/setbacks, determined through experience and industry best management practices, were applied to each constraint. Bobwhite also provided appropriate setbacks from roads, homes and non-participating parcel lines.

**Exhibit 3-5
Map of the Project Boundary and Residential Neighborhoods within 2,000 Feet of Project Facilities**



Source: Northern Bobwhite Solar, LLC, February 2021.

KRS 278.704(4) states that deviations from the setback requirements may be granted “on a finding that the proposed facility is designed to and, as located, would meet the goals of KRS 224.10-280, 278.010, 278.212, 278.214, 278.216, 278,218, and 278.700 to 278.716 at a distance closer than” those outlined in the setback statute.

The Applicant has submitted a document titled Northern Bobwhite Solar LLC’s Motion for Deviation from Setback Requirements (Motion for Deviation). That document addresses each of the statutes listed above, describing the Applicant’s or facility’s compliance with each, as follows:

- ***KRS 224.10-280: Cumulative Environmental Assessment (CEA)***: The Applicant has provided a CEA that addresses air pollutants, water pollutants, waste, and water withdrawal. That report provides a detailed discussion of each topic area and concludes the following:
 - ***Air pollutants*** – Air emissions during the construction phase would be generated primarily through the operations of vehicles and equipment. The quantities of emissions would vary based upon the stage of construction, with the majority occurring during initial site grading and excavation. The only emissions during the ongoing operation of the Project would be from maintenance equipment, worker vehicles and groundskeeping equipment. Therefore, facility operations will generate negligible levels of air pollutants.
 - ***Water resources*** – Site grading and construction activities will be the most likely potential source of surface water pollutants such as sediment. Grading and excavating activities will be minimized by incorporating topography into the layout of the site to the greatest extent possible. Final grading will result in contouring the land consistent with surrounding areas and will be stabilized with vegetation. A stormwater pollution prevention plan (SWPPP) will be prepared and implemented to minimize impacts associated with the construction activities. Best Management Practices (BMPs) including silt fences, sediment basins, and buffer zones will be identified in the SWPPP and implemented where appropriate.

Given the minimal chemical use and implemented BMP’s, it is unlikely that this Project will negatively impact any (groundwater) water resources in the area during the construction or ongoing operations phases.

- ***Wastes*** – General construction debris is expected to be generated during the construction phase of the Project. All waste materials generated at the site will be recycled when practicable, and otherwise will be disposed of in accordance with all local, state, and federal regulations at an appropriate permitted off-site location. BMPs will be implemented to inspect waste generation and storage practices to ensure that all material is managed in accordance with all applicable regulations. In the event hazardous waste is generated, Bobwhite

will develop a hazardous material business plan to ensure materials are handled, used, and stored accordance with BMPs.

During the ongoing operations of the site, wastes will be generated through the replacement and repair of the photovoltaic solar panels and associated equipment. All materials will be recycled when practicable and wastes will be disposed of in accordance with all applicable regulations.

- **Water withdrawal** – Construction and standard facility operations will require water. Wells that currently exist within the Project area that are fed by underground aquifers will be used for water supply or water will be hauled in as needed.¹¹ There is enough natural movement of groundwater to maintain current demand on water supplies. If there are no existing wells or if existing wells are not sufficient for construction and operations, a new well may be developed. Bobwhite does not anticipate construction and operation of solar electricity generating facilities to be water-use intensive. Water withdrawal for the Project is not expected to create negative effects on regional water resources.
- **KRS 278.010: Definitions applicable to associated statutes:** The Motion for Deviation states that “Bobwhite has met the goal of KRS 278.010 by filing a complete Application pursuant to the applicable statutes utilizing the definition of any applicable term defined in KRS 278.010.”
- **KRS 278.212: Filing of plans for electrical interconnection with merchant electric generation facility; costs of upgrading existing grid:** The Motion for Deviation states that “Bobwhite will comply with this requirement through the Interconnection Service Agreement included in Exhibit J of the Application. Additionally, Bobwhite will be responsible for the appropriate costs resulting from interconnecting with the electric utility”.
- **KRS 278.214: Curtailment of service or generation and transmission cooperative:** The Motion for Deviation states that “to the extent they apply to the Project, Bobwhite will comply with the requirements of KRS 278.214 and the requirements of the Interconnection Service Agreement included in Exhibit J of the Application”.
- **KRS 278.216: Site compatibility certificate; site assessment report; commission action on application:** This statute applies to jurisdictional utilities. The Motion for Deviation states “Bobwhite is not a utility as defined in KRS 278.010(3), and, as such, KRS 278.216 does not apply. However, by submitting its application to the Board and

¹¹ In response to HE inquires, the Applicant stated that the Project intends to use water that will be hauled in as needed for dust suppression. Water use is heavily dependent on weather and will only be required if dust becomes an issue for on-site work or off site (during construction). No water will be required during the operation of the Project for dust suppression.

complying with the similar requirements in KRS 278.700 to KRS 278.716, the Bobwhite Project meets the goals of KRS 278.216.”

- ***KRS 278.218: Approval of commission for change in ownership or control of assets owned by utility:*** According to the Motion for Deviation, “Bobwhite is not a utility as defined in KRS 278.010(3) and accordingly, KRS 278.218 does not apply.” The Motion for Deviation states that “to the extent Board approval may at some time be required for Bobwhite to transfer ownership or control of its assets, Bobwhite will comply with the applicable statutory and regulatory requirements.”
- ***KRS 278.700 – 278.716: Electric Generation and Transmission Siting:*** The Motion for Deviation states that “Bobwhite’s application includes an evaluation of the issues required by KRS 278.700 to KRS 278.716. Moreover, Bobwhite has designed the Project to ensure that, through Project layout and other mitigation measures, it will not intrude or otherwise disrupt its neighboring landowners.”

Evaluation of noise levels produced by facility. Noise levels related to facility construction and operations are discussed in detail in Section 5 of this report.

Results of SAR Review – Proposed Site Development Plan

Conclusions. Based on HE’s review of the Northern Bobwhite SAR, the subsequent information provided by the Applicant in response to two rounds of inquiries and follow-up questions, and other secondary area research, HE offers the following conclusions regarding the proposed site development plan:

- We believe that the Applicant has generally complied with the legislative requirements for describing the facility and a site development plan, as required by KRS 278.708.
- Security and access control measures appear to be adequate, given the type of facility and its location in a rural area.
- The Bobwhite Project does not meet the existing setback requirements, so the Applicant has made a motion for a deviation from those requirements. HE believes that the Project, as proposed, does meet the specific statutes noted for consideration in a setback deviation, assuming the mitigation HE proposes is adopted. The Siting Board will need to judge the quality of the Applicant responses in the setback deviation request.

Need for mitigation. Mitigation measures described in the SAR, or recommended by HE, which are related to the description of the facility and the proposed site development plan include:

1. A final site layout plan should be submitted to the Siting Board upon completion of the final site design. Deviations from the preliminary site layout plan which formed the basis for HE’s review should be clearly indicated on the revised graphic. Those changes would include, but are not limited to, location of solar panels, inverters, transformers,

- substation, operations and maintenance building or other Project facilities or infrastructure.
2. Any change in Project boundaries from the information which formed this evaluation should be submitted to the Siting Board for review.
 3. The Siting Board will determine if any deviation in the boundaries or site development plan is likely to create a materially different pattern or magnitude of impacts. If not, no further action is required, but if yes, the Applicant will support the Siting Board's effort to revise its assessment of impacts and mitigation requirements.
 4. A final, Project-specific construction schedule, including revised estimates of on-site workers and commuter vehicle traffic, should be submitted to the Siting Board. Deviations from the preliminary construction schedule, which formed the basis for HE's review, should be clearly indicated.
 5. The Siting Board will determine if any deviation to the construction schedule or workforce estimates is likely to create a materially different pattern or magnitude of impacts. If not, no further action is required, but if yes, the Applicant will support the Siting Board's effort to revise its assessment of impacts and mitigation requirements.
 6. The Applicant or its contractor will control access to the site during construction and operation. All construction entrances will be gated and locked when not in use.
 7. The Applicant's access control strategy should also include appropriate signage to warn potential trespassers. The Applicant must ensure that all site entrances and boundaries have adequate signage, particularly in locations visible to the public, local residents, and business owners.
 8. According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work. The substation will have its own separate security fence and locked access installed.

SECTION 4

Project Setting

Description of the Area

This section provides a description of the area surrounding the proposed Project site. The Project site is located near Lebanon, a city in Marion County, which is essentially the geographic center of Kentucky. Marion County includes parts of the Outer Bluegrass, Knobs, and Mississippian Plateau Regions, which consists of rolling hills and agricultural land, with wooded areas sprinkled throughout.¹²

Population and housing density. As of mid-2019, about 19,300 people resided in Marion County.¹³ The County's population has fluctuated slightly over the past 20 years; in 2000 the population was around 18,000 and in 2010 the population was about 20,000.^{14,15} About ninety percent of the population is white, seven percent is African American, and the median age of all residents is 39.¹⁶ Marion County is predicted to remain stable in population. The Kentucky State Data Center estimates 19,900 people will reside in the County in 2040, which was the population in 2010.¹⁷ Currently, there are about 7,400 households in Marion County, with an average of about 2.5 persons per household.¹⁸ There are 58 people per square mile, which makes Marion County about 50th out of 120 Kentucky counties in terms of population density.¹⁹

Lebanon is a city in central Kentucky with about 5,600 people and is the county seat of Marion County. Lexington is located about 64 miles northeast of Lebanon, and Louisville is about 66 miles northwest of Lebanon. The Lexington-Fayette metropolitan statistical area has a

¹² Kentucky Geological Survey. Generalized Geologic Map for Land-Use Planning: Marion County, Kentucky.

https://kgs.uky.edu/kgsweb/olops/pub/kgs/mc137_12.pdf

¹³ U.S. Census Bureau. Marion County Quickfacts.

<https://www.census.gov/quickfacts/fact/table/marioncountykentucky/PST045219>

¹⁴ U.S. Census Bureau. Marion County, Kentucky, Profile of General Demographic Characteristics.

<https://data.census.gov/cedsci/table?q=marion%20county%20kentucky&y=2000&tid=DECENNIALDPSF42000.DP1&hidePreview=false>

¹⁵ U.S. Census Bureau. Marion County, Kentucky, Annual Estimates of the Resident Population: April 2010 – July 1, 2019.

<https://data.census.gov/cedsci/table?q=marion%20county%20kentucky&tid=PEPPPOP2019.PEPANNRES&hidePreview=true>

¹⁶ U.S. Census Bureau. Marion County, Kentucky, Age and Sex.

<https://data.census.gov/cedsci/table?q=marion%20county%20kentucky&tid=ACSST5Y2019.S0101&hidePreview=false>

¹⁷ Kentucky State Data Center, Projections of Population and Households, State of Kentucky, Kentucky Counties, and Area Development Districts 2015 – 2040.

<http://www.ksdc.louisville.edu/wp-content/uploads/2016/10/projection-report-v16.pdf>

¹⁸ U.S. Census Bureau. Marion County Quickfacts.

<https://www.census.gov/quickfacts/marioncountykentucky>

¹⁹ Statistical Atlas. Marion County, Kentucky.

<https://statisticalatlas.com/county/Kentucky/Marion-County/Population>

population of about 517,000, and the Louisville/Jefferson County metropolitan statistical area has a population of nearly 1.3 million.²⁰

Income. In 2019, the per capita personal income in Marion County was \$37,340.²¹ This was 16 percent less than the per capital personal income in Kentucky, and 34 percent less than the average in the United States.²² As of mid-2019, about 17 percent of the Marion County population lived in poverty.²³

Business and industry. In 2019, there were about 12,100 jobs in Marion County, with 76 percent classified as wage and salary jobs and 24 percent being proprietors' employment.²⁴ Since 2001, the number of jobs in the County has grown steadily from 9,000 jobs to 12,100 jobs, except for a blip in 2008-2009 when jobs decreased to below 10,000 jobs.²⁵

- Manufacturing is the largest economic sector in Marion County, with roughly 4,300 jobs.²⁶ TG Kentucky, LLC (automotive part manufacturer) is the largest manufacturer with 1,100 employees. Curtis Maruyasu America, Inc. (automotive fluid, gas control, and technology fabricator) is the next largest manufacturer with 600 jobs. Kentucky Cooperage (crafters of wooden barrels for spirits) follows with 460 employees. Wilbert Plastic Services (plastics manufacturers) employs about 400 employees.²⁷
- Agriculture is the next largest sector, with 1,040 total jobs. As of 2017, 163,000 acres were farmland, which equates to roughly 73 percent of the total acreage in Marion County.²⁸ Hay and haylage are the top crops grown, in terms of acreage. Soybeans, corn, and wheat are the next largest in acreage.

²⁰ U.S. Census Bureau. Lexington-Fayette and Louisville/Jefferson, Annual Estimates of the Resident Population by Metropolitan Statistical Area.
<https://www.census.gov/data/tables/time-series/demo/popest/2010s-total-metro-and-micro-statistical-areas.html>

²¹ U.S. Bureau of Economic Analysis. Marion County, GDP and Personal Income.
<https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&acrdn=6>

²² U.S. Bureau of Economic Analysis. United States and Kentucky, GDP and Personal Income.
<https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&acrdn=2>

²³ U.S. Census Bureau. Marion County Quickfacts.
<https://www.census.gov/quickfacts/fact/table/marioncountykentucky/PST045219>

²⁴ U.S. Bureau of Economic Analysis. Marion County, Total Full-Time and Part-Time Employment.
<https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&acrdn=6>

²⁵ U.S. Bureau of Economic Analysis. Marion County, Total Full-Time and Part-Time Employment.
<https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&acrdn=6>

²⁶ U.S. Bureau of Economic Analysis. Marion County, Total Full-Time and Part-Time Employment.
<https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&acrdn=6>

²⁷ Kentucky Crossroads. Top 25 Largest Employers Located in Kentucky Crossroads (manufacturing and/or support service).
<https://www.kycrossroads.com/existing-industries/>

²⁸ U.S. Census of Agriculture. Marion County, Kentucky Profile.
https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Kentucky/cp21155.pdf

- Government is the third largest sector in the County, with about 1,030 jobs, and retail trade is the next largest sector with roughly 890 jobs.

Major and minor roads and railways. The Project site is just east of Kentucky Route (KR) 55. There are no interstate highways in Marion County. There are no railroads near the vicinity of the Project site.

Overall area description. Based on HE's research, the area around the Project site can be generally described as rural and agricultural. The population is generally stable and older; and the population is expected to remain stable over the next 30 years. Residents' income levels are low, and they experience higher than average rates of poverty than in other counties in Kentucky and the U.S.²⁹

²⁹ U.S. Census Bureau. Kentucky Quickfacts.
<https://www.census.gov/quickfacts/fact/table/KY/POP060210>

SECTION 5

Description of Impacts

This section of the report addresses impacts to the following resource topics, as enumerated in KRS 278.708 and KRS 278.706(j):

- Compatibility of the facility with scenic surroundings;
- Potential changes in property values and land use for adjacent property owners;
- Anticipated peak and average noise levels;
- Road and rail traffic, fugitive dust and anticipated degradation of roads and lands; and
- Economic impacts on the region and the state.

The statutes require that the SAR provides information about impacts to the above resources resulting from short-term construction activities and longer-term operational activities. The PSC directed HE to also address the potential effects of decommissioning activities and that discussion is included in this section.

For each resource topic, HE describes generally accepted assessment criteria or methodology necessary to evaluate impacts of a project of this nature. We then summarize the relevant information included in the SAR, as well as supplemental information about the Northern Bobwhite Project provided by the Applicant in response to data inquiries. Additional information gathered about the Project, its potential impacts on the region through secondary source research, including interviews, is also provided. Finally, HE draws conclusions about Project impacts as well as recommended mitigation measures.

