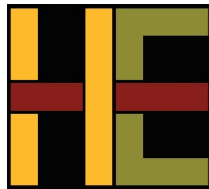


Review and Evaluation of the Hummingbird Solar, LLC Site Assessment Report

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

October 12, 2023





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October 12, 2023

Ms. Heather Temple
Kentucky Public Service Commission
211 Sower Blvd.
Frankfort, KY 40601

**Re: Harvey Economics' Review of Hummingbird Solar, LLC's Site
Assessment Report for Solar Facilities in Fleming County, Kentucky**

Dear Ms. Temple,

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

Yours truly,

Edward F. Harvey
Principal

Report

October 12, 2023

Review and Evaluation of the Hummingbird 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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SECTION 1

Introduction

This document provides a review of the Site Assessment Report (SAR) for the proposed Hummingbird Energy, LLC solar facility (Project or Solar Project) submitted to the Kentucky State Board on Electric Generation and Transmission Siting (Siting Board). Hummingbird Solar, LLC submitted the SAR to the Siting Board on June 23, 2023. Siting Board staff retained Harvey Economics (HE) to perform a review of the SAR. Hummingbird Energy, LLC (Hummingbird Solar or Applicant) 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, detailed below.

Statutes Applicable to the SAR Review

KRS 278.706 outlines the requirements for an application to receive a certificate to construct a merchant electric generating facility. Section (2)(l) of that statute requires the Applicant to prepare a SAR, as specified under KRS 278.708. The Hummingbird Solar SAR is the main focus of HE's review. However, the Siting Board staff 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 Hummingbird Solar SAR and certain other components of the Hummingbird Solar application:

- Review of the contents and information provided in the site assessment report, application and other documents provided by the Applicant;
- Brief review of secondary data sources to obtain background information and geographic setting for the Hummingbird Solar 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 General Counsel;
- Review of additional information supplied by the Applicant in response to first submitted HE questions, and discussion of responses with the 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 the Siting Board staff;
- Participation in a site visit, including a tour of the Project site with the Applicant and in-person meetings with local officials;
- 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 Hummingbird Solar Facility Application

Hummingbird Solar, LLC’s application package to the Siting Board (Application) consists of multiple documents, including several appendices:

- The main Application document provides a summary overview of the Hummingbird Solar Project and the Applicant’s responses to applicable KRS.
- Exhibits A through I include, but are not limited to, the following:
 - Description of the proposed site, including maps of the project area
 - Public notice evidence and report
 - Compliance with local ordinances, regulations and setback requirements
 - Effect on Kentucky electricity transmission system
 - Economic & Fiscal Contribution report
 - Property Value Impact report
 - Site Assessment Report (SAR), including Noise Assessment, Traffic Study, Glare Hazard Analysis and Landscape Plan. The SAR is Exhibit H.
 - Decommissioning Plan

Additional Information Provided by the Applicant

Once HE reviewed the contents of the Application, including the SAR, HE and Siting Board staff independently developed a first list of questions, either requesting additional information or asking for clarification about items in the SAR. The Siting Board staff submitted the first request for information, including questions from HE, on August 4, 2023; Hummingbird Solar provided written responses on August 18, 2023, with supplemental information provided on August 25, 2023, and September 8, 2023.

After HE and the Siting Board staff reviewed Hummingbird Solar’s responses to the first request for information, HE and the 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 September 15, 2023. Hummingbird Solar provided written responses to the second request for information on September 29, 2023.

HE and certain representatives from the Siting Board also met with the Applicant for an in-person meeting on August 28, 2023, to conduct a site visit and discuss remaining issues.

Report Format

This report is intended to support the Siting Board in its decision-making process pertaining to a construction certificate for Hummingbird Energy, 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) and to our contract:

- 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 of HE's SAR evaluation;
- Section 3 describes the Hummingbird Solar Project and proposed site development plan;
- Section 4 provides a brief profile of Fleming County's economic and demographic characteristics as context for the Project setting;
- Section 5 offers detailed findings and conclusions for each resource area; 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 Hummingbird Solar Project is contractually limited to a 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 of review 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 Hummingbird Solar 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. Although we evaluated Applicant data for consistency and clarity as part of our review, we did not perform any type of audit to confirm the accuracy of the information provided. 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 Siting Board and request that the Siting Board evaluate such a deviation and take appropriate action as deemed necessary. See mitigation recommendations in Section 6.

Cumulative impacts from multiple proposed solar facilities. In addition to the proposed Hummingbird Solar Project, two other solar facilities have already been approved by the Siting Board for operation in Fleming County: the AEUG Fleming Solar project (AEUG Fleming Project) and the Fleming Solar project (Fleming Project).

- The AEUG Fleming Project is proposed to be a 188-megawatt alternating current photovoltaic facility built on portions of approximately 1,590 acres to the north and west of the City of Flemingsburg. On May 24, 2021, the Siting Board conditionally granted AEUG Fleming Solar, LLC with a Certificate to Construct, subject to full compliance with specific mitigation measures and conditions.¹ That Project has not yet begun construction; the start date for construction of the AEUG Fleming Project is unknown at this time.
- The Fleming Project is proposed to be an 80-megawatt photovoltaic electricity generation facility built on portions of approximately 830 acres about a mile west of the City of Flemingsburg. On November 24, 2021, the Siting Board conditionally granted Fleming Solar, LLC with a Certificate to Construct, subject to full compliance with specific mitigation measures and conditions.² That Project has not yet begun construction; the start date for construction of the Fleming Project is also unknown at this time.

In the interest of full disclosure to the Siting Board and public, this report discusses the potential for cumulative impacts on the local area from the construction and operation of the three Projects in Section 5. However, we have not performed any analyses to quantify or to address the full scope of cumulative impacts, since the development and operation schedules of the projects are unknown at this time.

¹ HE also completed the SAR Review for the AEUG Fleming Solar Project.

² HE also completed the SAR Review for the Fleming Solar Project.

SECTION 2

Summary and Conclusions

On June 23, 2023, Hummingbird Energy, LLC (Hummingbird Energy or Applicant) 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. Hummingbird Energy's application (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 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 results and conclusions from 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

Hummingbird Energy proposes to construct a 200-megawatt (MW) alternating current photovoltaic electricity generation facility (Project or Solar Project) in northern Fleming County, KY, south of the City of Mt. Carmel. The Project site encompasses a total of about 4,100 acres of rural agricultural land. Solar infrastructure will include approximately 401,500 solar panels, associated racking structures, 53 inverters and a Project substation transformer that will tap into an existing overhead 138 kV transmission line owned by the East Kentucky Power Cooperative (EKPC).

- ***Surrounding land uses*** – The area around the Project site can be generally described as rural agricultural. Some areas are moderately to heavily treed and also include other types of vegetation; other areas are more sparsely vegetated or are comprised of open fields. Acreage surrounding the Project site is largely residential agriculture or purely agricultural land. A few commercial properties are located adjacent to the Project site or in the general Project area. At least two religious facilities are located in the general vicinity of the Project. Several small unincorporated communities are located in the region.
- ***Proximity to homes and other structures*** – A total of 257 residential structures are located within 2,000 feet of the Project boundary line. The shortest distance between a residence and a solar panel is 260 feet. The closest home to an inverter would be 577 feet and the closest home to the substation would be about 790 feet. Two religious facilities and three businesses are also located within 2,000 feet from the Project boundary; all of those facilities are located approximately 500 feet or more from any Project component.

- **Locations of structures** – Solar panels, inverters and the racking system will be located across about 2,032 acres within the Project site. The Project substation and O&M area will be located in the central portion of the Project site, on the west side of Carpenter Road. One weather station will be located on-site, in the northwest area of the Project off Poplar Grove Road. The Project’s AC collection system will include some above ground cabling across the Project site; above ground segments will not exceed 45 feet in height. The existing East Kentucky Power Cooperative Goddard to Plumville 138 kV transmission line runs in a northwest-southeast direction through the Project site; the Project substation will connect to that transmission line.
- **Locations of access ways** – Proposed development of a single entrance to individual parcels or groups of parcels will allow access to different areas of the property during construction and operations. Decisions regarding the number and locations of Project site entrances will be made in conjunction with the chosen engineering, procurement and construction (EPC) firm at a later date. Approximately 344,844 linear feet of gravel access roads will be constructed within the Project site. The Project will not use the railroad for any deliveries, and Project traffic will not cross the rail line directly.
- **Access control** – All site entrances will be gated and locked outside of normal working hours; all entrances and driveways will comply with applicable design requirements for safe access and egress. The Project’s solar arrays will be secured with six-foot chain link fence with three strand barbed wire, meeting National Electric Safety Code (NESC) requirements. The substation will be surrounded by its own separate fencing and additional locked gate. Once operational, the Project site will be automated and monitored remotely at all times.
- **Utility service** – Electrical, water, and telecommunication utilities will be required during Project construction and operations and would likely be obtained from Fleming-Mason Electric Cooperative, Fleming County Water Association, and Spectrum or Windstream, respectively.

Project construction is expected to last approximately 12 months. The Applicant anticipates implementing a phased approach, in which the Project site would be divided into separate geographic areas; those areas would be developed sequentially, with little to no overlap of construction activity. Because of the phased approach, the Applicant does not anticipate a single defined peak period of construction activity but would anticipate multiple smaller peaks within the 12-month timeframe. However, the exact timing and phasing of construction will be determined in coordination with the chosen EPC firm.

An average of approximately 250 construction workers will be on-site each day, with a maximum of approximately 300 workers on-site at any one time.

Setback requirements and requested deviation. The Applicant has entered a motion for deviation from the existing setback 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 Hummingbird Solar facility and the site development plan, as required by KRS 278.708.

Project Setting

Fleming County had a 2022 population of about 15,300 people. Population levels in the County have been growing slowly, but steadily, in recent years; that trend is projected to continue in the future. With a relatively low population density, the county is more sparsely populated than many other counties in Kentucky. The County's residents are older, as compared to other areas of Kentucky. The City of Flemingsburg, located less than five miles to the west of the Project site, is home to an estimated 2,900 residents and offers a mix of residential, commercial and public opportunities. Residents' income levels are low, and they experience higher than average rates of poverty, as compared with other counties in Kentucky or the U.S.

Compatibility with Scenic Surroundings

The area surrounding the Project is largely rural and agricultural, with some clusters of residential properties and additional rural residences scattered across the area. Agricultural activity is largely focused on row crops. Existing vegetation is moderate to heavy in some areas along the Project boundaries and sparse in other areas. Several unincorporated communities are located in this area of Fleming County, including the community of Mt Carmel. The Project site is located to the north and east of the City of Flemingsburg, which offers a mix of commercial activities.

Scenic compatibility focuses largely on the solar panels, inverters, and the Project substation area. Project solar panels or other infrastructure would be visible from different viewpoints. The closest (non-participating) home is about 260 feet from a panel and the closest home to an inverter is 577 feet. The substation is located along Carpenter Road, about 790 feet from the nearest home. Portions of the Project will be in view of some nearby homes and local roads without any type of visual barrier. The Applicant's proposed vegetative screening plan would largely shield the Project from local residences and vehicle drivers. The Applicant has stated they will extend vegetative screening as needed and work with neighboring homeowners and business owners to address concerns related to the Project.

The Project will use anti-glare solar panels. The Applicant's glare study acknowledged that certain roadway locations would experience some amount of low level (green) glare at specific times of day, but it concluded that that level of glare was unlikely to significantly affect drivers moving through the area. Four homes would also experience short periods of green glare (less than 30 minutes per day) in several winter months; the glare study describes that impact as negligible.

Given its rural location, relatively sparse population in the Project area, and the distances between Project components and nearby residences, HE believes the Hummingbird Solar facility can be considered compatible with the existing scenic surroundings, assuming the addition of vegetative screening in strategic areas and other proposed mitigation measures.

Potential Changes in Property Values and Land Use

The Applicant's consultant, Mr. Richard Kirkland, provided an extensive database and analysis of property values, transactions, and estimated impacts of solar facilities in diverse locations, concluding that the Project would have no effect on property values.

To further assess potential property value impacts, HE: (1) reviewed existing literature related to solar facility impacts; (2) interviewed the Fleming County Property Valuation Administrator; (3) requested additional information from Mr. Kirkland; and (4) examined the potential for impacts to residential and other properties closest to the Project. Most recent academic and applied research studies indicate no impact on property values as related to solar facilities.

The Fleming County Property Valuation Administrator (PVA) suggested that local residents are concerned about impacts to land values and re-sale values from the Project, but also stated that no specific inquiries about the Project have come through the PVA's office to date. The real estate market is strong in Fleming County and property values have increased considerably in recent years.

HE's evaluation of the data provided by Mr. Kirkland also suggests that property values are unlikely to be affected by solar facilities. In evaluating this particular Project, we find that the visual and noise impact to proximate structures can be minimized by natural conditions and vegetative buffering. Therefore, HE concludes that negative impacts to property values from this Project are unlikely as a general rule. This conclusion is predicated on the assumption that the mitigation strategies discussed in Section 6 are adopted by Hummingbird Solar and the Siting Board. Mitigation of visual and other effects, with close property owner coordination, can minimize uncertainties related to property values.

Anticipated Peak and Average Noise Levels

Neither the Commonwealth of Kentucky nor Fleming County have noise ordinances applicable to this Project. As such, HE adopted the noise recommendations generated by the Environmental Protection Agency and the World Health Organization to gauge acceptable levels of sound impact, between 50 and 55 dBA.

Construction activities are expected to generate noise emissions greater than 85 decibels (dBA) throughout the 12-month construction period. This level is above standards for annoyance, but the noise will be sporadic and decrease with distance from construction equipment. The rock drilling phase is the loudest part of the construction process, followed by the trenching and racking phases. Road and laydown area construction, inverter construction, substation construction, boring and piling may also be loud during construction. Those activities will only occur in any one location for a short period of time, moving around the Project site until construction is complete. Since these construction activities are not sustained, no hearing loss or long-term annoyance to residents is expected.

Noise from Project components during operations (inverters, motors, transformer) is anticipated to result in only a small increase, if any, to the local sound environment. Operational

components would emit relatively low but continuous sounds during daylight hours and little sound at night. For nearby residences, operational sound levels would be less than the 50.0 dBA noted by the World Health Organization (WHO) as potentially causing moderate annoyance. Noise from the Project's operational components is not likely to be annoying and may not be noticeable.

Natural vegetation exists in some areas surrounding the Project site but is sparse in other areas. Vegetative buffers developed by the Applicant would help mitigate noise emissions that may be caused by the Project. The natural but irregular hilliness of the terrain surrounding the Project will help mitigate noise for some residences, as well as for the nearby Mt Carmel Christian Church.

Road and Rail Traffic, Fugitive Dust and Road Degradation

KY-57 (Mt Carmel Rd), KY-344 (Foxport Road), KY-559 (Fox Spring/Wallingford Road) and KY-3301 (Beechtree Pike) will provide access to the Project site, along with CR 1027 (Carpenter Road), CR 1036 (Wilson Run Road), CR 1037 (Maddox Pike), and numerous other local roads. The Applicant's traffic study addressed construction effects to these roadways, and additional roads surrounding the Project site, including KY-989 (Salt Lick Road), KY-1237 (Burtonville Road) and CR 1030 (Colgan Road). Road and traffic impacts during operation will be minimal, but clearly evident during construction.

Traffic impacts during construction are uncertain, given the lack of a construction plan. Construction activities will cause noticeable increases in traffic volumes on local roads, given light existing traffic volumes in the area. Local roads are generally narrow and passing may be an issue in some areas. These impacts will be temporary, occurring over the 12-month construction period, but may be annoying to local residents. Vehicle traffic, including commuting workers and deliveries, may also have the potential to cause road degradation. Construction activities may impede access for residents on some local roads in the Project area.

A specific area of concern is Carpenter Road, a narrow two lane road in the center of the Project area which will be used to deliver the substation transformer. The Applicant has stated it intends to coordinate with the Kentucky Transportation Cabinet to acquire a special overweight/over-dimensional hauling permit for delivery of the transformer and with the Fleming County Road Department.

Given the few employees and deliveries required for Project operations, traffic impacts during the operational phase will be minimal.

There are no rail lines located in the Project area. The Applicant has stated they will not use the railroad for delivery of Project components.

Fugitive dust should not be an issue given the Applicant's commitment to best practices for construction and operational activities, including the application of water for dust suppression.

Economic Impact Analysis

Construction and operation of the Hummingbird Solar facility will provide some limited economic benefits to the region and the Commonwealth. Construction employment and income opportunities will be temporary, but local hires will increase employment and incomes in an area that may need it. The bulk of construction purchases will be made outside Kentucky, limiting opportunities for local business activity or generation of additional sales tax.

Operational economic benefits will be confined mostly to property taxes. Annual property tax payments will be made to Fleming County taxing authorities, including the Fleming County School District; however, those payments will likely amount to a small percentage of total tax revenues. Operational employment will be minimal, and purchases of materials or supplies will be small on an annual basis. Socioeconomic impacts of the Hummingbird Solar facility represent a positive, albeit small, contribution to the region.

Decommissioning

The Hummingbird solar facility is anticipated to have an expected useful life of about 40 years.³ Decommissioning activities will begin within 12 months of the Project ceasing operation. The Applicant's Decommissioning Plan provides a description of the decommissioning and restoration phase of the Project, including an overview of the primary decommissioning activities (dismantling and removal of facilities and subsequent restoration of land). Decommissioning activities include:

- Removal of the Project components: solar modules, racking, tracking system, foundations and piles, battery storage units, inverters, transformers, access roads, and electrical cabling and conduits.
- Components of the facility that have resale value may be sold in the wholesale market.
- Components with no wholesale value will be salvaged and sold as scrap for recycling or disposed of at an approved offsite licensed solid waste disposal facility.

The Project area will be returned to a substantially similar state to what it was prior to the commencement of construction. Restored areas will be revegetated in compliance with applicable laws and regulations in place at the time of decommissioning. Additionally, lease agreements with participating landowners obligate the Applicant to remove Project structures in accordance with applicable laws and requirements and restore the site to "substantially previous conditions," while allowing for certain elements to remain based on landowner preferences.

A summary of estimated costs and revenues associated with decommissioning the Project is also included. Hummingbird has indicated that they will secure a bond or other similar security for the Project to assure financial performance of the decommissioning obligation.

³ The Decommissioning Plan also notes the possibility that the Project could be repowered with newer technology.

Public Outreach and Communication

The Applicant has engaged in public outreach in Fleming County and in the Project area since early 2022, including multiple public meetings, informational mailings to adjacent landowners, meetings with County officials and creation of a Project website.

It appears that many, although not all, of the attendees at the public meetings have been participating landowners. The current Fleming County Judge Executive indicated that as of the date of the on-site visit, he has not been contacted by local community members about this Project. At this point, it is unclear whether, or how much, local or County residents know about the Project.

Complaint Resolution

The Applicant is committed to developing and implementing a Complaint Resolution Program. According to the Applicant, a clearly defined point of contact from Hummingbird, or via the EPC firm, will be designated to respond to questions or concerns. That point of contact will be designated as part of the intended Complain Resolution Program and will be shared with representatives from the Fleming County Fiscal Court, Fleming County Fire and Police, and other local stakeholders. Application materials do not provide any further detail about the program.

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 Hummingbird 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

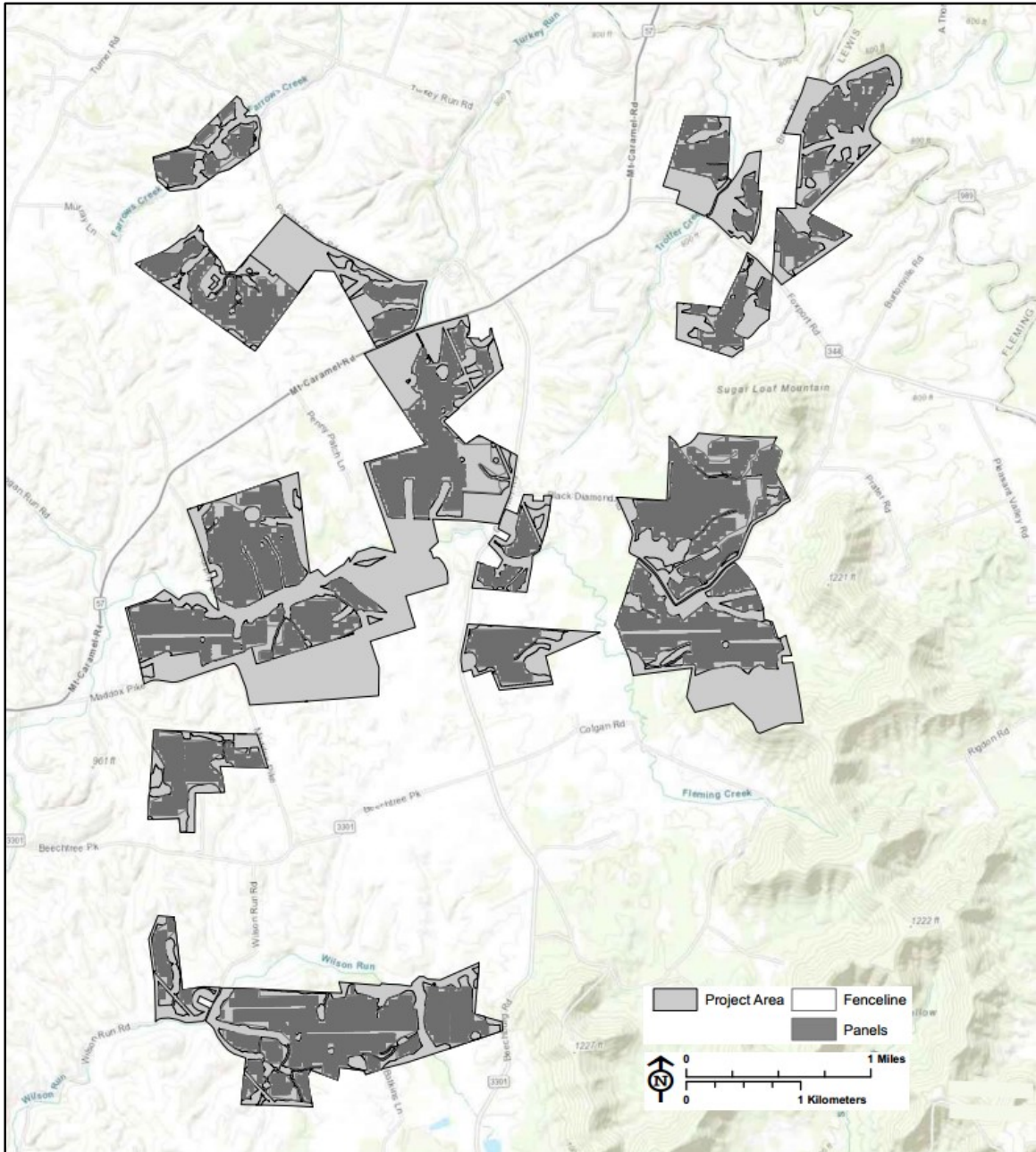
Project Overview

The Hummingbird Solar, LLC Application and SAR describes the Hummingbird Solar Project as follows:

- The proposed 200 MW Hummingbird solar electrical generation facility and nonregulated electric transmission line would be located on approximately 4,141 acres near Mt. Carmel, Kentucky, in Fleming County. PV solar modules are used to convert sunlight into direct current (DC) electricity which is then converted to AC electricity through inverters. Transformers step up the AC electricity to a higher voltage so that it can connect to the regional transmission grid.
- Project components will include a PV solar array field, an onsite substation, a DC collection system of underground cabling and combiner boxes, power conversion stations with inverters, transformers and emergency backup power to convert DC to AC. An underground and/or overhead collection system will be used to convey electricity from the solar array field to the substation. An operation and maintenance (O&M) area for the Project will also be installed and could include, as necessary, an O&M building, parking area, and other associated facilities. In addition, the Project will also include an onsite transmission line, fiber optic cable for communications via underground or on overhead lines, a meteorological station mounted on a concrete foundation, interior access ways, and a facility perimeter road.
- The substation area will serve as the general parking area for permanent employees and contain all necessary equipment to step up incoming MV electricity to the high voltage electricity necessary to interconnect into the existing Goddard to Plumville 138 kV transmission line owned and operated by East Kentucky Power Cooperative (EKPC). The substation gen-tie line will be approximately 300 feet in length, will be located entirely within the Project footprint, and will be constructed by the Applicant.
- During construction, the Project will include a temporary construction mobilization and laydown area for construction trailers, construction workforce parking, aboveground water and field tanks, materials receiving and materials storage.

