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July 10, 2020

TO: FILINGS DIVISION

RE: Case No. 2020-00043

ELECTRONIC APPLICATION OF GLOVER CREEK SOLAR, LLC FOR A CONSTRUCTION CERTIFICATE TO CONSTRUCT AN APPROXIMATELY 55 MEGAWATT MERCHANT ELECTRIC SOLAR GENERATING FACILITY IN METCALFE COUNTY, KENTUCKY PURSUANT TO KRS 278.700 AND 807 KAR 5:110

Please file in the administrative record of the above-referenced case the attached copy of the cover letter and final report of Harvey Economics, "Review and Evaluation of the Glover Creek Solar, LLC Site Assessment Report," both dated July 10, 2020.

Sincerely,

A handwritten signature in blue ink, appearing to read "K. Chandler".

Kent A. Chandler
Acting Executive Director
Public Service Commission *on behalf*
of the Kentucky State Board on Electric
Generation and Transmission Siting

Attachments

cc: Parties of Record



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July 10, 2020

Mr. Quang Nguyen
Assistant General Counsel
Kentucky Public Service Commission
211 Sower Blvd.
Frankfort, KY 40601

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

Dear Mr. Nguyen,

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

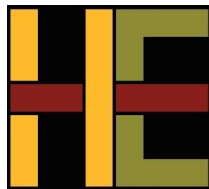
Yours truly,

Edward F. Harvey
Principal

Review and Evaluation of the Glover Creek Solar, LLC Site Assessment Report

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

July 10, 2020



Report

July 10, 2020

Review and Evaluation of the Glover Creek Solar, LLC Site Assessment Report

Prepared for

Kentucky Public Service Commission and
Kentucky State Board on Electrical Generation and Transmission Siting
211 Sower Boulevard
Frankfort, Kentucky 40602

Prepared by

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SECTION 1

Introduction

This document provides a review of the Site Assessment Report (SAR) for the proposed Glover Creek Solar Facility (Glover Creek) submitted to the Kentucky Public Service Commission (PSC) and the Kentucky State Board on Electrical Generation and Transmission (Siting Board). The SAR was submitted to the PSC by Glover Creek Solar, LLC on March 27, 2020. PSC staff retained Harvey Economics (HE) to perform a review of the SAR. Glover Creek Solar, LLC (or Applicant) has submitted the SAR as part of its application for a construction certificate to construct a merchant electric generating facility under KRS 278.706 and 807 KAR 5:110. Requirements specific to the SAR are defined under KRS 278.708.

Statutes Applicable to the SAR Review

KRS 278.706 outlines the requirements for an application for a certificate to construct a merchant electric generating facility. Section (2)(1) of that statute requires the applicant to prepare a SAR, as specified under KRS 278.708. The Glover Creek SAR is the main focus of HE's review. However, the PSC also requested that HE review the economic impact report prepared by Glover Creek Solar, LLC; 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 Glover Creek SAR and certain other components of the Glover Creek application:

- Review of the contents and information provided in the site assessment report, application and other documents provided by the Applicant;¹
- Brief review of secondary data sources to obtain background information and geographic setting for the Glover Creek 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 PSC General Counsel;

¹ Glover Creek Solar, LLC has submitted a motion for deviation from the setback requirements. That document includes a 13-page letter from Glover Creek Solar, LLC counsel, along with several attached Exhibits.

- Review of additional information supplied by the Applicant in response to first submitted HE questions, and discussion of responses with the PSC staff;
- Development of a second set of focused questions, which were submitted to the Applicant and discussed with the Applicant and the PSC via video conference;²
- Completion of interviews and data collection with a number of outside sources as identified in this document;
- Completion of analysis and evaluation; and
- Preparation of this report, which provides HE’s conclusions as to potential Project impacts and mitigation recommendations.

Components of the Glover Creek Solar Facility SAR

Glover Creek Solar, LLC’s application to the PSC consists of multiple documents included in two volumes.

- Volume 1: Among other items, Volume 1 includes a brief analysis and discussion of the facility’s estimated economic impacts.
- Volume 2: The second volume of the application is comprised of the SAR, including a brief summary of discussions addressing each requirement of KRS 278.708 and the following “exhibits” or attachments:
 - Property Value Impact Report – includes the Kirkland Appraisals, LLC report (Kirkland report);
 - Legal Description of Site – narrative description and map of property;
 - Noise and Traffic Study – this is referred to as the Pond report;
 - Environmental Site Assessment – Phase 1 Report; and
 - Preliminary Site Layout, which consists of two figures of the property and project facilities.

In addition to the application, Glover Creek Solar, LLC also provided the PSC with a document titled Applicant’s Motion for Deviation from Setback Requirements, which HE reviewed and considered as part of the evaluation of the proposed site development plan. The Motion for Deviation also included a Cumulative Environmental Assessment report, which discussed environmental aspects of the proposed solar facility.

² Under normal conditions, HE would have visited the project site and conducted an in-person interview with the Applicant to address remaining questions; however, in June 2020, the presence of COVID-19 prevented HE staff from traveling to Kentucky.

Additional Information Provided by the Applicant

After an initial review of the contents of the SAR, HE and the Siting Board independently developed a first list of detailed questions, either requesting additional data and information about specific topics or asking for clarification about items in the SAR. The PSC submitted those questions (Request for Information #1, or RFI #1) to Glover Creek on May 14, 2020 and Glover Creek provided written responses on June 1, 2020.

A conference call was held between HE and PSC staff on June 5, 2020 to address the completeness of the Glover Creek response to RFI # 1 and discuss the need for any additional follow-up. Remaining data and information needs were identified and, subsequently, both HE and the Siting Board prepared a second round of inquiries (Request for Information #2, or RFI #2). RFI # 2 was submitted by the PSC to Glover Creek on June 12, 2020.

A conference call including HE, PSC staff and Glover Creek staff was held on June 24, 2020. During that call, Glover Creek staff responded verbally to RFI #2, addressing the follow-up questions and clarifications. Glover Creek submitted written responses to RFI #2 on June 29, 2020.

Glover Creek's responses to RFI #1 and RFI #2, in combination with the conference call held with Glover Creek staff, provided adequate clarification and detail for HE to complete an evaluation of the Project, with respect to the applicable statutes and direction from the PSC.

Report Format

This report is intended to support the PSC and the Board in their decision-making process related to granting a construction certificate to Glover Creek Solar, LLC. The report is structured to respond to the requirements for a SAR as outlined in KRS 278.708, the economic analysis described in KRS 278.706(j) 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 as to the results of HE's SAR evaluation. Section 3 describes the Glover Creek Project and the proposed site development plan. Section 4 provides a brief profile of Metcalfe County's economic and demographic characteristics as context for the project setting. Section 5 offers detailed findings and conclusions for each resource area reviewed and Section 6 presents recommendations concerning mitigation measures and future PSC and Board actions.