Facility Compatibility with Scenic Surroundings

This component of the statute relates to how well the proposed facility will “blend-in” or is compatible with its physical surroundings and associated land uses. For example, certain industrial facilities can be visually unappealing, and generally incongruous with the surrounding area. Coal-fired electric generating plants often have large smokestacks that can be seen from far away. Wind turbines are tall, and their blades can be seen spinning from miles away, etc. Generally, solar farms are considered to be less visually intrusive, as they are relatively short, and can be effectively visually blocked through strategic use of surrounding vegetation.

General methods of assessment. Visual impacts of solar facilities are highly dependent on the characteristics of the surrounding area, i.e., industrial, suburban/residential, rural/agricultural. As a result, different methods may be used to assess the visual impacts of solar facilities, depending on location. The Argonne National Laboratory’s Environmental Science Division and the National Park Service jointly developed the *Guide to Evaluating*

Visual Impact Assessments for Renewable Energy Projects. This document is a guide designed to help planners evaluate the quality and completeness of visual impact assessments for solar and wind facilities.³⁰ Additional reports have been published from public agencies and private firms on visual impact assessments for solar facilities.

Most visual impact assessments focus on visualizations of the appearance of the project from key observation points (KOPs). Since it is impossible to visualize proposed projects from every observation point, it is common for planners to utilize a “worst-case” potential visual impact, i.e., locations where perceived change may be greatest. The overarching goal of the visual impact assessment is to determine potential visual impacts that may result from construction, operations, and decommissioning of a project, in a manner that is logical, repeatable, and defensible.³¹

A standard visual analysis generally proceeds in this sequence:³²

- Description of the Project’s visual setting;
- Identification of KOPs. KOPs are locations near the Project site where there is potential for solar facility components to be seen from ground-level vantage points, i.e., a nearby residence or a passing vehicle;
- Analysis of the visual characteristics of the Project, i.e., height of solar panels, descriptions of other facility components; and
- Evaluation of impacts at KOPs.

Summary of information provided by Applicant. The Applicant relies on Appendix A (Kirkland Report) and Appendix I (Conceptual Mitigation Planting Plan) when discussing the Project’s compatibility with its surroundings.

Visual setting. The Applicant describes the area as mostly rural and agricultural. The land under the Project is rolling hills and flatland, with some steep areas near streams. The Applicant states that large portions of the site are in areas that will not be visible from any roadways or neighbors. There is one neighborhood within 2,000 feet of the Project boundary, but it is unlikely any of these homes will be able to view the solar panels; any solar panels that could be seen from this neighborhood would be very far away from homes and should not cause any visual impacts to residents.

Key observation points. The Applicant does not identify any key observation points as part of their visual analysis but does provide photos in Appendix F (Part 1, Appendix B), and Appendix G (Appendix B) that give a general visual representation of the area.

³⁰ National Park Service, U.S. Department of the Interior. *Guide to Evaluating Visual Impact Assessments for Renewable Energy Projects*. August 2014. <http://visualimpact.anl.gov/npsguidance/>.

³¹ Dean Apostol, James Palmer, Martin Pasqualetti, Richard Smardon, Robert Sullivan. (2016). *The Renewable Energy Landscape: Preserving Scenic Values in our Sustainable Future*. September 2016.

³² Environmental Design & Research. *Visual Impact Analysis*. May 2019.

The Applicant has committed to adding a vegetative buffer to mitigate viewshed impacts for residences and roadways. The Applicant has pledged to install vegetative buffers where natural screening is not present for solar panels or inverters within 500 feet of a residence with a direct line of sight. Vegetative buffers will also be used if solar panels or inverters are located within 300 feet of a public roadway with a direct line of sight. The Applicant concluded that vegetative buffers would mitigate against visual impacts for 15 residences and 1.85 miles of roadway.

For areas that necessitate a vegetative buffer, the Applicant's planning strategy is broken into three modules:

1. The first module focuses on roadside enhancement. This module utilizes visual buffers where roadside screening from solar panels is absent;
2. The second module focuses on open field / supplemental hedgerow. This module utilizes visual buffers where existing hedgerows (commonly occurring between agricultural fields or along roadsides) are present but do not provide an appropriate amount of screening; and
3. The third module focuses on adjacent visually sensitive resources/ residences. This module utilizes visual buffers from residences on adjacent properties or other visually sensitive resources. This module emphasizes evergreen species that provide denser year-round screening.

Each module is intended to be naturalistic, and species chosen are similar to local vegetation. Each module is also flexible, in the sense that the final plant species chosen for a given location can respond to the unique character and needs of a location in need of visual buffers. Nearly all modules will reach a height of eight feet by 4 years, and numerous plants will be at least eight feet tall at the time of installation.

Construction activities. The Applicant expects to remove approximately 106 acres of trees throughout the construction process and grade up to 30 percent of the Project site. The Applicant expects 750 acres of the Project site will be altered. The Applicant has committed to stop any tree clearing from April 1 to September 30, in order to protect the habitat of bats in the area.

Project facilities. The majority of visual impacts will be the solar panels themselves. HE assumes panels with tracking motors will be built on the land, meaning the panels can raise to a height of 10-15 feet when tilted toward sunrise or sunset. A substation will be built within the Property, but this will be co-located with other similar looking electrical buildings, and the Applicant does not expect this to materially alter the surrounding area. Additional infrastructure, such as transmission line poles 70-100 feet in height will be constructed within the Property boundary, but the Applicant does not expect these to materially alter the surrounding area due to the numerous other power lines co-located in the area.

The Applicant has not conducted a glare study but has committed to working with community members to reduce glare for any homes that experience glare for more than 60 minutes in a

year. The Applicant is currently performing a glare study to assess glare impacts for the Lebanon-Springfield Airport. At the time of publication for this report, the study had not been completed.

HE's evaluation of impacts. HE used maps, Google Earth satellite imagery, and Google maps to “drive” around the area to assess viewpoints of the Project from a vehicle commuter’s point of view. In addition, HE staff visited the Project site on February 24, 2021. During this site visit, we visited the proposed access points, drove around the proposed boundary to gain line-of-sight to various viewpoints, and compiled a photo log of the Property boundary at different areas. The photo log is shown in Appendix B.

Visual setting. The area surrounding the Project is mostly agricultural, with residential homes scattered about the area. As shown in Exhibit 3-3, five residences are within 300 feet of the solar panels, and 35 residences are within 900 feet of the solar panels. There are five commercial/ industrial buildings within 2,400 feet of the solar panels, and none of these are expected to experience any visual effects from the solar panels. Approximately 325,000 solar panels will be located within the Project boundary.

A majority of the Project will be blocked from view for residents and commuters due to rolling hills. The topography of the area, which includes numerous rolling hills, is helpful in hiding panels from view. Numerous sections of the Project are set on the other side of hills that cannot be accessed by the public.

Key observation points. During the site visit, HE identified key observation points as each of the nine access points identified in Exhibit 3-1. Due to the topography of the area, apart from the proposed access points there are very few places where the solar panels might be seen by commuters or residents. It is possible commuters may see solar panels to the south of Horan Lane east of Access Point #1, to the west of Gene Campbell Road near Access Point #5, to the east of Gene Campbell Road near Access Point #8, and to the west of St. Ivos Road near Access Point #6, but these roads have little traffic, and the areas are obscured with trees and hills and HE does not think it likely the panels will cause significant visual impacts.

Construction activities. Commuters along KR-55 or United States Highway (US) 68 should not have glimpses of construction equipment besides vehicles commuting to the Project site. Commuters along Barbers Mill Road, Horan Lane and Simstown Road should not have many, if any, views of construction equipment. Commuters along Radio Station Road, Gene Campbell Road, and St. Ivos Road may see construction equipment working within the site, but glimpses would be short, and impacts should be limited. HE expects the visual impacts from construction activities to be very minimal.

Project facilities. HE’s focus of the scenic compatibility evaluation is upon the solar panels, as those structures will be of the greatest height above ground in proximity to KOP’s. The solar panels rest at a typical height of about six feet tall, which is their height during their “flat” orientation. The solar panels height increases as the tracker motors tilt the panels towards the east in the morning and west in the afternoon. The maximum height of the panels during their biggest tilt is 10-15 feet.

The panels are expected to be mostly hidden from view because of the topography of the land and the Applicant has committed to planting a vegetative buffer to shield the view of panels from roadways and residences. Any glare from the panels will essentially be nonexistent once the vegetative buffer reaches eight feet high, which will be within zero to four years. Some of the vegetative species being planted will be eight feet high at the time of installation. The Applicant has committed to performing maintenance on the vegetative buffer immediately after storms, and once every five years after installation.

The substation will also be mostly hidden from view, as it will be set back from Radio Station Road. The proposed substation and power lines will coexist with the current area, as there is a Marion County substation more visible to commuters on Radio Station Road and numerous power lines in the area.

Conclusions and recommendations. Based on our review of the SAR, supplemental information provided by the Applicant, and additional research conducted by HE, we offer the following conclusions and recommendations regarding scenic compatibility:

- The panels will be mostly hidden from view, primarily due to the topography of the land.
- The Applicant has committed to providing vegetative buffers for homes which should alleviate most visual impairment.
- The substation will be hidden from nearly all viewing points.
- The Applicant will utilize solar panels with anti-reflective coatings. The Applicant has committed to engaging with the community members that experience glare for more than 60 minutes in a year. The Applicant has not committed to ceasing operations as a result of glare impacts.

Need for mitigation. The visual impacts are likely to be such that the Applicant should consider certain mitigation:

1. The Applicant will not remove any existing vegetation unless the existing vegetation needs to be removed for placement of solar panels.
2. Existing vegetation between the solar arrays and the residences will be left in place, to the extent practicable, to help screen the Project and reduce visual impacts from nearby homes and roadways.
3. The Applicant has committed to providing vegetative buffers for houses (15) with sight lines within 500 feet of solar panels, and for roadways (1.85 miles) with sight lines within 300 feet of solar panels.

4. The Applicant has committed to working with homeowners to address glare impacts that may occur for any residents that experience glare for more than 60 minutes in a year.
5. The Applicant will consider cultivating at least two acres of native pollinator-friendly species within the solar facility site in the southwestern and northeastern parcels of the Project, leaving the site with a total of four acres of native pollinator-friendly species.

Potential Changes in Property Values and Land Use

The construction and operation of industrial facilities has the potential to negatively affect property values and/ or land uses of those properties adjacent to, or even in the general vicinity of, the facility in question. The magnitude, timing, and duration of increased traffic volume, noise, odor, visual impairments, or other emissions associated with the facility can influence the marketability and value of nearby properties. Each of those factors are addressed in this report and are considered here in evaluating property value impacts.

General methods of assessment. The value of a residential property is based on a number of factors, including characteristics of the home and the land on which it is situated, the surrounding property uses and values, among other attributes. The value of a residential property will consider things such as lot size, age of home, size of home, number of bedrooms and bathrooms, etc. A residential property located near public lands or open space may be more highly valued, whereas the same property located near a heavy industrial facility might have a lower value. Residential properties will be assessed differently than agricultural or industrial properties.

Several methods are available to assess the impacts of a new development on nearby property values. A technique known as hedonic pricing analysis can be used to determine the impacts of a specific characteristic on the price or value of a property. However, this method of valuation requires large amounts of data, statistical experience, and careful evaluation. Formal appraisal is a technique which uses the concept of specific property characteristics in comparing different properties. Matched-pair analysis is another technique. A matched-pair analysis makes a comparison between similarly situated properties that sold before and after a new industrial facility is constructed. This approach is described in more detail below.

Summary of information provided by the Applicant. The SAR provides a Property Value Impact report prepared by the Applicant's consultant, Richard Kirkland of Kirkland Appraisals, LLC (Kirkland). The Kirkland report and additional information provided by the Applicant provides the following relevant information:

- ***Residences located within the Project boundary*** – Seven residential structures are located within the Project boundary, at distances of between 240 and 1,800 feet from the closest solar panels. Those structures are occupied and owned by landowners who have entered into lease agreements with Bobwhite to include their parcels in the Project. The lease agreements define specific “Do Not Disturb” areas around these structures; those areas are expressly excluded from solar panel development.

According to the Applicant, by defining a “Do Not Disturb” area, these landowners have waived their respective setback rights to the extent permissible by law. However, Bobwhite applied the same setback distances to those residential structures as they did to all other residential structures on non-participating parcels, unless the “Do Not Disturb” areas required additional setbacks.

- ***Land uses of adjacent properties*** – Kirkland describes adjoining land as primarily a mix of residential and agricultural uses. About 56 percent of the acreage adjacent to the facility is mixed agricultural/ residential; an additional 38 percent is agricultural and about five percent is identified as purely residential.³³ According to the Applicant, an estimated 77 residences and three commercial or industrial structures are located within 1,200 feet of the Project boundary. No schools, hospitals, or religious facilities are located within 2,400 feet of the Project boundary.
- ***Distances between solar panels and homes on adjacent properties*** – the Kirkland report indicates that the closest home will be approximately 205 feet away from a solar panel. In response to HE’s inquiries, the Applicant provided additional information about the distance between residential structures and the nearest solar panels; those data were provided in Exhibit 3-3. Altogether, a total of 46 homes and three commercial or industrial structures are located within 1,200 feet of the solar panels. No schools, hospitals, or religious facilities are located within 2,400 feet of the solar panels.
- ***Discussion of a “matched-pair” analysis*** – The Kirkland report employs an analytical approach described as a matched-pair analysis, which aims to determine the impact of a specific feature or attribute on property value. This form of “matched-pair” analysis compares differences between the sales prices of properties adjacent to solar facilities and sales prices of properties located further from that same facility.³⁴ Kirkland identifies and compares the sales prices of properties sold using data from 44 different solar farms across multiple states. In general, each of the solar farms included in the analysis are relatively similar in terms of rural, less densely populated locations. Nearby land uses are typically residential and agriculture in nature. The size of the solar facilities evaluated ranges from about 0.2 MW up to 80 MW and from an overall property site of 24 acres (4 MW facility) up to 2,034 acres (80 MW facility). The results of this analysis and Kirkland’s overall conclusions are discussed below.
- ***Narrative discussion of specific factors related to impacts on property values*** – Kirkland briefly addresses the topics of hazardous materials, odor, noise, traffic, stigma, and appearance as related to solar facilities in general and concludes that the “proposed solar farm [Northern Bobwhite] will not negatively impact adjoining

³³ The Marion County 161 kV Substation is located on about 10 acres of land adjacent to the Project’s western boundary line.

³⁴ Kirkland makes adjustments for such factors as date of sale, age of home, square footage, number of bedrooms and bathrooms and garage spaces prior to comparing sales prices.

property values”. Kirkland does state that “the only category of impact of note is appearance, which is addressed through setbacks and landscaping buffers.”

- ***Construction related impacts to property values*** – Kirkland states that no impacts to property values are anticipated due to construction activity on the Project site. The report notes that “construction will be temporary and consistent with other development uses of the land and in fact dust from the construction will likely be less than most other construction projects given the minimal grading”.

Kirkland’s conclusions. Based on analysis of 96 residential dwelling matched-pairs associated with the 44 solar farms noted above, Kirkland concludes that:

“The range of differences (in sales prices) is from -10% to +10% with an average of +1% and median of +1%. This means that the average and median impact is for a slight positive impact due to adjacency to a solar farm. However, this 1% rate is within the typical variability I would expect from real estate. I therefore conclude that this data shows no negative or positive impact due to adjacency to a solar farm.”

Kirkland acknowledges that the -10% to +10% range is “seemingly wide” and notes that the “vast majority of the data falls between -5% and +5% and most of those are clearly in the 0 to +5% range.”