Exhibit 3-1 illustrates the Project boundaries and identifies locations of Project solar panels. Additional detailed maps of the Project site and Project components were provided in SAR Exhibit A (Project Site Layout). A series of slightly revised site plan maps were provided in response to the PSC's data requests and discussion during the on-site visit.

Exhibit 3-1.
Preliminary Project Layout Map for the Proposed Hummingbird Solar Project



Note: Detailed maps of the Project site and Project components are included in Exhibit A (Project Site Layout) of the SAR.

Source: Visual Resource Assessment and Mitigation Plan, Hummingbird Solar Project, September 2023 (Hummingbird Site Assessment Report Exhibit F).

The Project site is located approximately 70 miles northeast of the City of Lexington, KY, the largest community in the region. The westernmost portion of the Project site is located less than five miles east of the City of Flemingsburg.

Construction Activities

Construction of the Hummingbird Solar facility, including substation construction, racking and panel installation and completion activities, is expected to occur over a period of about 12 months. Although requested, the Applicant was unable to provide a detailed construction schedule, including timelines of different construction phases, stating that “this information will be obtained in coordination with the EPC [engineering, procurement and construction] firm closer to the construction commencement date.”⁴

The Applicant stated that construction will be conducted via a phased plan. Currently, the Applicant envisions the Project site being divided into approximately five separate geographic areas; those areas would be developed sequentially, with little to no overlap of construction activity.⁵ Because of the phased approach, the Applicant does not anticipate a single defined peak period of construction activity but would anticipate multiple smaller peaks within the 12-month timeframe. However, the exact timing and phasing of construction will be determined in coordination with the chosen EPC firm.

An average of approximately 250 construction workers will be on-site each day, with a maximum of approximately 300 workers on-site at any one time.

The Applicant has stated that construction related activities are expected to occur mainly between 7:00 a.m. and 7:00 p.m. The Applicant anticipates that the majority of work would occur Monday through Friday, but that Saturdays and Sundays may be utilized to offset construction delays.

Life of the Project

The Hummingbird Solar facility is anticipated to operate for approximately 40 years. The Applicant’s Decommissioning Plan notes that equipment replacement and repowering could provide an opportunity for a project lifetime of 50 years or more. Project decommissioning (the process of closing the facility to retire it from service) is discussed in Section 5 of this report.

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. Fleming County in general, and particularly the area to the north and east of the City of Flemingsburg, is rural in nature, with low population density and an agricultural emphasis. Appendix C of this report provides the Applicant’s map of land uses

⁴ HE requested a detailed construction schedule as part of the Siting Board’s First Data Request.

⁵ Information provided by the Applicant as part of the discussion at the on-site visit.

within a one-mile boundary of the Project site. Section 4 of this report offers a general overview of the County's demographic and economic characteristics.

Exhibit 3-2 indicates the percentage of adjoining acreage and parcels, by type of land use.

Exhibit 3-2.
Land Uses of Properties Adjoining the Hummingbird Solar Project Site

<u>Land Use</u>	<u>Percent of Total Adjoining Acres</u>
Agricultural / Residential	57.94%
Agricultural	37.40%
Residential	4.64%
Cemetery	0.02%
Total	100.00%

Source: Hummingbird Solar, LLC, June 2023.

Acreage within the Project site is currently used for agricultural purposes, including production of corn, soybeans, and hay, and as rangeland for cattle.⁶

Legal boundaries. The legal boundaries of the proposed site are described in Exhibit C (Legal Property Description) of the SAR. According to the Applicant, the Project area consists of 41 parcels secured pursuant to 38 real estate agreements.⁷ Portions of certain parcels are identified as Exclusion Areas; those areas are owned by participating landowners and will not be part of the Project. The entire Project site includes approximately 4,141 acres; however, the developed acreage or “Project footprint” is estimated to be approximately 2,032 acres.

Access control. The Applicant indicated their intention to develop a single entrance to each parcel or group of parcels, using public roads to move between parcels; however, final decisions regarding the number and locations of Project site entrances have not been made yet but will be determined in conjunction with the chosen EPC firm.⁸ Entrances will be used during both construction and operations and will be locked outside of normal working hours. According to the Applicant, all entrances and driveways will comply with applicable design requirements for safe access and egress.

The Project’s solar arrays will be secured with approximately 278,604 linear feet of perimeter fence, consisting of six-foot chain link fence with three strand barbed wire, meeting National Electric Safety Code (NESC) requirements. The substation will be surrounded by its own separate fencing and additional locked gate. Once operational, the Project site will be automated and monitored remotely at all times, with personnel located on-site to perform

⁶ Hummingbird Solar, LLC., Economic & Fiscal Contribution to Fleming County & the State of Kentucky (Application, Exhibit F).

⁷ The SAR stated that the site consists of 42 parcels; that information was updated as part of the Applicant’s response to the Siting Board’s First Data Request.

⁸ Information provided in response to the Siting Board’s First Data Request and as part of the discussion at the on-site visit.

duties, including security, as necessary. Fixed lighting at the perimeter will be limited to gates and the substation area and will be motion-activated to minimize light spillage.

The Applicant has stated that it will coordinate with Fleming County law enforcement and fire services prior to construction to answer questions regarding security and emergency protocols and provide first responder training.

Location of buildings, transmission lines and other structures. Approximately 401,500 solar modules, 53 inverters and associated other structures will be located on approximately 2,032 acres within the larger Project site, as illustrated in the Applicant's Conceptual Site Layout map.⁹

The Project Substation will be located in a central portion of the Project site, along Carpenter Road and south of Mt Carmel Road (KY-57), adjacent to EKPC's existing Goddard to Plumville 138-kV overhead electric transmission line. The DC collection system will include underground cabling and an underground and/ or overhead collection system will be used to convey electricity from the solar array field to the Project Substation. Underground segments of the AC collection system will be buried a minimum of three feet below grade; overhead portions will not exceed a maximum height of 45 feet above grade.¹⁰ Approximately 430,000 linear feet of collection system cables would be installed throughout the Project area. Collection cables will be congregated in common trenches and run adjacent to one another.

During construction, temporary laydown areas will be located throughout the Project site. The Applicant envisions individual laydown areas will be used to serve groups of parcels in the northeast, northwest, east, central, west and south portions of the Project site; however, final decisions regarding the number and locations of specific laydown areas will be made in conjunction with the chosen EPC firm. The Project will also include one meteorological station located in the northwest portion of the Project site.

The O&M area will be located near the Project substation and could include, as necessary, an O&M building, parking area and other associated facilities, such as above ground water storage tanks, security gates, signage, and flagpoles.

Location and use of access ways, internal roads and railways. As noted previously, multiple entrances will allow access to different areas of the Project site during construction and operations. The Applicant intends to develop a single entrance to each parcel or group of parcels, using public roads to move between parcels; however, final decisions regarding the number and locations of Project site entrances will be made in conjunction with the chosen EPC firm.

⁹ SAR, Exhibit A-1.

¹⁰ According to the Applicant, the specific segments of cabling to be located above and below ground will be identified in conjunction with the chosen EPC firm closer to the time of construction and will depend on a combination of site characteristics and cost estimates at the time of construction.

Approximately 344,844 linear feet of all-weather gravel access roads will be utilized within the Project Site during construction and operations. Roads will not exceed 16 feet in width, except for turning radii, which will not exceed 50 feet.

No railways are located within the Project site, or in close proximity to the Project area.

Existing or proposed utilities to service facility. Electrical, water, and telecommunication utilities will be required during Project construction and operations and would likely be obtained from Fleming-Mason Electric Cooperative, Fleming County Water Association, and Spectrum or Windstream, respectively, which are the utilities that provide services for the participating landowner properties and surrounding region.

Compliance with applicable setback requirements. Applicable portions of the setback statute (KRS 278.706(2)(e)) state that “all proposed structures or facilities used for generation of electricity be 2,000 feet from any residential neighborhood, school, hospital, or nursing home facility”.¹¹ Fleming County has no planning and zoning ordinances governing relevant setback requirements; therefore, the State statutory setback requirements apply to the Hummingbird Solar facility. Five “residential neighborhoods” are located within 2,000 feet of Project facilities; there are no schools, hospitals or nursing homes within 2,000 feet of the Applicant’s proposed location of Project structures or facilities.

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 Motion for Deviation from Setback Requirements (Motion for Deviation). The Motion for Deviation addresses each of the statutes listed above, describing the Applicant’s or facility’s compliance with each. That document also provides descriptions of the five residential neighborhoods within 2,000 feet of Project facilities.

Residential neighborhoods. The five residential neighborhoods identified in the Motion for Deviation are described as follows:¹²

- ***Beech Springs Drive:*** The Beech Springs Drive residential neighborhood consists of 16 residences along Beechtree Pike (KY-3301), near the southwestern portion of the Project.
- ***Maddox Road:*** The Maddox Road residential neighborhood consists of five residences along Maddox Road (CR 1037), near the western portion of the Project.

¹¹ According to KRS 278.700(6), a residential neighborhood is a populated area of five or more acres containing at least one residential structure per acre.

¹² A map showing the residential neighborhoods was included in the Applicant’s second supplemental response to the Siting Boards’s First Request for Information (Exhibit C203).

- **Poplar Grove:** The Poplar Grove residential neighborhood consists of 11 residences along Poplar Grove Road, near the northwestern portion of the Project.
- **Mount Carmel Road:** The Mount Carmel Road residential neighborhood consists of six residences along Mount Carmel Road (KY-57), near the central portion of the Project.
- **Foxport Road:** The Foxport Road residential neighborhood consists of five residences along Foxport Road (KY-344), near the northeast portion of the Project.¹³

Exhibit 3-3 provides information about the minimum distances between Project structures and nearby residences for each identified Residential Neighborhood.¹⁴

**Exhibit 3-3.
Minimum Distances between Residential Neighborhoods and Proposed Hummingbird Solar Project Facilities**

Residential Neighborhood	Distance to Project Boundary	Distance to Nearest Solar Panel	Distance to Nearest Inverter
Beech Springs Drive	305 feet	352 feet	1,252 feet
Maddox Road	309 feet	381 feet	1,053 feet
Poplar Grove	317 feet	373 feet	1,111 feet
Mount Carmel Road	320 feet	394 feet	1,529 feet
Foxport Road	243 feet	306 feet	1,287 feet

Note: Per Kentucky statutes, a Residential Neighborhood is defined as a populated area of five or more acres containing at least one residential structure per acre.

Source: Hummingbird Solar, LLC, June 2023 and August 2023.

Photos of the residential neighborhoods are included in Appendix B of this report.¹⁵

¹³ Subsequent to the filing of the Motion for Deviation, the Applicant performed a revised analysis to identify residential neighborhoods based on tax parcel boundaries; that analysis suggested that the residences located in the Foxport Road area do not meet the definition of a Residential Neighborhood. However, the Applicant does not intend to amend the Motion for Deviation and will maintain the proposed setbacks as presented in Exhibit 3-3.

¹⁴ Distances between Residential Neighborhood 1 and Project facilities, as stated in the Motion for Deviation, were revised as part of the Applicant’s response to the Siting Board’s First Request for Information.

¹⁵ Photos were taken by HE staff as part of the Project site visit.

Compliance with statutory requirements. The Motion for Deviation described the Applicant's or facility's compliance with applicable requirements 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*** – Increases in air pollutant emissions would occur during development and construction of the facility; however, these increases would be temporary in nature. Air pollutant emissions would result from operation and staging of supplies and construction equipment, worker personnel vehicles, and equipment and supply deliveries. Local emissions of PM, NO_x, CO, volatile organic compounds (VOCs), and SO₂ would be generated by both gasoline and diesel combustion engines. These emissions are anticipated to result in minor air quality impacts due to the limited durations, numbers of vehicles, and hours of operation.

The Project is not anticipated to emit any of the criteria pollutants (PM, CO, SO₂, NO_x, VOCs, or lead) or hazardous pollutants during operations. During operation, the only anticipated emissions associated with the facility are those from maintenance vehicles, such as trucks used by technicians and equipment used during mowing and other vegetation control. Hummingbird anticipates limited visits by personnel to the site to conduct inspections, perform equipment maintenance, and vegetation management.

- ***Water pollutants*** – Construction activities may increase erosion and sedimentation impacting onsite streams and wetlands. Hummingbird expects the Project to have storm water discharge during construction and intends to comply with KDOW's Construction Storm Water Discharge General Permit for any construction activities that disturb an acre or more. Contractors will be required to use silt fences, temporary sediment basins and traps, buffers around streams, wetlands, and open waters, and other best management practices (BMPs) in order to minimize the impacts of stormwater runoff. Hummingbird or its contractor will prepare and implement a stormwater pollution prevention plan (SWPPP) to comply with KDOW requirements. These BMPs will be used during the construction phase through final vegetative stabilization to minimize sediment runoff into waters of the U.S. and Commonwealth.

The Project is not anticipated to have any negative impacts to groundwater. Hazardous materials in the form of fuels, lubricants and other fluids will be stored on-site. Contractors will utilize BMPs to minimize the risk of leaks and spills and implement plans and procedures to immediately address spills and leaks that do occur.

- **Wastes** – All waste generated during the construction and operation of the Project will be disposed of following all local, state, and federal regulations. Where practical, construction waste material will be recycled, and any material that cannot be recycled will be disposed of offsite at a permitted facility. Construction contractors and subcontractors will be responsible for proper cleanup, disposal, and storage activities. Waste materials generated during the construction process will be stored in appropriate containers specific to the waste material. Proper storage and handling procedures for preventing spills related to machinery re-fueling will be implemented by the construction contractor. Hummingbird will develop and implement a Hazardous Material Business Plan to ensure the safe handling, storage, and disposal of hazardous material.

Waste produced on site is expected to be minimal and will be mainly related to maintenance or repair of construction equipment. Additionally, portable chemical toilets will be placed on site for construction workers. Licensed contractors will be responsible for pumping sewage from the portable toilets. Once construction is complete and the Project is in the operation phase, no waste is expected to be generated from the site. Any waste generated during maintenance activities will be removed from the site and disposed of in accordance with state and federal regulations.

- **Water withdrawal** – Water for construction-related dust control and operations will be obtained from several potential sources, including an on or off-site groundwater well, or trucked from an offsite water purveyor. Groundwater resources are not anticipated to be adversely affected by the volume of water required during the construction process. During operations, water will be used for vegetation management needs, including screening vegetation installation and during prolonged periods of drought.
- ***KRS 278.010: Definitions applicable to associated statutes:*** The Motion for Deviation states that in filing a complete application pursuant to applicable statutes, Hummingbird Solar has satisfied the goal of providing the required information 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 Hummingbird Solar will comply with all applicable conditions relating to electrical interconnection with utilities by following the PJM interconnection process. Hummingbird Solar will accept responsibility for appropriate costs which may result from its interconnecting with the electricity transmission grid.
- ***KRS 278.214: Curtailment of service or generation and transmission cooperative:*** The Motion for Deviation states that Hummingbird Solar will abide by the requirements of this provision to the extent that these requirements are applicable.

- ***KRS 278.216: Site compatibility certificate; site assessment report; commission action on application:*** The Motion for Deviation states that by complying with the requirements of KRS 278.700 et seq., Hummingbird Solar has met the requirements and goals of KRS 278.216.
- ***KRS 278.218: Approval of commission for change in ownership or control of assets owned by utility:*** Hummingbird Solar is not a utility as defined by the applicable statute; therefore, the Motion for Deviation states that this statute does not apply to the Applicant. However, the Motion for Deviation also states that “to the extent Siting Board approval may at some time be required for change of ownership or control of assets owned by Hummingbird, Hummingbird will abide by the applicable rules and regulations which govern its operation.”
- ***KRS 278.700 – 278.716: Electric Generation and Transmission Siting:*** The Motion for Deviation states that Hummingbird Solar’s application includes an evaluation of the issues required by KRS 278.700 to KRS 278.716. Moreover, the Applicant has designed the Project to ensure that, through Project layout and other mitigation measures, it will not intrude on 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 Hummingbird Solar SAR, the subsequent information provided by the Applicant in response to two rounds of inquiries, direct discussions with the Applicant, 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 Applicant is uncertain about details of site development (including specific locations of site entrances, the O&M area and aboveground cabling), as well as various aspects of construction activity (including timing of phasing and volume and flow of delivery and workforce vehicles). The Applicant has stated that many of these decisions will be made in coordination with the chosen EPC firm, closer to the time of construction. This leaves the PSC with a level of uncertainty about the Project and its impacts. In response, the recommended mitigation measures included in this report aim to ensure that the PSC will have this information before final approval, before making a final decision in this matter.
- The Hummingbird Solar Project does not meet the existing setback requirements, so the Applicant has submitted 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's 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 could include, but are not limited to, the location of solar panels, inverters, transformers, substation, operations and maintenance building, site entrances or other Project facilities or infrastructure.
2. Maps or other materials should be submitted to the Siting Board identifying and describing the specific segments of AC cabling to be located below grade and the specific segments to be located above grade throughout the Project site.
3. Any change in Project boundaries and developed areas from the information which formed this evaluation should be submitted to the Siting Board for review.
4. The Siting Board will determine if any deviation in the Project boundaries or proposed site layout 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 impact and mitigation requirements.
5. A detailed, Project-specific construction schedule should be submitted to the Siting Board. At a minimum, that information should include detailed descriptions of Project phasing, explanations of the timing and specific activities included in each phase, revised workforce estimates, if applicable, and estimates of delivery truck and commuter vehicle traffic by roadway.
6. The Siting Board will determine whether any information provided in the construction schedule or revised workforce estimates is likely to create a materially different pattern or magnitude of impacts than described in this report. If not, no further action is required. If so, the Applicant will support the Siting Board's effort to revise its assessment of impacts and mitigation requirements.
7. 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.
8. The Applicant's access control strategy will include appropriate signage to warn potential trespassers. The Applicant will ensure that all site entrances and boundaries have adequate signage, particularly in locations visible to the public, local residents and business owners.

9. According to National Electrical Safety Code regulations, the Applicant must install a security fence prior to any electrical installation work. The substation will have its own separate security fence and locked access installed.
10. Prior to construction, Hummingbird Solar will coordinate with Fleming County law enforcement and fire services to answer questions regarding security and emergency protocols and provide first responder training.
11. The Applicant will develop an emergency response plan prior to the start of construction. The Applicant will meet with local emergency management representatives to ensure familiarity with plans and procedures. The emergency response plan will be revised following completion of construction to reflect operational measures, and a meeting will be held with local emergency response representatives for an updated review.
12. The Applicant will post contact information for Project representatives and emergency agencies on signs at each entrance to the Project site.