Caveats and Limitations

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

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

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

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

COVID-19 pandemic. HE began working with the PSC on the review of the Glover Creek SAR in March 2020, during the early stages of the current COVID-19 pandemic. Various “stay-at-home” and later “safer-at home” (Colorado) and “healthy-at-home” (Kentucky) orders prevented HE staff from traveling to Kentucky for an in-person site visit or in-person meetings with the PSC, Applicant or others. As an alternative, the group opted for video conference calls, telephone interviews and heavier reliance on maps and satellite imagery of the local area. HE believes this alternate approach was satisfactory for the purposes of the Glover Creek SAR review.

SECTION 2

Summary and Conclusions

Glover Creek Solar LLC (Glover Creek) proposes to construct a 55-megawatt, alternating current (MWac) photovoltaic electricity generation facility (Project) in the Summer Shade area of Metcalfe County, KY, about 56 miles southeast of Bowling Green. In March 2020, Glover Creek submitted an application to the Kentucky Public Service Commission (PSC) for a construction certificate to construct a merchant electric generation facility. Glover Creek's application responded to the statutory requirements set forth by the State of Kentucky in KRS 278.706 and 278.708.

The PSC retained Harvey Economics (HE) to review and evaluate the Site Assessment Report (SAR) included in the Glover Creek 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 of HE's review and evaluation are provided below. Recommended mitigation measures are offered in Section 6 of this report.

Facility Description and Site Development Plan

The Project site encompasses a total of about 560 acres of rural agricultural land with solar components covering approximately 400 acres. Solar infrastructure will include about 140,000 solar panels, solar tracking motors, one substation transformer, and 13 inverter / transformer/ Energy Storage System (ESS) groupings.

- ***Surrounding land uses*** – The area around the Project site can be generally described as rural, agricultural, with rolling hills and areas of trees. Acreage surrounding the Project site is largely residential agriculture, with additional smaller sections of purely agricultural land or residential properties. Twenty-eight individual parcels of land, varying in size from less than one acre to more than 200 acres, are located adjacent to the Project site.
- ***Proximity to homes***—A total of 32 homes are located within 1,000 feet of the Project's boundaries. Nine houses are within 300 feet of the boundaries and five homes are within 300 feet of the nearest solar panels.
- ***Locations of structures*** – Exact locations of some solar panels and the locations of the 13 inverter / transformer / ESS groupings have not been finalized. Therefore, “worst-case” assumptions related to panel location and distance from solar components to the property boundary were made for the purposes of this review. Two existing transmission lines are routed through the Project site.
- ***Locations of access ways*** – Construction access points will be located on Randolph Summer Shade Road (SR 640) and Summer Shade Road (SR 90). Big Jack Road will be the primary access point for the construction and on-going maintenance of

the substation. Those same entrances will also be available during operations. Railway use is not applicable to the Glover Creek Solar facility.

- **Access control** – All Project entrances on SR 90, SR 640 and Big Jack Road will be gated and locked when not in use. Security fencing will enclose the facility during construction and operation.
- **Utility service** – The facility will rely upon power from the local utility (Farmers Rural Electric Cooperative Corporation) during construction and operation. During operations, no power will be drawn from Summer Shade - Patton Rd Jct 69kv line; power will only be input into that transmission line.
- **Project life**—The Applicant anticipates a 40-year project life.

Project construction is expected to last one year. An estimated 40 to 150 workers will be on site throughout this period, with a peak of 250 workers.

Setback requirements and requested deviation. As proposed, the Glover Creek Project does not meet existing setback requirements. The Applicant has entered a motion for a deviation from these requirements. HE reviewed this motion and believes that the Project meets the specific statutes of a setback deviation. The Board must determine if these measures are sufficient.

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

Project Setting

Metcalf County had a 2019 population of about 10,100 people. Population levels have been stable and are projected to remain so. Summer Shade has an estimated 230 residents. The County population is relatively older with lower income levels than the State as a whole. The economic stimulus from this project, albeit modest, should be positive.

Compatibility with Scenic Surroundings

The area surrounding the Project is largely agricultural, with few homes near the Project boundary. Visitation to the area is minimal and virtually no tourism exists in the area. Rolling hills and clumps of trees will help protect against negative visual impacts to residents and commuters. Only a small section of the Project is observable from SR 90 (in the southwestern corner). More panels might be seen from SR 640, where there are fewer trees; however, SR 640 is a lightly traveled road.

Scenic compatibility focuses on the solar panels since those structures will represent the greatest height above ground at six to ten feet. Some glare will occur in the early mornings from about October to February, especially during the first three years of the Project, but only observable on SR 640. The Applicant has committed to planting a three-foot vegetative

buffer, which should grow to six feet after three years. The vegetative buffer and natural landscape will shield almost all Project facilities from view of those residences. HE believes the solar panels will coexist well with the surrounding area.

Potential Changes in Property Values and Land Use

The Applicant's consultant, Kirkland, prepared an extensive data collection effort and analysis of property value impacts of solar facilities in diverse locations, concluding that the Project would have a no effect on property values once in operation, and perhaps none during construction. To further assess potential property value impacts, HE: (1) reviewed existing literature related to solar facility impacts; (2) prepared further analysis of the data from Kirkland; and (3) conducted interviews with several local real estate professionals. Those efforts each resulted in an indication of no impacts to property values related to solar facilities.

HE believes that it is unlikely that property values or land uses will be affected by the construction or operation of the Glover Creek facility. Construction activity will be temporary, and, if anything, may have more of an effect on the timing of property sales than on prices or value.

HE's review of the Kirkland work, existing research, and local interviews, all indicate little or no impacts to property values due to Glover Creek siting or operations. That conclusion is also supported by the specifics of operational activity at the Glover Creek facility, including minimal traffic or noise, no odors, panels which will be largely hidden from view by shrubbery, and no emissions of any kind.

Anticipated Peak and Average Noise Levels

During construction, almost all the noise from the Glover Creek site will be intermittent and will not cause permanent ear damage to nearby residents. According to the Applicant's consultant, Pond, baseline noise levels in the area are about as loud as the construction noises. However, the tamping process that drives the solar posts into the ground will be particularly bothersome for up to two and a half weeks, especially to the closest residences. Other construction equipment, especially earth-moving equipment (such as backhoes and bulldozers) will produce noises that the EPA classifies as grating for residents within 1,500 feet from the originating sound. Thus, construction has the potential to be annoying, but not harmful, to residents in the area for as many as eight months.

During operation, the co-located transformers and inverters are not expected to have a noticeable noise impact on residences due to distance and vegetative buffering. The transformers and inverters will be at least 200 feet away from the nearest residence, and the constant hum of the equipment (during the day) is anticipated to be less than what the EPA classifies as a nuisance or annoyance. However, the solar panel tracker motors, which are louder than the transformers and inverters and will be closer to residences, might create an annoying noise impact for a small number of residents.