A separate analysis of 10 land sale matched-pairs shows property value impacts ranging from -12% to +17%, with a median impact of 0% due to adjacency to a solar facility.

- Kirkland concludes that the land sale matched-pair “data supports no negative or positive impact due to adjacency to a solar farm.”

In response to HE’s inquiries, Kirkland also evaluated a sub-set of the 44 total solar farms, focused on 19 matched-pair sets for seven solar facilities between 70 MW and 80 MW. Kirkland concludes that the price differential for those matched-pairs ranges “between -2% and +5% with two findings suggesting a positive impact over +5% and two findings suggesting a negative impact over -5%.

In response to HE inquiries regarding the potential effects of larger solar facilities, Kirkland makes the following comments:

- “Any impact from a solar farm is limited to the visual impacts...Essentially, if you can’t see it, hear it, or smell it and there are no health impacts, then it doesn’t matter how large that use might be.”
- “While solar farms often can be seen in bits and parts from adjoining properties, the adjoining homeowner is not able to see 2,000 adjoining acres either before or after the project. Adjoining a 20 MW facility with an appropriate landscaping buffer would offer the homeowner the same effective view as a 200 MW facility in most cases.”

- “Landscaping is an important tool in maintaining a good visual buffer. It is not necessary for the solar farm to be invisible. There is no evidence found in the evaluation that indicates the visibility of solar farms or other solar infrastructure had a measurable negative impact on property values. Many of the matched-pairs considered in the analysis can see solar farms. However, the primary need for a landscaping screen is to obscure the up-close view of panels near the ground, Distant views of solar panels can be found in many locations with panels peeking through trees or on hillsides with no particular or measurable negative impacts.”

Kirkland also provides a long list of larger solar farm projects across the country ranging in size from 50 MW up to 1,000 MW (average size of 112 MW), including descriptive information such as the average distance to homes, closest distance to homes and types of adjoining uses. However, data does not include additional matched-pair pricing analysis of very large facilities.

HE’s evaluation of impacts. To assess the topic of impacts to property values, HE: (1) reviewed relevant existing literature related to solar facility impacts; (2) conducted interviews with several real estate professionals in Marion County; and (3) prepared further analysis of the data provided in the Kirkland report. Since the Bobwhite solar facility is relatively large at 96 MW (larger than any of the facilities included in Kirkland’s matched-pair data sets), HE was particularly interested in potential effects of larger scale facilities on nearby home values.

Literature review. HE reviewed the existing literature related to the relationship between property values and utility – scale solar facilities. Overall, there are not many studies available that address the issue of changes in property values specifically related to solar facilities; the few that are available include the following:

- A 2020 study completed by economists at the University of Rhode Island found that in areas of high population density, houses within a one-mile radius depreciate by about 1.7 percent following construction of a solar array. The study found “substantially larger negative effects for properties within 0.1 miles and properties surrounding solar sites built on farm and forest lands in no-rural areas.” However, additional analysis focused on impacts in more rural areas found that the “effect in rural areas is effectively zero (a statistically insignificant 0.1%) and that the negative externalities of solar arrays are only occurring in non-rural areas.” The researchers note that this may be due to solar facilities being less visible in rural areas (due to land abundance or vegetative buffers).³⁵
- A 2020 study focusing on the property value effects of wind turbines and solar facilities in the Netherlands states evidence suggesting that the negative effects of solar facilities (including noise (buzzing sounds), glare and visibility) results in decreased residential housing prices (2-3%). They found these effects to be localized (within 1km of the facility, or a little more than half a mile). However, the

³⁵ Gaur, V. and C. Lang. *Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island*. University of Rhode Island, Department of Environmental and Natural Resource Economics, September 2020. <https://web.uri.edu/coopext/files/PropertyValueImpactsOfSolar.pdf>

researchers also note that the relatively small number of solar facilities in the Netherlands makes the results less precise (as compared to the wind farm analysis).³⁶

- A 2019 article produced by the American Planning Association (APA) indicates that the “impact of utility-scale solar facilities is typically negligible on neighboring property values.” The issue of property value impacts “can be a significant concern of adjacent residents, but negative impacts to property values are rarely demonstrated.”³⁷
- A 2018 University of Texas study included a geospatial analysis and a survey of residential property assessors to determine the potential for property value impacts. The results show “that while a majority of survey respondents estimated a value impact of zero, some estimated a negative impact associated with close distance between the home and the facility, and large facility size. Regardless of these perceptions, geospatial analysis shows that relatively few homes would be impacted.”³⁸
- Independent appraisers are often hired to conduct analyses related to property value impacts for solar companies, as is the case here for the Bobwhite facility. Those analyses focus on property value trends of lands adjacent to existing solar farms across the country, using a paired sales or matching-pair approach. HE reviewed several appraisal reports (not completed by Kirkland Associates); those appraisals indicate differences in property values ranging from about -3.2% to as much as +27%, although generally in cases with positive impacts, property values increased by about 5% or less. Overall, the conclusions were that solar facilities do not negatively impact property values.³⁹

It is interesting to note that although the few existing studies related to this issue generally indicate no impacts to property values, local residents often bring up concerns about property

³⁶ Koster, H. and M. Drees. *Wind turbines and solar farms drive down house prices*. VoxEU, September 2020. <https://voxeu.org/article/wind-turbines-and-solar-farms-drive-down-house-prices>. Mr. Koster is Professor of Urban Economics and Real Estate at Vrije University in Amsterdam; Mr. Drees is Assistant Professor of real Estate Finance at the University of Amsterdam.

³⁷ Coffey, Darren. *Planning for Utility-Scale Soar Energy Facilities*. American Planning Association, PAS Memo, September – October 2019. <https://www.planning.org/pas/memo/2019/sep/>.

³⁸ Al-Hamoodah, Leila, et al. *An Exploration of Property-Value Impacts Near Utility-Scale Solar Installations*. Policy Research Project, LBJ School of Public Affairs, The University of Texas at Austin, May 2018. https://emp.lbj.gov/sites/default/files/property-value_impacts_near_utility-scale_solar_installations.pdf.

³⁹ McGarr, P. and A. Lines, CohnReznick, Property Value Impact Study, Proposed Soar Farm, McLean County, IL, 2018; McGarr, P. and A. Lines, CohnReznick, Property Value Impact Study, Proposed Soar Farm, Kane County, IL, 2018; McGarr, P., CohnReznick, Property Value Impact Study, Adjacent Property Values Solar Impact Study: A Study of Nine Existing Solar Farms Located in Champaign, LaSalle, and Winnebago Counties, Illinois; and Lake, Porter, Madison, Marion, And Elkhart Counties, Indiana, 2018; McGarr, P., CohnReznick, Property Value Impact Study, Adjacent Property Values Solar Impact Study: A Study of Eight Existing Solar Farms Located in Lapeer County, Michigan; Chisago County, Minnesota; Marion County, Indiana; LaSalle County, Illinois; Bladen, Cumberland, Rutherford and Wilson Counties, North Carolina; and Isle of Wight County, Virginia, 2020.

values during public hearings or open houses related to specific solar facilities. In many cases, as evidenced by newspaper articles or other media, residents believe that property values will be reduced by nearby solar farms. So, there may at least be a perception of negative effects on property values that permeates communities. According to interviews conducted with the Marion County Property Value Administrator and local realtors, changes in property values do not appear to be a serious concern in Marion County, although many residents may be unaware of the proposed Project.

Interviews. HE conducted interviews with several individuals familiar with property valuation and real estate in Marion County.⁴⁰ Summaries of those interviews are provided below:

- **Mr. Terry Rakes, Marion County Property Valuation Administrator.** Mr. Rakes has been the Marion County Property Valuation Administrator for over 10 years and is aware of the Project in a general sense. He has not heard from any County residents regarding concerns about impacts to property values; however, he did comment that other than the landowners that have entered into lease agreements with Bobwhite and perhaps those adjacent to the Project site, it is most likely that other residents of the County have no clue that the Bobwhite Project has been proposed for the area. Mr. Rakes stated that the only interaction he has had with Bobwhite was a conversation related to tax payments when the leased acreage changes from being assessed as agricultural land to commercial property. He also stated that he believed the Bobwhite lease payments would be two to three times the rent obtained by a landowner for agricultural use and that that fact would drive up property prices in the County, or at least in the Project area. He did not have other thoughts about the potential for property value changes related to the solar facility. Mr. Rakes described a local housing market where prices are increasing rapidly due to low interest rates and higher construction costs. Residential growth in the County is occurring in the vicinity of Lebanon as well as throughout more rural areas of the County.
- **Mr. Chuck Dye, Realtor with May & Parman Agency, Lebanon.** Mr. Dye has been a Marion County resident his entire life and has been a local real estate agent for the last 22 years. He had heard of the Bobwhite Project but did not have any detailed knowledge about its components, design, or operations. Mr. Dye also believes that very few people throughout the county are aware of the Project. In terms of potential impacts to property values, Mr. Dye believes that any effects would be limited to adjoining properties and would probably depend on what the current use of the adjoining property was. For example, if the adjoining property were used for agricultural production, its likely there would be no effect on prices. However, Mr. Dye was not certain there would be any effects on other types of properties either. In terms of local general perceptions regarding solar facilities, Mr. Dye commented that it depends on the person, with older folks perhaps having more concerns or opposition than younger folks. Mr. Dye confirmed and expanded on Mr. Rakes description of the local real estate market. Marion County is experiencing increasing home and property

⁴⁰ Mr. Terry Rakes, Marion County Property Valuation Administrator and Mr. Chuck Dye, Real Estate Agent, May & Parman Agency. Telephone interviews conducted with Susan Walker of Harvey Economics on March 10, 2021 and March 11, 2021, respectively.

prices; there are a limited number of properties on the market, but those on the market sell quickly; farmland prices are skyrocketing. The area is seeing some influx of residents from outside the County and outside the Commonwealth.

Review of Kirkland data. Although Kirkland concludes that there would be no impacts on property values from the Northern Bobwhite facility, the matched-pair analysis does indicate the potential for a range of positive or negative effects. As noted previously, the Kirkland data included 44 solar facilities, ranging in size from about 0.2 MW up to 80 MW. Fifteen facilities were larger than 20 MW and seven facilities were larger than 70 MW. Of the seven facilities larger than 70 MW, two were located in rural areas and five were located in suburban areas. HE examined more closely the data provided in the matched-pair sets to determine the likelihood of a positive impact, negative impact, or no impact. Exhibit 5-1 summarizes that effort.

Exhibit 5-1.

Number of Matched Pair Sets with Negative, Positive or No Impact Results

Facility Size	Number of Matched Pairs	Negative Impact		No Impact		Positive Impact	
		# of Pairs	% of Total	# of Pairs	% of Total	# of Pairs	% of Total
> 0.2 MW	96 Pairs	27	28.1%	13	13.5%	56	58.3%
> 70 MW	19 Pairs	4	21.1%	3	15.8%	12	63.2%

Source: Kirkland data set, 2020.

HE’s evaluation of the data by facility size indicates that the majority of matched-pair comparisons resulted in no sales price difference or an increase in sales price due to adjacency to the solar facility property, regardless of facility size. However, roughly one fifth of matched-pair comparisons included in the larger facility dataset indicated a negative effect and about 28 percent of all matched-pairs indicated a negative effect on sales prices. Exhibit 5-2 presents a more detailed picture of the distribution of price differences for matched-pair sets, by facility size.

Exhibit 5-2.

Distribution of Sales Price Differences for Matched Pair Sets, by Size of Solar Facility

Range of Impact	Facility Size			
	> 0.2 MW		> 70 MW	
-10% to -15%	0	0.0%	0	0.0%
-5% to -10%	3	3.1%	2	10.5%
0% to -5%	24	25.0%	2	10.5%
0%	13	13.5%	3	15.8%
0% to +5%	45	46.9%	10	52.6%
+5% to +10%	11	11.5%	2	10.5%
+10% to +15%	0	0.0%	0	0.0%
Total	96 Pairs	100.0%	19 Pairs	100.0%

Source: Kirkland data set, 2020.

For both datasets (all facilities and the larger facility subset), the majority of matched-pair sets reflect a sales price increase of between one percent and five percent.

Conclusions and recommendations. Based upon review of the Kirkland report and our additional research efforts and interviews, HE offers the following conclusions related to potential impacts to property values or land uses for adjacent property owners:

- Some of the literature and our interviews suggest that the concern surrounding impacts to property values from solar facilities stems from visibility of panels and other infrastructure. If that is the case, the creation of vegetative or other buffers may go a long way to reducing concerns or mitigating potential reductions in property values. For example, a group called Community & Environmental Defense Services, located in Maryland, supports local residents related to development concerns of all types, including solar farms. That group supports coordination and negotiation between solar companies and landowners related to implementation and maintenance of screening measures to protect the view.⁴¹
- Construction activities will be temporary, occurring over a period of about 12-18 months. Those activities will result in increased traffic and noise in the vicinity of the project; however, homebuyers and those interested in buying other types of properties often have the longer-term in mind when considering a purchase. Additionally, the high level of current market activity in Marion County, coupled with current low interest rates, will likely have a larger influence on desirability and prices than the solar facility construction. Even so, some sales might be delayed because of uncertainty.

⁴¹ Community & Environmental Defense Services, Solar Farms: Protecting Homes, Property Value, Views & the Environment While Reaping Solar Energy Benefits. <https://ceds.org/solar/>

- Current research suggests that the existence of solar facilities does not, in general, measurably influence property values for adjacent landowners in a negative direction, at least in rural areas. HE’s research, in combination with local interviews, points to a conclusion of no discernible impacts to property values. That conclusion is also supported by the specifics of operational activity and suggested mitigation at the Northern Bobwhite facility, including minimal increased traffic, no odors or emissions, panels which will be largely shielded from view and from noise through natural conditions or by Applicant efforts.
- Given the operations of the facility as described by the Applicant, there is no reason to believe that the Northern Bobwhite solar facility would affect the current or future desired land uses of surrounding agricultural or residential properties.

Need for mitigation. No unique mitigation measures are recommended related to potential impacts to property values or adjacent land uses. Other mitigation will help ensure that such effects are minimized.

Anticipated Peak and Average Noise Levels

Noise issues stem from construction activities and operational components of the solar facility. During construction, noise will emanate from graders, bulldozers, excavators, dozers, dump trucks, pile drivers and other equipment. During operations, noise will be emitted from transformers, inverters, and the tracking motors which tilt the solar panels to track the sun. Distance from noise emitters to noise receptors is an important factor in determining how loud a noise is, since noise emissions lessen the further a noise receptor is from a noise emitter. Marion County does not have a noise ordinance.

General methods of assessment. Sound levels are measured in decibel units (dB). Decibels are measured on a logarithmic scale that quantifies sound intensity. Sound levels are typically described as dBA, which is the measure of the overall noise level of sound across the audible spectrum to compensate for the varying sensitivity of the human ear to sound at different frequencies. The impacts of noise are not strictly related to loudness – the time of day when noise occurs, the duration of the noise, and baseline or background noise levels are also important factors in determining the “loudness” of a noise.

Generally speaking, an increase in 10 dBA is perceived as a doubling of loudness, that is to say, 70 dBA is perceived as twice as loud as is a level of 60 dBA.⁴² Once sounds reach 90 dBA, humans can experience pain and sounds above 150 dBA can cause permanent hearing damage.⁴³ As additional context, 30 dBA is the sound emitted by a whisper, 55 dBA is the sound emitted from a percolating coffee-maker, and 90 dBA is the sound emitted by a person’s yell.