SECTION 4

Project Setting

Description of the Area

This section provides a description of the area surrounding the proposed Hummingbird Project site. The Project site is located less than five miles northeast of the City of Flemingsburg, in Fleming County, in northeastern Kentucky. A portion of the Project site's eastern border follows the North Fork Licking River. Lewis County is located on the eastern side of that river. The topography of the area is mostly rolling hills and agricultural land, with wooded areas sprinkled throughout.¹⁶

Population and housing density. As of mid-2022, approximately 15,300 people resided in Fleming County.¹⁷ The County's population has increased slightly over the past 20 years; in 2000 the population was 13,800 and in 2010 the population was 14,350.^{18,19} About 96 percent of the population is white and the median age of residents is 41.²⁰ Fleming County's population is projected to grow slowly over time; the Kentucky State Data Center estimates that about 16,400 people will reside in the County in 2050.²¹ Currently, there are about 5,900 households in Fleming County, with an average of about 2.5 persons per household.²² At a density of about 42 people per square mile, Fleming County is more sparsely populated than most other counties in Kentucky.²³

Flemingsburg, the County seat of Fleming County, is a small city in north-central Kentucky with about 2,900 people. Lexington, located about 70 miles southwest of Flemingsburg, is the

¹⁶ Kentucky Geological Survey. Groundwater Resources of Henderson County, Kentucky.
<https://www.uky.edu/KGS/water/library/gwatlas/Fleming/Topography.htm>

¹⁷ U.S. Census Bureau. Fleming County Quickfacts.
<https://www.census.gov/quickfacts/flemingcountykentucky>

¹⁸ U.S. Census Bureau. Fleming County, Kentucky, Profile of General Demographic Characteristics.
<https://data.census.gov/cedsci/table?q=fleming%20county%20kentucky&y=2000&tid=DECENNIALDPSF42000.DP1&hidePreview=false>

¹⁹ U.S. Census Bureau. Fleming County, Kentucky, Annual Estimates of the Resident Population: April 2010 – July 1, 2019.
<https://data.census.gov/cedsci/table?q=fleming%20county%20kentucky&tid=PEPPPOP2019.PEPANNRES&hidePreview=true>

²⁰ U.S. Census Bureau. Fleming County, Kentucky, Age and Sex.
<https://data.census.gov/table?q=fleming+county+kentucky&tid=ACSST5Y2021.S0601>

²¹ University of Louisville, College of Arts and Sciences, Population and Household Projections, Kentucky, Kentucky Counties and Area Development Districts, 2020 – 2050,
<https://louisville.app.box.com/s/rh39adf5ou0cd0aduxe5dnodanj3ftf0/file/993066674933>

²² University of Louisville, College of Arts and Sciences, Population and Household Projections, Kentucky, Kentucky Counties and Area Development Districts, 2020 – 2050,
<https://louisville.app.box.com/s/rh39adf5ou0cd0aduxe5dnodanj3ftf0/file/993066674933>

²³ Statistical Atlas. Fleming County, Kentucky.
<https://statisticalatlas.com/county/Kentucky/Fleming-County/Population>

nearest metropolitan area in Kentucky. Lexington has a population of about 323,000.²⁴ The Lexington-Fayette metropolitan statistical area has a population of about 320,300.²⁵

Income. In 2021, the per capita personal income in Fleming County was \$41,490. This was 19 percent less than the average per capital personal income in the Commonwealth of Kentucky, and 35 percent less than the average in the United States.²⁶ As of mid-2022, about 17 percent of the Fleming County population lived below the poverty line.²⁷

Business and industry. In 2021, there were about 6,300 jobs in Fleming County, with 56 percent classified as wage and salary jobs and 44 percent being proprietors' employment.²⁸

- Agriculture is the largest employment sector in Fleming County, with 1,050 jobs.²⁹ As of 2017, 171,000 acres were in farms, which equates to roughly 77 percent of the total acreage in Fleming County.³⁰ Forage-land used for hay and grass silage account for most of the cropland, and soybeans and corn are the next most commonly grown crops. As of 2017, there were roughly 44,000 head of cattle and calves in the County.
- Government is the second largest sector in the County, with about 695 jobs.
- Retail trade is the next largest sector with roughly 680 jobs.
- Construction and manufacturing sectors follow with about 620 jobs and 600 jobs, respectively. Major industries in the area include A. Raymond Tinnerman (makers of automotive and appliance trim), GreenTree Forest Products (specialty pallets and skids, and hardwood grade lumber products), Wallingford Pallet (pallets, lumber, and sawdust), Appalachian Floor Vents (hardwood floor registers), Hypac Inc. (hydraulic equipment refurbishing), Riverside Plastics (plastic flower pots, boat parts, and plastic livestock equipment), Toyo Seat USA (makers of automotive seat tracks, latches, and

²⁴ U.S. Census Bureau. Lexington-Fayette, Total Population.

<https://data.census.gov/cedsci/table?q=Lexington-Fayette.%20Kentucky&tid=ACSDT1Y2019.B01003&hidePreview=false>

²⁵ U.S. Census Bureau. Lexington-Fayette, Annual Estimates of the Resident Population by Metropolitan Statistical Area.

<https://www.census.gov/quickfacts/fact/table/lexingtonfayetteurbancountykentucky.KY/PST045222>

²⁶ U.S. Bureau of Economic Analysis. United States, Kentucky and Fleming County, GDP and Personal Income.

<https://www.bea.gov/data/income-saving/personal-income-county-metro-and-other-areas>

²⁷ U.S. Census Bureau. Fleming County Quickfacts.

<https://www.census.gov/quickfacts/fact/table/flemingcountykentucky,US/PST045219>

²⁸ U.S. Bureau of Economic Analysis. Fleming County, Total Full-Time and Part-Time Employment.

<https://apps.bea.gov/iTable/?reqid=70&step=1&acrdn=6#eyJhcHBpZCI6NzAsInN0ZXBzIjpjbMSWvOSWvNSwzMSWvNiwvNywzMF0sImRhdGEiOltbIIRhYmxISWQiLCIzMyJdLFsiTWfqb3JfQXJlYSIsIjQiXSxbIIN0YXRlIixbljlxMDAwIIIldLFsiQXJlYSIsWyIyMTA2OSJdXSxbIIN0YXRpc3RpYyIsWyItMSJdXSxbIIVuaXRfb2ZfbWVhc3VyZSIsIkxldmVseyJdLFsiWWVhcnIIsWyIyMDIxIiIldLFsiWWVhcnJlZ2luIiwilTEiXSxbIIIiYXJfRW5kIiwilTEiXV19>

²⁹ U.S. Bureau of Economic Analysis. Fleming County, Total Full-Time and Part-Time Employment.

<https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&acrdn=6>

³⁰ U.S. Census of Agriculture. Fleming County, Kentucky Profile.

https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Kentucky/cp21069.pdf

seat frames), and Ridley Block Operations (manufacturer of agricultural feed supplements).³¹ The area promotes itself as a good place for companies looking for low operating costs, low tax rates, reasonable wage scales, and a quality labor force.

Major and minor roads and railways. The main portion of the Project site is accessible by KR-57 (Mount Carmel Road), which runs northeast from Flemingsburg. No railroad tracks are located within the Project site and there are no interstate highways in Fleming County.

Overall area description. Based on HE's research, the area around the Project site can be generally described as rural and agricultural. The County's population is increasing slowly and is projected to continue growing through 2050. Residents' income levels are low, and they experience higher than average rates of poverty than in other counties in Kentucky and the U.S.³²

³¹ Fleming County Chamber of Commerce. Economic Development Profile.

<http://www.flemingkychamber.com/ecdev.html>

³² 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 Siting Board also directed HE to 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 Hummingbird Solar Project provided by the Applicant in response to inquiries. HE also provides additional information gathered about the Project and its potential impacts on the region through secondary source research, including interviews. Finally, HE draws conclusions about Project impacts as well as recommended mitigation measures.

HE is also aware of the AEUG Fleming Solar, LLC solar project (AEUG Fleming Project) and the Fleming Solar, LLC solar project (Fleming Project), both of which were granted a Certificate to Construct in Fleming County by the Siting Board in 2021.³³ The AEUG Fleming Project is described as a 188 MW(ac) photovoltaic facility built on portions of approximately 1,590 acres on the south side of KY-559 (Old Convict Road), west of the City of Flemingsburg. The Fleming Project is described as an 80 MW(ac) photovoltaic facility built on portions of approximately 830 acres on the north side of KY-559 (Old Convict Road).³⁴ Neither Project has begun construction as of the date of this report. Construction of those Projects may or may not overlap with that of Hummingbird Solar to some extent; however, all Projects would likely be simultaneously operational for many years. Therefore, in the interest of full disclosure to the Siting Board and public, this section of the report discusses the potential for cumulative impacts on the local area from the construction and operations of the three Projects as related to scenic compatibility; land uses and property values; noise; and traffic.

³³ HE also completed the SAR reviews for the AEUG Fleming Solar Project and the Fleming Solar Project; we are familiar with the details of those Projects.

³⁴ Both of these Projects are located approximately 4.5 miles west of the Hummingbird Solar Project site.

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 unsightly, 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 in stature, and can be effectively visually blocked naturally with topographic variation or intervening vegetation, or through strategic means utilized by an applicant.

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*; that document is a guide designed to help planners evaluate the quality and completeness of visual impact assessments for solar and wind facilities.³⁵ Additional reports have been published from public agencies and private firms on visual impact assessments for solar facilities.

Most visual impact assessments focus on visualization 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 visual impact assessments 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.³⁶

A standard visual analysis generally proceeds in this sequence:³⁷

- 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 from KOPs.

³⁵ 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/>.

³⁶ Dean Apostol, James Palmer, Martin Pasqualetti, Richard Smardon, Robert Sullivan. (2016). *The Renewable Energy Landscape: Preserving Scenic Values in our Sustainable Future*. September 2016.

³⁷ Environmental Design & Research. *Visual Impact Analysis*. May 2019.

Glare from sun shining off solar panels can also be a potential issue in certain locations (i.e., along roadways, near airports, or close to residential properties) or at specific times of the day (generally in the early morning or later in the afternoon as the panels rotate to capture the light). Potential concerns associated with glare may include:

- Safety impacts, such as the potential to disorient motorists when driving or airline pilots when taking off or landing; or
- Annoyance impacts, such as distraction, after-image in the viewer's vision, or temporary avoidance of a view due to the presence of reflected light.

Glare analyses evaluate the potential for different types of glare (red, which is the most severe; yellow, which is less severe; and green, which has the lowest severity rating) at different locations around a project site and the duration of potential glare, if applicable, at different times of the day. Measures can be implemented to reduce the potential for glare impacts, including the use of anti-glare panels, appropriate panel location and growth of vegetative buffers.

Summary of information provided by the Applicant. In addressing scenic compatibility, the Applicant offers an overall description of the area and focuses on visual impacts during operations.

Scenic surroundings. The Applicant describes the Project area as rural in nature, including rural residential uses, agricultural fields and some forested areas. Agricultural uses are mainly row crops. Similar to its surroundings, the Project site is located on gently rolling terrain. The existing EKPC Goddard to Plumville 138 kV overhead electric transmission line, to which the Project will connect, runs through the middle portion of the Project site, generally along Carpenter Road. This portion of the Project site consists of open pastureland interspersed with trees and forested areas; other portions of the Project site are currently used for row-crop agriculture.

The area surrounding the Project site can be described as consisting of rolling terrain of a generally rural character. Small groups of residences are scattered throughout the area, with additional homes and farms located along local roads. Several small communities are located in this area, including Mt Carmel, Dalesburg, Beechburg, Foxport and Wallingford. Some groups of homes in Project area qualify, on a density basis, as a “residential area,” as identified in Section 3 of this report. Residences, businesses and religious facilities are located along KY-57 (Mt Carmel Road) and other local roads. Other areas surrounding the Project site generally consist of farmed or wooded acreage.

Potential visual impacts from Project construction. The SAR does not address the potential for visual impacts to adjacent landowners, local visitors or drivers during the construction phase.

Potential visual impacts from Project operations. Exhibit F of the SAR is the Visual Resource Assessment and Mitigation Plan prepared by Stantec; that document also includes a

glare analysis for the Project. Exhibit G of the SAR is the Landscape Plan, also prepared by Stantec.

During operations, different Project components may result in visual impacts to local residents and drivers. Sections 2 and 3 of the SAR describe the look of various components:³⁸

- *Solar panels:* The Project would include approximately 401,500 solar panels (modules) scattered across the non-contiguous parcels included in the Project site. The solar arrays, consisting of modules in individual rows placed on a racking structure, will be supported by steel piles driven into the soil. Piles typically are spaced approximately 25 feet apart, and the maximum height of the PV arrays will not exceed 15 feet. The spacing between array rows is estimated to be approximately eight to 15 feet. The center height of the racking structures will be approximately four feet to 6.8 feet above the ground. The panels will use anti-reflective technology to minimize reflection.
- *Inverter skids:* A total of 53 inverters will be installed throughout the Project site to convert the DC power to AC power, which will then be transmitted to the project substation.
- *Collection lines:* The modules will be connected using DC cables that can either be buried in a trench or attached to the racking system. The AC collection system will include underground and/or overhead segments. Overhead segments will not exceed a maximum height of 45 feet above grade. Approximately 430,000 linear feet of collection system cable would be installed throughout the Project site.³⁹ Collection cables will be congregated in common trenches and run adjacent to one another.
- *Project substation:* The Project substation will be located along Carpenter Road, adjacent to the existing EKPC Goddard to Plumville 138-kV overhead electric transmission line. The substation will include transformer equipment, control building foundation, an oil containment area, and a battery storage component with storage capacity of up to 200 MW. Concrete pads will be constructed as foundations for substation equipment, and the remaining area will be graveled. The substation area will also serve as the general parking area for permanent employees and will contain all the necessary equipment to interconnect to the EKPC transmission line. The substation gen-tie line will be approximately 300 feet in length and will be located entirely within the Project footprint. It is anticipated that the gen-tie and substation components will not exceed 85 feet above grade.

³⁸ The locations of the panels, inverters, substation and other Project infrastructure are shown in the Applicant's maps, provided in Exhibit A of the SAR and revised in response to the Siting Board's First Request for Information.

³⁹ As of the time of this report, the Applicant was unable to estimate the number of linear feet of cable that would be located above ground.

- *Meteorological station:* One meteorological station, mounted on a concrete foundation, will be located on a parcel located off Poplar Grove Road, in the northwest portion of the Project site.
- *Fencing and lighting:* Solar arrays will be secured with approximately 278,604 linear feet of perimeter fence, consisting of six-foot chain link fence with three strand barbed wire. The Project substation will be surrounded by additional security fencing. Fixed lighting at the perimeter will be limited to gates and the substation area and will be motion-activated to minimize light spillage.
- *Internal roadways:* Approximately 344,844 linear feet of private access roads will be constructed for use across the Project site. Those roads will be constructed of all-weather gravel and will not exceed 16 feet in width, except for turning radii, which will not exceed 50 feet in radius.

Distances between Project facilities and existing structures. The Applicant provided information describing the distances between residences, businesses or other structures within 2,000 feet of the Project boundary and various Project facilities. A total of 257 residences are located within 2,000 feet of the Project boundary:⁴⁰

- Of the non-participating residences, 74 are located within 500 feet of the Project boundary.
- Of the non-participating residences, 55 are located within 500 feet of a solar panel.
- The shortest distance between a non-participating home and a solar panel is 260 feet.
- The shortest distance between a non-participating home and an inverter is 577 feet. Sixteen non-participating homes are within 1,000 feet of an inverter.
- The shortest distance between a non-participating home and the substation is 790 feet; five non-participating homes are within 1,000 feet of the substation.

Two churches, three businesses and several hundred barns, sheds, garages and other uninhabited structures are also located within 2,000 feet of the Project boundary line. Information about the distances between the churches, businesses and Project infrastructure is provided in Exhibit 5-1.

⁴⁰ Including participating landowners' residences and homes located within the five areas identified as "Residential Neighborhoods" in the Applicant's Motion for Deviation from Setback Requirements.

**Exhibit 5-1.
Distances between Non-Residential Structures within 2,000 Feet of the
Hummingbird Solar Project Boundary and Project Facilities**

<u>Feature</u>	<u>Distance to Boundary Line (ft)</u>	<u>Distance to Nearest Solar Panel (ft)</u>	<u>Distance to Nearest Inverter (ft)</u>	<u>Distance to Substation (ft)</u>
Mt Carmel Bible Fellowship	407	493	1,967	2,604
Mt Carmel Christian Church	986	1,083	2,208	4,284
Business 1	1,752	1,916	2,153	8,524
Business 2	1,462	1,538	2,774	4,411
Business 3	1,670	1,752	3,024	4,471

Source: Hummingbird Solar, LLC, August 2023.

Several small cemeteries are located in the general vicinity of the Project site.⁴¹ The closest two cemeteries are located within about a quarter of a mile of the Project boundary; others are located about a half mile or more from the Project.

The Applicant has stated that the Project will utilize construction methods that minimize large-scale grading and removal of native soil. Clearing and grubbing will occur only where necessary. Minimal grading may be required to level rough or undulating areas of the site and to prepare soils for concrete foundations for substation equipment and inverters.

Visual resource assessment and viewshed analysis. The Applicant’s Visual Resource Assessment (SAR Exhibit F) was “conducted to identify and assess the Visually Sensitive Resources (VSRs), project visibility, and potential visual impacts” from the Project. The study focuses on the area within a five-mile radius of the Project site, evaluating visually sensitive resources such as historic landmarks, natural scenic areas, public lands and other public areas including cities, villages, schools, airports, roads and similar features.⁴²

A viewshed analysis, accounting for existing topography, structures and vegetation, was conducted using a digital surface model (DSM) derived from the Statewide Imagery Program's (KyFromAbove) 2021 LIDAR data for Fleming, Mason, and Lewis counties, and enhanced with Esri ArcGIS® software. Visual simulations at 15 separate locations across the Project site

⁴¹ The Applicant provided a map identifying each cemetery within a five-mile radius of the Project in their response to the Siting Board’s First Data Request.

⁴² A list of the identified Visually Sensitive Resources, distance from the nearest PV array and the determined Project visibility is provided in Appendix C of the Applicant’s Visual Resource Assessment report.

are provided, illustrating existing conditions, conditions immediately following construction and conditions five to seven years post construction with the inclusion of vegetative screening.

The Visual Resource Assessment reaches the following conclusions:

- The proposed solar arrays associated with the Project will be screened from view in approximately 95.9% of the 5-mile radius visually sensitive area. Visibility is concentrated within the Project Area and adjacent open fields. The viewshed analysis suggests that panel visibility substantially diminishes beyond the near-foreground distance zone (0.5 mile).
- Twenty-one visually sensitive resources have potential Project visibility. Viewshed results suggest that views from those locations will generally be small and/or include only a limited number of Project components.
- Beyond 0.5-mile, Project visibility will be reduced due to screening provided by topography and hedgerows in combination with the low height of the solar panels. Additionally, discernibility of panels that are visible in the outer extent of the 0.5 mile range will be diminished due to visual blending with the background at these distances.
- The Project will result in varying levels of visual impact when viewed from its surrounding vicinity. The Applicant will install structures that will alter the scenic quality and/or existing agricultural character of the landscape. However, Project visibility and potential visual impact will diminish rapidly at greater distances. For this reason, the Applicant believes that the impacts will be localized to a limited number of areas adjacent to the Project.

Potential for glare from Project panels. The Applicant provided a Glare Hazard Analysis (SAR Exhibit F, Appendix D), prepared by Stantec. Stantec utilized the web based ForgeSolar glare hazard analysis program to complete a glare analysis for the Project to determine the potential effect of glare from the photovoltaic (PV) solar panels on pilots and airport operations, residents in the area, and drivers in the vicinity of the Project area.

The report offers the following observations and conclusions:

- Glare can occur from the reflection of sunlight on the PV solar panels of utility scale solar-powered electric generating facilities. While PV solar panels absorb direct sunlight, some reflection can occur when the panels are directed close to horizontal, which mainly occurs during sunset and sunrise when the incidence angle of the panels is highest.
- Glare from the Project is not predicted to impact pilots landing on two runways at one airport, the Fleming Mason Airstrip, located approximately 5 miles northwest of the Project.
- Glare from the Project is not predicted to occur for drivers of vehicles on 12 of 16 road segments analyzed adjacent to the Project. One of the four roads predicted to see glare

appears to be outside the viewshed of the array. The remaining three roads likely to see green glare in limited areas include Breeze Road, Foxport Road, and Maddox Road. Of the road segments included in the analysis, these roads are expected to see up to 150, 120 and 2 minutes per day of green glare, respectively. The analysis was completed at two viewing heights for roadways: five feet for cars and small trucks and nine feet for semi-trucks. It should be noted that vehicles will quickly pass through any areas of green glare, which the Federal Aviation Administration does not consider a problem for pilots and is therefore unlikely to significantly affect drivers.

- Glare is not predicted for 168 of the 172 structures, primarily residences, which were analyzed within proximity to the Project area. The remaining four structures are predicted to see green glare for up to 20-25 minutes per day, mid-day late November to early January. This glare should be considered negligible both due to severity (green category) and length of time predicted.

Vegetation management and landscape planning. The Applicant's Landscaping Plan (SAR Exhibit G) includes the following information regarding vegetation management and landscaping:

1. The Project has been sited in a way to minimize impacts to the forested lands, shrublands, wetlands, and streams within the Project area, thereby minimizing impacts to trees and woody vegetation.
2. In order to limit the impacts to vegetation, all clearing will be confined to the Project infrastructure footprint. Typical footprints include:
 - 10 feet on either side of access road centerline
 - 5 feet on either side of buried collection line centerline
 - 3 acres for laydown yard(s)
3. Project construction will require a limited area of permanent disturbance of vegetation. The majority of disturbance activities will occur in agricultural lands for roads or laydown areas, and efforts to retain desirable vegetation growth will be maximized to the extent practicable. The Project will require minimal clearing of tree stands within various window or tree lot communities in order to access adjacent parcels.
4. After construction, disturbed areas not used for Project infrastructure will be returned to approximate preconstruction use and capability via reclamation and revegetation. Disturbed soils inside the Project's fence line will be reseeded with a mix of fescue and/or pollinators to stabilize exposed soils and control sedimentation and erosion.

Regarding the proposed screening plan, the Applicant notes that "vegetation will not provide 100% screening or visual obstruction from the Project. The primary intent is to provide visual relief in order to break up the lines of the infrastructure and enhance the overall aesthetics of the Project." The Applicant's proposed screening plan includes use of native evergreen trees

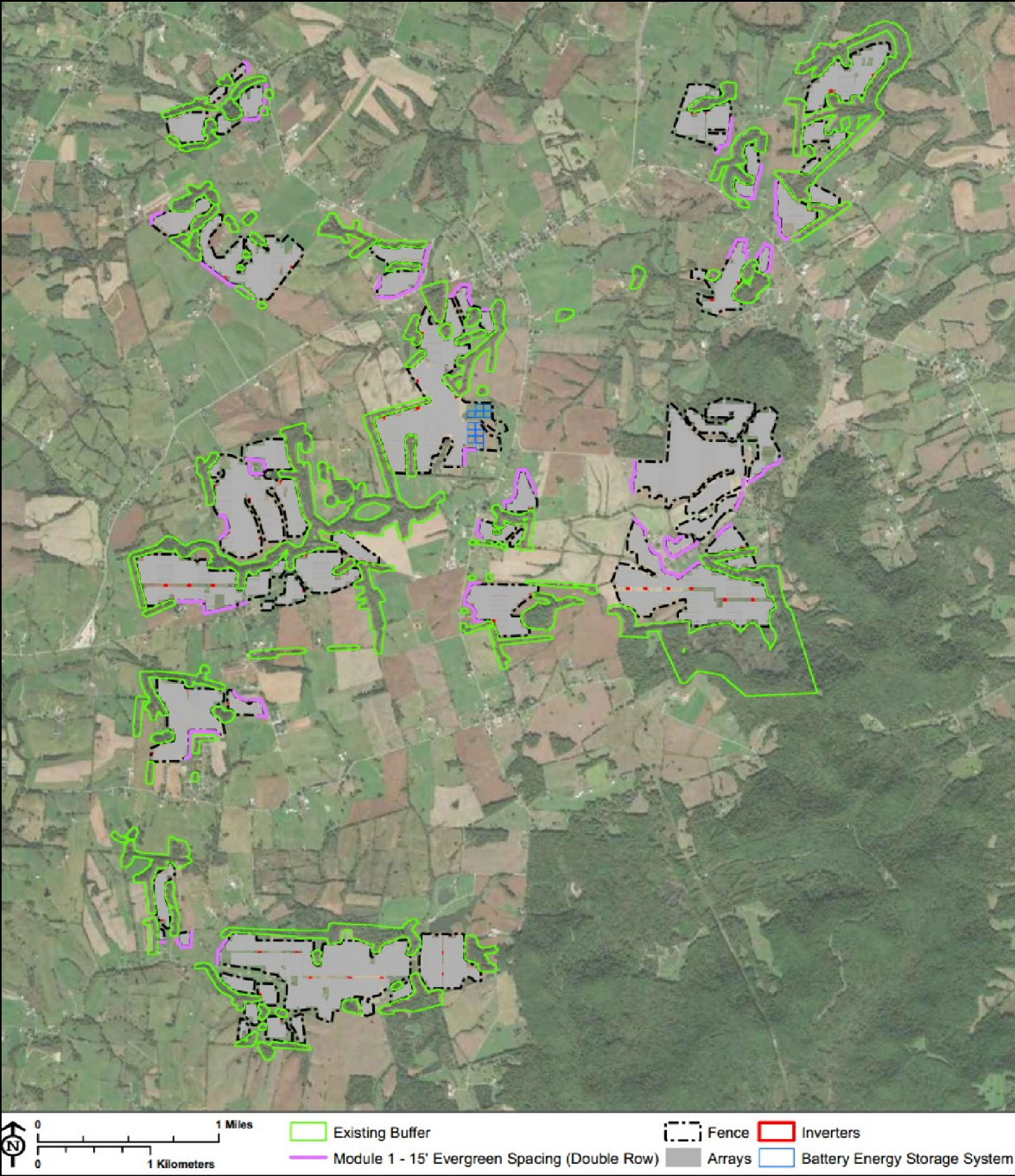
spaced at 15-feet on center.⁴³ The Applicant anticipates planting trees at a height of approximately six feet and assumes a mature height of about eight feet within about five years. Maintenance of planted landscape buffers will be conducted as needed following installation and will focus on ensuring survival of planted materials.⁴⁴

Exhibit 5-2 provides the Applicant's preliminary landscaping plan, identifying areas of existing natural vegetation and proposed screening. Specific locations were identified for screening generally based on the perceived visibility from residences, commercial structures or heavily trafficked roads and areas which may be affected by potential glare from panels. Distance from Project facilities and topographic conditions were accounted for in the determination of the need for screening.