In sum, there could be up to eight months of potentially aggravating noise impacts during construction, with a peak of up to two and a half weeks of particularly loud and annoying construction activity. There will most likely be noticeable noise from solar tracker motors during operation, especially during the first three years of operation before the vegetative buffer reaches six feet high and can help reduce noise impacts. However, the motors will likely impact fewer than nine residences. Buffering, undulating lands and agricultural background noise will likely diminish this irritation.

Traffic, Fugitive Dust and Road Degradation

Traffic impacts during construction will be limited, but somewhat higher during the peak construction weeks. There is the potential for traffic congestion to increase along SR 640, especially during the peak construction phase, but this road has only modest traffic now. The entrance to the Project site from SR 640 should be able to handle the increase.

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

Road degradation should not occur unduly from construction commuting and other vehicles except for the very large Class 21 truck trips. There are expected to be up to approximately 11 Class 21 truck trips, and these substantially exceed the weight classification on roadways in the area. Road damage is quite possible from these vehicles.

There will be no noticeable traffic impacts during operations.

Economic Impact Analysis

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

Operational economic benefits will be confined mostly to property taxes, although these will be relatively minor. Operational employment will be minimal, and purchases of materials or supplies will be small on an annual basis. Annual property tax payments will be made to multiple Metcalfe County taxing authorities; however, those payments will likely amount to a small percentage of total tax revenues.

Socioeconomic impacts of the Glover Creek Solar Facility represent a positive, all be it small contribution to the region.

Decommissioning

HE considered the three possible outcomes for the Glover Creek Solar facility and site after

the 40-year useful life. We cannot know which of the three (decommissioning, extending the present plant life, or re-purposing the site for power generation) is more likely at this time:

- Decommissioning the facility and returning the site to its original condition can be accomplished, since all the components can be removed. After reclamation, this would return the land to a productive use and property value, and eliminate long term project-related impacts, compared with simply shuttering the solar facility. This process will also add a modest, temporary positive economic stimulus to the region.
- Power generation facilities often have a useful life beyond 40 years. Perhaps with modernized retrofitting, the Glover Creek facility can continue to operate indefinitely. Given the discrete component nature of this plant, switching out elements seems possible. In this case, operational impacts discussed in this report would also continue indefinitely.
- As part of its development, Glover Creek Solar LLC also has interconnection rights to the Summer Shade -Patton Rd Jct 69kv transmission line. Together, the substation transformer and the interconnection rights at the point of interconnection (POI) will remain valuable assets at the end of the life of the Project. That value is likely to grow over time. As a result, there will be a future incentive for some type of power generation to start at this site once the Glover Creek facility is fully depreciated or closed. Impacts under this circumstance will also continue indefinitely, although at an unknown magnitude.

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 PSC approve Glover Creek Solar, LLCs 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

As described by Glover Creek Solar, LLC:³

“The Glover Creek Solar Facility will be a 55-megawatt alternating current (MWac) photovoltaic electricity generation facility. The project will be located in Metcalfe County, at approximately 7449 Randolph-Summer Shade Road, Summer Shade, KY 42166. The power generated by the project will be sold on the open market through the existing transmission line that crosses the property.

The project will cover approximately 400 acres which has historically been used as pasture and crop land.⁴ The equipment onsite will consist of crystalline solar panels, an energy storage system, inverters, a substation transformer, and an associated wiring and balance system.

The racking system, which is used to affix the solar panels to the ground, has a small footprint that does not use any concrete. The panels are not considered impervious as rainwater can travel over and around the panels, making this a low impact development. A fence meeting the national electrical code requirements, typically a six-foot fence with three strings of barbed wire at the top, will enclose the facility. Where there are potential visual impacts created by the facility, a 15’ wide vegetative buffer will be planted as shown on the attached site plan map. The buffer will consist of two staggered rows of evergreen shrubs at least three feet in height at time of planting.”

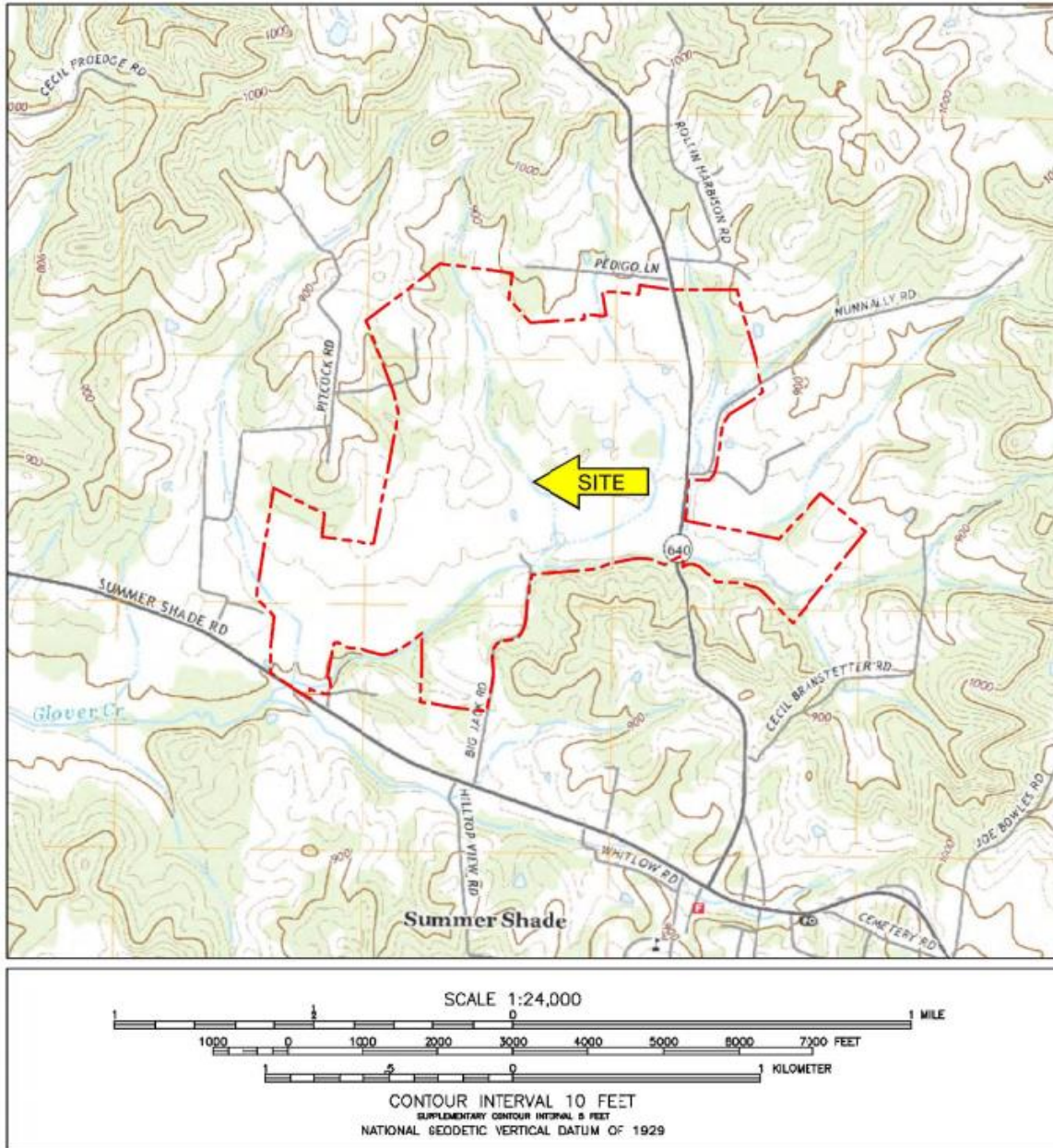
The entire Project site encompasses an area of about 556 acres located on the north side of Summer Shade Road (SR 90) and including parcels on both the east and west sides of Randolph Summer Shade Road (SR 640). Given the 55 MW size, the Applicant estimates the need for about 140,000 solar panels. Additional infrastructure includes one substation transformer, 13 inverter / transformer/ Energy Storage System (ESS) groupings and several tracking motors.