⁴² RECON Environmental, Inc. *Noise Analysis for the Drew Solar Project, Imperial County, California*. July 24, 2018. <http://www.icpds.com/CMS/Media/Drew-Solar---Appendix-G.pdf>

⁴³ Alpine Hearing Protection website, <https://www.alpinehearingprotection.co.uk/5-sound-levels-in-decibels/#:~:text=0%20decibel%20is%20the%20so,permanent%20damage%20to%20your%20hearing.>

A standard noise impact assessment focuses on several key factors:⁴⁴

- Measurement of existing ambient noise levels;
- Identification of noise-sensitive receptor sites;
- Calculation of distances between noise sources and sensitive receptors;
- Estimation of Project-related (construction or operational) noise exposure, including cumulative noise effects.

Summary of information provided by the Applicant. Appendix D (“Noise Assessment”) is the Applicant’s Noise Assessment, which was completed by Smith Management Group (SMG), a consulting group with offices in Louisville and Lexington. This Noise Assessment analyzed Project noise levels during operations and construction. In RFI #1, the Applicant produced an additional Noise Assessment performed by Resource Systems Group, Inc. (RSG) which replaced the Operational Noise Conditions analysis (Section 2.4 of the Noise Assessment) performed by SMG. HE disregarded Section 2.4 of SMG’s Noise Assessment, per the Applicant’s request.

Baseline noise levels. The areas surrounding the Project site are described as rural and agricultural. The Applicant indicates that existing on-site noises are from traffic on rural roadways, Kentucky Route (KR) 55, KR-150 and KR-1195. Other sources of existing noise include cattle farms, insects, dogs, birds, other wildlife, and noise typically associated with a rural farming location.

Sensitive noise receptors. The Applicant identified five residential structures within 300 feet of the proposed solar panels, and 113 residences within 2,400 feet of the proposed solar panels (Exhibit 3-3). There are five commercial/ industrial structures within 2,400 feet of the proposed solar panels. The “other structures” listed in Exhibit 3-3 are barns and garages that are not considered sensitive noise receptors. The solar panels do not make noise during operations, but the panels will be mounted to racking systems which are powered by tracker motors, and the tracker motors are a source of potential noise emissions.

The RSG analysis identified two residences within 400 feet of the nearest inverter, three residences within 401-500 feet of the nearest inverter, and three residences within 501-600 feet of the nearest inverter.

Construction noise emitters. Numerous construction equipment projected to be utilized for this Project can generate considerable noise. The Applicant’s analysis includes noise estimates for bulldozers, backhoes, pile drivers and trucks (among other equipment) which come from the Federal Highway Administration’s estimated noise levels. There are myriad pieces of construction equipment estimated to emit noise levels greater than 80 dBA at 50 feet, which can be clearly heard from over 1,000 feet away. The Applicant indicated that since the land

⁴⁴ Department of Energy. Noise and Vibration Impact Assessment Methodology. https://www.energy.gov/sites/prod/files/edg/media/EIS0250F-S2_0369_Volume_V_Part_3.pdf;

being utilized for solar panels is largely open farmland, the need for extensive earth-moving equipment will be minimal.

The Applicant anticipates construction activities will generally occur from 7am – 10pm. The Applicant has stated that during normal construction activities, work will not occur after 6pm; however, work may continue after 6pm for infrequent work on time-sensitive tasks or to catch up in the event of unforeseen delays.

During construction activities, the loudest piece of equipment used will be a pile driver, which pounds posts into the ground. The posts are a critical part of the operational infrastructure, as they hold the solar panels off the ground. These pile drivers will move throughout the Project Area, pounding posts into the ground wherever solar panels are to be constructed. The pile driving activity is estimated to occur for about 19 weeks and generates noise emissions greater than 55 dBA for nearly a mile. Pile driving activities may occur for more or less time depending on factors such as shallow bedrock or wet weather.

Operational noise emitters. There are three types of noise emitters during operations: 210 tracker motors, 42 inverters, and one substation transformer. The Applicant's operational noise analysis, performed by RSG, was provided in RFI #1.

The tracker motors to be utilized by the Applicant are made by Array Technologies and each motor can power a total of 3,200 solar panels, which is many more panels than traditional tracker motors. These tracker motors are relatively quiet, as the sound pressure level dissipates to imperceptible levels at 50 feet away. The sound pressure level is the sound realized by the human ear.

There will be 42 inverters utilized by the Applicant. These inverters emit a sound pressure level of 58 dBA at 80 feet, and at 300 feet this noise reduces to less than 45 dBA. The closest residence is 377 feet away from the nearest inverter.

The main substation transformer emits a sound pressure level of 75 dBA at a distance of 1 foot. At 50 feet, this noise dissipates to imperceptible levels. The location of the substation also lends itself to mitigating against any potential noise impacts; the Marion County substation is closer to residents in the area, so any noise generated by the Project substation will likely not even be noticeable by residents. The closest residence is 1,633 feet away from the substation.

The Applicant's analyses conclude that the loudest constant noise levels that may be experienced by residences in the area would be 42 dBA. Only 4 residences will experience noise emissions greater than 40.0 dBA from Project operations.

The Applicant compares the noise emissions generated by the noise emitters to the standards set forth by the World Health Organization (WHO). The WHO identifies 50 dBA as the level of noise that may cause annoyance. Since the Applicant's analyses show that the loudest constant noise levels experienced by the nearest resident will only be 42 dBA, the Applicant concludes that the noise emissions from the Project will not be annoying to any residents.

HE's evaluation of impacts. The Commonwealth of Kentucky does not have an applicable noise ordinance and neither does Marion County. As such, HE utilized the noise recommendations generated by the EPA and WHO to gauge acceptable levels of sound.

- The EPA determined that a constant sound of 70 dBA over a 24-hour period is enough to start causing permanent hearing loss for individuals, and a sound of 55 dBA outdoors is enough to cause activity interference and annoyance.⁴⁵
- The WHO determined that daytime noise emissions greater than 55 dBA over a 16-hour period can cause serious annoyance, and noise emissions greater than 50 dBA over a 16-hour period can cause moderate annoyance. The WHO recommends limits of 45 dBA over an 8-hour period during the night.⁴⁶

Construction noise. The Project is expected to generate noise emissions greater than 55 dBA throughout construction, but the noise will be sporadic and typically cease at the end of the day. The Applicant stated in a response for information that work after 6pm will only happen for specialized work (or to catch up on unforeseen delays).

On some days, construction utilizing the pile driver will be loud and annoying for numerous residences in the area. On other days, as construction equipment migrates across the dispersed Project site, construction noise will not be loud enough to interfere with the quality of life for residences. Since these construction activities are not sustained, no hearing loss or long-term annoyance to residents is expected. HE does expect construction activities to be annoying to nearby residences in the short-term, as the pile driver can be heard from more than a mile away.

Operational noise. The operational components will be loudest during the day, as this is when the tracking motors, inverters, and transformer will all be operating. The Applicant's analyses modeled inverters under a worst-case scenario, assuming the equipment would be active and producing noise even during nighttime hours. The noise of all operational components is estimated to be less than 45 dBA at the nearest noise receptor.

The Applicant's analyses show that noise emissions from operational components are well below the WHO's recommended maximum noise level of 50 dBA. HE believes the vegetative buffers discussed in the "Facility Compatibility with Scenic Surroundings" section will help mitigate any noise emissions generated by inverters, especially for the residences within 500 feet of the solar panels. However, the three vegetation modules proposed by the Applicant only relate to distances between homes and solar panels, not inverters.

⁴⁵ United States Environmental Protection Agency. *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety*. March 1974. <https://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF>

⁴⁶ World Health Organization. *Guidelines for Community Noise*. April 1999. <https://www.who.int/docstore/peh/noise/Comnoise-1.pdf>

Conclusions and recommendations. Based on our review of the SAR, supplemental information provided by the Applicant, and additional research conducted by HE, we offer the following conclusions and recommendations regarding noise emissions:

- Construction will be annoying for numerous months for residents in the area. The pile driving process, which is the loudest part of the construction process, is estimated to last 19 weeks. During construction, almost all the noise from the Project site will be intermittent and will not be permanently impactful to nearby residents.
- The area surrounding the Project is largely agricultural; few residents exist in the area and noise from operational components should not annoy any residents.
- The topography of the area will help mitigate noise emissions that may be caused by construction or operational components of the Project.

Need for mitigation. The Applicant should consider certain mitigation to reduce noise impacts:

1. The Applicant should notify residents and businesses within 2,400 feet of the project boundary about the construction plan, the noise potential, and the mitigation plans at least one month prior to the start of construction.
2. The Applicant should remain in contact with nearby residents to confirm that noise levels are not unduly high or annoying after the pounding and placement of the solar panel racking begins. If the noise levels are unduly high or annoying, the Applicant should mitigate those effects as needed.
3. Pile driving activities should cease by 6pm each day. Since the area is largely rural, a constant pounding during evening hours has the potential to upset the natural tranquility of the area and severely annoy residents.

Road and Rail Traffic, Fugitive Dust and Road Degradation

Traffic concerns related to the development of the Bobwhite facility during the construction or operational periods are addressed here. The 12-month construction phase would include commuting construction workers, vehicles, and equipment on site, plus the delivery of heavy loads of solar components, infrastructure, and other equipment. Increased traffic during operations could occur as a small number of employees travel to and from the property to monitor and maintain the site.

Railway-related issues are not a concern for the Bobwhite facility. None of the related construction deliveries or operational activities will involve railroads, nor are there any railroads in the Project area.

General methods of assessment. A typical evaluation of traffic-related impacts include:

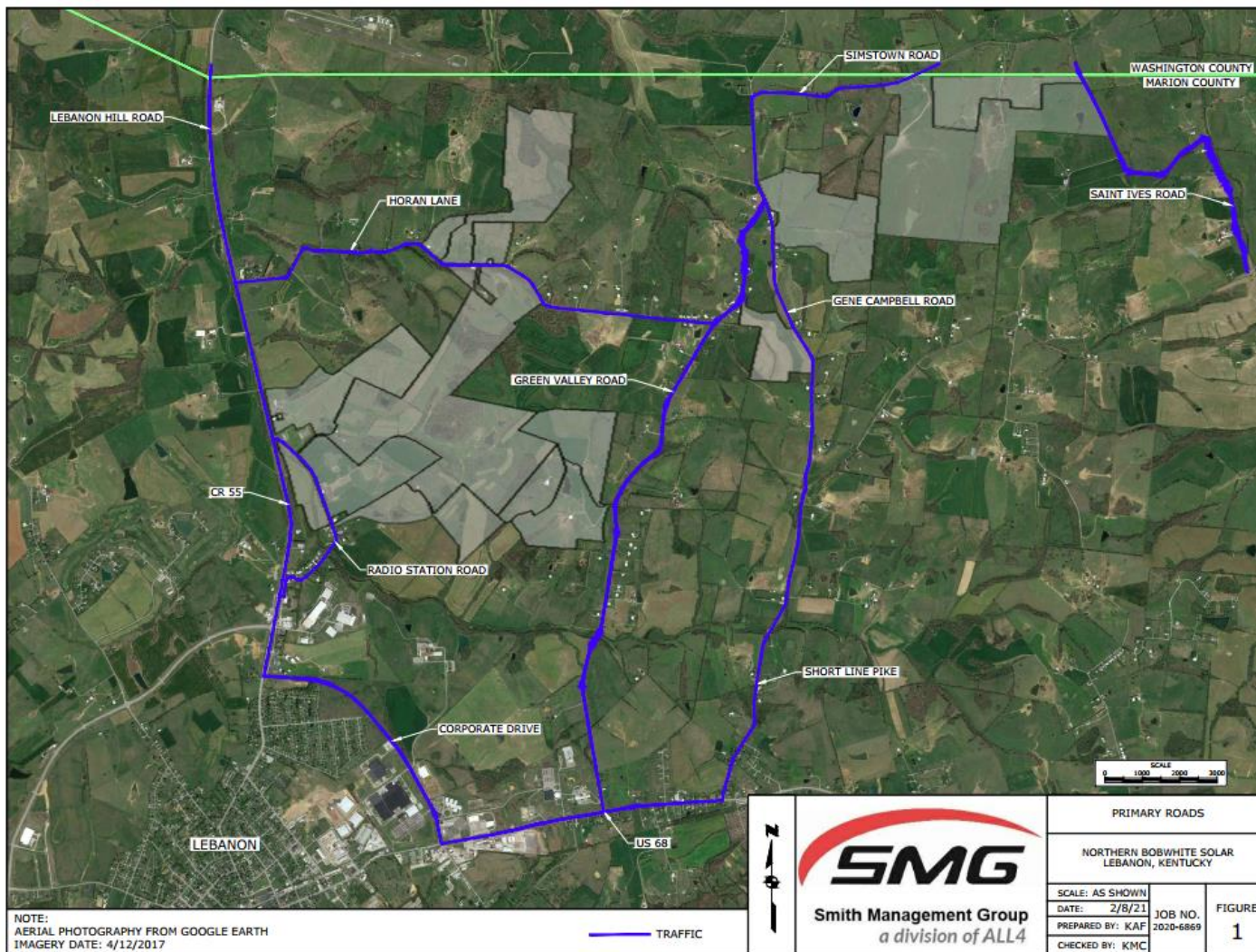
- Establishing existing traffic conditions in the area;
- Identifying primary access points that will be used for the Project;
- Estimating changes in traffic due to construction and operations; and
- Assessing the impacts of Project-related traffic on local areas. This includes determining whether additional traffic will lead to congestion, changes in service levels of existing road networks and identifying any potential degradation to existing roadways.

Summary of information provided by the Applicant. The Applicant's traffic and dust analyses were provided in Appendix E ("Traffic Assessment") within Exhibit O of the SAR, prepared by Smith Management Group (SMG).

Access. There are nine potential access points serving the Project area, and these are shown in Exhibit 3-1. The primary access point will be #2, which is nearest to the planned substation. Each access point is anticipated to experience an influx of vehicles because the parcels are noncontiguous, and vehicles will need to travel on local roads to get to other parcels. Within the Project boundaries, the Applicant will build roads to access all areas where panels will be placed.

The Applicant indicated construction commuter vehicles will park near where the work is being performed. Temporary staging areas may be designated inside the Project fence line. Construction vehicles will not be required to use the laydown/ parking area near the substation. The Applicant has committed to re-grade and reseed any portion of the Project site that is disturbed during construction. Exhibit 5-3 identifies the roads providing entry to each access point.

**Exhibit 5-3.
Identification of Roads Utilized during Construction and Operations**



Source: Northern Bobwhite, RFI #1, Exhibit N.

Baseline traffic volumes. The Applicant-provided information regarding six current traffic volumes is shown in Exhibit 5-4. KR-55. This is the busiest highway in the vicinity of the Project. The main substation is located near this road, and this road is anticipated to receive the biggest increase in traffic volumes. The primary parking area is also expected to be in this general area, which will contribute to the amount of construction-related traffic.