⁴³ The Landscape Plan includes photo simulations of the proposed vegetative screening in several locations.

⁴⁴ The Landscape Plan provides additional details regarding vegetation maintenance.

Exhibit 5-2.
Hummingbird Solar Project Preliminary Screening Plan



Source: Hummingbird Solar, LLC, June 2023.

HE's evaluation of impacts. HE reviewed maps and Google Earth satellite imagery of the site and used 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 made a visit to the Project site in August 2023. During this site visit, we visited all proposed access points, drove around the property to gain line-of-sight to various viewpoints, and compiled a photo log of the Property boundary at different areas. The photo log index map and site photos can be found in Appendices A and B of this report, respectively.

Visual setting. With regard to the rural nature and “look” of the area, HE’s site visit confirmed information provided by the Applicant and gathered as part of the Project evaluation. The area surrounding the Project is largely rural and agricultural, but there are several clusters of homes in close proximity to the Project boundary, including several areas identified as residential neighborhoods.⁴⁵ Existing vegetation includes trees, bushes and grasses. There are extensive trees in the area surrounding the Project site, but vegetation is sparse in some areas. Open agricultural fields occur throughout the area. The natural hilliness of the terrain surrounding the Project will help mitigate visibility in some areas but may increase visibility in other areas.

Construction activities. Some adjacent landowners and commuters driving along surrounding roads, including KY-57 (Mt Carmel Road), Carpenter Road, Foxport Road and other roads will be able to see construction equipment and activity as it occurs.

- Residences close to the Project site would be able to see trucks and other equipment during construction.
- Drivers on surrounding roadways, including local roads near the Project site, would be able to see construction activities occurring on the Project site in certain areas where vegetation is relatively sparse.
- The Applicant’s description of construction phasing suggests that construction activity may be concentrated in smaller geographic areas on certain roads for short periods of time within the full 12-month construction phase. This will disperse visual impacts over a shorter period.
- The Applicant has stated that it will implement a complaint resolution process. Although not specifically stated, HE assumes this process would be used to address potential issues during construction as well as operations.

Because of the rural nature of the area and the fact that a phased construction approach would limit the duration of construction activity in any one area of the Project site, HE expects the visual impacts from construction activities to be minimal.

Project facilities. This scenic compatibility evaluation focuses upon the above-ground Project components, including the solar panels, inverters, substation/switchyard and other structures as those components may be visible from local residences and roads.

⁴⁵ Section 3 of this report describes the residential neighborhoods.

- Existing vegetation is moderate to heavy in some areas surrounding the Project and is sparse in others. Without the development of some type of visual barrier, the Project could be visible from many viewpoints (homes, roadways, etc.).
- The Applicant’s proposed screening plan includes planting of native evergreen trees to mitigate potential viewshed impacts in certain areas. As proposed, the vegetative buffers appear to generally shield nearby residences and roads from viewing the Project. However, site specific circumstances (i.e., elevation) may render portions of certain Project components visible in some locations, regardless of screening.
- During the on-site visit, the Applicant indicated that additional screening would be developed where needed, especially in areas near the Project substation and residential neighborhoods.
- The Applicant has stated that it will implement a complaint resolution process.
- Residences are located throughout the Project area, within varying distances from solar panels, inverters and other Project facilities. The smallest distance between a residence and a solar panel would be 260 feet. Other Project facilities would be located at greater distances from any homes. Religious facilities in the area would be located at least approximately 500 feet from a panel and further from inverters or the substation.

During one public meeting, a member of the Mt Carmel Bible Fellowship, located on Carpenter Road, expressed concern regarding the church’s viewshed in relation to panels proposed to be placed in a pasture east of the church. The Applicant responded that the proposed landscape screening plan addresses that location and stated that a buffer of trees and shrubs would be planted in that area.⁴⁶ HE's interviews with the Fleming County Judge Executive and Fleming County Property Value Administrator indicated some additional public concerns related to Project visibility.⁴⁷ The Applicant’s buffering plan and willingness to work with landowners to mitigate potential impacts should allay at least some of the public concern.

Without a vegetative buffer, the Project would be visible from some surrounding homes and roadways. However, if buffers are planted according to the Applicant’s proposed landscape screening plan, HE would expect the visual impacts associated with the presence of Project facilities to be minimal for the majority of the area surrounding the Project site. Visual impacts may be greater in some areas surrounding the Project while the vegetative buffers mature, during the winter months when vegetative cover is sparser, or for any residences located at higher elevations in relation to the Project site.

Potential for cumulative impacts with other solar projects. Once constructed, both the AEUG Fleming Solar Project and the Fleming Solar Project would be located approximately

⁴⁶ This interaction was described by the Applicant in their response to the Siting Board’s First Request for Information.

⁴⁷ Interviews with Mr. John Sims, the Fleming County Judge Executive, and Ms. Stephanie Harding, the Fleming County Property Valuation Administrator, were conducted during the site visit trip in August 2023.

4.5 miles west of the Hummingbird Project site. The Applicants in those cases have also proposed some level of vegetative screening in certain areas surrounding their project facilities. Given the distance between those projects and the Hummingbird Project site, it is unlikely that there would be any cumulative visual impacts to residents or businesses located in the vicinity of the Hummingbird Project.

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:

- Construction vehicles and activity may be visible from local roadways and certain vantage points around the Project site, but these effects will be temporary as construction work moves around the site. Proposed construction phasing and dispersed facilities would limit the duration of construction activity in any specific geographic area over the course of the anticipated 12-month construction period.
- Existing vegetation left in place along the Project boundary line may reduce visibility of construction activities occurring on-site in some areas, but natural vegetation surrounding the Project site is sparse in some areas along the Project boundary.
- Operational infrastructure, including the solar panels and inverters, will generally be obscured to drivers along local roads, as well as to local residents surrounding the Project site, due to the natural conditions and proposed vegetative screening. The Applicant has also indicated a willingness to extend proposed screening to additional areas of the Project site, as needed.
- The substation area will be located in the central portion of the Project site, on the west side of Carpenter Road. Several homes and one church are located in that area. One church member expressed concern regarding impacts to the view from the building; the Applicant plans to develop vegetative screening in that area and will work with local residents to mitigate impacts to the viewshed.
- A small number of homes would be within 500 feet of any Project facilities. HE believes that the vegetative buffers proposed by the Applicant would largely shield Project components from the view of local residents. Certain homes may have partial views of certain Project facilities due to the topography of the area.
- The use of anti-glare panels will reduce, or eliminate, the potential for glare from solar panels for local residents and drivers. Glare may be present for relatively short periods of time at certain segments of three roadways and for four residences.
- Based on our understanding of the Project area in Fleming County, HE believes that the Hummingbird Solar facility would not be incompatible with existing scenic conditions with appropriate vegetative screening. Development of vegetative buffers would support scenic compatibility between the Project and adjacent properties and land uses.

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

1. Existing vegetation between the solar arrays and nearby roadways and homes shall be left in place, to the extent feasible, to help minimize visual impacts and screen the Project from nearby homeowners and travelers.
2. The Applicant will not remove any existing vegetation except to the extent it must be removed for the construction and operation of Project components.
3. The Applicant shall implement planting of native evergreen species as a visual buffer to mitigate viewshed impacts, particularly in areas directly adjacent to the Project without existing vegetation.
4. The Applicant shall carry out visual screening consistent with the plans proposed in its Application, including the Site Assessment Report, and ensure proposed new vegetative buffers are successfully established and develop as expected over time. Should vegetation used as buffers fail to thrive over time, the Applicant shall replace them as appropriate.
5. The Applicant shall provide a visual buffer between Project infrastructure and residences or other occupied structures with a line of sight to the facility to the reasonable satisfaction of the affected property owners. To the extent that an affected property owner indicates to the Applicant that a visual barrier or vegetative buffer is not necessary, Hummingbird Solar will obtain that property owner's written consent and submit such consent in writing to the Siting Board.
6. Any changes to the vegetative buffering plan or site infrastructure layout (i.e., panels, inverters, etc.) included in the Application materials will be submitted to the Siting Board for review. If the Siting Board deems those changes to be significant, the Siting Board may require the Applicant to further modify the buffering plan.
7. The Applicant's proposed mitigation measures commit to plantings a minimum of six feet in height at the time of planting and eight feet high at within five years.
8. Landscape screening will extend and connect to existing site vegetation, if any, to help create a more natural transition between existing vegetation and Applicant developed vegetation.
9. The Applicant will develop a written vegetation management plan that describes the approach and procedures for maintaining or replacing vegetative buffers as needed.
10. The Applicant shall use grasses and pollinator seed mixes that support native birds, insects and other species as part of the planned landscaping buffers.
11. The Applicant will use anti-glare panels and operate the panels in such a way that glare from the panels is minimized or eliminated.

12. The Applicant will coordinate with adjacent homeowners affected by glare to further minimize or reduce the duration of glare to the reasonable satisfaction of the affected property owner.
13. The Applicant will post road signs warning of potential glare along affected portions of Breeze Road and Foxport Road, as identified in the Glare Hazard Analysis.
14. The Applicant will work with homeowners, business owners and churches to address concerns related to the visual impact of the Project on its neighbors.

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 and considered here in examining property value impacts.

General methods of assessment. The value of a residential property is based on several factors, including characteristics of the home and the land on which it is situated, the uses and values of the surrounding property, among other attributes. The value of a residential property will take into account 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 spaces may be more highly valued, whereas the same property located near a heavy industry 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 Property Value Impact Report (provided as Exhibit G and SAR Exhibit B) was completed by the Applicant's consultant, Richard Kirkland of Kirkland Appraisals, LLC. Referred to here as the Kirkland report, that document, along with additional follow-up information from Mr. Kirkland provides the following relevant information:

- ***Land uses of adjacent properties*** – Mr. Kirkland describes adjoining land as primarily a mix of residential and agricultural uses. About 58 percent of the acreage adjacent to the facility is mixed agricultural/ residential; an additional 37 percent is agricultural

and about five percent is identified as purely residential. A very small amount of acreage adjacent to the Project site is identified as Cemetery.⁴⁸

- ***Distances between solar panels and homes on adjacent properties*** – The Kirkland report indicated that the closest adjoining home will be 500 feet away from the closest solar panel.⁴⁹ In response to HE’s inquiries, the Applicant provided additional information about the distance between various structures and the potential Project footprint. Altogether a total of 257 homes, several churches and businesses and hundreds of barns, sheds and other structures are located within 2,000 feet of the Project footprint.
- ***Academic research studies, appraisal market studies, other publications and broker comments*** – The Kirkland report provides summaries of several research papers and articles addressing property value impacts of solar or wind facilities. Based on his understanding of each study, Mr. Kirkland concludes that proximity to a solar facility has no impact (positive or negative) on property values. Mr. Kirkland also provides the results of several appraisal market studies focused on the presence of solar facilities, which all conclude finding no impacts on property values due to proximity to solar facilities. Comments from real estate brokers during the course of Mr. Kirkland’s work also indicate that solar farms have had no impact on the marketing, timing, or sales price for the adjoining homes.
- ***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 a solar facilities and sales prices of properties located further from that same facility.⁵⁰ Mr. Kirkland identifies and compares the sales prices of properties sold using data from 37 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 5.0 MW up to 617 MW and from an overall property size of 35 acres (5 MW facility) up to 3,500 acres (617 MW facility).⁵¹ The results of this analysis and Mr. Kirkland’s overall conclusions are discussed below.
- ***Effects of landscaping buffers on property values*** – The Kirkland report also provides an analysis of home price differentials based on Project size in combination with the amount of vegetative buffer (light, medium or heavy) from existing landscaping and Project planting and the distance between the home and solar panels. Mr. Kirkland

⁴⁸ The Applicant provided land use map is included as Appendix C of this report.

⁴⁹ Subsequent to Mr. Kirkland’s report, the Applicant revised the site layout. The closest home is now located approximately 260 feet from a panel. In a letter provided in response to the Siting Board’s First Request for Information, Mr. Kirkland indicated that the revision does not change the overall assessment described in his report.

⁵⁰ Mr. Kirkland adjusts 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.

⁵¹ Of the 37 solar facilities used in Mr. Kirkland’s analyses, 36 facilities are 80 MWs or smaller.

concludes that once Project facilities have been substantially screened with a light buffer (such that no price differential exists), additional buffering has no further beneficial effect on property values, regardless of Project size.

- ***Narrative discussion of specific factors related to impacts on property values*** – Mr. 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 [Hummingbird Solar] will not negatively impact adjoining property values.” He 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*** – Mr. 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. The Kirkland report presents two sets of analysis: (1) property price differentials for 23 solar facilities (56 matched pairs) located in the Southeastern U.S. and (2) property price differentials for 37 solar facilities (94 matched pairs) located across the entire U.S. Those analyses note the degree of vegetative buffer (light to heavy) between the adjacent property and the solar facility for each matched pair set.

Southeastern U.S. solar facilities. Based on analysis of the 56 residential dwelling matched pairs associated with the 23 solar facilities located in the Southeastern part of the U.S., 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 range is “seemingly wide” but notes that the “vast majority of the data falls between -5% and +5% and most of those are in the 0 to +5% range.” He concludes that “these matched pairs support a finding of no impact on value at the subject property for the proposed project, which as proposed will include a landscaped buffer to screen adjoining residential properties.”

National solar facility data. Mr. Kirkland’s analysis of the 94 matched pair sets associated with solar facilities across the U.S. found the following:

“The matched pairs show no negative impact at distances as close as 105 feet between a solar panel and the nearest point on a home. The range of impacts is -10% to +10% with an average and median of +1%.”

Mr. Kirkland notes that the range is “broad,” but that only three data points out of the 94 matched pairs show a negative impact. Nine sets indicate a positive impact, and the remaining sets show no impact. Mr. Kirkland states that he considers this data “to strongly support a finding of no impact on value as most of the findings are within typical market variation and even within that, most are mildly positive findings.”

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 an interview with the Fleming County Property Valuation Administrator; (3) requested additional information from Mr. Kirkland regarding his analyses and conclusions; and (4) examined the potential for impacts to residential and other properties closest to the Project.

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 non-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 for vegetative buffers).⁵²
- 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 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).⁵³
- 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

⁵² 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>

⁵³ 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.

of adjacent residents, but negative impacts to property values are rarely demonstrated.”⁵⁴

- 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.”⁵⁵
- Independent appraisers are often hired to conduct analyses related to property value impacts for solar companies, as is the case here for the Hummingbird solar 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; 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.⁵⁶

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 mention concerns about property 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.

Interview with the Fleming County Property Valuation Administrator (PVA). HE spoke with Ms. Stephanie Harding on August 28, 2023, as part of the in-person site visit. In terms of property values in Fleming County, Ms. Harding indicated that sales prices increased considerably in 2021 and 2022, but that higher interest rates in 2023 have resulted in a leveling out of prices in recent months. Additionally, higher interest rates have reduced the number of sales occurring in the county in 2023, as compared to previous years. Properties in Fleming

⁵⁴ Coffey, Darren. *Planning for Utility-Scale Solar Energy Facilities*. American Planning Association, PAS Memo, September – October 2019. <https://www.planning.org/pas/memo/2019/sep/>.

⁵⁵ 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.

⁵⁶ 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 ElkFleming 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.

County have not been assessed on a regular basis, historically, but reassessments are being done as of fall 2023. That process may result in higher assessments and therefore larger property tax bills for homeowners; the PVA's office is approaching these reassessments carefully. Ms. Harding explained that the increasing prices and high volume of sales activity seen in recent years is mainly due to an influx of out-of-state residents moving to Kentucky. She indicated that this is a trend seen across Kentucky and that PVAs across the Commonwealth are grappling with the effects. Ms. Harding commented that it is her belief that local residents (non-participants of the Project) do not want to see solar project developments in Fleming County. These residents are concerned about the visual effects, impact to land values, property re-sale values, and noise.

Review of Kirkland data. Although Mr. Kirkland concludes that there would be no impacts on property values from the Hummingbird Solar facility, the matched pair analysis does indicate the potential for a range of positive or negative effects. Therefore, 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 5-3 presents a detailed picture of the distribution of price differences for matched pair sets associated with solar facilities larger than 5 MWs. About 87 percent of matched pair comparisons reflected a sales price differential of between negative five percent and positive five percent, with almost 18 percent of comparisons showing no price differential at all. About 23 percent of all comparisons showed a negative impact on home prices, as compared with almost 59 percent of comparisons indicating a positive effect. Overall, these data appear to support Mr. Kirkland's conclusion of no property value impacts due to proximity to solar facilities.

Although the Hummingbird Project is larger than the majority of the facilities included in Exhibit 5-3, in terms of both MWs and acreage, the dispersion of the panels across a relatively wide geographic area may result in impacts similar to some smaller scale developments. Otherwise, distance from panels and levels of vegetative buffering are generally similar to the projects included in Mr. Kirkland's analysis.

Exhibit 5-3.

Distribution of Sales Price Differences for Matched Pair Sets, Southeastern U.S.

Southeastern U.S. Facility Analysis		
# Facilities Included	23	
# Matched Pair Sets	56	
Range of Impact		
-6% to -10%	2	3.6%
-1% to -5%	11	19.6%
0%	10	17.9%
1% to +5%	28	50.0%
+6% to +10%	5	8.9%
Total	56 Pairs	100.0%

Source: Kirkland report data set, 2023.

Exhibit 5-4 provides a summary of Mr. Kirkland’s analysis of the effects of different levels of landscaping and vegetative buffers on home sales prices. Although Mr. Kirkland concluded that medium or heavy buffering provides no additional benefits (in mitigating impacts to property values) over “substantial” light buffering, the summary provided below suggests that heavier buffering could potentially minimize the large range of price impacts evident with lighter buffering. However, the three matched pair sets identified as having heavy landscaping buffers may not provide a large enough sample size to accurately test that theory.

Exhibit 5-4.

Effects of Light, Medium or Heavy Vegetative Solar Facility Buffers on Home Prices, Southeastern U.S.

Southeastern U.S. Facility Analysis					
# Facilities Included	23				
# Matched Pair Sets	56				
			Price Differencial		
<u>Vegetative Buffer</u>	<u># Matched Pair Sets</u>	<u>Average</u>	<u>Median</u>	<u>Range</u>	
Light	41	2%	1%	-10% - +10%	
Medium	12	1%	2%	-7% - +9%	
Heavy	3	0%	0%	0% - +1%	

Source: Kirkland report data set, 2023.

Potential for cumulative impacts with other solar Projects. Once constructed, both the AEUG Fleming Solar Project and the Fleming Solar Project would be located approximately 4.5 miles west of the Hummingbird Project site. The Applicants in those cases have also

proposed some level of vegetative screening in certain areas surrounding their project facilities. Given the distance between those projects and the Hummingbird Project site, in combination with the screening mitigation, it is unlikely that there would be any cumulative impacts to the desirability or sales values of properties located in the vicinity of the Hummingbird Project.

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:

- Publicly available literature and our interviews point to concerns surrounding impacts to property values from solar facilities stems from visibility of panels and other infrastructure. The Fleming County Property Valuation Administrator (PVA) stated that local residents (non-participants of the Project) are concerned about impacts to land values and property re-sale values, especially as related to potential visual impacts and noise.
- Current research suggests that the existence of solar facilities does not, in general, measurably result in negative influences on property values for adjacent landowners in rural areas. The creation of vegetative or other buffers may go a long way to reducing concerns or mitigating potential reductions in property values.⁵⁷
- HE's data analyses also point to a conclusion of no discernible impacts to property values, although there may be a small risk of negative impacts and there may be specific exceptions. A small number of homes located along local roads adjacent to the Project site would be located close to Project facilities – the closest home would be 260 feet from a solar panel and 55 residences would be within 500 feet of a panel.
- If vegetative screening is developed as proposed by the Applicant to shield the Project from view, most residential property owners will likely not be able to see the solar panels or other infrastructure from their homes. Homes located at further distances from the Project panels may also benefit from vegetative screening, in terms of alleviating any concerns related to property value impacts in general.
- Additionally, as described in the next section of this report (noise evaluation), operational noise levels are expected to be low, and Project generated noise level may not be noticeable to nearby residents.
- According to the Fleming County PVA, the real estate market in Fleming County has been strong in recent years, with increasing property (home and land) prices and relatively high demand. Although current higher interest rates have slowed those trends, the desirability of the area for both residential and other purposes appears high.