Exhibit 3-1, submitted as part of the Environmental Site Assessment – Phase I Report, shows a map of the Project site within Metcalfe County.

³ SAR, Section 1.

⁴ The solar panels and other facilities will cover an area of about 400 acres (Project footprint); however, the entire project site encompasses an area of about 556 acres.

**Exhibit 3-1.
Map of Proposed Project Site and Surrounding Area**



Source: Glover Creek Solar, LLC, June 2020.

The Project site is located approximately 56 miles southeast of the City of Bowling Green, the largest community in the region.

Construction Activities

Construction of the Glover Creek Solar facility is expected to occur over a period of about 12 months. Exhibit 3-2 below offers a visualization of the construction schedule, provided by the Applicant.

That work will include grading a two-acre site, pouring a concrete pad, and installing the substation transformer.

On average, between 40 and 150 construction workers are estimated to be on-site each day, depending on the specific tasks and activities occurring at that time. The grading and post-driving phases (approximately 2-3 months total) will require an average of about 40 people on-site each day. The panel installation and wiring (approximately 3-6 months total) will require an average of about 150 people on-site each day. Peak construction activity will most likely occur during the 2nd and 3rd quarters of the year when solar panel installation and staging and wiring installation is concurrent. During the peak construction activity, as many as 250 people could be present at the site on a given day, depending on how much the panel installation and wiring phases overlap.

Life of the Project

The Glover Creek Solar facility is anticipated to be operational for a period of 40 years.⁵ It is possible that this facility or power generation in some form will continue beyond the nominal 40-year project life. 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. Metcalfe County in general, and Summer Shade in particular, are rural residential areas, with low population density and an agricultural emphasis. As part of the SAR, the Applicant's consultant, Kirkland, identifies the acreage surrounding the Project site as largely residential agriculture. Smaller amounts of adjacent acreages are agricultural land (no residences) and some tracts are simply residential properties. Section 4 of this report provides a general overview of the County's demographic and economic characteristics.

Twenty-eight individual parcels of land, varying in size from less than one acre to more than 200 acres, are located adjacent to the Project boundary. Exhibit 3-3 illustrates the locations of those parcels, while Exhibit 3-4 lists individual parcel information.

⁵ This timeframe was noted in the Pond report and in the economic impact analysis report and was also confirmed by the Applicant.

**Exhibit 3-3.
Map of Parcels Adjacent to the Glover Creek Solar Project Boundary**



Source: Kentucky Public Service Commission, GIS staff, June 2020.

Exhibit 3-4.
Data for Parcels Adjacent to the Glover Creek Solar Project Boundary

<u>Parcel ID</u>	<u>Acres</u>	<u>Name</u>	<u>Address</u>
016-00-00-021.00	155.28	Vibbert, Delbert	1573 Pitcock Road
029-00-00-016.00	181.42	Branstetter Trust	P.O. Box 135
029-00-00-015.00	337.37	Sandidge, Donald & Mary Lee	47 Nunnally Road
029-00-00-019.00	41.24	Poore, Bonita McIntyre	8110 Randolph Summer Shade Road
017-00-00-003.02	2.92	Fugate, Cash Jr.	P.O. Box 73
017-00-00-011.04	0.81	Frye, Pauline	29 Jim Paige Road
017-00-00-004.01	10.66	Shaw, James	1056 Pitcock Road
017-00-00-003.04	29.50	Pitcock, Joshua	635 Tarter Jessie Road
017-00-00-004.00	34.03	Beets Family Trust	684 Pitcock Road
017-00-00-024.03	2.58	Coop, Stephen & Julie	1524 Summer Shade Road
017-00-00-029.00	2.41	Pedigo, Richard	2481 Flint Knob Road
017-00-00-025.00	11.83	Palmore, Joseph & Pedigo, Lisa	1706 Summer Shade Road
017-00-00-022.00	111.15	Dickerson Lumber Co.	P.O. Box 125
017-00-00-023.00	98.01	Spears, Keith & Mary	1285 Summer Shade Road
017-00-00-026.01	1.55	Atwell, James	222 Big Jack Road
017-00-00-028.00	47.14	Brown, Gabe & Kelli	1750 Summer Shade Road
017-00-00-027.00	54.3	Wade, Elaine (Trustee)	110 Karakal Drive
017-00-00-003.05	14.47	Durant, Susan & Davis	684 Pitcock Road
017-00-00-003.00	11.63	Miller, Betty	92 Pitcock Road
017-00-00-011.01	0.92	Perkins, Glen and Pauline	44 Jim Page Road
017-00-00-011.06	16.52	Anderson Wendell Estate	5700 Pinetree Drive
017-00-00-011.07	0.48	Hurt, Steven	57 Jim Page Road
017-00-00-008.03	0.28	Whitlow, Ryan & Diana	125 Pedigo Lane
017-00-00-008.02	22.00	Whitlow, Matthew & Allison	380 Pedigo Lane
017-00-00-026.00	7.00	Wade, Elaine (Trustee)	110 Karakal Drive
017-00-00-007.00	48.59		No Data Available
029-00-00-014.00	65.61		No Data Available
017-00-00-008.00	0.91		No Data Available

Source: Kentucky Public Service Commission, GIS staff, obtained this data from the Metcalfe County Property Valuation Administrator's Office, June 2020.

In response to HE's inquiries, the Applicant also provided a table describing the distances, in feet, between nearby residences and the Project boundaries and between nearby residences and the closest solar panels. That information is provided in Exhibit 3-5.

Exhibit 3-5.
Distances between Nearby Residences and the Glover Creek Solar Project Boundary and Project Solar Panels

<u>Distance from Property Boundary (feet)</u>	<u># of Residences</u>	<u>Distance from Solar Panels (feet)</u>	<u># of Residences</u>
<100	4	<100	0
100 - 200	4	100 - 200	2
200 - 300	1	200 - 300	3
300 - 400	0	300 - 400	2
400 - 500	5	400 - 500	1
500 - 600	0	500 - 600	3
600 - 700	4	600 - 700	1
700 - 800	4	700 - 800	3
800 - 900	3	800 - 900	6
900 - 1,000	<u>7</u>	900 - 1,000	<u>3</u>
Total Residences:	32		24

As noted by the Applicant:

- The minimum distance from a solar panel to the site boundary will be 100 feet.
- No solar panels can be placed within the floodplain, so some residences that are relatively close to the property boundaries may actually be further from any solar panels.
- One house within 100 feet of the property boundary is unoccupied and owned by a landowner who has leased land to the Applicant. One house within 200 feet of the property boundary is a rental home owned by a landowner who has also leased land to the Applicant.