**Exhibit 5-4.
Applicant-Provided ADT Stations**

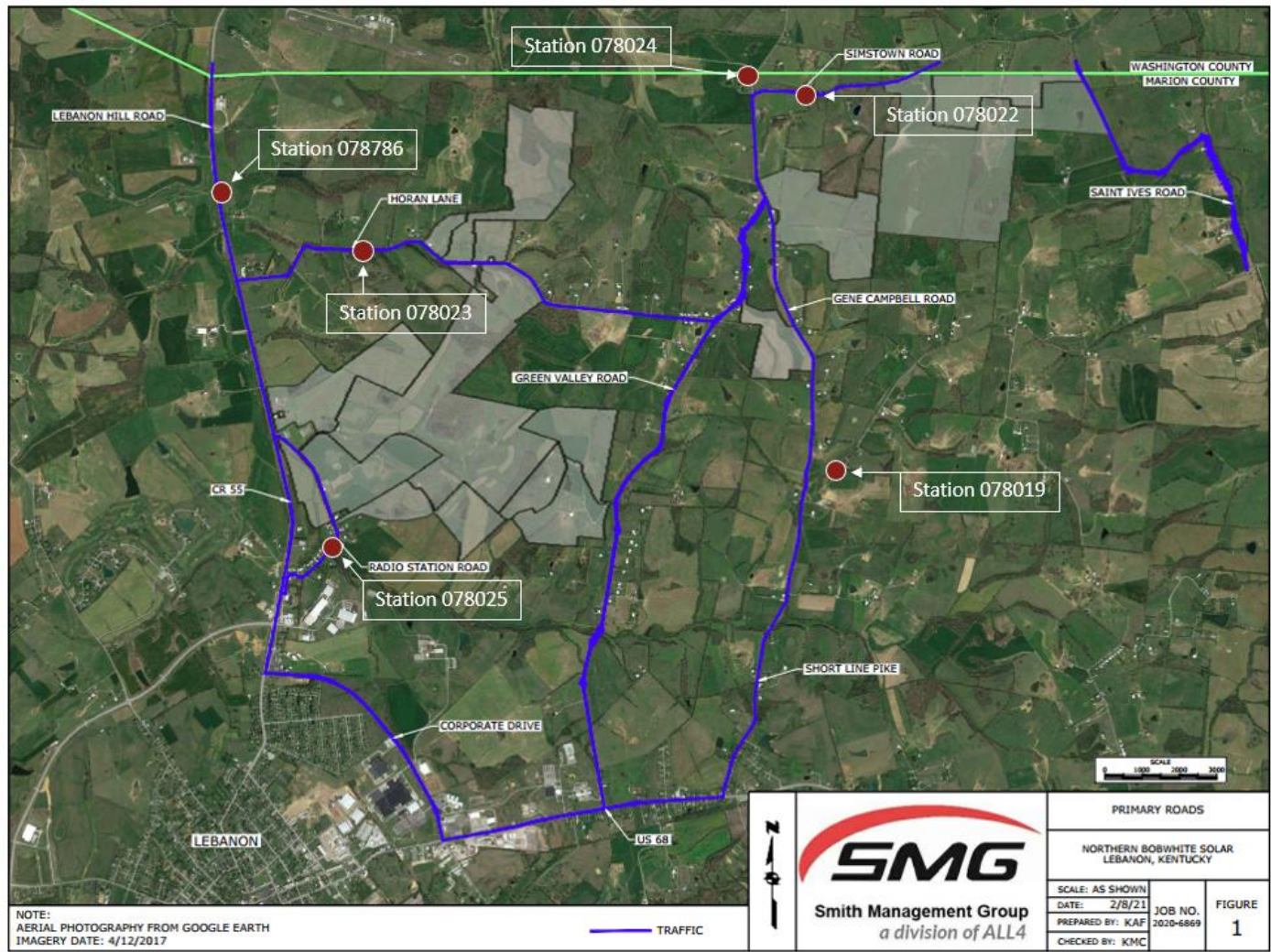
Station ID	Roadway	Location and Distance (feet) and Direction from the Nearest Property Boundary	ADT (average number of vehicles / 24-hour period)	Year Assessed	% Single	% Combo
078786	KY-55 Springfield Road	MP 3.0 80 feet East	10,015	2019	5.464	2.298
078019	KY-1195 Short Line Pike	MP 1.5 3,400 feet North	467	2019	-	-
078022	Simstown Road	MP 0.0 2,600 feet South	121	2019	-	-
078024	KY-1406 Barbers Mill Road	MP 3.0 20 feet East	337	2018	-	-
078023	Horan Lane	MP 1.85 1,800 feet East	214	2009	-	-
078025	Radio Station Road	MP 0.491 20 feet East	138	2009	-	-

Notes: Station ID: three-digit county number + station number.
 ADT: Annual Average Daily Traffic – the annualized average 24-hour volume of vehicles on a segment of roadway.
 % Single: Single unit truck volume as a percentage of the ADT.
 % Combo: Combination truck volume as a percentage of the ADT.

Source: Bobwhite SAR, Exhibit O, Appendix C.

Very little traffic is present on the access roads other than KY-55. Exhibit 5-5 shows a map of the ADT stations provided by the Applicant.

**Exhibit 5-5.
Map of Applicant-Provided ADT Stations**



Source: Northern Bobwhite RFI #1, Exhibit N, and Harvey Economics, 2021.

Construction related traffic volumes. The Applicant is anticipating construction activities to contribute 100-150 commuter vehicles and four freight trucks to access the Project site on an average day. During peak construction times, a maximum of 200 commuter vehicles and 10 freight trucks are anticipated to travel to the site per day.

The Applicant stated that the primary access point to the Project site will be via KR-55 (Springfield Road, near station 078025 in Exhibit 5-5), but does not indicate whether the construction-related vehicles will come from a specific direction. The Applicant also stated that KR-1195 and KR-1406 will be used to move equipment and materials from the parking area to other Project areas when internal roads cannot be utilized. HE assumes by “KR-1406” the Applicant means KR-1404.

The typical hours of construction activities are 7am – 6pm, and it is expected that the majority of traffic will occur during daylight hours. Work may be required during extended hours (6pm – 10pm), but this will be atypical.

Operations related traffic volumes. The Applicant does not expect operations-related traffic to make a noticeable impact in the Project area. Only two employees, making site visits three times a week, are expected to visit the Project in an average week. Maintenance activities, such as vegetation management, will occur periodically and be limited to typical working hours Monday through Friday.

Road degradation. The Applicant does not anticipate construction activities to degrade the surrounding road infrastructure. The Applicant has committed to performing a road condition survey before and after construction activities. The Applicant has pledged to assess the area and mitigate, as necessary.

The combined weight of the heaviest vehicle and cargo (delivery of the main transformer) is approximately 120 tons. Typical freight trucks carrying solar panels will weigh a combined 65,000 pounds. In general, 10-20 freight trucks will deliver equipment to the site per week, and at peak, 10 trucks per day.

Fugitive dust. The Applicant states in the SAR that they will implement “appropriate” revegetation measures, water applicant practices, and the covering of spoil piles to reduce wind erosion. In addition, they will cover any open-bodied truck transporting dirt. The Applicant will build internal roads with compacted gravel and may water road systems as necessary to reduce dust generation.

HE’s evaluation of impacts. HE spoke with Mr. Josh Hornbeck of the Kentucky Transportation Cabinet (KTC) and Mr. Jimmy Rakes of the Marion County Road Department

(MCRD) to review existing road conditions and plans for the Project.⁴⁷ HE also conducted additional research and analyses related to traffic, road degradation and fugitive dust.

Baseline traffic volumes. Exhibit 5-6 presents traffic and road data at ten additional traffic stations. HE researched traffic data at additional stations to compare traffic baselines in the vicinity of the Project. In addition, the Applicant has not decided where construction traffic will originate from. In Exhibit 5-8, the blue stations show the stations HE selected, in addition to the stations provided by the Applicant.

Exhibit 5-6.

Baseline Traffic Data for Roads near the Project Site

<u>Roadway</u>	<u>Station ID</u>	<u>Average Daily Traffic (ADT)</u>	<u>Year Assessed</u>	<u>% Change in Activity (Avg.)</u>	<u>% Change in Activity (Peak)</u>
KR-55 Springfield Road	078786	10,015	2019	1%	1%
KR-1195 Shortline Pike	078019	467	2019	15%	25%
KR-2758 Simstown Road	078022	121	2019	24%	39%
KR-1404 Barbers Mill Road	078024	337	2018	9%	14%
Horan Lane	078023	214	2009	7%	11%
Radio Station Road	078025	138	2009	31%	51%
KR-2154 Veterans Memorial Parkway	078A81	6,676	2017	1%	1%
KR-55 Springfield Road	078A68	6,383	2018	1%	2%
KR-2154 Corporate Drive	078A78	5,233	2019	1%	2%
US-68 Danville Highway	078A67	7,170	2018	1%	2%
US-68 Danville Highway	078291	4,911	2017	1%	2%
US-68 Danville Highway	078250	3,769	2018	2%	3%
KR-1404 Barbers Mill Road	078024	337	2018	21%	35%
Guthrie Mays Road	078101	52	2009	138%	224%
KR-2758 Simstown Road	115511	86	2017	17%	27%
KR-1195 Shortline Pike	078017	312	2017	5%	7%

Source: Northern Bobwhite SAR, Exhibit O, Appendix C and RFI #2, and Harvey Economics, 2021.

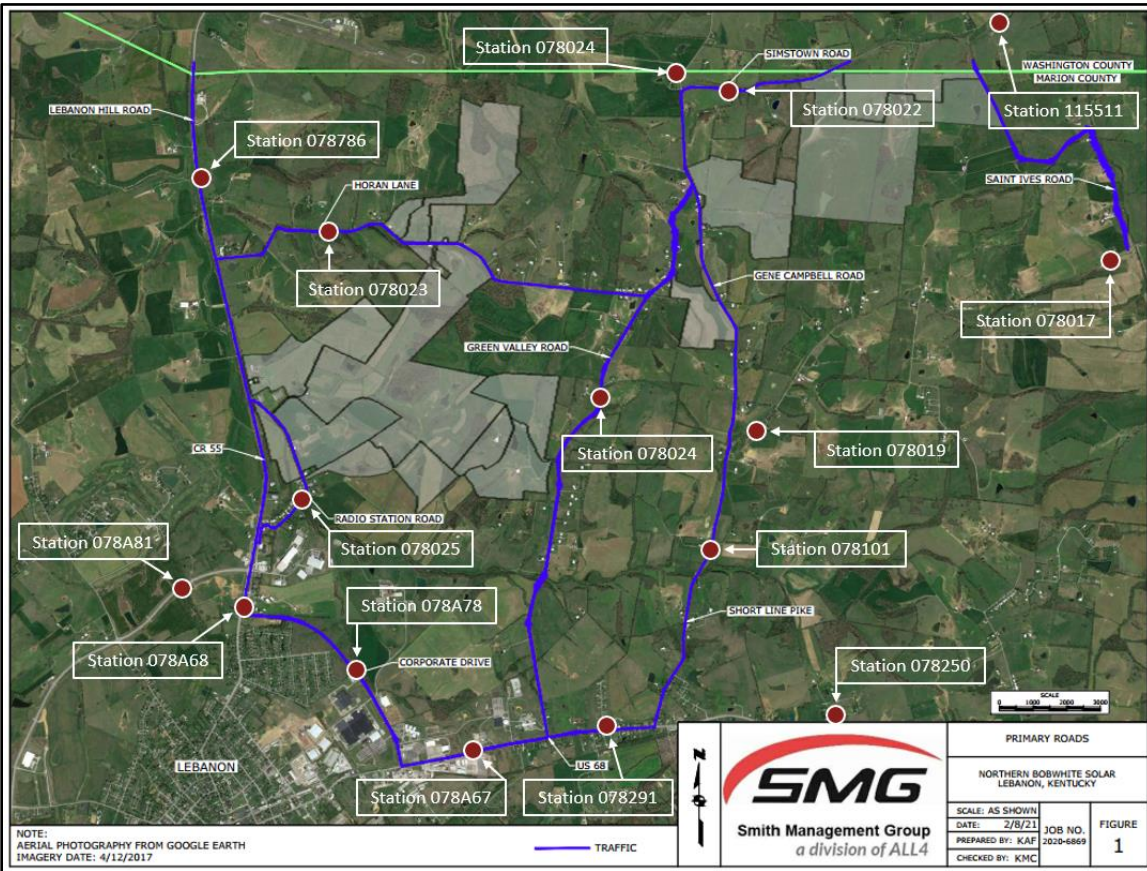
Exhibit 5-7 shows locations of stations provided in Exhibit 5-6.

⁴⁷ Mr. Hornbeck, P.E., is the Transportation Engineering Branch Manager – Project Delivery and Preservation Branch II for District 04. He works in Green, Larue, Marion, Nelson, Taylor and Washington Counties.

Mr. Rakes is the Supervisor of the Marion County Road Department.

Exhibit 5-7.

Map of Baseline Traffic Data for Roads near the Project Site



Source: Northern Bobwhite RFI #1, Exhibit N, and Harvey Economics, 2021.

Construction related traffic impacts. To estimate traffic impacts, HE assumed 125 construction commuter vehicles will access the Project site on an average day, and 200 commuter vehicles will access the site during peak construction activities.

In the last two columns of Exhibit 5-6, HE estimates a percent increase in estimated traffic volumes due to the increase in construction-related activity at each potentially relevant ADT station. Since the Applicant is not able to confirm points of origin for construction traffic and construction activities are expected to occur simultaneously at different areas within the Project, HE apportions construction traffic equally to each proposed access point:

- For the “% Change in Activity (Avg.) column,” HE estimates 129 vehicles may pass through all ADT stations in any given day. HE estimates 129 as follows: [125 commuter vehicles + 4 delivery trucks].
 - Since there are two access points along Simstown Road and St. Ivos Road, HE assumes traffic along Simstown Road at Station 078022 may increase by as much as 24 percent during an average day ($[129 \text{ vehicles} / 9 \text{ access points}] * 2 \text{ access points along Simstown Road \& St. Ivos Road} / 121 \text{ ADT}$).

- For the “% Change in Activity (Peak) column,” HE estimates as many as 210 vehicles may pass through ADT stations in any given day. HE estimates 210 as follows: [200 commuter vehicles + 10 delivery trucks].
 - Since there are three access points along Radio Station Road, HE assumes traffic along KY-55 at Station 078025 may increase by as much as 51 percent during peak construction activities ([210 vehicles / 9 access points] * 3 access points along Radio Station Road / 138 ADT).

HE’s calculations in Exhibit 5-6 show construction traffic along Simstown Road, Radio Station Road, and Barbers Mill Road has the potential to increase by more than 25 percent. However, these roads are relatively less traveled, compared to the other roads utilized by construction activities. Guthrie Mays Road, which extends off of Shortline Pike Road at Station 078101, would experience the greatest increase in traffic, but it is not likely the Project will need to utilize this route.

An issue during construction is the narrowness of the roads in this area. Many roads (Radio Station Road, Horan Lane, Barbers Mill Road, Glen Campbell Road, Simstown Road, and St. Ivos Road) are only able to fit 1.5 standard sized cars on the road at the same location and often requires vehicles to pull half-off the road to avoid oncoming traffic.⁴⁸ This has the potential to inconvenience numerous residents and agricultural producers in the area; in particular, residents of the neighborhood near the middle of Exhibit 3-5 (shaded in purple) may have difficulty accessing their residences, depending on the routes of freight trucks. Some permits issued by the KTC require a lead vehicle in front of freight trucks; it is HE’s conclusion that oncoming traffic meeting these lead vehicles will likely need to turn around or into private driveways to avoid oncoming freight trucks. The narrowness of the roads may also require the Applicant to develop drop-off sites for materials (e.g., construction equipment, solar panels, racking systems, etc.) at a site near the intersections of KR-55 and Radio Station Road, and US-68 and KR-1404/ KR-1195, so that smaller trucks can transport materials from drop-off sites to access points.

Another problematic issue during construction is that some roads have hairpin curves that will be difficult, if not impossible, for freight trucks to navigate. Horan Lane, between Access Point #1 and KR-55, has two hairpin curves and a blind section of road that may be impossible for freight trucks to navigate without road expansion and tree removal.⁴⁹

Another issue during construction will be accessibility of proposed Access Points. Access Point #7 (Exhibit 3-1, Figure B-28 in Appendix B) crosses a stream and utilizes a very small bridge and an uphill road that features hairpin curves that may be impossible for freight trucks to navigate.