⁵⁷ Community & Environmental Defense Services, located in Maryland supports coordination between solar companies and landowners related to screening measures to protect the view. Community & Environmental Defense Services, Solar Farms: Protecting Homes, Property Value, Views & the Environment While Reaping Solar Energy Benefits. <https://ceds.org/solar/>

- Construction activities will be temporary, occurring over a period of approximately 12 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 a longer-term mindset when deliberating a purchase.
- HE concludes that property values in the Project area and in Fleming County are unlikely to be affected by the siting of the Hummingbird Solar facility. This conclusion assumes that the mitigation strategies discussed in Section 6 are adopted by Hummingbird Solar.

Need for mitigation. No unique mitigation measures are recommended related to potential impacts to property values or adjacent land uses because other mitigation can limit property value impacts. However, the Applicant’s close coordination with impacted and concerned homeowners will be needed to minimize potential visual impacts and impacts from noise, traffic or other Project activities.

Anticipated Peak and Average Noise Levels

Noise issues stem from construction activities and operational components of the solar facility. During construction, noise emitting equipment will include dump trucks, pile drivers, backhoes, dozers, excavators and other construction equipment. During operations, noise will be emitted from transformers, inverters, and the tracking motors that tilt the panels to track the sun throughout the day. Distance from noise emitters to noise receptors is important since noise levels decrease the further a noise receptor is from a noise emitter.

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, which is to say, 70 dBA is perceived as twice as loud as is a level of 60 dBA.⁵⁸ A change of three decibels is barely noticeable, but a change of five decibels is typically noticeable. Once sounds reach 90 dBA humans can experience pain from the noise and sounds above 150 dBA can cause permanent hearing damage.⁵⁹ For additional context, 30 dBA is the sound emitted by a whisper, 55 dBA are emitted from a percolating coffeemaker, and 90 dBA would be the sound emitted by a person’s yell.

Neither the Commonwealth of Kentucky nor Fleming County have a noise ordinance that is applicable to the Project. As such, HE utilized the noise limit recommendations generated

⁵⁸ 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>

⁵⁹ 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.>

by the Environmental Protection Agency (EPA) and the World Health Organization (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.⁶⁰
- 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.⁶¹

A standard noise impact assessment focuses on several key factors:⁶²

- 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 production and exposure, including cumulative noise effects.

Summary of information provided by the Applicant. Attachment D of the SAR is the Hummingbird Solar Noise Assessment prepared by Stantec Consulting Services, Inc. (Stantec). That technical report provides an assessment of sound emissions during both the construction and operational phases of the Project. A revised Noise Assessment prepared by Stantec on September 1, 2023, was submitted by the Applicant after the first data request. Additional data on baseline ambient conditions and expected noise conditions during construction were provided in the Application and in response to the two Siting Board data requests.

Baseline (ambient) noise levels. As previously described, existing land uses in the Project area are mainly agricultural with rural residences and farmsteads and some undeveloped forest land. The area surrounding the Project site also includes several churches, cemeteries, local roads and scattered commercial and residential structures.

The Applicant did not report baseline noise levels for the Project site, but indicated that agricultural-related sounds, including tractors, farm machinery, trucks and all-terrain vehicles, as well as sparse automotive traffic, and wildlife sounds from birds, frogs, and insects

⁶⁰ 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>

⁶¹ World Health Organization. *Guidelines for Community Noise*. April 1999. <https://www.who.int/docstore/peh/noise/Comnoise-1.pdf>

⁶² 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;

contributed to the ambient noise in the area. The Applicant’s noise study assumed an ambient daytime noise level of 40 dBA.

Construction noise emitters. During the construction phase, a variety of heavy equipment will be utilized. Peak construction noise will be created by pile drivers, dozers, graders, trucks, and additional heavy equipment. At a distance of 50 feet, maximum noise levels for that equipment may range from about 76 dBA for a saw or concrete vibrator to 101 dBA for an impact pile driver.⁶³ At a distance of 250 feet, the noise levels for these same pieces of equipment are estimated to range from 62 dBA to 87 dBA, per the Applicant’s revised Noise Study.

The Applicant’s consultant, Stantec, utilized construction equipment noise levels from the Federal Transit Administration (2018) and the Federal Highway Administration Roadway Construction Noise Model (2006) to conduct desktop sound propagation modeling. Stantec provided the sound pressure levels both with and without pile drivers in use for select noise receptors within 600 feet of Project components. Representative sound pressure levels by distance to Project components for these receptors are provided in Exhibit 5-5.

**Exhibit 5-5.
Calculated Sound Levels from Construction, Sunrise to Sunset**

Receptor	L _{max} (dBA)	L _{eq} (dBA)	Panel Distance	Inverter Distance	Substation Distance
R105	66.2	64.2	260 ft	788 ft	6,267 ft
R105 w/ Pile Driving	86.5	79.6			
R52	62.4	60.2	405 ft	1,320 ft	7,917 ft
R52 - w/ Pile Driving	82.7	75.8			
R91	72.8	58.4	575 ft	1,624 ft	792 ft
R91 - w/ Pile Driving	79.6	59.3			

- Notes:
1. R105 is the closest receptor (home) to a Panel.
 2. R52 is receptor (home) at an intermediary distance from a panel and inverter relative to the other receptors.
 3. R91 is the closest receptor (home) to the Substation/Transformer area.
 4. L_{max} is the maximum sound level.
 5. L_{eq} is the equivalent continuous sound level.

Source: Hummingbird Solar, LLC, September 2023, Harvey Economics.

The Applicant has indicated that non-participating residences will be located at a minimum of approximately 260 feet from any solar panel, which is where pile driving would occur during construction. As shown in Exhibit 5-5 above, sound levels during the pile driving phase of construction will reach approximately 86.5 dBA for a noise receptor located 260 feet away.

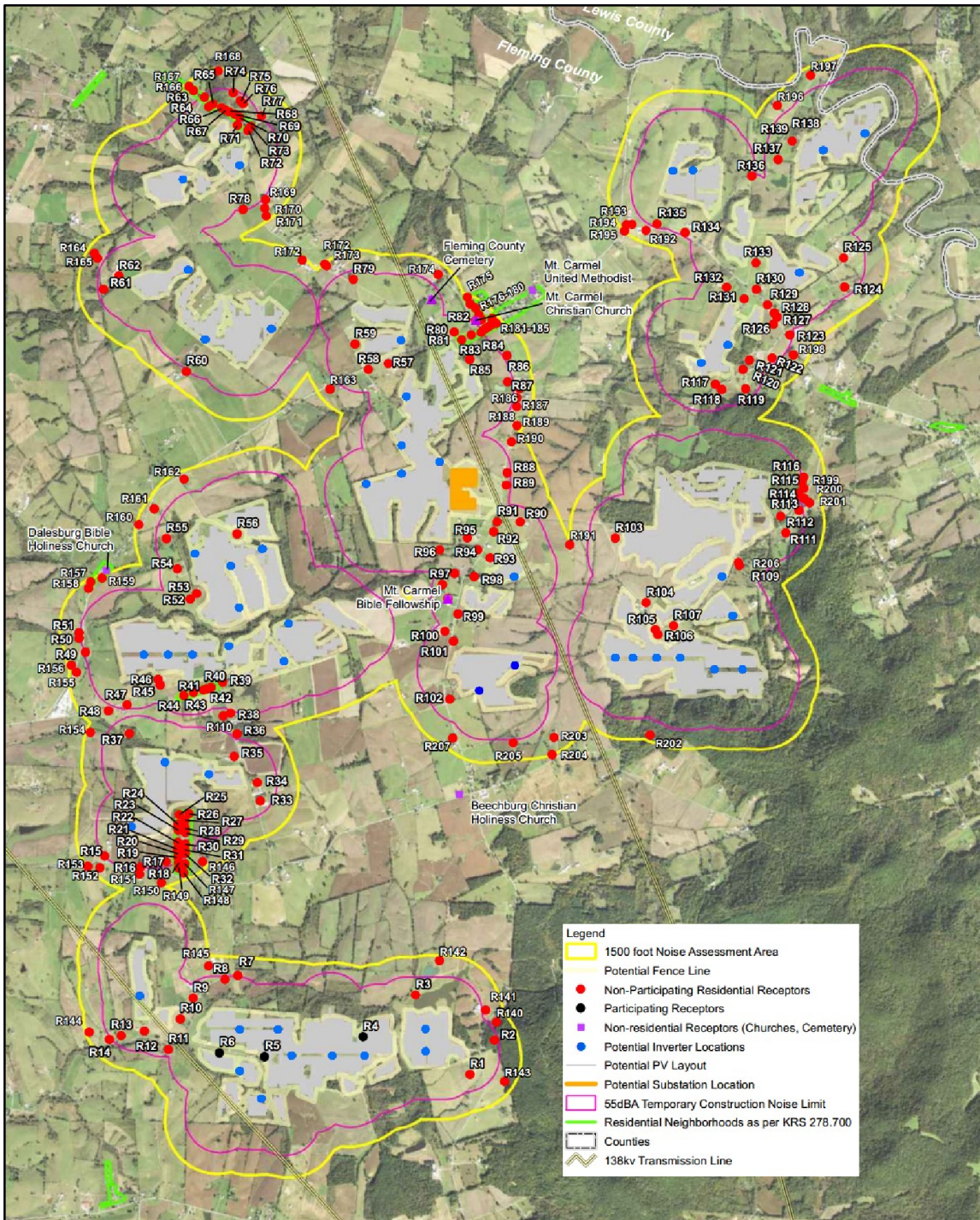
⁶³ Information updating the sound levels from construction equipment, as provided in the Noise Report, was provided by the Applicant in response to the Siting Board’s First Request for Information.

Without pile driving, typical noise levels for that receptor are expected to be about 64.2 dBA during construction.

According to the Applicant, construction activities at the Project site are expected to move around and “are not anticipated to be performed near a sensitive receptor for more than a few weeks.” Pile driving activity will also move across the Project site such that noise impacts to individual residences will not occur over the entire construction period; however, pile driving may overlap with other construction activities, potentially including inverter construction and racking. The Applicant has indicated that they will predominantly employ a 12-hour workday, from 7:00 am to 7:00 pm, Monday through Friday, with additional Saturday and Sunday workdays as needed to compensate for schedule delays.

Sound levels during construction are expected to be greater than 55 dBA for residences and other noise receptors located within 1,000 feet of the Project during the pile driving phase. There are 137 residences within 1,000 feet of the Project boundary, including five identified residential neighborhoods, along with two churches and a cemetery. Figure 2 of the Applicant’s Noise Report (Exhibit 5-6, below) displays the 1,500 foot Noise Assessment Area and a “55dBA Temporary Construction Noise Limit” boundary which is inclusive of residences and other sensitive receptors within 1,000 feet of the Project.

Exhibit 5-6.
Sensitive Noise Receptors within 1,500 Feet of Hummingbird Solar Project



Note: The 55dBA Temporary Construction Noise Limit is approximately 1,000 feet from the Project Boundary

Source: Hummingbird Solar, LLC, September 2023.

In the Applicant’s response to the first information request and during the on-site visit, they stated they plan to implement noise mitigation measures to reduce construction sound levels within 1,500 feet of noise sensitive receptors during pile driving activities, as per Siting Board recommendations for solar project applications of comparable size.

Operational noise emitters. Stantec’s noise modeling accounted for the following:

- Inverters – Approximately 53 inverters will be scattered throughout the Project area. The inverters will not operate at night.
- Substation transformer – a 127 kVA transformer.
- Tracking motors – Approximately 401,500 single-axis tracking panels will be distributed evenly throughout the Project. Each panel’s tracking system will include a 24-volt brushless DC tracking motor. Tracking motors typically operate briefly and intermittently during daylight only.

Exhibit 5-7 provides the anticipated maximum sound levels produced by this equipment during daytime operations under the modeling performed by Stantec.

**Exhibit 5-7.
Calculated Sound Levels during Operation by Source**

Sound Source	Modeled Sound Power Level	Distance from Source
Tracking Motors	20 dBA	100 feet
Inverter	91 dBA	32.8 ft
Substation Transformer	60 dBA	3.2 ft

Note: Two inverter options were listed in the Stantec noise report; As it is an unknown, the greater of the two is represented in this exhibit.

Source: Hummingbird Solar, LLC, September 2023.

Most of the operational noise will occur during daylight hours; however, the substation transformer remains energized at night, which will produce sound. The noise report provides sound modeling results at each noise receptor location during operations. Exhibit 5-8 provides a summary of the model results for the closest receptors to Project components.

Exhibit 5-8.
Calculated Sound Levels from Operation, Sunrise to Sunset

Receptor	Panel Distance	L _{max} (dBA)	Inverter Distance	L _{max} (dBA)	Substation Distance	L _{max} (dBA)
R105	260 ft	11.7	788 ft	45.9	6,267 ft	<10
R109	469 ft	<10	624 ft	48.6	7,7851 ft	<10
R91	575 ft	<10	1,624 ft	39.7	792 ft	12.2

- Notes:
1. Home number R105 is the closet receptor to a panel.
 2. Home number R109 is the closest receptor to an inverter.
 3. Home number R91 is the closest receptor to the substation.

Source: Hummingbird Solar, LLC, September 2023.

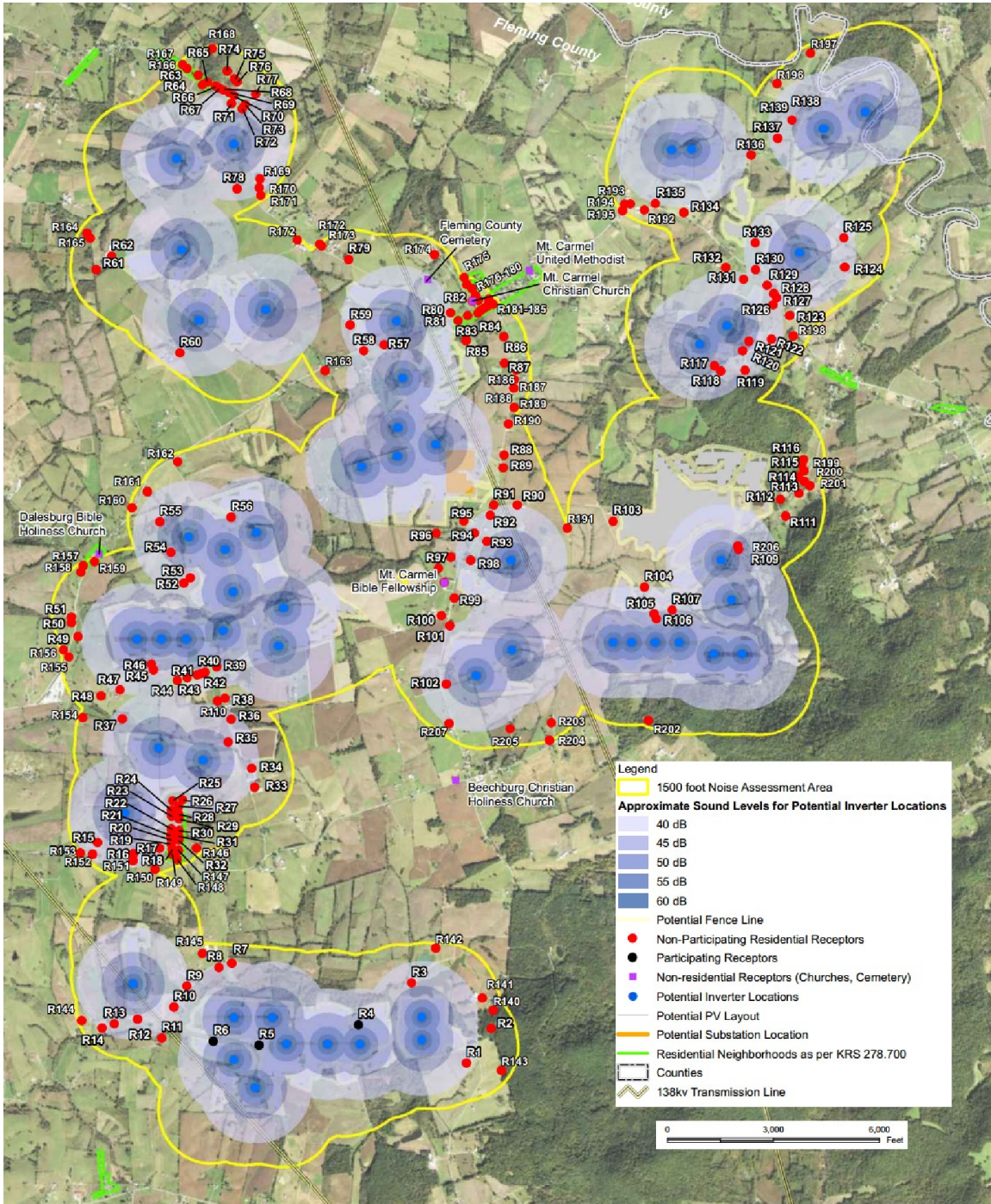
Maximum sound levels (48.6 dBA) would be experienced by one residence (R109) located in the eastern central portion of the Project area, about 624 feet from an inverter; sound levels at that location will be lower at night without operation of the inverter or trackers. The closest residence to the substation is located about 792 feet from that facility; modeling predicts maximum sound levels of 39.7 dBA during daytime operations for that residence.

Additional modeling results are illustrated in Exhibit 5-9, which show the distance from each inverter at which sound levels are 60 dBA, 55 dBA, 50 dBA, 45 dBA, and 40 dBA during operations, shaded from darkest to lightest blue, respectively.

Focusing on daytime operations and noise levels, Exhibit 5-9 indicates that all residences are outside the 50 dBA inverter sound contour. As described in Exhibit 5-8, the highest predicted sound level is 48.6 dBA.

Exhibit 5-9.

Approximate Inverter Sound Contours for Hummingbird Solar Operations



Note: These sound levels do not account for cumulative noise levels from other Project components, such as the Substation/Transformer, or existing ambient noise around the Project Area.

Source: Hummingbird Solar, LLC, September 2023.

Sound levels during operations will be higher than 40 dBA for residences and other noise receptors within approximately 1,500 feet of an inverter, and higher than 43 dBA for those located within approximately 1,000 feet.

In addition to the inverters and the substation transformers, routine inspection, maintenance and repair activities will occur during operations but will not materially impact noise levels in the area. Grounds maintenance and mowing will occur and will be similar to other farm-related noise in the area. All site visits will occur during daylight hours, with the exception of emergency maintenance.

The Stantec report concludes that, “At the nearest receptors, besides intermittent and infrequent pile driver activity, no elevated and prolonged noise levels above background levels are expected either during construction or operation of the Project site.”

HE’s evaluation of impacts.

Construction noise. Construction activities will produce sporadic noise that will exceed 55 dBA during daytime hours. Homes less than 575 feet from pile driving locations will experience estimated sound levels of approximately 60–85 dBA during pile driving. Solar component assembly, road construction and other construction activities will also generate noise greater than 55 dBA at 250 feet. As the distance from the source of noise increases, the sound level attenuates, or decreases. A doubling of distance results in a decreased noise level of ~6 dBA.⁶⁴

The Project has the potential for a number of loud construction activities to occur simultaneously, but the timing of activities is such that it is not realistic to predict which sources of noise will contribute to these periods of cumulative sounds. Therefore, HE examined methods for calculating cumulative sound levels.

The frequencies of different sounds will affect the perceived loudness of cumulative noise. “Compared with dB, A-weighted measurements underestimate the perceived loudness, annoyance factor, and stress-inducing capability of noises with low frequency components, especially at moderate and high volumes of noise.”⁶⁵ This means that very different types of noises could have a greater cumulative impact than expected. Multiple sources of loud noise will produce only modest increases to overall sound levels, as long as the sources of noise are not of very different frequencies.⁶⁶ Cumulatively, for example, if two pilings were constructed at the same time, this would result in a doubling of the noise, which would add 3 dBA to the total if both activities were the same distance from a receptor.

Although residents near the Project site will experience noise at levels expected to cause annoyance (55 dBA or greater), the sporadic nature of the noise should not be sufficient to cause damage to residents’ hearing.

⁶⁴ <http://hyperphysics.phy-astr.gsu.edu/hbase/Acoustic/isprob2.html#c1>

⁶⁵ <https://www.softdb.com/difference-between-db-dba/>

⁶⁶ https://www.engineeringtoolbox.com/adding-decibel-d_63.html

The nature of the Project, which requires that construction activities move around the site as each task is completed, will limit the number of days of the annoyance created by loud, though sporadic, noise.

Operational noise. The nature of solar projects dictates that noise from operations will occur mainly during daylight hours. During operations, the closest residential receptor to an inverter will experience consistent daytime sound levels of about 49 dBA. This is within the WHO's recommended maximum noise level of 50 dBA. HE concludes that, overall, noise impacts from Project operations will create only modest negative impacts for certain homes and receptors.

Potential for cumulative impacts with other solar projects. Once constructed, both the AEUG Fleming Solar Project and the Fleming Solar Project would be located approximately 4.5 miles west of the Hummingbird Project site. Given the distance between those projects and the Hummingbird Project site, it is unlikely that there would be any cumulative noise impacts to residents or businesses located in the vicinity of the Hummingbird Project.

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 phase noise will likely be annoying for a number of residents and receptors surrounding the Project area for short periods of time. The intermittent nature of the noise might ameliorate the impacts, but residents close to the Project site might find construction noise to be troublesome even if it does not present actual damage to hearing.
- Hummingbird Solar has stated that during the construction phase, general construction activity could take place from 7:00 am to 7:00 pm. However, it is likely that some noise, for example from worker vehicles, would occur before and after that timeframe. Noise occurring in the early hours of the morning and later hours of the evening will be minimized.
- The current trend of employees working from home could make daytime noise more of an issue than it would have been previously.
- Noise from Project components during operations (inverters, motors, transformer) is anticipated to result in minor, if any, increases to the local sound environment, depending on location. For most homeowners in the areas, those increases would be unnoticeable.
- The topography and existing vegetation in some areas might help mitigate noise emissions that may be caused by construction or operational components of the Project. Vegetative buffering proposed by the Applicant would also help to reduce operational noise impacts.