Legal boundaries. The SAR included a legal description of the proposed site, as well as a mapped boundary survey. These documents provide correct information about the property boundaries and acreage. The legal description and boundary survey correspond to the entire 556-acre Project site, which includes the approximate 400 acres covered by the solar panels and other Project components.

Several maps included throughout other portions of the SAR and other Applicant provided materials include additional parcels or exclude certain parcels that are a part of the legal boundaries. The legal boundary description in the SAR should be referred to for the correct parcel information.

Access control. In response to HE’s inquiries, the Applicant provided a revised site layout plan from its original SAR, indicating one primary and one secondary construction access point on Randolph Summer Shade Road (SR 640). An additional secondary

construction access point will be located on Summer Shade Road (SR 90). Big Jack Road was identified as the primary access point for the construction and on-going maintenance of the substation and as a secondary access point for construction of other Project components.

All construction entrances will be gated and locked when not in use by construction workers or operational employees. According to Note 10 of the site layout plan graphic, a standard keyed or combination lock will be used, and emergency personnel will be provided with a key or the combination code to access the site. The Applicant indicated that a security guard may also be hired to provide additional security in the evenings and on weekends.

The fence surrounding the property boundary will be installed after grading of the site (early in the construction period) and before the main array installation begins. According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work. The substation and construction staging area will also have their own separate security fences installed.

Location of buildings, transmission lines and other structures. The Applicant first indicated that site layout plan graphic provided on page 316 of the SAR was the most current layout of Project structures, such as the location of solar panels, the substation, transmission lines and other Project components. However, in response to HE's inquiries, it became clear that the exact locations of some solar panels and the locations of the 13 inverter / transformer / ESS groupings will not be finalized until the Applicant completes the final site design process. Therefore, after discussion with the Applicant and the PSC, the following assumptions were made for the purposes of this review:

- Solar panels will be in the northeastern most portion of the property - the parcel located on the east side of SR 640, just south of Rollin Harbison Road.
- The transformers / inverters / ESS groupings will be located at least 150 feet from the property boundaries.

These assumptions, confirmed with the Applicant, will produce "worst case" impacts.

The two existing transmission lines routed through the Project site include the Summer Shade – Patton Rd Jct 69kv transmission line (East Kentucky Power Cooperative), which runs diagonally across the southern portion of the Project site, and the East Kentucky Power Cooperative Summer Shade – Barren County 161kV transmission line, which runs diagonally across the northern portion of the property.

Location and use of access ways, internal roads, and railways. As noted previously, primary and secondary construction access points will be located on Randolph Summer Shade Road (SR 640) and Summer Shade Road (SR 90). Big Jack Road will be the primary access point for the construction an on-going maintenance of the substation and as a secondary access point for construction of other Project components. The access points on SR 640 will be located about a mile or less north of the intersection with SR 90. The access point on SR 90 will be located about half a mile west of Big Jack Road. Those same entrances will be available to employees during the operational phase of the Project.

The site layout plan graphic in the SAR notes the intent to develop a gravel construction staging area on site but does not indicate the location of that staging area. As part of the Applicant's response to HE's second set of inquiries, it was stated that the construction staging area will most likely be located near one of the property entrances on SR 640 (as opposed to the entrance on (SR 90) due to the flatter topography in that area and the existence of a floodplain and stream (Glover Creek) near the SR 90 access entrance. The staging area will be removed once construction is complete.

Internal access roads are shown on the site layout plan; however, those locations may be revised based on the final locations of solar panels and the inverter/ transformer/ ESS groupings.

Railway use is not applicable to the Glover Creek Solar Facility.

Existing or proposed utilities to service facility. Section 1 of the SAR states that the existing Summer Shade – Patton Rd Jct 69kv transmission line would serve the facility and that no outside utility services would be needed during facility operations. Based upon subsequent discussions with the Applicant, HE learned the facility will rely upon power from the local utility (Farmers Rural Electric Cooperative Corporation, or Farmers RECC) during construction and operation. During operations, no power will be drawn from the Summer Shade - Patton Rd Jct 69kv line; power will only be input into the transmission line.

Compliance with applicable setback requirements. Applicable portions of the setback statute (KRS 278.706(2)(e)) require that Glover Creek project facilities be located at least 2,000 feet from any residential neighborhood, school, hospital or nursing home facility.⁶ Because there are two residential neighborhoods within 2,000 feet of project facilities, the Applicant is seeking a deviation from the requirements. The Applicant has stated that they do not have the flexibility to move panels in conformance with the 2,000-foot radius and still maintain project size. The Applicant indicated that this size is necessary to maintain project economics of scale.

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 Applicant's Motion for Deviation from Setback Requirements. That document addresses each of the statutes listed above, describing the Applicant's or facility's compliance with each, as follows:

- ***KRS 224.10-280: Cumulative Environmental Assessment (CEA):*** The Applicant has provided a CEA that addresses air pollutants, water pollutants, waste, and water

⁶ 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.

withdrawal. That report provides a detailed discussion of each topic area and concludes the following:

- ***Air pollutants*** – Overall, the potential impacts to air quality from construction related activities for the Project would be minor and would be well below the applicable ambient air quality standard. During operations, the solar panels produce zero emissions and therefore, the solar facility is not expected to emit any of the following criteria pollutants: PM, CO, SO₂, NO_x, VOCs, or lead. Similarly, the facility is also not expected to emit Hazardous Air Pollutants (HAPs).
- ***Water pollutants*** – The operations and maintenance of the solar facility would have little impacts on surface water, and Best Management Practices (BMPs) would be used during any maintenance activities that have the potential to cause runoff of sediment and pollutants, No direct adverse impacts to groundwater would be anticipated as a result of the Project.
- ***Wastes*** – Based on a review of Project waste generation activities, no adverse effects from waste are anticipated.
- ***Water withdrawal*** – The Project anticipates using existing wells to provide water needed during construction; a new water well may be developed for the construction manager trailer. Equipment washing and any potential dust control discharges would be handled in accordance with BMPs described in a stormwater pollution prevention plan (SWPPP) for water-only cleaning. Water will be used for ongoing vegetation management needs.
- ***KRS 278.010: Definitions applicable to associated statutes:*** The Applicant’s Motion for Deviation states that the Applicant has utilized the definitions of all applicable terms.
- ***KRS 278.212: Filing of plans for electrical interconnection with merchant electric generation facility; costs of upgrading existing grid:*** The Applicant’s Motion for Deviation states that the Applicant will comply with the PJM interconnection process and accept responsibility for appropriate costs related to interconnection with the electricity transmission grid.
- ***KRS 278.214: Curtailment of service or generation and transmission cooperative:*** The Applicant’s Motion for Deviation states that the Applicant will abide by the requirements of this provision, as applicable.
- ***KRS 278.216: Site compatibility certificate; site assessment report; commission action on application:*** This statute applies to jurisdictional utilities, which Glover Creek is not. However, the Applicant has submitted a site assessment report in response to other statute requirements.