⁴⁸ Figures B-02, B-10, B-14, B-16, B-19, B-22, B-24, B-30 and B-33 in Appendix B provide visual examples of the narrow roads.

⁴⁹ Figures B-10 and B-12 in Appendix B provide visual examples of these curves.

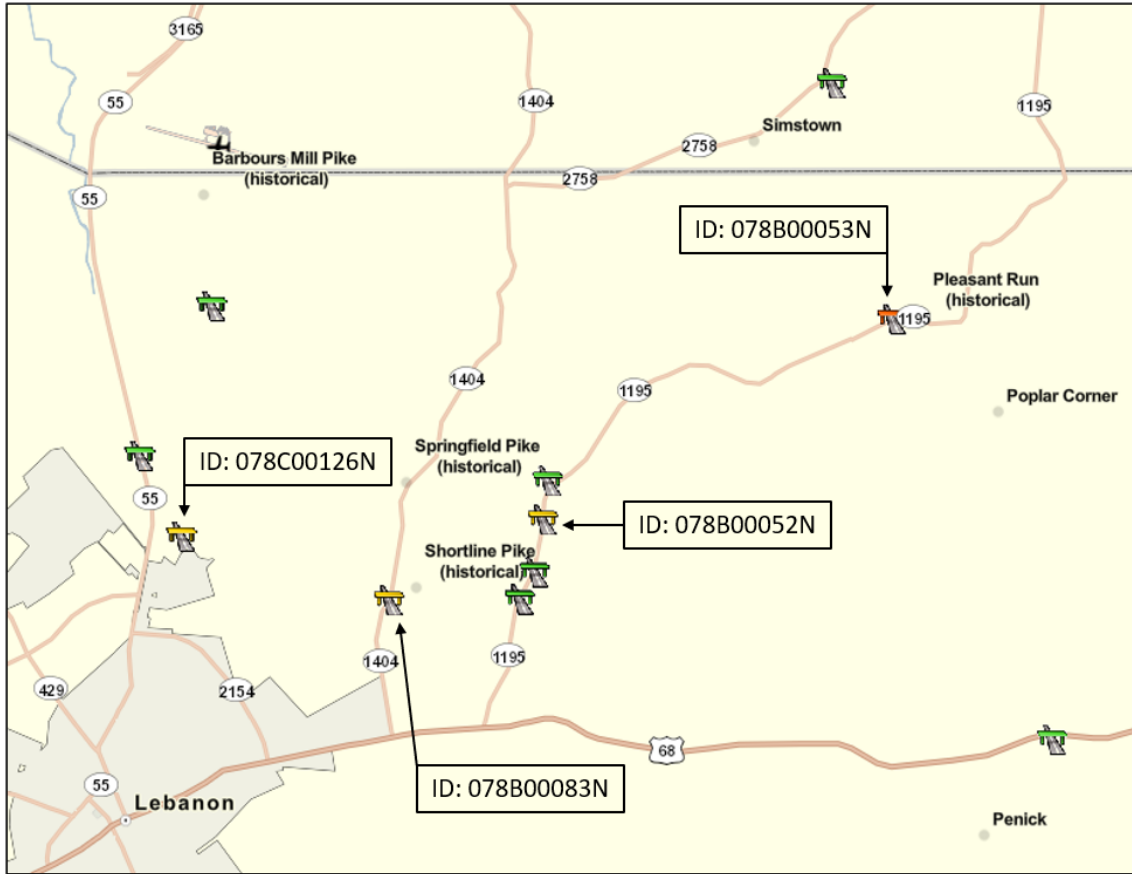
Operations related traffic impacts. HE does not expect operations-related vehicles to impact commuters or residents in the vicinity of the Project. Only two employees are expected to visit the site a few times a week, and maintenance employees travelling to the site will be performing vegetative maintenance and should not contribute a noticeable impact to traffic conditions.

Road degradation. The Applicant is not anticipating construction activities to cause noticeable road degradation. The Applicant has pledged to rectify any damage that occurs to public roads from construction activities.

The KTC rates KR-55, KR-2154, and US-68 at 80,000 pounds, which means these roads are designed to carry traffic so long as the combined weight of vehicles plus loads does not exceed 80,000 pounds. KR-55 is the “main” road which is expected to receive the largest increase in construction-related traffic. KR-1404 and KR-1195 are rated at 44,000 pounds. The Applicant has indicated that numerous shipments (of solar panels, racking systems, etc.) will be 65,000 pounds or more. Currently, these vehicles will not be allowed to travel on local roads such as KR-1404, KR-1195, and certainly not on smaller roads such as Horan Lane, Gene Campbell Road, or Simstown Road without special permits. The Applicant will need to coordinate with the KTC and the MCRD to gain approval of the routes proposed by the Applicant and receive permission to haul shipments heavier than the legal limit.

Bridge degradation. There are a small number of bridges in the vicinity of the Project. The KTC classifies bridges under a three-color coded system: “green” bridges are in good condition and not deficient; “yellow” bridges are in fair condition but not structurally deficient; and “red” bridges are in poor condition and structurally deficient. Exhibit 5-8 shows a map of bridges in the vicinity of the Project.

Exhibit 5-8.
Map of Bridge Conditions near the Project Site

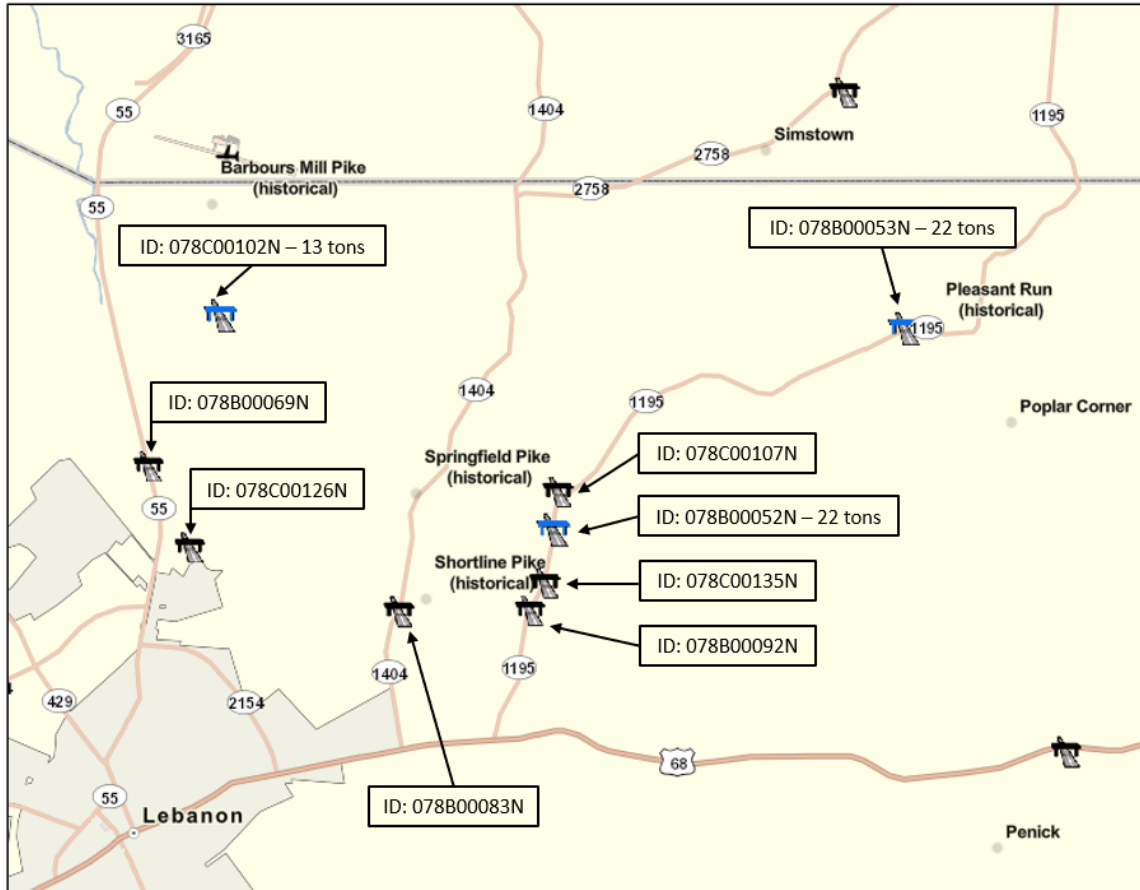


Source: Kentucky Transportation Cabinet, Bridge Data Miner, and Harvey Economics.

The only structurally deficient bridge is ID: 078B00053N. This bridge is not expected to be utilized by the Project, but special consideration should be paid to this bridge if the Applicant intends to utilize it during construction. Bridges ID: 078C00126N and 078B00052N are not structurally deficient but received a “yellow” rating instead of “green” meaning these bridges are in less-than-ideal condition.

The KTC also classifies bridges by weight. The weight limits of bridges mean the combined weight of vehicles plus loads may not be greater than the posted weight limit. Exhibit 5-9 shows a map of bridges in the area, and identifies bridges with specific weight restrictions:

Exhibit 5-9.
Map of Bridge Weight Limits near the Project Site



Source: Kentucky Transportation Cabinet, Bridge Data Miner, and Harvey Economics.

The bridge along Horan Lane (ID: 078C00102N) is only rated to carry a maximum of 26,000 pounds. Two bridges along KR-1195 (ID: 078B00052N and 078B00053N) are only rated for 44,000 pounds. The Applicant will need to work with the KTC and MCRD to develop a plan to navigate these bridges safely and successfully. Generally, bridges in the area have a rating of 80,000 pounds + 10 percent, but the Applicant will need to confirm with the KTC about each bridge when considering which routes to utilize.

Fugitive dust. The Applicant has pledged to implement numerous methods for reducing fugitive dust. The Applicant will cover open-bodied trucks transporting roads, cover spoil piles, apply water to road networks as necessary, and implement revegetation measures, all of which will help mitigate fugitive dust. The Applicant has also pledged to build internal roads with compacted gravel, which will help mitigate the dust.

Conclusions and recommendations. Based on our review of the SAR and subsequent information provided by the Applicant, as well as other secondary research conducted regarding roads and dust, HE offers the following conclusions regarding traffic, road and bridge degradation, and fugitive dust:

- Traffic congestion resulting from construction activities will likely be noticeable along Horan Lane, Simstown Road, Radio Station Road, and Barbers Mill Road. Additional congestion may occur if freight trucks travel along these roads and on KR-2154, as the roads in the area are narrow and not able to handle two-way traffic.
- The roads in this area are very narrow, and often times vehicles need to pull half-off the road to pass oncoming traffic.
- Road degradation may occur during construction for every road utilized by the Project area except for KR-55, KR-2154 and US-68. The delivery of the main transformer is heavy enough to potentially cause degradation for every road utilized by the Project.
- Bridge degradation is possible, especially for bridges 078C00102N (along Horan Lane) and 078B00052N (along KR-1195).
- Fugitive dust should not be an issue with the Applicant’s proposed mitigation.

Need for mitigation. HE recommends the following mitigation:

1. The Applicant has committed to rectify any damage to public roads resulting from Project construction. HE recommends that “rectify” mean fix or fully compensate road authorities as necessary to mitigate against any damage that may occur to the existing road network.
2. The Applicant will comply with all laws and regulations regarding the use of roadways.
3. The Applicant will consult with KTC regarding truck and other construction traffic and obtain necessary permits from the KTC.
4. The Applicant will consult with MCRD regarding truck and other construction traffic and obtain necessary permits from the MCRD.
5. The Applicant will comply with any road use agreement executed with the MCRD. Such an agreement might consider special considerations for overweight loads, routes utilized by heavy trucks, road weight limits and bridge weight limits.
6. The Applicant will properly maintain construction equipment and follow BMPs related to fugitive dust throughout the construction process. This should keep dust impacts off-site to a minimal level.

Economic Impacts

Evaluation of the potential economic effects of the Northern Bobwhite Project is based on knowledge of the Project’s construction timeline and activities and the solar facility’s long-term operational activities. Project employment needs, local expenditures (labor, materials/supplies, equipment) and payment of applicable taxes (sales tax, lodging tax, property tax) and

other fees are considered over the short and long-term and placed within the context of existing demographic and economic conditions.

General methods of assessment. Both the construction and operational phases should be evaluated to include:

- Detailed understanding of the project: specific activities to occur, the timeline of those activities, geographic extent of project effects;
- Quantification of direct effects: number of employees and range of wage levels, materials purchases, supplies and equipment and associated sales tax payments, other tax payments, including property taxes. Determining the portion of purchases to occur in the local area or within Kentucky is key;
- Estimation of total effects: use of region and industry specific multipliers to estimate indirect and induced effects to calculate total effects such as employment, income and overall economic activity;
- Other social or economic benefits, including potential non-monetary benefits, to the local community or surrounding area;
- Potential curtailments or impacts to other industries.

Summary of information provided by the Applicant. Exhibit N of the Application is the Economic Assessment for the Northern Bobwhite Project completed by Smith Management Group (SGM).⁵⁰ That report included a brief description of the Project, discussion of the economic modeling and a simple table presenting the Project’s economic benefits. The report also addresses the Applicant’s Industrial Revenue Bond agreement with Marion County and the associated payments in lieu of taxes (PILOT) agreement, which are discussed in more detail below. The report states that most of the local economic impact will occur during construction, with on-going beneficial impacts from local and state taxes over the course of the Project.

In response to HE inquires, the Applicant provided additional information regarding construction and operational expenditures and tax payments. Excerpts from the Applicant’s Economic Assessment and supplemental materials include the following:

- **Capital investment:** Bobwhite anticipates capital construction costs of \$125 million. A portion of the Project’s spending will occur within Marion County and possibly surrounding counties. Solar infrastructure (panels, inverters and other electrical equipment) will be manufactured out of state and delivered to the Project site.
- **Construction employment and earnings:** The Project is estimated to provide approximately 200 full-time equivalent (“FTE”) construction jobs over about a 12-

⁵⁰ The employment and income benefits described in the Economic Assessment are based on the Applicant’s initial estimate of 400 full-time equivalents (FTEs) required for 12 to 18 months of Project construction. Subsequently, the Applicant revised that estimate to 200 FTEs over about a 12 month period.

month period.⁵¹ Bobwhite anticipates 25 to 50 local hires, which would amount to as much as 25 percent of the hired workforce.⁵² Local contractors may be used for equipment rental, fencing, site work and landscaping. The average base salary for a solar installer in Kentucky is approximately \$34,000 per year, which amounts to about \$16 per hour. That rate would not be out of range for other types of laborer jobs required for Project construction.

- ***Operational employment and expenditures:*** Permanent positions supported during the operation of the facility include facility maintenance of the solar farm and landscaping/ grounds-keeping. The Project anticipates having approximately two permanent positions for on-going O&M of the facility; salaries for those employees are confidential. A portion of annual operating expenditures may be made in Marion County, depending on whether Northern Bobwhite is able to contract with local providers for vegetation management, lawncare, facility maintenance and other similar tasks.
- ***Industrial Revenue Bond:*** Bobwhite has secured an Inducement Resolution for Industrial Revenue Bond (IRB) with the Fiscal Court of Marion County consistent with state regulations to promote economic development and solar energy projects. The Inducement Resolution for the IRB includes a form for the beneficial PILOT agreement to the local school system of approximately \$400,000 over the lifetime of the Project and another approximately \$6 million in taxes to Marion County and other local entities.
- ***Other tax payments:*** In addition to the IRB benefits described above, in the first year of construction Marion County would receive \$68,000 in county occupational license taxes and the Commonwealth of Kentucky would receive \$500,000 in state individual income taxes. Those tax revenues would be related to wages paid for construction labor.

Exhibits 5-10 and 5-11 present the estimated economic benefits of the Project, as described by the Applicant in the Economic Analysis and subsequent materials.