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

1. The Applicant shall notify residents and businesses within 1,500 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 shall respond to any complaints related to noise levels or noise causing activities occurring during construction or operations via a formal and clearly developed complaint resolution program.
3. If pile driving activity occurs within 1,500 feet of a noise sensitive receptor, the Applicant shall implement applicable Best Management Practices to suppress the noise generated during the pile driving process (i.e., semi-tractor and canvas method; sound blankets on fencing surrounding the Project site; or any other comparably effective method).
4. The Applicant shall implement Best Management Practices to reduce noise levels with regard to construction-related activity occurring near residential neighborhoods (i.e., utilizing construction equipment fitted with exhaust systems and mufflers when available; using back-up alarms that are the minimum increment above background noise allowable by OSHA requirements; staging materials and equipment away from these locations when feasible; etc.).
5. The Applicant should limit the noise-producing construction activity, process and deliveries to the hours of 8:00 am to 6:00 pm, Monday through Saturday. No construction work should be conducted on Sundays.
6. The Applicant shall place panels, inverters and substation equipment consistent with the distances to noise receptors indicated in the Applicant's noise study and with the Applicant's proposed setbacks. Nevertheless, the Applicant shall not place solar panels closer than 260 feet from a residence, church or school and shall not place inverters closer than 624 feet from a residence, church or school. These setbacks shall not be required for residences owned by landowners involved in the Project that explicitly agree to lesser setbacks and have done so in writing. All agreements by participating landowners to lesser setbacks must be filed with the Siting Board prior to commencement of construction of the Project.

Road and Rail Traffic, Fugitive Dust and Road Degradation

Traffic concerns related to the development of the Hummingbird Solar facility during the construction or operational phases are addressed in this section. The approximately 12-month long 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 will occur as employees travel to and from the property to monitor and maintain the site.

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

- Establishing existing traffic conditions in the area;
- Identifying primary access points that will be used by 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. Exhibit E of the SAR is a Traffic Impact Study prepared by Stantec Consulting Services Inc. (Stantec). That document provided existing AM/PM peak traffic conditions; estimates of the Project's construction and operational traffic, and estimated impacts on traffic conditions during Project construction and operation. More detailed and updated information was provided in the Applicant's subsequent responses to the Siting Board's data requests, including an opinion on potential impacts to road infrastructure. HE assumes that responses to the second data request are the best available information, superseding earlier submittals.

Site access, vehicle parking and internal roadways. Vehicles traveling to the Project site will use KY-57, KY-3301, KY-559, and KY-344 to reach local roads accessing the site. KY-57 is weight rated for 80,000 pounds. KY-344 and KY-3301 are both rated for 44,000 pounds.⁶⁷ Vehicles will primarily use local roads to reach as many as 26 separate access points proposed for the Project, one access point for each parcel/group of parcels.⁶⁸

The Applicant has not determined the route for delivery of transformer. Hummingbird Solar will obtain and comply with all necessary permits from applicable State and local road authorities for its delivery.

Seven laydown yards are anticipated to be developed within the Project site, in each geographical section of the Project and in the Substation/Transformer area. The laydown yards will include parking areas for construction workers and receiving/staging areas for Project equipment and supplies during construction. The proposed locations of these laydowns are in areas accessible from local roads and near construction entrances.⁶⁹

Project components will be moved from laydown areas to nearby sections of the project by internal access roads and by local roads. Approximately 344,844 feet of graveled roadways will be constructed across the Project site, extending from approximately 26 access points,

⁶⁷ Roads in the vicinity of the Project are shown in Exhibit A of the SAR.

⁶⁸ Proposed construction entrances are shown in Exhibit A of the SAR and in the Applicant's second supplemental response to the first data request.

⁶⁹ Laydown areas are shown in Exhibit A of the SAR and in the Applicant's second supplemental response to the first data request.

allowing internal access to equipment throughout the site. Internal roads will be no greater than 16 feet wide with turning radii of up to 50 feet.

Baseline traffic volumes and road conditions. The Applicant provided certain traffic data for roads used to access the Project and adjacent to the Project. Current daily traffic volumes and projected future traffic levels for local roads during the morning and evening peak hours are provided in Exhibit 5-10.

Exhibit 5-10.

Average Daily Traffic Volumes, during Peak Hourly Periods, for Roads near Hummingbird Site

Roadway	Existing Conditions (2023)		
	AADT	AM Peak (# Vehicles)	PM Peak (# Vehicles)
KY-57 (Mt Carmel Road)	2263	148.5	187
KY-344 (Foxport Road)	1027	75	117.5
KY-559 (Wallingford Road)	1039	77	108
KY-3301 (Beechtree Pike)	443	43	52
CR 1027 (Carpenter Road)	358	26	36.5
CR 1036 (Wilson Run Road)	92	15.5	15.5
CR 1037 (Maddox Road)	178	19	24.5

Note: If more than one count was given per roadway, the count closest to Project area was used.

Source: Hummingbird Solar, LLC, September 2023.

Peak AM and PM traffic counts were not available for smaller local roads in the Project vicinity.

The Applicant’s traffic study also provided brief descriptions of road conditions, including functional class, weight limit ratings and speed limits, for larger roads in the Project area. That information is summarized in Exhibit 5-11. Further observations of baseline road conditions from HE’s site visit are provided later in this section.

Exhibit 5-11.
Description of Roads in the Project Area

Roadway	No. of Lanes	Lane Width (ft)	Speed Limit	Striping	Weight Limit	Functional Class
KY-57 (Mt Carmel Road)	2	9 - 12	55*	Y	40 tons	Major Collector
KY-344 (Foxport Road)	2	9	55*	Y	22 tons	Minor Collector
KY-559 (Wallingford Road)	2	10	55*	Y	22 tons	Minor Collector
KY-3301 (Beechtree Pike)	2	9	55	Y	22 tons	Minor Collector
CR 1027 (Carpenter Road)	2	9	25	N	N/R	N/A
CR 1036 (Wilson Run Road)	2	N/A	25	N	N/R	N/A
CR 1037 (Maddox Road)	2	9	25	N	N/R	N/A

Notes: (1) * Indicates the dominant speed limit. A portion or portions of these roadways have reduced speed limits of 35 or 45 mph.
(2) N/R indicates not rated.
(3) N/A indicates not available.

Source: Hummingbird Solar, LLC, September 2023.

Construction related traffic volumes. Construction related traffic will include passenger vehicles (commuting workers) and heavy vehicles for delivery (trailers, flatbeds, other large vehicles). The rate of commuting workers and deliveries on site throughout the 12-month construction period and the specific roads to be used are unknown since the construction plan has not been completed at this time. The Applicant’s consultant, Stantec, employed a 50 percent increase in AM and PM peak hour traffic volumes for their construction impact analysis, calculated below in Exhibit 5-12. The Applicant considers this a “worst-case” scenario for traffic volume increases. However, that assumption was developed prior to the Applicant's intent to complete construction in phases; therefore, it may not accurately reflect the potential for increases in localized traffic volumes.

During construction:

- Between 250 and 300 workers will be on-site on any individual day, driving personal vehicles, likely pickup trucks. The weight of these vehicles is unknown.
- The average number of delivery vehicles per month is unknown and will be determined in coordination with the Project’s EPC firm.
- Delivery vehicles will vary from passenger trucks to tractor-trailers. The heaviest load will be delivery of the transformer, with a currently unknown load weight in addition to the gross vehicle weight of the delivery vehicle.
- It is assumed that water trucks would be needed to apply water for dust suppression, but no specific details regarding the weight, use or frequency of water trucks were provided by the Applicant.

The Applicant has stated that major deliveries will occur via KY-57, KY-344, and Carpenter Road; however, travel on local roads will also be necessary for access to the seven proposed laydown areas around the Project site. Hummingbird Solar will obtain all necessary permits for oversized or overweight deliveries. The Applicant also indicated that improvements to local roads may occur if determined to be necessary in coordination with the EPC firm.

The number of construction vehicles utilizing specific individual roads to access the Project site has not been determined. The Project plan for construction entrances and access roads is anticipated to change from the initial Application and Traffic Impact Study, potentially reducing the number of construction entrances. According to the Applicant during the on-site visit, an easement had not yet been obtained to access the “island parcel” located furthest south on Carpenter Road. The Applicant’s traffic study, based on the initial Project plan, did not anticipate significant changes to the level of service, average speeds, or travel times for local roadways during construction, despite the increase in traffic volume.

Construction traffic management. The Applicant did not provide any specific traffic management strategies to be implemented during construction. Hummingbird Solar indicated that they would coordinate these strategies with their EPC firm prior to construction.

Operations related traffic volumes. The Traffic Study indicated that traffic during the operational phase will be negligible and limited to up to four employees and a small maintenance crew. The study concluded that traffic function would not be impacted.

Road degradation. Hummingbird Solar anticipates some road degradation due to the size and scope of the Project, but it does not anticipate any damage to existing roadways or transportation infrastructure.

Railways. There are no railway lines in the Project. Hummingbird Solar has indicated that large equipment, such as the main power transformers, will not be delivered by railroad.

Fugitive dust. The Applicant expects some dust generation from Project construction and has indicated that best management practices (BMP) will be employed in accordance with the Kentucky Stormwater Construction general permit requirements. These BMPs include covering loads, applying water to suppress dust, and constructing perimeter silt fences as needed. Compacted gravel internal roads may also contribute to airborne dust particles. Hummingbird Solar will apply water to local gravel roads. During operations, the Project site will be irrigated on an as needed basis, depending on weather conditions and vegetation establishment.

HE’s evaluation of impacts. HE conducted the following additional analyses related to traffic, road degradation and fugitive dust.

Local road conditions. Traffic volumes in the Project area can be described as moderate for such a rural area; although several roads, including KY-57 (Mt Carmel Road), are more heavily traveled.

In addition to KY-57 (Mt Carmel Road), KY-344, KY-599 and KY-3301 will likely be the larger roadways used by delivery vehicles. According to the KYTC's Truck Weight Classification Map, KY-57 is rated for 80,000 pounds (40-ton) gross vehicle weight.⁷⁰ KY-344, KY-559 and KY-3301 are rated for 44,000 pounds gross vehicle weight. Gross vehicle weight is the total weight of the vehicle, including passengers and cargo. No weight limit information is available for local roads surrounding the Project site.

HE made the following observations about local roads during the Project site visit:

- *KY-57 (Mt Carmel Road)* – two-lane, striped, blacktop road with a varying width shoulder, adequate width for two cars to pass.
- *KY-344 (Foxport Road)* – two-lane, striped, blacktop road with a one foot shoulder, adequate width for two cars to pass.
- *KY-3301 (Beechtree Pike)* – two-lane, striped, blacktop road with no shoulder, adequate width for two cars to pass.
- *Wilson Run Road* – two vehicle, unlined, blacktop road with no shoulder, in reasonable condition.
- *Maddox Road* – two vehicle, unlined, blacktop road with no shoulder, in reasonable condition.
- *Carpenter Road* – narrow, two vehicle, unlined, chip seal road with no shoulder, in poor condition.
- *Poplar Grove Road* – narrow, two vehicle, unlined, blacktop road with no shoulder, in reasonable condition.
- *Black Diamond Road* – two vehicle, unlined, blacktop road with no shoulder, in reasonable condition.
- *Breeze Road* – narrow, one vehicle, unlined, chip seal road with no shoulder, in poor condition. Difficult for two vehicles to pass.
- *Botkins Lane* – narrow, two vehicle, unlined, chipseal road with no shoulder, in adequate condition.
- *Kilbreth Valley Road* – two vehicle, blacktop road with no shoulder, in reasonable condition.
- *Saunders Road* – two vehicle, blacktop road with no shoulder, in reasonable condition.
- *Murphy Lane* – narrow, two vehicle, unlined, blacktop road with no shoulder, in poor condition. Difficult for two vehicles to pass.

Local roads surrounding the Project site are mostly paved. All local roads are relatively narrow.

⁷⁰ <https://transportation.ky.gov/Planning/Documents/Weight%20Class.pdf>

Baseline traffic volumes. The Applicant provided traffic counts for roads in the Project area, as shown previously in Exhibit 5-10. HE confirmed that no additional data for other roads is available, which is likely due to the low volumes of traffic expected on those roads.

During the site visit (a weekday), there was moderate traffic on KY-57 and KY-559, with less traffic on local roads surrounding the Project site. Appendix B provides photos from the site visit, including several capturing local road conditions.

Construction related traffic impacts. Exhibit 5-12 presents the calculated vehicle traffic on larger local roads at peak hours during construction. Construction traffic may create noticeable, but acceptable, increases on KY-57, assuming that both worker and delivery vehicles will use that road. With a baseline traffic volume of about 2,500 vehicles per day, the Project’s construction traffic may increase that volume by approximately 20 percent.

**Exhibit 5-12.
Anticipated Construction Related Peak Traffic Volume**

Roadway	During Construction	
	AM Peak (# Vehicles)	PM Peak (# Vehicles)
KY-57 (Mt Carmel Road)	222.75	280.5
KY-344 (Foxport Road)	112.5	176.25
KY-559 (Wallingford Road)	115.5	162
KY-3301 (Beechtree Pike)	64.5	78
CR 1027 (Carpenter Road)	39	54.75
CR 1036 (Wilson Run Road)	23.25	23.25
CR 1037 (Maddox Road)	28.5	36.75

Source: Hummingbird Solar, LLC, September 2023, and Harvey Economics, 2023.

Other local roads are lightly traveled, so even small increases in traffic volume will be noticeable to local drivers. At a minimum, some delays in drive times on Poplar Grove Road and Black Diamond Road should be expected given their proximity to Project components and laydown areas. However, the Applicant indicated that they would work with the Fleming County Road Department to coordinate traffic plans.

Construction activity in the areas of Breeze Road, Saunders Road, and Murphy Lane may result in significant delays or disruptions in travel for vehicles accessing the private residences on those roads. As described previously, Breeze Road is a narrow, one vehicle road with no shoulder. Residents may be prevented from accessing or leaving their property if construction delivery vehicles are present, as it is difficult for vehicles to pass along the road and there are no pull-offs or turnarounds.

HE offers the following observations:

- With the lack of a specific construction plan, there is considerable uncertainty about the traffic impacts, both in location and magnitude. For instance, traffic could be concentrated in a small number of locations.
- The dispersed parcels which make up the Hummingbird Project will tend to diffuse traffic impacts.
- On peak days, the increased traffic on local roads could be substantial. While it will likely be predominantly proximate residents who are impacted, this impact may create negative attitudes about the Project.
- The narrow roads and lack of shoulders on many local roads in the Project area will require drivers to pull over to pass and will increase the inconvenience to local residents during the construction period.
- Large trucks and a lack of shoulders may create untenable situations where there is nowhere for either the truck or oncoming vehicles to pull over.
- Average construction traffic will also create noticeable changes in traffic volumes in the Project area, especially on KY-57, KY-344, KY-3301 and Carpenter Road.

This information suggests that carpooling will be important for minimizing traffic impacts to local residents during the construction period.

Operations related traffic impacts. With one to four staff members working regular business hours and the occasional off-hours maintenance and repair, traffic impacts during operations should be minimal. HE does not expect significant traffic effects related to the operation of the facility.

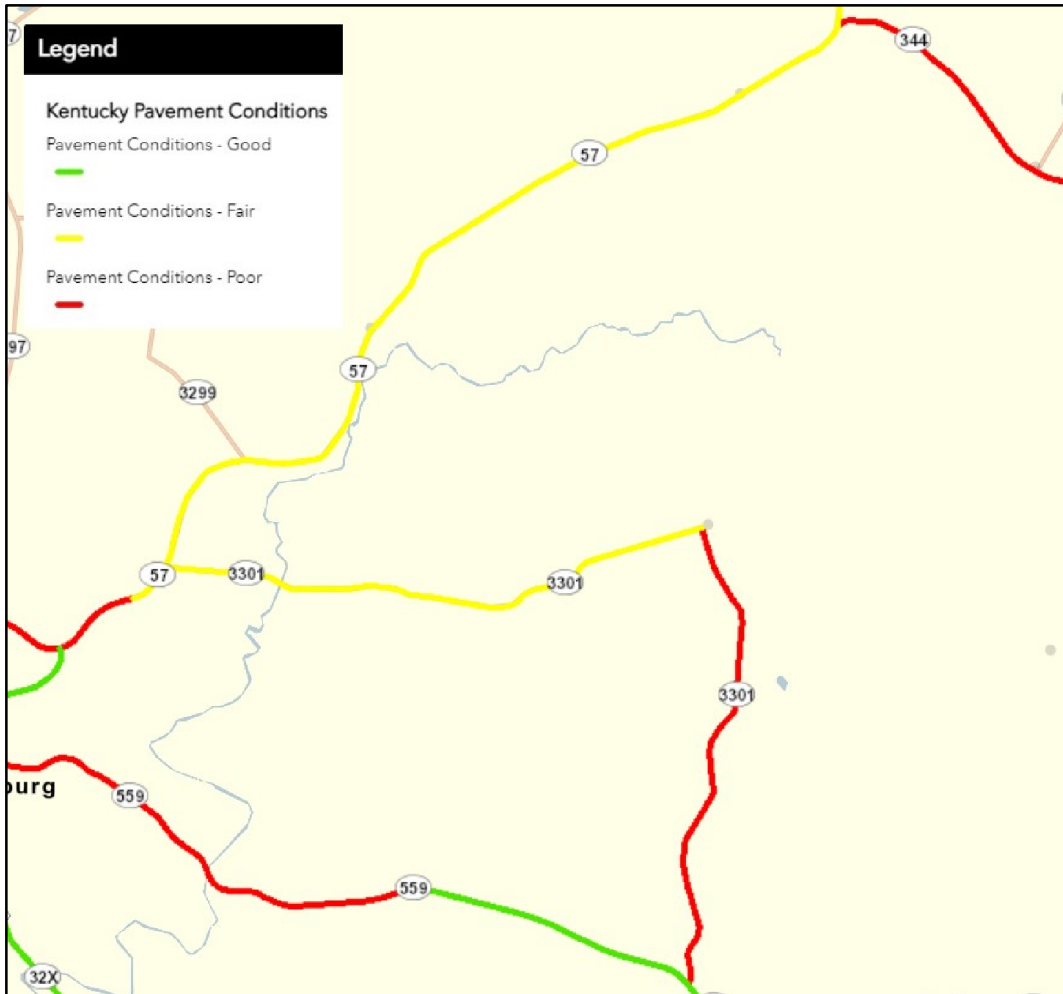
Impacts to railways. Project traffic will not impact railway operations. The Applicant has indicated that Project construction vehicles will not use railway crossings for delivery of Project components.

Road degradation. The KYTC's Pavement Conditions interactive map provides data regarding road conditions for individual segments of state and county roads; pavement conditions data are not available for local or city roads.⁷¹ Pavement conditions are measured by several factors, including an International Roughness Index and a Pavement Distress Index; higher values of these indices indicate rougher pavement or poorer pavement conditions. Exhibit 5-13, below, shows the conditions for the state and county roads surrounding the Project area. HE interprets these data to mean that these roads are likely more susceptible to degradation in their current condition. No pavement conditions data are available for Carpenter Road, Black Diamond Road or other local roads.

⁷¹ <https://maps.kytc.ky.gov/pavementconditions/>

Exhibit 5-13.

State and County Road Conditions near Hummingbird Solar Project



Sources: Kentucky Transportation Cabinet, Pavement Conditions, September 2023; Harvey Economics, 2023.

The lack of information about weight limits on some roads and construction delivery plans (especially vehicle weights and distribution of deliveries across traffic routes) creates uncertainty about the extent of, if any, road degradation. Despite this, the nature of the local roads to be used to access the Project site suggests that either extensive work will need to be done in advance of Project onset, or that degradation will occur. Hummingbird Solar will need to work with Fleming County road authorities to correct the damage.

Carpenter Road, for example, is an unlined, two lane, local road with no weight rating and limited daily traffic that will be used for delivery of the transformer and other heavy materials related to the substation and construction entrance/access road. Reaching Carpenter Road requires moderately tight turns off KY-57 and KY-3301 from either direction of travel. These turns will likely be difficult for large vehicles and those carrying heavy loads. Multiple heavy deliveries and numerous construction vehicles will need to travel this road to reach the substation site during Project construction, exposing the road to higher than typical traffic flows and weight loads, increasing the likelihood of degradation.

Given the estimates of Project-generated traffic during construction and the available information about road conditions, the Applicant should be prepared to repair any damage due to commuting workers or heavy trucks traveling on the local roadways.

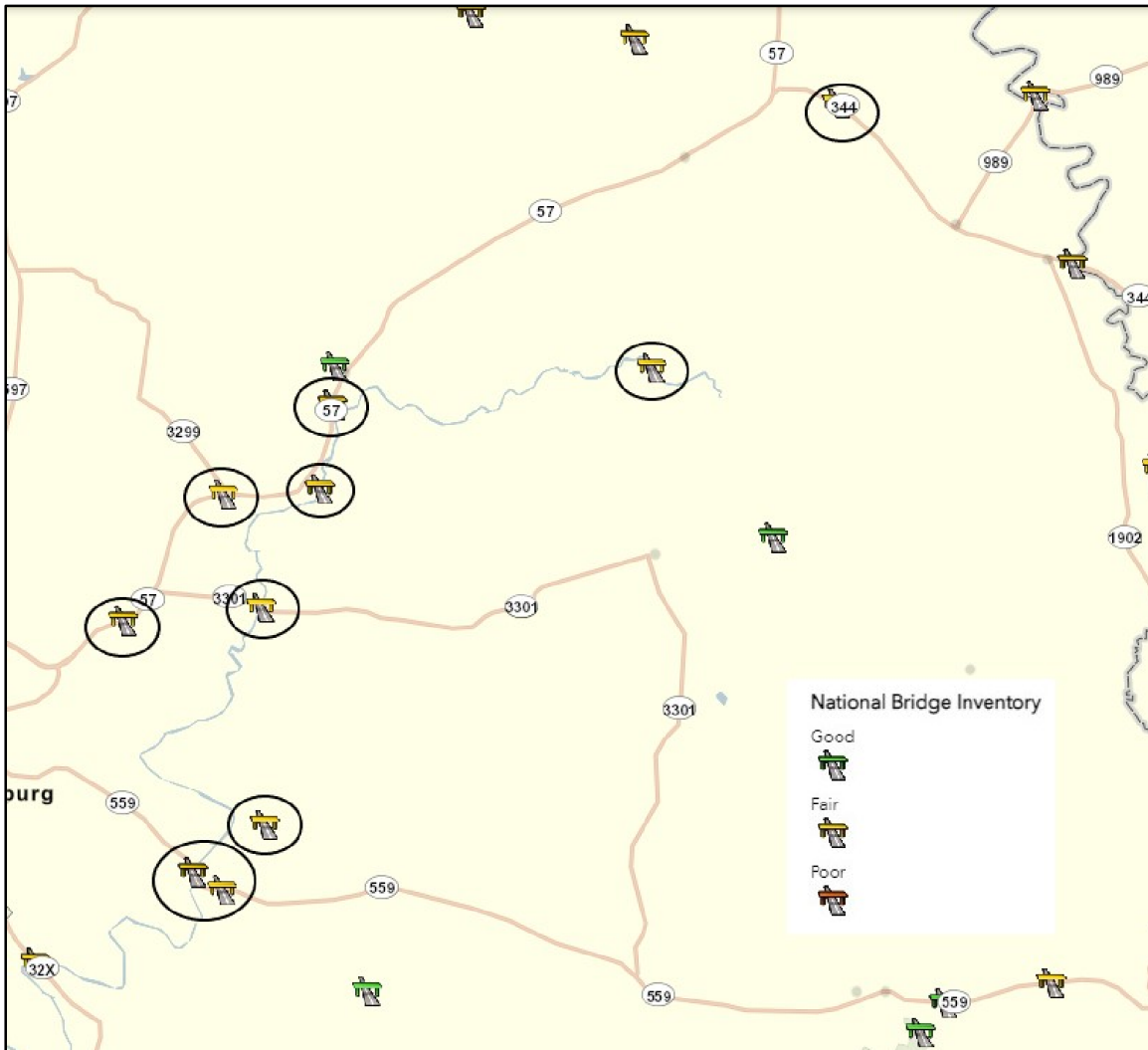
Local and regional bridge conditions. The Applicant did not provide details regarding the locations, conditions and weight limits for bridges in the vicinity of the Project area. HE acquired specific data for bridges in the vicinity of the Project area from the Kentucky Transportation Cabinet's (KTC) Bridge Data Miner⁷² and Bridge Weight Limits⁷³ interactive map resources. For the purposes of this review, HE selected a map area inclusive of KY-57 to the west, KY-344 to the north, and KY-559 to the south of the Project site.