- ***KRS 278.218: Approval of commission for change in ownership or control of assets owned by utility:*** Glover Creek is not a utility as defined by the applicable statute; therefore, the Motion for Deviation indicates that this statute does not apply. The Applicant’s Motion for Deviation does state that “to the extent Board approval may at some time be required for change of ownership or control of assets owned by Glover Creek, Glover Creek will abide by the applicable rules and regulations which govern its operation.”
- ***KRS 278.700 – 278.716: Electric Generation and Transmission Siting:*** The Applicant’s Motion for Deviation states that “Glover Creek has met the goals set forth in these provisions as evidenced by the Application in its entirety”, noting the submittal of a “comprehensive Application with a detailed discussion of all of the criteria applicable to its proposed facility under KRS 278.700 – 278.716.”

Evaluation of noise levels produced by facility. Noise levels related to facility construction and operation 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 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.
- Although the exact locations of certain elements, including some solar panels, motors, and transformer/ inverter. ESS groupings, have not been finalized, the Applicant has provided information for a “worst-case” scenario, assuming the least amount of distance between project facilities and nearby homes.⁷
- The Glover Creek Project does not meet the existing setback requirements, so the Applicant has made a motion for a deviation from those requirements. HE believes that the Project, as proposed, does meet the specific statutes noted for consideration in a setback deviation. The Board or other authorities within the PSC will need to judge the quality of the Applicant responses in the setback deviation request.

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

⁷ That information is used to evaluate other components of the SAR, including impacts to property values and noise, as presented in Section 5.

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 might include location of solar panels, transformer/ inverter/ ESS groupings, panel motors, the substation or other Project facilities or infrastructure.
2. Any change in Project boundaries from the information which formed this evaluation should be submitted to the Board for review.
3. The Board will determine if any deviation in the boundaries or site development plan is likely to create a materially different pattern or magnitude of impacts. If not, no further action is required, but if yes, the Applicant will support the Board's effort to revise its assessment of impacts and mitigation requirements.
4. 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.
5. The fence surrounding the property boundary will be installed after grading of the site and before the main array installation begins. According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work. The substation and construction staging area will also have their own separate security fences installed.

SECTION 4

Project Setting

Description of the Area

This section provides a description of the area surrounding the proposed Project site. The Project site is located near Summer Shade, a small unincorporated area in Metcalfe County, in south-central Kentucky. The topography of the area is mostly rolling hills, agricultural land, and wooded areas.⁸

Population and housing density. As of mid-2019, approximately 10,070 people resided in Metcalfe County.⁹ The County's population has remained relatively stable over the past 20 years; in 2000 the population was 10,037 and in 2010 the population was 10,099.¹⁰ Over 96 percent of the population is white and the median age of residents is 41.¹¹ Metcalfe County is predicted to slowly decline in population; the Kentucky State Data Center estimates 8,900 people will reside in the County in 2040, a decrease of about 12 percent as compared to the 2019 population.¹² Currently, there are about 4,000 households in Metcalfe County, with an average of about 2.51 persons per household. There are 35 people per square mile, which makes Metcalfe County more sparsely populated than most other counties in the area.¹³

Summer Shade is an unincorporated area with about 230 people. Edmonton, the county seat of Metcalfe County, is located about 14 miles northeast of Summer Shade and has a population of about 1,600 people. Bowling Green, located about 56 miles west of Summer Shade, is the nearest metropolitan area in Kentucky. Bowling Green has a population of about 180,000 in the metropolitan area, located in Warren County.

Income. In 2018, the per capita personal income in Metcalfe County was \$31,512. This was 26 percent less than the per capital personal income of the state of Kentucky, and 42 percent less than the average in the United States.¹⁴ As of mid-2019, over 23 percent of the Metcalfe County population lived in poverty.¹⁵

Business and industry. Currently, there are about 4,100 jobs in Metcalfe County, nearly split evenly between wage and salary jobs and proprietors' employment.¹⁶ Prior to the Great

⁸ <https://www.anyplaceamerica.com/directory/ky/metcalfe-county-21169/>

⁹ U.S. Census Bureau, Quickfacts, Metcalfe County,

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

¹⁰ U.S. Census Bureau, <http://censusviewer.com/county/KY/Metcalfe>

¹¹ Edmonton, Metcalfe County, Community Profile.

¹² Kentucky State Data Center, Projections of Population and Households, State of Kentucky, Kentucky Counties, and Area Development Districts 2015 – 2040. <http://ksdc.louisville.edu/>

¹³ <https://www.towncharts.com/Kentucky/Demographics/Metcalfe-County-KY-Demographics-data.html>

¹⁴ U.S. Bureau of Economic Analysis, <https://www.bea.gov/index.php/data/by-place-county-metro-local>.

¹⁵ U.S. Census Bureau, Quickfacts, Metcalfe County,

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

¹⁶ U.S. Bureau of Economic Analysis, <https://www.bea.gov/index.php/data/by-place-county-metro-local>.

Recession of 2007-2009, the number of jobs in Metcalfe County hovered around 4,600. Since then, the economy has shrunk by about 500 jobs.¹⁷

- Agriculture is the largest economic sector in Metcalfe County, with 925 jobs. As of 2017, 138,000 acres were in farms, roughly 75 percent of the total acreage in Metcalfe County. Forage-land used for hay and grass silage account for most of the cropland. Almost 2/3rds of farms raise livestock and poultry. Farms typically grow grain for silage or green-chop, soybeans, or tobacco.¹⁸
- Manufacturing is the second largest industry in the County, with about 700 jobs. Sumitomo (electrical wiring and components for automobiles), Carhartt (outdoor clothing), Kingsford (charcoal briquettes) and James Ritter Lumber are the four largest firms by employment in the County.¹⁹ Kingsford (roughly 90 employees) and James Ritter Lumber (85 employees) are both located in Summer Shade. These two companies bring commuters into the area. The area appears to be conducive for additional light manufacturing.
- The Government sector (federal, state, and local) accounts for about 500 jobs throughout Metcalfe County.

Major and minor roads and railways. The Project site is bounded on the south by State Route (SR) 90 and on the east by SR 640. There are no railways in the vicinity of the site. Big Jack Road is an unpaved dirt road that cuts through the property and will serve as the primary access point for the project. There are no interstate highways in Metcalfe County.