⁵¹ Information about construction employment and earnings was revised by the Applicant subsequent to the development of the Economic Analysis included in the Application. These numbers reflect that revision.

⁵² Local hires are defined by the Applicant as residents of Marion County or employees who may reside in other counties but work for companies that currently operate in Marion County.

Exhibit 5-10.

Economic Benefits of the Northern Bobwhite Solar Project, Construction Phase

	Marion County			Commonwealth of Kentucky		
	<u>Employment</u>	<u>Labor Income</u>	<u>Value Added</u>	<u>Employment</u>	<u>Labor Income</u>	<u>Value Added</u>
Direct	25 - 50	\$1.3 - \$2.5 M	\$2.5 - \$5.1 M	200	\$10.1 M	\$20.6 M
Total	38 - 77	\$1.7 - \$3.4 M	\$3.3 - \$6.6 M	307	\$13.7 M	\$26.5 M

- Notes: (1) Employment is measured in full-time equivalents, FTEs. Marion County employment is defined by the Applicant as residents of Marion County or employees who may reside in other counties but work for companies that currently operate in Marion County.
- (2) Direct labor income reflects wages paid to construction workers, electricians and skilled labor working on-site and salaries paid to individuals not on the construction site, including engineers, accountants, managers and attorneys.
- (3) Value added includes labor income, some taxes and other property income.
- (4) Total benefits include direct, indirect and induced effects.
- (5) Commonwealth of Kentucky columns are inclusive of Marion County

Source: Northern Bobwhite Solar, LLC, December 2020 and March 2021.

Exhibit 5-11.

Average Annual Property Tax Benefits of the Northern Bobwhite Solar Project, First Ten Years of Operations

<u>Marion County</u>	<u>Extension District</u>	<u>Health District</u>	<u>Library District</u>	<u>Air Board</u>	<u>School District</u>	<u>Total</u>
\$51,000	\$4,000	\$4,000	\$7,000	\$1,000	\$88,000	\$155,000

Notes: School District tax revenues also include annual PILOT payments.

Source: Northern Bobwhite Solar, LLC, December 2020 and February 2021.

The Applicant also notes that in addition to the ad valorem tax revenue, Marion County would also receive the following taxes: (1) county insurance premiums tax on the Project’s estimated annual property and casualty insurance premiums; (2) county net profits tax on the rent paid to landowners; and (3) county net profits tax paid on Project net profits. None of those tax revenues have been quantified.

HE’s evaluation of impacts. An economic impact analysis can be an opportunity to identify the monetary and other benefits provided by Project construction and operational activities. A meaningful discussion of those benefits must provide some quantification of the benefits, along with additional context to determine the magnitude of those benefits:

- For most solar facilities, the purchase of materials, supplies and equipment makes up a large portion of total Project construction costs. In response to HE inquiries, the Applicant stated that estimates of the portion of capital expenditures to be made within Kentucky, or specifically within Marion County, were unavailable. It is likely that a large portion of the Project’s capital expenditures would occur out-of-state, limiting

the economic benefits within the Commonwealth. Economic benefits related to local or regional purchases will focus mainly on certain labor activities, equipment, and other construction costs.

- It is also important to note that direct construction jobs, as well as indirect and induced jobs, will be temporary, resulting from the 12-month construction period.
- In response to HE inquiries, the Applicant noted that during the operational phase, local purchases might be related to vegetation management, lawncare, facility maintenance, and other similar tasks, to the extent that those services and supplies are available in Marion County. Estimates of annual operations and maintenance expenditures were not provided to HE due to confidentiality. HE assumes that those expenditures would be minimal on an annual basis and that the majority of economic benefits generated during operations would result from employee earnings and property taxes.
- Property taxes and PILOT payments distributed to local entities within Marion County will provide additional revenue for these agencies; however, those payments will generally amount to a small percentage of total tax revenues for any individual entity each year.
- Landowner leases are not mentioned in the economic analysis. Those landowners will realize real direct benefits from the Project via lease payments.

Conclusions and recommendations. Construction and operation of the Bobwhite solar facility will provide some limited economic benefits to the region and to the Commonwealth. Overall, the Project will result in measurable, but temporary, positive economic effects to Marion County during the construction phase. Construction activity will generate modest regional employment and income opportunities. Those effects will be temporary, but local hires will increase employment and incomes to an area which needs it. Most construction purchases will be made outside of Kentucky.

Operational economic benefits will be confined mostly to property taxes, although these will be relatively minor. Operational employment will be minimal, and purchases of materials or supplies will be very small on an annual basis. Property tax payments made to Marion County taxing authorities are estimated to average about \$155,000 per year over the first ten years of operation.⁵³ Those payments will generally amount to a small percentage of total tax revenues for any one entity.

Need for mitigation. Socioeconomic impacts of the Bobwhite solar facility represent a positive contribution to the region, so no mitigation is required.

⁵³ Property tax payments will decrease over time as the value of the solar assets depreciates.

Decommissioning Activities

Decommissioning is the process of safely closing the solar facility to retire it from service at the end of its useful life, and subsequently returning the land to its original condition. This might include removal of solar panels and all associated facilities, and restoration of the property to pre- project conditions. Although not specifically addressed in the statues, the PSC requested that HE discuss the potential impacts associated with decommissioning activities.

General methods of assessment. The types of impacts likely to result from decommissioning might be similar in nature to those experienced during construction. For example, workers would need to commute to the site daily, trucks would be required to haul equipment away using local roads and noise may be generated by all the activity. Therefore, the methods of assessing decommissioning impacts would be similar to those employed to evaluate the construction phase effects.

In addition, the decommissioning of a facility is often compared to the conditions which might exist if the facility is not commissioned. This step is relevant if decommissioning is not required, or the facility owner is not committed to decommissioning.

Summary of information provided by the Applicant. According to the Applicant, the Northern Bobwhite solar facility would have an expected useful life of approximately 35 years. Supplemental materials provided by the Applicant describe the following decommissioning activities:

- **Equipment Decommissioning and Removal** - The basic components of the Project are photovoltaic (PV) modules, mechanical racking system, electrical cabling, inverter racks, transformers, inverters, electrical equipment, cabling, and concrete pads. They will be removed, placed in a truck, and recycled or disposed as applicable.
- **Roads, Parking Area** - All access roads and the parking area will be removed to allow for the complete rehabilitation. Typically, the granular base covering of these areas will be removed using a wheel loader to strip off the material and dump trucks to haul the aggregate to a recycling facility or approved disposal facility. The underlying subsoil, if exhibiting significant compaction (more likely for the site entrance road than the interior access roads), will then be diced using a tractor and disc attachment to restore the soil structure and to aerate the soil. Clean topsoil will be imported on site by dump truck, replaced over the area and leveled to match the existing grade. A cover crop or perennial seed mix of grasses may be applied to stabilize the soil if farming operations are not planned to recommence.
- **Site Restoration** - These activities will be undertaken to restore the site to essentially its previous condition: site cleanup, restoration of surface drainage swales and ditches if impacted, and trenches/drains constructed will be filled with materials and leveled.

The Applicant also provided the following information:

“At the termination of each lease, Bobwhite shall restore the land to substantially its condition as of the effective date of the lease using prudent engineering practices where applicable, (including, without limitation, all fencing, roads, solar panels and mounting, and other improvements or alterations) and any electrical or communication or other utility poles, lines and connections. If the landowner provides written consent, roads and fences could remain. The restoration shall be completed within twenty-four (24) months after the termination of the lease and Bobwhite shall continue to pay rent during the restoration period. Bobwhite is not obligated to regrade the property or replant any crops or plants.”

Upon further request for information from the Siting Board, the Applicant also stated:

“Decommissioning includes the removal of all steel piles, which will be pulled out of the ground. Foundations will be excavated to a minimum depth of four feet below grade and removed and disposed of. Cabling will be (i) removed to a depth of four feet, (ii) abandoned in place if buried more than four feet below grade, or (iii) abandoned in place if it is buried below the top grade of bedrock (i.e., was originally trenched into the bedrock). Any subsurface equipment that remains after decommissioning will either be at a sufficient depth as to not interfere with future farming operations or will be within bedrock and thus outside of farming operations.”

HE did not review individual landowner lease agreements due to confidentiality concerns.

HE’s evaluation of impacts. The impacts of decommissioning activities are likely to be somewhat smaller than those of construction. Fewer workers may be able to complete facility removal activities in a shorter time period, as compared to construction activities. Additionally, decommissioning work may not require the same level of experience or skill sets as project construction, resulting in the employment of more general laborers at lower wages. Therefore, the benefits to local employment and income during decommissioning would be somewhat less than those described for the construction phase.

Conclusions and recommendations. HE believes that decommissioning the facility and returning the site to its original condition can be accomplished if all the components can be removed. After reclamation, this would return the land to its pre-Project productive use and property value, and eliminate long term project-related impacts, compared with simply shutting the solar facility. This process will also have a modest and temporary positive economic stimulus to the region.

Need for mitigation. The Applicant has provided a general description of the decommissioning activities to occur at the end of Bobwhite’s Project life. The Applicant has also indicated that land restoration commitments have been made with landowners as part of the lease agreements. To ensure that those commitments are met, we recommend the following:

1. As applicable to individual lease agreements, the Applicant, its successors, or assigns will abide by the specific land restoration commitments agreed to by individual property owners, as described in each signed lease agreement.

2. The Applicant should develop an explicit decommissioning plan. This plan should commit the Applicant to removing all facility components from the Site and from Marion County at the cessation of operations.

Public Involvement

According to the Application, Bobwhite conducted the following activities to notify and inform Marion County residents about the Project:

- Bobwhite, through its initial developer partner Geenex, has been actively engaged with Marion County officials and the community since early 2019. That year, at least two informal meetings were held with Marion County staff and officials so that Geenex could answer any questions about the development of the proposed Project.
- On October 29, 2019, the Marion County Public Library in Lebanon was the site for a regional Utility-Scale Solar Workshop for County Officials conducted by the Center for Energy Education and funded by Geenex. Several representatives from Marion County attended this day-long event along with approximately 30 officials from more than 12 counties across Kentucky. The workshop featured presentations on topics including environmental health and safety, property values, land leasing, and economic benefits to hosting counties, as well as informal meetings between representatives of Geenex and Marion County officials.
- In 2020, Geenex twice presented publicly to the Marion County Fiscal Court and had opportunities to answer their questions concerning the Project. The first presentation on June 4, 2020 was a high-level introduction to utility-scale solar, its growth in Kentucky and the future benefits of the Project to Marion County. The second presentation on July 23, 2020 provided the officials and participating citizens a more detailed look into the design and layout of the Project and the proposed setbacks and vegetative screening to be utilized.
- On June 22, 2020, the Applicant sent an introductory letter to neighboring landowners of the Project informing them about the proposed Project and providing them contact information ahead of official public information meetings to come.
- In light of COVID-19 restrictions, Bobwhite requested a minor deviation from standard meeting requirements. On June 26, 2020, the Applicant filed a motion for waiver and request for approval of an alternative method for the public information program including: (i) a Project website, (ii) Informational Open House “Office Hours”, and (iii) a virtual Public Information Meeting. The Applicant’s motion was granted on July 9, 2020.
 - The Applicant launched a Project website (www.geenexsolar.com/northernbobwhite) on July 10, 2020. Information about the website (including the web address) was included in the notice to neighboring landowners and the newspaper advertisement for the Project. The

website was promoted through direct mail, field outreach and virtual meetings.

- Bobwhite held an informational open house on July 30th from 10 a.m. to 3 p.m. in order to inform the public about the Project, answer questions, and receive comments. This meeting was held at the Marion County Agriculture Extension Complex, located close to the Project site. A notice announcing the public meeting was printed in the Lebanon Enterprise on July 15, 2020 and mailed to adjoining landowners.
- On Thursday, July 30th from 6 p.m. to 8 p.m., the Applicant hosted a virtual Public Information Meeting. Attendees were able to join either by web or telephone. The event was promoted via newspaper, website, direct mail, and field outreach.
- Bobwhite mailed letters providing notice that it intended to file an Application to 75 adjoining or nearby landowners and to the 13 participating landowners by certified mail, return receipt requested, and via regular US Mail on November 27, 2020.
- On December 2, 2020, Bobwhite published notice that it intended to file an Application in the Lebanon Enterprise.

As noted in previous sections, HE staff spoke with several Marion County representatives and local residents, including the Marion County Judge Executive (Mr. David Daugherty), the Marion County Property Valuation Administrator (Mr. Terry Rakes), Marion County Road Department Supervisor (Mr. Jimmy Rakes), Kentucky Transportation Cabinet District Engineer (Mr. Josh Hornbeck) and a local realtor. Many of those folks had only limited did knowledge of the Project's construction or operational activities and their general perception was that many people in the County were unaware of the proposed Bobwhite Project at any level.

Part of the apparent lack of public awareness of the Project may be due to COVID-19 restrictions and reduced social gathering. However, it may also be the case that Bobwhite's attempts to provide Project information and engage the public are not reaching a broad swath of County residents for other reasons.

Need for mitigation. It is suggested that the Applicant continue its online and public noticing efforts to keep Marion County residents informed.

SECTION 6

Recommended Mitigation

This section identifies actions the Applicant can take to mitigate potential negative impacts on certain regional resources. Other regulatory processes will determine the need for particular actions; these are only noted here, and Harvey Economics makes no recommendation as to their merit. Beyond those actions, HE recommends a list of mitigation actions for Siting Board and Applicant consideration.

Regulatory Actions and Mitigation Outside Board Jurisdiction

The Siting Board should be aware of the following permitting and regulatory actions which will require Applicant compliance and possibly mitigation efforts. No action on these actions is required by the Siting Board since these are outside the Siting Board's jurisdiction.

The SAR states that "all necessary air, water, waste permits have been or will be obtained before construction and operation of the Project" and goes on to list seven individual permits from various regulatory agencies (Kentucky Division of Water, Marion County and the U.S. Army Corp of Engineers) that may apply to the Project. In subsequent materials provided to HE and the Siting Board, the Applicant revised that list to the following:

- Kentucky Pollutant Discharge Elimination System (KPDES) Construction Storm Water Discharge General Permit (Kentucky Division of Water). This permit is for stormwater discharges from construction activities that disturb one or more acres.
- General Permit for Floodplain Development (Kentucky Division of Water). This permit is related to development, in, along or across a stream.
- Section 404 Clean Water Act Permit (Individual) (U.S. Army Corps of Engineers). This is a permit for structures affecting navigable waters of the United States.
- Section 401 Water Quality Certification (Kentucky Division of Water). This permit relates to any discharge into waters of the Commonwealth, associated with any federally licensed permitted activity.

The Applicant has stated that, to date, no applications have been submitted for the permits listed above. For the Construction Storm Water Discharge General Permit, a notice of intent to seek coverage will be submitted after final design and prior to construction. If other permits are required, those applications will be also submitted after final design and prior to construction.

A Phase 1 Environmental Site Assessment (ESA) was completed for the site in December 2020. The ESA Phase 1 report does not include any recommendations for future actions related to environmental condition on the Project site.

The Applicant will also be required to obtain road access permits from the Kentucky Transportation Cabinet and potentially the Marion County Road Department. The Applicant is anticipating that numerous heavy trucks will be necessary to ship in operational components for the Project; many of these shipments exceed current posted weight limits for roads and bridges in the area.

Mitigation for Siting Board and Applicant Consideration

The following mitigation measures are based upon: (1) Applicant commitments set forth in the SAR; (2) measures discussed with the Applicant in subsequent information exchanges or discussions; and (3) additional mitigation steps HE believes will reduce or eliminate negative Project impacts and which are reasonable for the Applicant to undertake.