There are ten bridges located in the immediate Project area. These include three bridges on KY-57 (Mt Carmel Rd), two on KY-559 (Wallingford Rd), one on KY-344 (Foxport Rd), one on KY-3301 (Beechtree Pike), another on Maddox Road, one on Wilson Run Road, and a bridge on Carpenter Road, south of the proposed Substation. All ten bridges are identified as being in fair condition, as illustrated in Exhibit 5-14.

⁷² <http://maps.kytc.ky.gov/bridge/>

⁷³ <https://maps.kytc.ky.gov/bridgeweightlimits/>

Exhibit 5-14.
Bridge Locations and Conditions in the Hummingbird Solar Project Area



Note: Circled bridges are applicable to this evaluation.

Source: Kentucky Transportation Cabinet, Bridge Data Miner, September 2023; Harvey Economics, 2023.

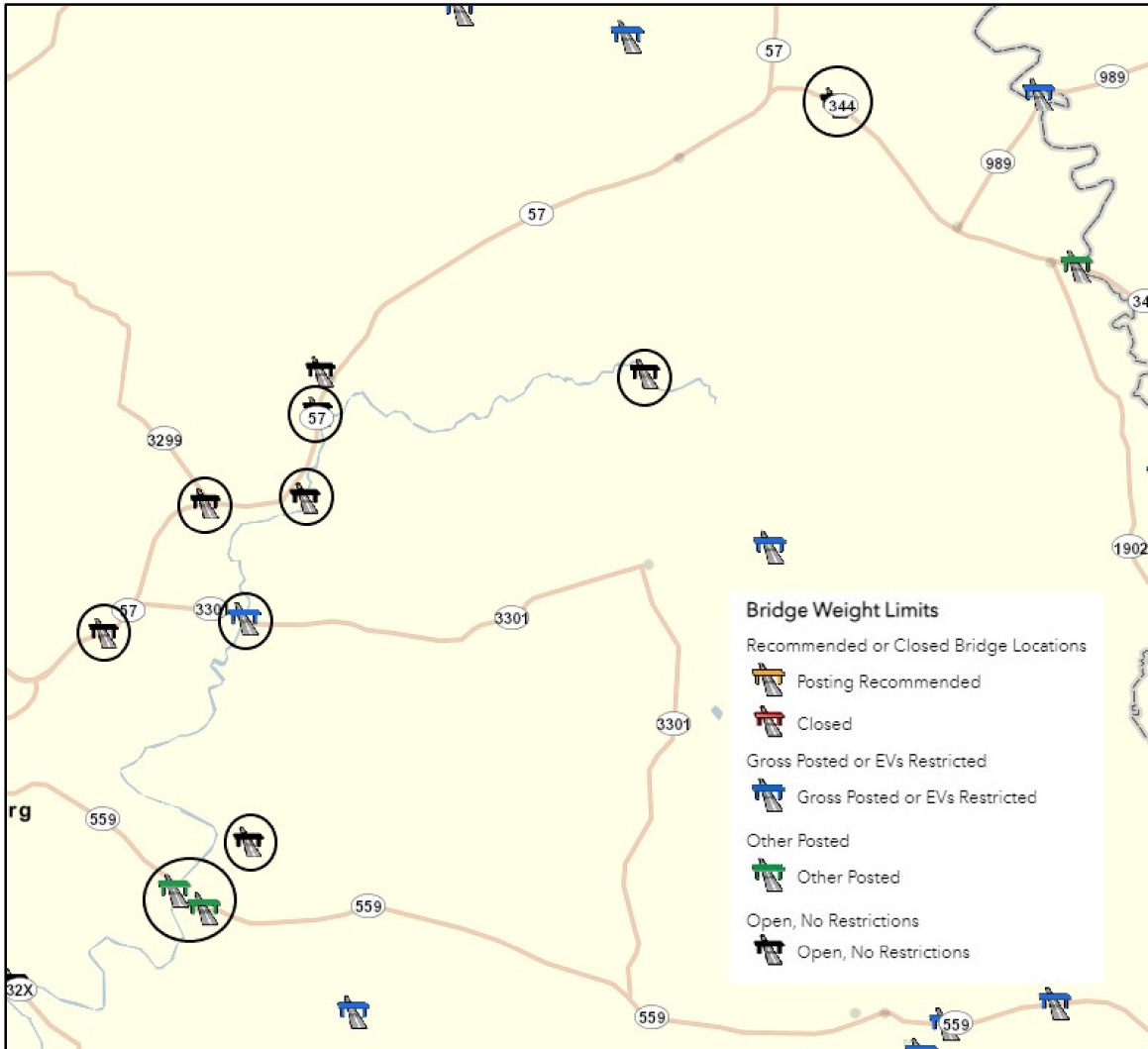
In terms of weight limits, the majority of these bridges are listed as “Open, No Restrictions,” as shown in Exhibit 5-15. Two bridges on KY-559 (Wallingford Rd) are posted for loads up to 44 tons. The bridge on KY-3301 (Beechtree Pike), east of KY-57, is posted for loads up to 43 tons with an emergency vehicle restriction of 33 tons gross weight.

These restrictions should be taken into account when developing routes for semi-trailers and any heavy vehicles or deliveries. The Applicant should be prepared to repair any damage to affected bridges due to commuting workers or heavy trucks traveling to the Project site.

During the site visit, one additional bridge was noted at the location of the proposed construction entrance/laydown area at Barrett Drive, off Wilson Run Road. This bridge, shown

in Exhibit B-12 of Appendix B, is on a participating landowner’s property and the weight limit is unknown. HE assumes this bridge will be maintained through the landowner’s participation agreement.

**Exhibit 5-15.
Bridge Weight Limits in the Hummingbird Solar Project Area**



Note: Circled bridges are applicable to this evaluation.

Source: Kentucky Transportation Cabinet, Bridge Weight Limits, September 2023; Harvey Economics, 2023.

Fugitive dust. Fugitive dust should not be an issue given the Applicant’s proposed efforts to control dust, including the application of water and other best management practices.

Potential for cumulative impacts with other solar projects. If all three solar projects (Hummingbird, Fleming and AEUG Fleming) are under construction at the same time, the Applicant noted a potential for traffic overlap “only on the south to northeast section of Highway 57 during peak hours.” Cumulative traffic impacts might be a concern at this location, depending on the three Projects’ development schedules and plans.

Once constructed, both the AEUG Fleming Solar Project and the Fleming Solar Project would be located approximately 4.5 miles west of the Hummingbird Project site. Given the distance between those projects and the Hummingbird Project site, it is unlikely that there would be any cumulative traffic impacts in the vicinity of the Hummingbird Project during operation.

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, fugitive dust, and road degradation:

- There is considerable uncertainty about traffic impacts, given the lack of a detailed construction plan. HE has made assumptions based on the information provided thus far by the Applicant.
- The lack of weight restrictions for local roads used to access the Project site is a concern. Special care should be taken in developing a plan to consider road conditions, the presence or lack of road shoulders, and vehicle weights.
- The construction entrances planned for the Project are widely dispersed; this might distribute construction vehicles across the site, minimizing traffic impacts, or might result in a feeling of overwhelming traffic in the general area for local residents.
- Construction traffic will likely be noticeable on local roads surrounding the Project site, and near residential neighborhoods. Construction traffic could be disruptive to some local residents. The nature of several local roads will require that drivers pull over for large vehicles and construction deliveries. While residents may be accustomed to this, it might be a point of irritation. Additionally, some local roads may not be wide enough to allow for safe passage of multiple vehicles, in their current condition.
- Delivery of the transformer down Carpenter Road may require pre-construction improvements and/or follow-up mitigation for that road and the turns onto Carpenter Road to prepare it for a delivery of that size and weight.
- Construction traffic will be more noticeable on KY-57 as construction vehicles originating from north and south will need to travel on KY-57 to access the Project site. The combination of construction-related and local traffic will likely cause periods of congestion when construction occurs.
- Road degradation may be an issue in some areas on local roads, depending on the amount of traffic using certain smaller or less maintained roads.
- Hummingbird Solar should consider incentives or other means of encouraging carpooling to reduce the number of worker vehicles and to minimize traffic-related effects, including the potential for congestion, accidents, noise or dust issues.

- While KY-57 is rated to support the weight of most of the Project deliveries, the transformer delivery likely exceeds the weight limits of that road and potential alternative routes for delivery such as KY-344 or KY-559, as well as the weight limit for the bridge on KY-3301. A plan to accomplish these deliveries is needed, as well as special overweight/over-dimensional hauling permitting.
- Given the small number of employees on-site during operations, HE does not anticipate any noticeable traffic impacts during the operational period.
- Fugitive dust should not be an issue given the Applicant's proposed efforts to reduce dust with the application of water and other best management practices.

Need for mitigation. The Applicant should consider certain mitigation to reduce impacts associated with traffic and dust:

1. The Applicant should revisit construction traffic impacts once a construction plan is in place. These revised traffic assessments should be reported to the Siting Board for determination about the adequacy of the agreed upon traffic mitigation measures.
2. The Applicant shall comply with all laws and regulations regarding the use of roadways and bridges.
3. The Applicant shall consult with the Kentucky Transportation Cabinet (KYTC) regarding truck and other construction traffic and obtain necessary permits from the KYTC.
4. The Applicant shall consult with the Fleming County Road Department (FCRD) regarding truck and other construction traffic and obtain necessary permits from the FCRD. Surveys before and after construction should be conducted. Special attention should be given to heavy vehicles, bridges and local roads.
5. The Applicant should work with the Commonwealth road authorities and the FCRD to perform road surveys, before and after construction activities, on all roads to be used by construction vehicles.
6. The Applicant will fix or pay for damage resulting from any vehicle transport to the Project site. For damage resulting from vehicle transport in accordance with all permits, those permits will be controlling.
7. The Applicant shall implement ridesharing between construction workers when feasible, use appropriate traffic controls or allow flexible working hours outside of peak hours if practicable, to minimize any potential delays during AM and PM peak hours.
8. The Applicant should work with the local community and authorities to ensure that construction commuting schedules and major deliveries do not cause undue impacts during peak hours.

9. The Applicant shall comply with any road use agreement executed with the FCRD. Such an agreement might include special considerations for overweight loads, routes utilized by heavy trucks, road weight limits and bridge weight limits.
10. The Applicant shall develop and implement a traffic management plan to minimize the impacts on traffic flow and keep traffic and people safe. Any such traffic management plan shall also identify any noise concerns during the construction phase and develop measures that would address those noise concerns.
11. The Applicant shall properly maintain construction equipment and follow best practices related to fugitive dust throughout the construction process. Dust impacts shall be kept at a minimum level.
12. The Applicant will monitor the development schedules of other solar facilities in the area. If construction schedules with either or both of the other projects coincide with Hummingbird, efforts should be made to jointly manage traffic impacts.

Economic Impacts

Evaluation of the potential economic effects of the Hummingbird Solar 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 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 the Commonwealth 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; and
- Potential curtailments or impacts to other industries.

Summary of information provided by the Applicant. The Hummingbird Solar Application included a report titled Economic & Fiscal Contribution to Fleming County & the

State of Kentucky (Exhibit F) prepared by Magnum Economics. That report includes a discussion and explanation of the Project's economic benefits, including estimates of employment, labor income, total economic output and tax revenues generated by Project construction and operations for the Commonwealth of Kentucky.

Excerpts from the Applicant's economic impact analysis and supplemental materials included the following:

Capital investment: The Hummingbird Solar project is estimated to require an investment of \$245.4 million. Of that total:

- Architecture, engineering, site preparation, and other development and construction costs are estimated to be approximately \$87.8 million. It is estimated that approximately 26 percent of that total (\$22.8 million) could be spent in Fleming County, while the remainder would be spent with vendors within the state.
- Capital equipment and other capital costs are estimated to be approximately \$157.6 million. It is anticipated that no capital equipment or expenditures would be purchased from vendors in Fleming County or Kentucky.

Construction employment, earnings and tax revenues: According to the Applicant's consultant, architecture, engineering, site preparation, and other development and construction activities are anticipated to require approximately 638 full-time equivalent (FTE) workers over the course of the construction phase.⁷⁴ Associated labor costs for Project development are estimated at approximately \$31.3 million, resulting in an average annual wage of \$49,000 per FTE. Given the circulation of construction phase related monies throughout Kentucky, the Applicant's consultant indicated that the Project would also generate about 302 additional (temporary) new FTEs, and \$14.4 million in associated income in other economic sectors.⁷⁵ These construction workforce figures are higher than the Applicant initially expressed in the SAR and higher than most other solar projects in Kentucky.

Exhibit 5-16 presents the Applicant's consultant's forecasts of employment, income and economic output generated by Project construction anticipated to occur in Fleming County and in the Commonwealth of Kentucky.

⁷⁴ 1 FTE = 2,080 hours worked in one year. A part-time or temporary position would constitute a fraction of one FTE. Therefore, the number of individual people hired for construction will likely be greater than the estimated number of FTEs.

⁷⁵ These are referred to as indirect and induced jobs.

Exhibit 5-16.

Estimated Economic Benefits of the Proposed Hummingbird Solar Project, Construction Phase

	Fleming County			Commonwealth of Kentucky		
	Labor			Labor		
	Employment	Income	Output	Employment	Income	Output
Direct	216	\$6.5 M	\$22.5 M	638	\$31.3 M	\$87.8 M
Total	268	\$8.3 M	\$30.2 M	940	\$45.6 M	\$136.8 M

Notes: (1) Employment is measured as FTEs; the number of individual workers may be greater than the number of FTEs.

(2) Total benefits include direct, indirect and induced benefits.

(3) Benefits to Kentucky are inclusive of the benefits to Fleming County.

Source: Hummingbird Solar, LLC, June 2023.

In addition to employment, labor income and other expenditures, the Applicant suggests the Project will generate approximately \$6.8 million in state and local tax revenues during the construction period.

Operational employment and earnings: Hummingbird Solar project will require approximately four part-time employees to perform the Project’s regular operation and maintenance work, including vegetative control, maintenance and repair and other operations. Salaries for each of those part-time employees are estimated to be approximately \$26,700 per year.

Exhibit 5-17 presents the employment, income and economic output generated by Project operations, anticipated to occur in Kentucky.

Exhibit 5-17.

Estimated Annual Economic Benefits of the Proposed Hummingbird Solar Project, Operations Phase

	Fleming County			Commonwealth of Kentucky		
	Labor			Labor		
	Employment	Income	Output	Employment	Income	Output
Direct	4	\$96.5 K	\$357.9 K	4	\$96.5 K	\$357.9 K
Total	8	\$234.8 K	\$915.0 K	9	\$276.6 K	\$1.1 M

Notes: (1) Total benefits include direct, indirect and induced benefits.

(2) Benefits to Kentucky are inclusive of the benefits to Fleming County.

Source: Hummingbird Solar, LLC, June 2023 and August 2023.

Potential agricultural losses. Taking land out of agricultural production will result in some economic losses. According to the Magnum Economic Report, agricultural use of a similarly sized site growing similar types of row crops as the Hummingbird Project site would support

about 12 FTE jobs and approximately \$700,000 in economic output each year.⁷⁶ That analysis assumes that some jobs and economic output are cattle-related, and some are crop-related. If cattle were moved to a different grazing site within Fleming County, it is possible that only a fraction of that economic activity would be lost because of the Hummingbird Project.⁷⁷

Property tax revenues: The taxation of real property (land) and capital investments would generate tax dollars for Fleming County and the Commonwealth of Kentucky. Hummingbird Solar is estimated to generate a net of approximately \$17.3 million in total tax revenue over the 40-year life of the Project, including approximately \$7.6 million in State taxes and \$9.7 million in local taxes. Those estimates are net of the property tax revenues generated by Project parcels under agricultural use.

Exhibit 5-18 presents cumulative net tax revenues generated by the Project over the course of the 40-year operational phase.

Exhibit 5-18.

Estimated Cumulative Net Tax Revenue from the Proposed Hummingbird Solar Project, Operations Phase

	Fleming County								
	Fiscal Court	Health Depart.	Library	Ambulance	Extension Service	Soil Conserv.	School District	Total Local	Kentucky
Real Property	\$972.8 K	\$304.0 K	\$553.3 K	\$535.0 K	\$285.8 K	\$91.2 K	\$2.8 M	\$5.5 M	\$723.5 K
Tangible Property	\$696.6 K	\$217.7 K	\$556.4 K	\$383.1 K	\$276.0 K	—	\$2.0 M	\$4.1 M	\$6.9 M
Total	\$1.7 M	\$518.6 K	\$1.1 M	\$912.7 K	\$558.8 K	\$90.3 K	\$4.8 M	\$9.6 M	\$7.6 M

Notes: (1) Estimated tax revenues are net of property taxes generated by Project parcels under agricultural use.
 (2) Tangible property tax revenues for Kentucky include estimated manufacturing machinery tax revenues.

Source: Hummingbird Solar, LLC, June 2023 and October 2023.

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 the monetary and other benefits must provide some quantification of said 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. The majority of the Project’s capital expenditures are anticipated to occur out-of-state, limiting the economic benefits to the Commonwealth. The Applicant noted that major Project components (panels and inverters) would be sourced from outside Kentucky. Therefore, the economic benefits of construction will come mainly from labor activities.

⁷⁶ The evaluation of these economic impacts resulting from agricultural production are theoretical numbers, not specific to the Hummingbird Project site.

⁷⁷ Hummingbird Solar, LLC, October 2023.

- In response to a specific information request from HE, the Applicant stated that between 250 and 300 construction workers are expected to be on-site each day. Those estimates differ greatly from the construction phase employment numbers estimated by Magnum Economics in the Economic & Fiscal Contribution report (presented in Exhibit 5-16 above). In our experience, a solar development project of this size, with similar amounts of capital investment would be expected to generate far fewer jobs than estimated by Magnum Economics.’ Again, the Applicant’s construction plans are preliminary.
- It is also important to note that direct construction jobs, as well as indirect and induced, will be temporary, resulting from the approximately 12-month construction period. Additionally, the portion of construction period jobs realized for Fleming County residents will depend on the number of available and qualified workers in the area.
- Economic benefits generated during operations would result from employee earnings, and other expenditures which are likely to be minimal.
- Taking land out of agricultural production will result in some economic losses, including jobs, income and economic activity. Agricultural output losses would be \$700,000 per year or approximately \$28 million over the 40-year life of the Project. However, many of the jobs impacted and the associated agricultural production are likely associated with participating landowners, who have accepted the change in land use and been renumerated via their leases with the Applicant. Therefore, the potential net agricultural-related losses due to the Project will be negligible from a county perspective. Total economic output generated by the operation of the Project appears to outweigh any losses due to changes in agricultural production.
- Property taxes distributed to local entities within Fleming County, including the Fleming County School District, will provide additional revenue for these agencies; however, those payments will generally amount to a small percentage of total annual tax revenues for any individual entity.
- Landowner leases are not mentioned in the economic analysis. Those landowners will realize direct benefits from the Project via lease payments.

Conclusions and recommendations. Construction and operation of the Hummingbird 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 the region during the construction phase. Construction activity will generate regional employment and income opportunities; those effects will be temporary, but local hires will increase employment and incomes to an area that needs it. Most construction purchases will be made outside of Kentucky.

Operational economic benefits will include property tax revenues, although these are assumed to be relatively minor in terms of total County tax revenues. Those payments will generally amount to a small percentage of total tax revenues for any individual public entity. Operational

employment will be minimal, but will generate local income, and local purchases of materials or supplies will generate additional economic activity.

Need for mitigation. Socioeconomic impacts of the Hummingbird Solar facility represent a positive, albeit small, contribution to the region. The following mitigation measures could be implemented to increase economic benefits within Fleming County and provide more detailed information about the Project's local economic benefits:

1. The Applicant should attempt to hire local workers and contractors to the extent they are qualified to perform the construction and operations work.
2. The Applicant should consider opportunities to optimize local benefits; for example, by purchasing materials, if possible, in the local area during construction and operation.

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 statutes, the Siting Board 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 of the activity. Therefore, the methods of assessing decommissioning impacts would be similar to those employed to evaluate the construction phase effects. Removal and disposal of the project components should also be addressed in this assessment.

Summary of information provided by the Applicant. Exhibit I of the Application provides the Applicant's Decommissioning Plan, which provides a description of the decommissioning and restoration phase of the Project. The Plan includes an overview of the primary decommissioning activities, including the dismantling and removal of facilities and subsequent restoration of land. A summary of estimated costs and revenues associated with decommissioning the Project is also included. The Hummingbird solar facility is anticipated to have an expected useful life of about 40 years. Decommissioning activities will begin within 12 months of the Project ceasing operation.

Decommissioning plan and activities. The Decommissioning Plan identifies the sequence of events to occur during the decommissioning process, from preparing the site for component removal through restoration and revegetation of disturbed land.

The activities involved in decommissioning the Project include removal of the Project components: solar modules, racking, tracking system, foundations and piles, battery storage units, inverters, transformers, access roads, and electrical cabling and conduits. Components

of the facility that have resale value may be sold in the wholesale market. Components with no wholesale value will be salvaged and sold as scrap for recycling or disposed of at an approved offsite licensed solid waste disposal facility.