Overall area description. Based on HE's research, the area around the Project site can be generally described as rural, and agricultural. A few manufacturing firms provide the bulk of the non-agricultural, private sector jobs in the area. The population is generally stable and older; numbers are expected to slowly decrease over the next 30 years. Residents' income levels are low, and they experience much higher rates of poverty than other counties in Kentucky and the U.S.²⁰

¹⁷ U.S. Bureau of Economic Analysis. <https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1>

¹⁸ https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Kentucky/st21_2_0001_0001.pdf

¹⁹ Edmonton -Metcalfe County Chamber of Commerce, <http://www.metcalfechamber.com/index.htm>.

²⁰ <https://www.indexmundi.com/facts/united-states/quick-facts/kentucky/percent-of-people-of-all-ages-in-poverty#table>

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
- Economic impacts on the region and the state

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

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

Facility Compatibility with Scenic Surroundings

This component of the statute relates to how well the proposed facility will “blend-in” or is compatible with its physical surroundings and associated land uses. For example, certain industrial facilities can be 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, and can be effectively visually blocked through strategic use of surrounding vegetation.

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

Visual Impact Assessments for Renewable Energy Projects; that document is a guide designed to help planners evaluate the quality and completeness of visual impact assessments for solar and wind facilities.²¹ Additional reports have been published from public agencies and private firms on visual impact assessments for solar facilities.

Most visual impact assessments focus on visualizations of the appearance of the project from key observation points (KOPs). Since it is impossible to visualize proposed projects from every observation point, it is common for planners to utilize a “worst-case” potential visual impact, i.e. locations where perceived change may be greatest. The overarching goal of 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.²²

A standard visual analysis generally proceeds in this sequence:²³

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

Summary of information provided by Applicant. The Applicant provided the following information about panel appearance and operation and about other structures on the property:

- The SAR indicated the solar panels would be at most 15 feet high, which is comparable to a greenhouse or a single-story residential dwelling. However, supplemental information provided by the Applicant stated that, in fact, the solar panels will generally be six to ten feet off the ground and have a maximum height of 12 feet.
- The Project will utilize a sun-tracking system, whereby the panels start out in the morning at their tallest height tilting east. They then transition to a fairly flat orientation, parallel to the ground in the middle of the day, later rotating to a the same tallest height as they track the sun west in the late afternoon/evening. In the middle of

²¹ 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/>.

²² Dean Apostol, James Palmer, Martin Pasqualetti, Richard Smardon, Robert Sullivan. (2016). *The Renewable Energy Landscape: Preserving Scenic Values in our Sustainable Future*. September 2016.

²³ Environmental Design & Research. *Visual Impact Analysis*. May 2019.

the day, the panels will be about six feet tall. Thus, only during a small portion of the day will the panels be at most 12 feet high.

- At night, after the panels have tracked the sun west, they will rotate to face east, ready to catch the sun's rays in the early morning. Since the panels are dark gray/black, they are virtually invisible in the darkness of night.
- The substation is the only sizable building on the property, but this building will be placed on the Project site in such a way that it is virtually invisible to any passing traffic or residents. The Glover Creek facility will also require inverters, transformers, and energy storage systems, but these are also short; less than eight feet tall.
- The SAR states that the Project site is located at a raised elevation to the surrounding residential and agricultural properties, which shields the Project from the view of most of its neighbors.

Illustrations and diagrams of generic solar facility components were provided by the Applicant, but no 3D modeling or other visual renderings specific to the Glover Creek facility or the Project site were provided.

As part of the SAR, the Kirkland report asserts that there is no stigma associated with solar farms and people "generally respond favorably towards such a use." No information was provided to support this opinion.

Commuters could potentially experience sun glare caused by solar panels when driving on SR 90 or SR 640. In response to HE's inquiries, the Applicant provided an impact analysis of the potential for glare coming off the solar panels. ForgeSolar, a sub-contractor hired by the Applicant to review potential glare issues, provided analyses comparing glare impacts from typical solar panels, and solar panels coated with an anti-reflective coating at three different locations where drivers might be affected (no homes would be exposed to glare). Exhibit 5-1 depicts the three KOPs used in the ForgeSolar glare analyses.

**Exhibit 5-1.
Key Observation Points (KOPs) Used in the ForgeSolar Glare Analyses**



Source: ForgeSolar, June 2020.

The KOPs chosen by ForgeSolar are areas where solar panels would be most visible to passing vehicles. The areas to the west and north of the site are almost exclusively farmland, with only a few residences adjacent to the western boundary; thus, very few individuals will be visually affected, if at all, by the operational components in those locations. KOP 1 is located along SR 640 at the northernmost point of the Project boundary and may be sandwiched between solar arrays to the east and west. KOP 2 is also located along SR 640, quite a bit south of KOP 1. KOP 3 is located along SR 90, where commuters may also be able to view a small portion of the solar arrays.

Three types of glare are measured by the Federal Aviation Administration:²⁴

- Red glare – this is the most severe rating for glare, which causes after-image.
- Yellow glare – this type of glare has the potential to cause temporary after-image.
- Green glare – this type of glare has low potential to cause temporary after-image.

No red or yellow glare was detected at any of the three KOPs analyzed by ForgeSolar. No green glare was detected at KOP 2 or KOP 3.

²⁴ Conversation with Chris Sandifer, ForgeSolar. June 24, 2020.

The analysis completed by ForgeSolar indicated that, overall, very little glare will be caused by the solar panels. KOP 1 may experience as many as 2,017 minutes of green glare in one year (about 34 hours over the course of a year). This glare is expected to last 10-20 minutes per day between about 9:00 am and 9:20 am in the months of January, November, and December. Additional glare is expected to last 1-10 minutes per day between about 8:40 am to 8:50 am for portions of the months of February and October.

The Applicant is uncertain, at this time, about the purchase of anti-reflective (AR) solar panels to help mitigate against potential glare. If the Applicant does purchase AR solar panels, the anticipated glare will decrease from 2,017 minutes per year to 927 minutes per year, a decrease of 54 percent. AR panels will reduce glare to 5-10 minutes per day from the beginning of November to the end of January. The results of the ForgeSolar analysis are presented in Exhibit 5-2.

**Exhibit 5-2.
Red, Yellow and Green Glare Produced by Glover Creek Solar Panels at KOPs**

Standard Solar Panels			
Type of Glare	KOP 1	KOP 2	KOP 3
Red	None	None	None
Yellow	None	None	None
Green	10 - 20 minutes per day: Jan, Nov, Dec; 1 - 10 minutes per day: Feb and Oct	None	None

Anti- Reflective (AR) Solar Panels			
Type of Glare	KOP 1	KOP 2	KOP 3
Red	None	None	None
Yellow	None	None	None
Green	5 - 10 minutes per day: Jan, Nov, Dec	None	None

Source: ForgeSolar, June 2020.

The impacts of green glare are estimated at a height of 10 feet, which only applies to truckers. Most traffic (cars or pick-up type trucks with a viewing height of less than six feet high) will not see most of the solar panels due to the six-foot high vegetative buffer. The glare may be worse during the first three years of operation, when the vegetative buffer is between three and six feet high.