In performing this comprehensive review of the Bobwhite SAR, HE has gained an understanding of the Project, the location, the construction and operational activities, the Applicant's intentions, and the Project's impacts. Our recommended mitigation actions are intended to reduce or eliminate potential adverse impacts.

A. Site development plan:

1. A final site layout plan should be submitted to the Siting Board upon completion of the final site design. Deviations from the preliminary site layout plan which formed the basis for HE's review should be clearly indicated on the revised graphic. Those changes could include, but are not limited to, location of solar panels, inverters, transformers, substation, operations and maintenance building or other Project facilities and infrastructure.
2. Any change in Project boundaries from the information which formed this evaluation should be submitted to the Siting Board for review.
3. The Board will determine if any deviation in the boundaries or site development plan is likely to create a materially different pattern or magnitude of impacts. If not, no further action is required, but if yes, the Applicant will support the Siting Board's effort to revise its assessment of impacts and mitigation requirements.
4. A final, Project specific, construction schedule, including revised estimates of on-site workers and commuter vehicle traffic, should be submitted to the Siting Board. Deviations from the preliminary construction schedule, which formed the basis for HE's review, should be clearly indicated.
5. The Board will determine if any deviation to the construction schedule or workforce estimates is likely to create a materially different pattern or magnitude of impacts. If not, no further action is required, but if yes, the Applicant will support the Siting Board's effort to revise its assessment of impacts and mitigation requirements.
6. The Applicant or its contractor will control access to the site during construction and operation. All construction entrances will be gated and locked when not in use.

7. The Applicant's access control strategy should also include appropriate signage to warn potential trespassers. The Applicant must ensure that all site entrances and boundaries have adequate signage, particularly in locations visible to the public, local residents, and business owners.
8. According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work. The substation will have its own separate security fence and locked access installed.

B. Compatibility with scenic surroundings:

1. The Applicant will not remove any existing vegetation unless the existing vegetation needs to be removed for placement of solar panels.
2. Existing vegetation between the solar arrays and the residences will be left in place, to the extent practicable, to help screen the Project and reduce visual impacts from nearby homes and roadways.
3. The Applicant has committed to providing vegetative buffers for homes (15) with sight lines within 500 feet of solar panels, and for roadways (1.85 miles) with sight lines within 300 feet of the panels.
4. The Applicant has committed to working with homeowners to address glare impacts that may occur for any residents that experience glare for more than 60 minutes in a year.
5. The Applicant will consider cultivating at least two acres of native pollinator-friendly species within the solar facility site in the southwestern and northeastern parcels of the Project, leading to a total of four acres of native pollinator-friendly species within the Project site.

C. Potential changes in property values and land use:

1. No unique mitigation measures are recommended related to potential impacts to property values or adjacent land uses. Other mitigation will help ensure that such effects are minimized.

D. Peak and average noise levels:

1. The Applicant should notify residents and businesses within 2,400 feet of the project boundary about the construction plan, the noise potential, and the mitigation plans at least one month prior to the start of construction.
2. The Applicant should remain in contact with nearby residents to confirm that noise levels are not unduly high or annoying after the pounding and placement of the solar panel racking begins and mitigate those effects as needed.

3. Pile driving activities should cease by 6pm each day. Since the area is largely rural, a constant pounding during evening hours has the potential to upset the natural tranquility of the area and severely annoy residents.

E. Road and rail traffic, dust, and road degradation:

1. The Applicant has committed to rectify any damage to public roads resulting from Project construction. HE recommends that “rectify” mean fix or fully compensate road authorities as necessary to mitigate any damage that may occur to the existing road network.
2. The Applicant will comply with all laws and regulations regarding the use of roadways.
3. The Applicant will consult with KTC regarding truck and other construction traffic and obtain necessary permits from the KTC.
4. The Applicant will consult with MCRD regarding truck and other construction traffic and obtain necessary permits from the MCRD.
5. The Applicant will comply with any road use agreement executed with the MCRD. Such an agreement might consider special considerations for overweight loads, routes utilized by heavy trucks, road weight limits and bridge weight limits.
6. The Applicant will properly maintain construction equipment and follow BMPs related to fugitive dust throughout the construction process. This should keep dust impacts off-site to a minimal level.

F. Economic impacts:

1. Socioeconomic impacts of the Bobwhite solar facility represent a positive contribution to the region, so no mitigation is required.

G. Decommissioning:

1. As applicable to individual lease agreements, the Applicant, its successors, or assigns will abide by the specific land restoration commitments agreed to by individual property owners, as described in each signed lease agreement.
2. The Applicant should develop an explicit decommissioning plan. This plan should commit the Applicant to removing all facility components from the Site and from Marion County at the cessation of operations.

H. Public Involvement:

1. It is suggested that the Applicant continue its on-line and public noticing efforts to keep Marion County residents informed.

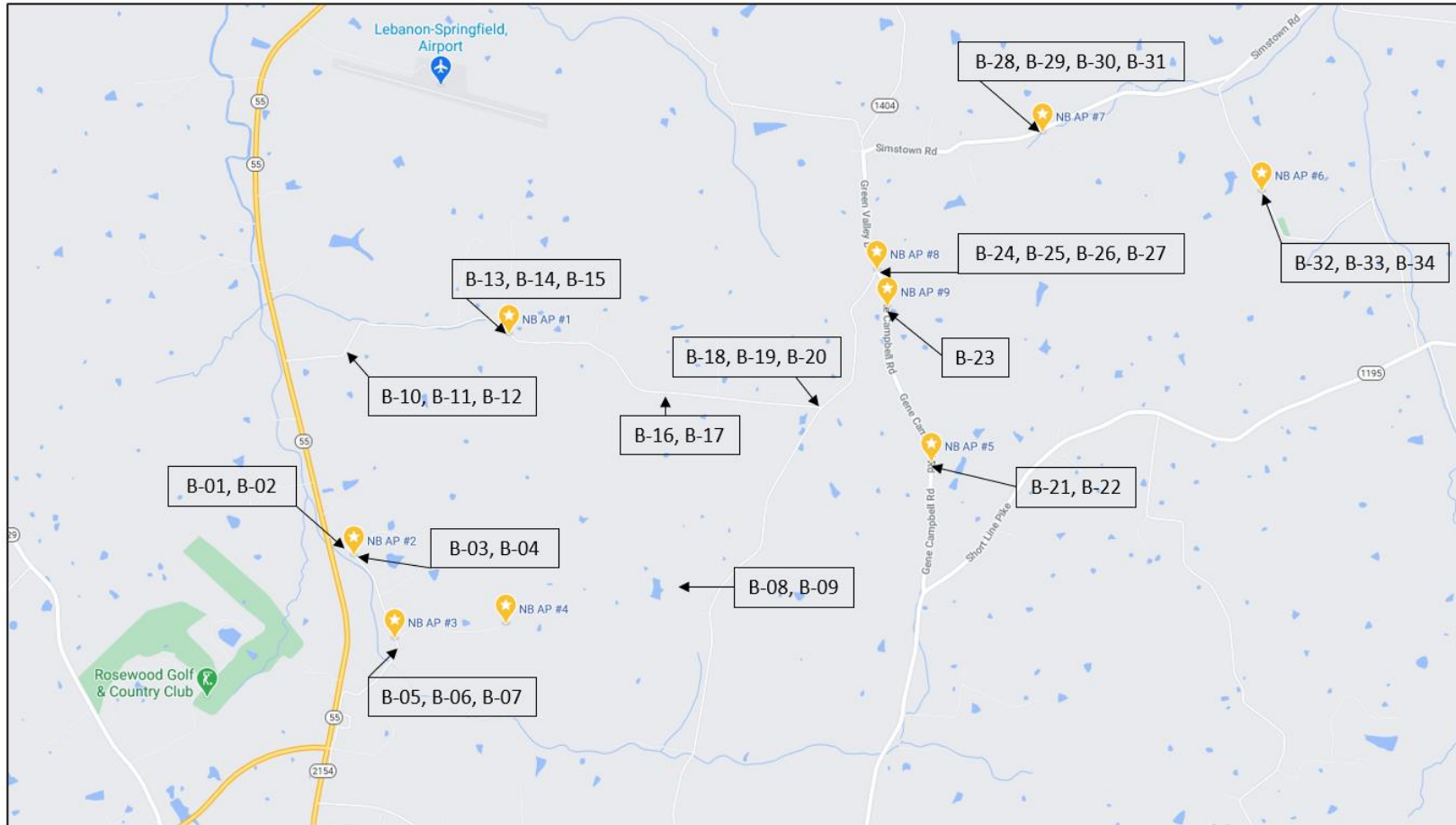
Deviation from Setback Requirements

As presently proposed, the Bobwhite Project does not meet the existing setback requirements. As such, the Applicant has entered a motion for a deviation from those requirements. HE has reviewed this motion and believes that the Project does meet the specific statutes noted for consideration of a setback deviation. The Siting Board will need to judge whether the quality of the Applicant responses on the setback deviation request is satisfactory.

APPENDICES

Appendix A

Photo Log Index Map



Appendix B

Site Photos

Figure B-1.

Location near proposed substation, facing northeast



Figure B-2.

Location near proposed substation, facing northwest



Figure B-3.
Location near primary Access Point (AP) #2, facing southeast



Figure B-4.
Location near primary Access Point (AP) #2, facing northeast



Figure B-5.
Location near AP #3, facing southeast



Figure B-6.
Location near AP #3, facing northwest



Figure B-7.
Location near AP #3, facing northeast



Figure B-8.
Location east of AP #4, facing west



Figure B-9.
Location east of AP #4, facing east



Figure B-10.
Location west of AP #1 (along Horan Lane), facing southwest

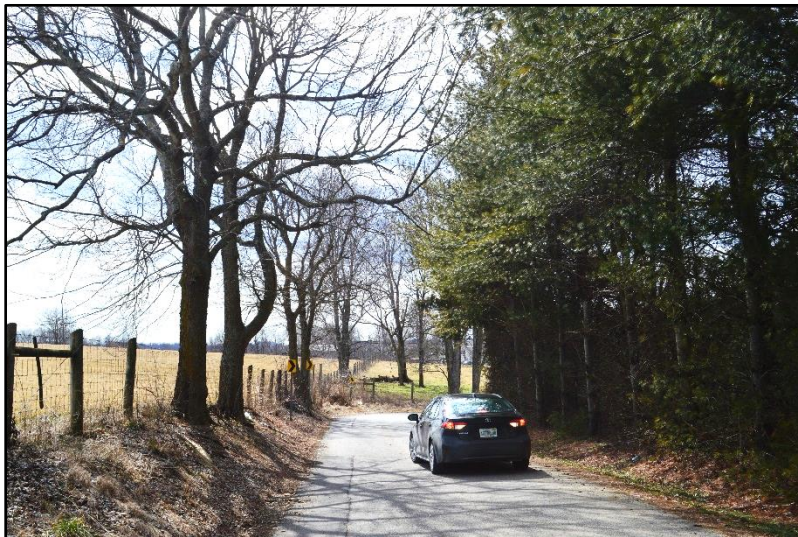


Figure B-11.
Location west of AP #1 (along Horan Lane), facing northeast



Figure B-12.
Location west of AP #1 (along Horan Lane), facing northeast (about 60 feet from Figure B-11).



Figure B-13.
Location near AP #1, facing north



Figure B-14.
Location near AP #1, facing northwest



Figure B-15.
Location near AP #1, southeast



Figure B-16.
Location east of AP #1 (along Horan Lane), facing west



Figure B-17.
Location east of AP #1 (along Horan Lane), facing east

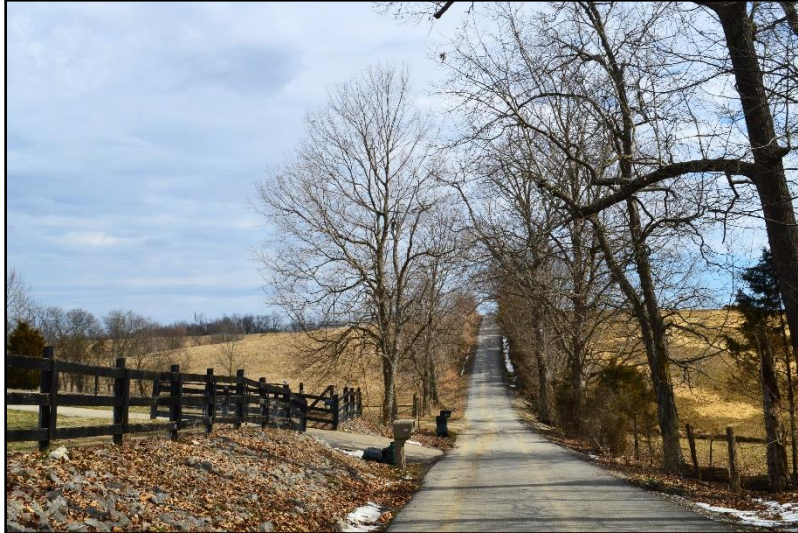


Figure B-18.
Location east of AP #1 (at intersection of Horan Lane and Barbers Mill Road), facing northeast



Figure B-19.
Location east of AP #1 (at intersection of Horan Lane and Barbers Mill Road),
facing southwest



Figure B-20.
Location east of AP #1 (at intersection of Horan Lane and Barbers Mill Road),
facing west



Figure B-21.
Location near AP #5, facing west



Figure B-22.
Location near AP #5, facing north



Figure B-23.
Location near AP #9, facing east



Figure B-24.
Location near AP #8 (at intersection of Barbers Mill Road, Green Valley Drive, and Gene Campbell Road), facing north

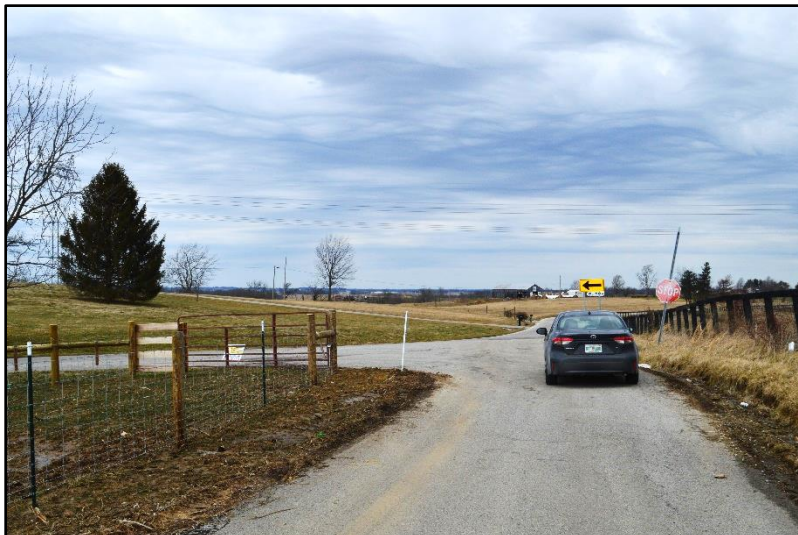


Figure B-25.

Location near AP #8 (at intersection of Barbers Mill Road, Green Valley Drive, and Gene Campbell Road), facing east



Figure B-26.

Location near AP #8 (at intersection of Barbers Mill Road, Green Valley Drive, and Gene Campbell Road), facing southeast



Figure B-27.

Location near AP #8 (at intersection of Barbers Mill Road, Green Valley Drive, and Gene Campbell Road), facing southwest



Figure B-28.

Location near AP #7, facing south



Figure B-29.
Location of bridge near AP #7, facing southeast



Figure B-30.
Location near AP #7, facing west



Figure B-31.
Location near AP #7, facing east



Figure B-32.
Location near AP #6, facing west



Figure B-33.
Location near AP #6, facing northwest



Figure B-34.
Location near AP #6, facing southeast



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