The Project area will be returned to a substantially similar state as to what it was prior to the commencement of construction. Portions of the Project site that have been excavated and backfilled will be returned to a substantially similar state as it was prior to the commencement of construction. Restoration activities include back-filling of pile and foundation sites; de-compaction of subsoils; grading of surfaces to pre-construction land contours; and revegetation of the disturbed areas. Soils compacted during de-construction activities will be de-compacted, as necessary. Restored areas will be revegetated in compliance with applicable laws and regulations in place at the time of decommissioning.

Additionally, lease agreements with participating landowners obligate the Applicant to remove Project structures in accordance with applicable laws and requirements and restore the site to “substantially is previous condition,” while allowing for certain elements to remain based on landowner preferences.

Anticipated decommissioning costs. The total estimated cost of decommissioning the Hummingbird Solar Project is approximately \$14,744,658. The estimated salvage/scrap value of the solar panels, tracking system and other materials is approximately \$3,639,358. The net decommissioning costs after accounting for resale and salvage values is approximately \$11,105,300 in surplus. The Plan states that Hummingbird has indicated that they will secure a bond or other similar security for the Project to assure financial performance of the decommissioning obligation. The form of the bond or similar security, and its amount, will comply with applicable law and be acceptable to the Project's landowners and the Fleming County Fiscal Court.

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 once all the components are removed. After reclamation, the Applicant would return the land to its pre-Project productive use and property value, and eliminate long term Project-related negative impacts, compared with simply shutting the solar facility. This process will also have a modest and temporary positive economic stimulus to the region.

The Applicant has suggested that economic incentives exist for decommissioning, but HE believes that is highly uncertain due to costs for decommissioning and metal prices so far in the future.

Need for mitigation. The Applicant's approach to decommissioning and restoration includes removal of above ground and underground structures associated with the Project, as well as site restoration activities. Commitments regarding land restoration are included in individual lease agreements with participating landowners. To ensure that all decommissioning commitments are met, we recommend the following:

1. The Applicant shall file a full and explicit decommissioning plan with the Siting Board or its successors as well as Fleming County. This plan shall commit the Applicant to removing all facility components, above-ground and below-ground from the Project site. Internal roadways and other structures shall also be removed unless the landowner states in writing that they prefer those to remain in place. The decommissioning plan shall be completed at least one month prior to construction of the Project.
2. The Applicant, its successors, or assigns shall decommission the entire site of the Project once it ceases producing electricity for a continuous period of 12 months. Decommissioning shall include the removal of all solar panels, racking, and equipment including concrete pads and trenched electrical wiring.
3. The Applicant will notify Fleming County officials of upcoming decommissioning activities at least 30 days prior to the commencement of decommissioning.
4. 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 executed lease agreement.
5. The Applicant shall file a bond with Fleming County Fiscal Court, equal to the amount necessary to effectuate the explicit or formal decommissioning plan, naming Fleming County as an obliged or a third-party (or secondary, in addition to individual landowners) beneficiary of that bond, so that Fleming County will have the authority to draw upon the bond to effectuate the decommissioning plan as needed. For land in which there is no bonding requirement otherwise, Fleming County shall be the primary beneficiary of the decommissioning bond for that portion of the Project. The bond(s) shall be in place at the time of commencement of operation of the Project.
6. The bond amount should be reviewed and updated every five years at the expense of the Applicant to determine and update the cost of facility removal. This review shall be conducted by an individual or firm with experience or expertise in the costs of removal or decommissioning of electric generating facilities. Certification of this review shall be provided to the Siting Board or its successors and the Fleming County Fiscal Court. Such certification shall be by letter and shall include the current amount of the anticipated bond and any change in the costs of removal or decommissioning.
7. If the Applicant proposes to retrofit the current proposed facility, it shall demonstrate to the Siting Board that the retrofit facility will not result in a material change in the pattern or magnitude of impacts compared to the original project. Otherwise, a new Site Assessment Report will be submitted for Siting Board review. The term retrofit is

defined as the facility being re-designed such that the facility has a different type of operations or function, i.e., no longer operates as a solar electric generation facility.

8. The Applicant shall also prepare a new Site Assessment Report for Siting Board review if the Applicant intends to retire the currently proposed facility and employ a different technology.
9. The Applicant or its assigns must provide notice to the Siting Board if during any two-year period, it replaces more than twenty percent of its facilities. The Applicant shall commit to removing the debris and replaced facility components from the Project site and Fleming County upon replacement. If the replaced facility components are properly disposed of at a permitted facility, they do not have to be physically removed from Fleming County. However, if the replaced facility components remain in Fleming County, the Applicant must inform the Siting Board of where the replaced facility components are being disposed of.
10. Any disposal or recycling of Project equipment, during operations or decommissioning of the Project, shall be done in accordance with applicable laws and requirements.

Public Outreach and Communication

The Application details the public involvement activities undertaken by Hummingbird Solar, LLC staff (Exhibit B). Those activities included the following events and actions taken to notify and inform Fleming County officials and residents about the Project:

- Public meetings and events.⁷⁸
 - An open-house style meeting was held on March 15, 2022, at the Mt Carmel Fire Department in Fleming County. A total of approximately 40 community members attended the meeting.
 - A public meeting was held on May 24, 2022, at the Mt Carmel Fire Department. The Applicant published advertisements for the meeting in the *Flemingsburg Gazette* on two occasions.
 - A public meeting was held on November 14, 2022, at the Mt Carmel Fire Department. The Applicant published advertisements for the meeting in the *Flemingsburg Gazette* on October 26, 2022.
 - A public meeting was held on March 23, 2022, at the Mt Carmel Fire Department in Fleming County. Notice of that meeting was mailed to adjacent landowners on March 7, 2023, and published in the *Flemingsburg Gazette* on March 8, 2023.

⁷⁸ According to Applicant provided sign-in sheets, attendance at public meetings was limited. It appears that many, although not all, attendees are participating landowners and, in some cases, attendees have participated in multiple meetings.

- Participation in Center for Energy Education’s Solar 101 event, held in Flemingsburg.
- Outreach to surrounding landowners and others:
 - A notice of application letter was sent to adjacent landowners on June 15, 2023, via FedEx and U.S. certified mail. Notice of the pending application was published in the *Flemingsburg Gazette* on June 14, 2023.
 - 2021 - Meetings with the Fleming County Judge Executive at the time, Mr. Larry Foxworthy; Fleming Chamber of Commerce; and Fleming Tourist and Convention Commission.
 - 2023 - Meeting with the current Fleming County Judge Executive, Mr. John Sims Jr.
- The Applicant created a Project website to publish information about the Project, answer common questions, and to provide an e-mail and telephone number for feedback. That website address is <https://recurrentenergy.com/project/hummingbird/>.

As part of HE’s site visit to the Project area, HE met with the Fleming County Judge Executive, Mr. John Sims. Mr. Sims confirmed that he had met with the Applicant and was aware of the Project. He indicated that he has not yet been contacted by any residents or others concerned about the Project. Mr. Sims has several concerns about the Project, including setbacks from residences and protection from noise and visual impacts; the enforcement of decommissioning agreements; impacts to roads and traffic; and the timing of construction activities in relation to church services.

HE also spoke with the Fleming County Property Valuation Administrator, Ms. Stephanie Harding, during the site visit. Ms. Harding stated that she has not yet been contacted by the Applicant. Her main concerns are related to changes in property tax revenues within Fleming County. Ms. Harding is also concerned about the disposal of materials during decommissioning and the reduction of land in agricultural production. Her understanding of the concerns of local residents includes visual impacts, general property value worries and noise issues.

Need for mitigation. Although Hummingbird Solar has held numerous public meetings and engaged some County representatives in discussion about the Project, it is unclear whether, or how much, local or County residents know about the Project. The following measures should be taken to ensure public awareness of the Project and Project activities:

1. The Applicant should reach out to the churches in the area to address any concerns about the Project.
2. The Applicant should continue to pursue public outreach and engagement activities within Fleming County.

3. The Applicant should notify local officials and adjacent landowners regarding the start of the construction schedule.
4. The Applicant should update the Project website throughout construction and operations to describe current status and Project activities.

Complaint Resolution

In the Application, Hummingbird offered the following commitment: “There will be a clearly defined point of contact from Hummingbird, or via the EPC firm, designated to respond to questions or concerns. This point of contact will be designated as part of the Complaint Resolution Program Hummingbird intends to implement. This point of contact will be shared with representatives from the Fleming County Fiscal Court, Fleming County Fire and Police, and other local stakeholders.”⁷⁹

Need for mitigation. A detailed process for addressing complaints should be developed and followed during the construction and operational periods to address any issues associated with visual, noise or other Project-related impacts. The following measures should be undertaken to implement a complaint resolution process:

1. The Applicant should develop, publicize and implement a complaint resolution plan that describes the process for filing complaints during construction and during operations, and this plan should be provided to Fleming County and the Siting Board. The complaint resolution plan should explain how the complaint will be addressed; the timeframe in which a complainant can expect a response; and an explanation of how the resolution will be determined if the complainant is not satisfied with the response from the Applicant.
2. The Applicant should submit to the Siting Board, annually, a status report associated with the complaint resolution process, recounting the individual complaints, how the Applicant addressed those complaints and the ultimate resolution of those complaints, and whether or not the resolution was to the complainant’s satisfaction.

⁷⁹ Information provided in response to the Siting Board’s First Data Request.

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 on other resource topics. These are only noted here, and HE 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 Siting Board Jurisdiction

The Siting Board should be aware of additional permitting and regulatory actions that will require Applicant compliance and possible mitigation efforts (in addition to this effort to obtain a Certificate of Construction from the Siting Board).⁸⁰ No action on these actions is required by the Siting Board since these are outside the Siting Board's jurisdiction. The Applicant states that the following permits from local, state or federal agencies have been or will be obtained prior to construction and operation of the Project:

Federal Permits / Compliance

- Federal Energy Regulatory Commission (FERC) Interconnection Service Agreement
- U.S. Environmental Protection Agency (EPA) SPCC
- U.S. Department of Energy (DOE) EIS Form 860 and Extension Form 860-M
- U.S. Army Corp of Engineers Nationwide Permit for Stream/ Wetland Crossings
- U.S. Fish and Wildlife Service (potential consultation on recently and upcoming endangered listed bat species)

State Permits / Compliance

- KPDES General Permit for Stormwater Discharges Associated with Construction Activity
- Kentucky Transportation Cabinet: Driveway, Utility Crossings, and Oversize / Overweight Permits

Local Permits / Compliance

- Fleming County Road Department Coordination on Driveways and Road Crossings

⁸⁰ Information provided in response to the Siting Board's First Data Request.

- Fiscal Court Approval of Decommissioning Plan

In addition to the above, the Applicant has prepared and submitted a Cumulative Environmental Assessment (CEA), as required by Section 224.10-280 of the KRS.

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 are reasonable for the Applicant to undertake.

In performing this comprehensive review of the Hummingbird Solar Application and supplemental materials, 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, the location of solar panels, inverters, transformers, substation, operations and maintenance building, site entrances or other Project facilities or infrastructure.
2. Maps or other materials should be submitted to the Siting Board identifying and describing the specific segments of AC cabling to be located below grade and the specific segments to be located above grade throughout the Project site.
3. Any change in Project boundaries and developed areas from the information which formed this evaluation should be submitted to the Siting Board for review.
4. The Siting Board will determine if any deviation in the Project boundaries or proposed site layout 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 impact and mitigation requirements.
5. A detailed, Project-specific construction schedule should be submitted to the Siting Board. At a minimum, that information should include detailed descriptions of Project phasing, explanations of the timing and specific activities included in each phase, revised workforce estimates, if applicable, and estimates of delivery truck and commuter vehicle traffic by roadway.
6. The Siting Board will determine whether any information provided in the construction schedule or revised workforce estimates is likely to create a materially different pattern

or magnitude of impacts than described in this report. If not, no further action is required. If so, the Applicant will support the Siting Board's effort to revise its assessment of impacts and mitigation requirements.

7. 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.
8. The Applicant's access control strategy will include appropriate signage to warn potential trespassers. The Applicant will ensure that all site entrances and boundaries have adequate signage, particularly in locations visible to the public, local residents and business owners.
9. According to National Electrical Safety Code regulations, the Applicant must install a security fence prior to any electrical installation work. The substation will have its own separate security fence and locked access installed.
10. Prior to construction, Hummingbird Solar will coordinate with Fleming County law enforcement and fire services to answer questions regarding security and emergency protocols and provide first responder training.
11. The Applicant will develop an emergency response plan prior to the start of construction. The Applicant will meet with local emergency management representatives to ensure familiarity with plans and procedures. The emergency response plan will be revised following completion of construction to reflect operational measures, and a meeting will be held with local emergency response representatives for an updated review.
12. The Applicant will post contact information for Project representatives and emergency agencies on signs at each entrance to the Project site.

B. Compatibility with scenic surroundings:

1. Existing vegetation between the solar arrays and nearby roadways and homes shall be left in place, to the extent feasible, to help minimize visual impacts and screen the Project from nearby homeowners and travelers.
2. The Applicant will not remove any existing vegetation except to the extent it must be removed for the construction and operation of Project components.
3. The Applicant shall implement planting of native evergreen species as a visual buffer to mitigate viewshed impacts, particularly in areas directly adjacent to the Project without existing vegetation.
4. The Applicant shall carry out visual screening consistent with the plans proposed in its Application, including the Site Assessment Report, and ensure proposed new vegetative buffers are successfully established and develop as expected over time.

Should vegetation used as buffers fail to thrive over time, the Applicant shall replace them as appropriate.

5. The Applicant shall provide a visual buffer between Project infrastructure and residences or other occupied structures with a line of sight to the facility to the reasonable satisfaction of the affected property owners. To the extent that an affected property owner indicates to the Applicant that a visual barrier or vegetative buffer is not necessary, Hummingbird Solar will obtain that property owner's written consent and submit such consent in writing to the Siting Board.
6. Any changes to the vegetative buffering plan or site infrastructure layout (i.e., panels, inverters, etc.) included in the Application materials will be submitted to the Siting Board for review. If the Siting Board deems those changes to be significant, the Siting Board may require the Applicant to further modify the buffering plan.
7. The Applicant's proposed mitigation measures commit to plantings a minimum of six feet in height at the time of planting and eight feet high at within five years.
8. Landscape screening will extend and connect to existing site vegetation, if any, to help create a more natural transition between existing vegetation and Applicant developed vegetation.
9. The Applicant will develop a written vegetation management plan that describes the approach and procedures for maintaining or replacing vegetative buffers as needed.
10. The Applicant shall use grasses and pollinator seed mixes that support native birds, insects and other species as part of the planned landscaping buffers.
11. The Applicant will use anti-glare panels and operate the panels in such a way that glare from the panels is minimized or eliminated.
12. The Applicant will coordinate with adjacent homeowners affected by glare to further minimize or reduce the duration of glare to the reasonable satisfaction of the affected property owner.
13. The Applicant will post road signs warning of potential glare along affected portions of Breeze Road and Foxport Road, as identified in the Glare Hazard Analysis.
14. The Applicant will work with homeowners, business owners and churches to address concerns related to the visual impact of the Project on its neighbors.

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 because other mitigation can limit property value impacts. However, the Applicant's close coordination with impacted and concerned homeowners will be needed to minimize potential visual impacts and impacts from noise, traffic or other Project activities.

D. Anticipated peak and average noise levels:

1. The Applicant shall notify residents and businesses within 1,500 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 shall respond to any complaints related to noise levels or noise causing activities occurring during construction or operations via a formal and clearly developed complaint resolution program.
3. If pile driving activity occurs within 1,500 feet of a noise sensitive receptor, the Applicant shall implement applicable Best Management Practices to suppress the noise generated during the pile driving process (i.e., semi-tractor and canvas method; sound blankets on fencing surrounding the Project site; or any other comparably effective method).
4. The Applicant shall implement Best Management Practices to reduce noise levels with regard to construction-related activity occurring near residential neighborhoods (i.e., utilizing construction equipment fitted with exhaust systems and mufflers when available; using back-up alarms that are the minimum increment above background noise allowable by OSHA requirements; staging materials and equipment away from these locations when feasible; etc.).
5. The Applicant should limit the noise-producing construction activity, process and deliveries to the hours of 8:00 am to 6:00 pm, Monday through Saturday. No construction work should be conducted on Sundays.
6. The Applicant shall place panels, inverters and substation equipment consistent with the distances to noise receptors indicated in the Applicant's noise study and with the Applicant's proposed setbacks. Nevertheless, the Applicant shall not place solar panels closer than 260 feet from a residence, church or school and shall not place inverters closer than 624 feet from a residence, church or school. These setbacks shall not be required for residences owned by landowners involved in the Project that explicitly agree to lesser setbacks and have done so in writing. All agreements by participating landowners to lesser setbacks must be filed with the Siting Board prior to commencement of construction of the Project.

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

1. The Applicant should revisit construction traffic impacts once a construction plan is in place. These revised traffic assessments should be reported to the Siting Board for determination about the adequacy of the agreed upon traffic mitigation measures.
2. The Applicant shall comply with all laws and regulations regarding the use of roadways and bridges.

3. The Applicant shall consult with the Kentucky Transportation Cabinet (KYTC) regarding truck and other construction traffic and obtain necessary permits from the KYTC.
4. The Applicant shall consult with the Fleming County Road Department (FCRD) regarding truck and other construction traffic and obtain necessary permits from the FCRD. Surveys before and after construction should be conducted. Special attention should be given to heavy vehicles, bridges and local roads.
5. The Applicant should work with the Commonwealth road authorities and the FCRD to perform road surveys, before and after construction activities, on all roads to be used by construction vehicles.
6. The Applicant will fix or pay for damage resulting from any vehicle transport to the Project site. For damage resulting from vehicle transport in accordance with all permits, those permits will be controlling.
7. The Applicant shall implement ridesharing between construction workers when feasible, use appropriate traffic controls or allow flexible working hours outside of peak hours if practicable, to minimize any potential delays during AM and PM peak hours.
8. The Applicant should work with the local community and authorities to ensure that construction commuting schedules and major deliveries do not cause undue impacts during peak hours.
9. The Applicant shall comply with any road use agreement executed with the FCRD. Such an agreement might include special considerations for overweight loads, routes utilized by heavy trucks, road weight limits and bridge weight limits.
10. The Applicant shall develop and implement a traffic management plan to minimize the impacts on traffic flow and keep traffic and people safe. Any such traffic management plan shall also identify any noise concerns during the construction phase and develop measures that would address those noise concerns.
11. The Applicant shall properly maintain construction equipment and follow best practices related to fugitive dust throughout the construction process. Dust impacts shall be kept at a minimum level.
12. The Applicant will monitor the development schedules of other solar facilities in the area. If construction schedules with either or both of the other projects coincide with Hummingbird, efforts should be made to jointly manage traffic impacts.

F. Economic impacts:

1. The Applicant should attempt to hire local workers and contractors to the extent they are qualified to perform the construction and operations work.

2. The Applicant should consider opportunities to optimize local benefits; for example, by purchasing materials, if possible, in the local area during construction and operation.

G. Decommissioning:

1. The Applicant shall file a full and explicit decommissioning plan with the Siting Board or its successors as well as Fleming County. This plan shall commit the Applicant to removing all facility components, above-ground and below-ground from the Project site. Internal roadways and other structures shall also be removed unless the landowner states in writing that they prefer those to remain in place. The decommissioning plan shall be completed at least one month prior to construction of the Project.
2. The Applicant, its successors, or assigns shall decommission the entire site of the Project once it ceases producing electricity for a continuous period of 12 months. Decommissioning shall include the removal of all solar panels, racking, and equipment including concrete pads and trenched electrical wiring.
3. The Applicant will notify Fleming County officials of upcoming decommissioning activities at least 30 days prior to the commencement of decommissioning.
4. 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 executed lease agreement.
5. The Applicant shall file a bond with Fleming County Fiscal Court, equal to the amount necessary to effectuate the explicit or formal decommissioning plan, naming Fleming County as an obliged or a third-party (or secondary, in addition to individual landowners) beneficiary of that bond, so that Fleming County will have the authority to draw upon the bond to effectuate the decommissioning plan as needed. For land in which there is no bonding requirement otherwise, Fleming County shall be the primary beneficiary of the decommissioning bond for that portion of the Project. The bond(s) shall be in place at the time of commencement of operation of the Project.
6. The bond amount should be reviewed and updated every five years at the expense of the Applicant to determine and update the cost of facility removal. This review shall be conducted by an individual or firm with experience or expertise in the costs of removal or decommissioning of electric generating facilities. Certification of this review shall be provided to the Siting Board or its successors and the Fleming County Fiscal Court. Such certification shall be by letter and shall include the current amount of the anticipated bond and any change in the costs of removal or decommissioning.
7. If the Applicant proposes to retrofit the current proposed facility, it shall demonstrate to the Siting Board that the retrofit facility will not result in a material change in the pattern or magnitude of impacts compared to the original project. Otherwise, a new Site Assessment Report will be submitted for Siting Board review. The term retrofit is defined as the facility being re-designed such that the facility has a different type of operations or function, i.e., no longer operates as a solar electric generation facility.

8. The Applicant shall also prepare a new Site Assessment Report for Siting Board review if the Applicant intends to retire the currently proposed facility and employ a different technology.
9. The Applicant or its assigns must provide notice to the Siting Board if during any two-year period, it replaces more than twenty percent of its facilities. The Applicant shall commit to removing the debris and replaced facility components from the Project site and Fleming County upon replacement. If the replaced facility components are properly disposed of at a permitted facility, they do not have to be physically removed from Fleming County. However, if the replaced facility components remain in Fleming County, the Applicant must inform the Siting Board of where the replaced facility components are being disposed of.
10. Any disposal or recycling of Project equipment, during operations or decommissioning of the Project, shall be done in accordance with applicable laws and requirements.

H. Public outreach and communication:

1. The Applicant should reach out to the churches in the area to address any concerns about the Project.
2. The Applicant should continue to pursue public outreach and engagement activities within Fleming County.
3. The Applicant should notify local officials and adjacent landowners regarding the start of the construction schedule.
4. The Applicant should update the Project website throughout construction and operations to describe current status and Project activities.

I. Complaint resolution program:

1. The Applicant should develop, publicize and implement a complaint resolution plan that describes the process for filing complaints during construction and during operations, and this plan should be provided to Fleming County and the Siting Board. The complaint resolution plan should explain how the complaint will be addressed; the timeframe in which a complainant can expect a response; and an explanation of how the resolution will be determined if the complainant is not satisfied with the response from the Applicant.
2. The Applicant should submit to the Siting Board, annually, a status report associated with the complaint resolution process, recounting the individual complaints, how the Applicant addressed those complaints and the ultimate resolution of those complaints, and whether or not the resolution was to the complainant's satisfaction.