HE’s evaluation of impacts. HE used maps provided by the Applicant, Google Earth satellite imagery and Google Maps to “drive” around the area to assess views of the project from a vehicle commuter’s point of view.

Visual setting. The area surrounding the Project is largely agricultural, with few homes in close proximity to the Project boundaries. Visitation to the area is minimal and virtually no tourism exists in the area. Rolling hills and clumps of trees will help protect against negative visual impacts to residents and commuters. Portions of the property where the Project is located is at a raised elevation to the surrounding rural agricultural and residential properties,

which will help shield the Project from certain viewpoints. The area towards the northeastern sections of the Project (along SR 640) has fewer trees and is more open, but traffic volume on that road is relatively minimal.

Nine homes are located within 300 feet of the property boundary and 32 residences are located within 1,000 feet of the property boundary. The vegetative buffer and natural landscape will shield the majority of Project facilities from view of those residences. There may be a few homes within view of the substation building, but that structure is largely hidden from view due to the existence of trees and the area's natural topography.

Identification of the Project's KOPs. Any scenic compatibility concerns would generally affect traffic at specific viewpoints on SR 640 and SR 90. The KOPs used by ForgeSolar to evaluate glare also appear to be appropriate locations for the analysis of other visual impacts. Only a small section of the Project is observable from SR 90 (in the southwestern corner); therefore, the potential to see panels from that location is relatively low. More panels might be seen from SR 640, where there are fewer trees; however, SR 640 is a lightly traveled road.

Construction activities. The visual impacts from construction activities will be minimal. Commuters along SR 90 or SR 640 will see bulldozers leveling out ground, but most of the construction of the panels will take place away from SR 90 and SR 640, thereby limiting its impacts.

Project facilities. The scenic compatibility evaluation focuses on the solar panels as those structures will be of the greatest height above ground. The solar panels rest at a typical height of about six feet tall. This is the height during their "flat" orientation, when the sun is towards the middle of the sky. Most of the viewers of the solar panels will be commuters, and since most the commuting happens along SR 90, the visual impacts to residents and commuters is expected to be very minimal. The visual impacts of the solar panels will be greatest in the first three years of the Project, when the vegetative buffer is growing from three feet to six feet tall. HE believes the solar panels will coexist well with the surrounding area.

Some glare will occur in the early mornings from about October to February, especially during the first three years of the Project. However, after three years, these issues will be limited to truckers only, since most other vehicles will be shielded from the glare due to the six-foot tall vegetative buffer. Based on conversations with ForgeSolar, glare should not cause any significant issues for commuters. Traffic on SR 640 is minimal – there is an average daily traffic of 358 vehicles (or an average of 1 vehicle every 4 minutes).

Conclusions and recommendations. Based on review of the SAR, supplemental information provided by the Applicant and the Applicant's consultants, and additional research conducted by HE, we offer the following conclusions and recommendations:

- Given the rural nature of the Summer Shade area, the number of people that will see the panels or other infrastructure will be very small. Numerous clumps of trees and rolling hills will help the panels stay hidden from potential viewers.

- The substation is hidden from nearly all viewing points. The substation is the only building that will be built on the property.
- Glare will occur for fewer than 20 minutes per day during several winter months in one location on SR 640, which is a lightly traveled road. After three years, there should be virtually no glare experienced by personal vehicles; only truckers may experience slight glare in the mornings. Glare should not be for smaller size commuters.
- HE does not expect the Glover Creek Solar Facility to result in adverse visual impacts to residents or commuters, especially given the Applicant's commitment to vegetative buffers.

Need for mitigation. Mitigation measures described in the SAR related to compatibility with scenic surroundings include:

1. The Applicant will strategically plant a vegetative buffer around certain areas of the Project. Plantings of native evergreen species will serve as visual and noise buffers to mitigate viewshed impacts. Plantings will primarily be in areas directly adjacent to the Project without existing vegetation. At the time of planting, the buffer will be three feet in height, expected to grow to six feet high after a period of three years, and hopefully continue to grow thereafter. Once the vegetative buffer has grown six feet high, the panels will be hidden throughout most of the day. The Applicant met with numerous landowners near the Project site, and the landowners had input in the placement of some of the visual buffers associated with the facility.
2. Applicant will monitor growth of vegetative buffer, ensuring that its plantings are thriving to at least six feet in height.
3. Applicant will cultivate at least two acres of native pollinator-friendly species within the solar facility site, among the solar panels.

Potential Changes in Property Values and Land Use

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

General methods of assessment. The value of a property is based on a number of factors, including characteristics of the home and the land on which it is situated, the surrounding property uses and values, among other attributes. For example, residential properties will be assessed differently than agricultural or industrial properties. 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.

There are a few methods for assessing 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. For this, a comparison is made between similarly situated properties that sold before and after a new industrial facility is constructed. This approach is described in more detail below.

Summary of information provided by the Applicant. The SAR provides a report and follow-up letters from the Applicant's consultant, Richard Kirkland of Kirkland Appraisals, LLC. The Kirkland report provides several pieces of relevant information:

- ***Land uses of adjacent properties*** – largely residential agriculture, with smaller amounts of adjacent acreage that is completely agricultural land (no residences) or properties with only a residential property. About 25 percent of the acreage adjacent to the facility boundary is agricultural; an additional 69 percent is mixed agricultural/residential and only about six percent is identified as purely residential. There are an estimated 32 residences within 1,000 feet of the Project boundary.
- ***Distances between solar panels and homes on adjacent properties*** – Kirkland indicates that the closest home is 375 feet away from a proposed solar panel. However, an updated list of distances between the property boundaries and nearby residences and between the solar panels and nearby residences was provided by the Applicant as part of the response to HE's inquiries. Exhibit 3-5 lists the distances, in feet, between nearby residences and the Project boundaries and between nearby residences and the closest solar panels. That updated information indicates two residences within 200 feet of the solar panels and seven residences within 400 feet of

panels. Altogether a total of 24 homes are located within 1,000 feet of the solar panels.

- ***Discussion of a “matched-pair” analysis*** – the report addresses potential effects on property values due to the existence of the Glover Greek Solar Facility.
- ***Narrative evaluation of the facility’s harmony of use / compatibility with the surrounding area.***

Matched-pair analyses. The Kirkland report employs an analytical approach described as a matched-pair analysis, which aims to determine the impact of a 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. For 37 different solar farms across multiple states, Kirkland identifies and compares the sales prices of properties sold under the following conditions:

- Properties adjoining the potential boundary of the solar farm before and after the solar farm was *announced*;
- One or more properties adjoining the boundary of a proposed solar farm versus one or more properties not adjoining, but located nearby the proposed solar farm after the facility was *approved*;
- Sale and re-sale of the same property before and after solar facility construction; and
- One or more properties adjoining the boundary of the solar farm versus one or more properties not adjoining but located nearby the solar farm after the facility was *built*. The bulk of the Kirkland data fall into this category.

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. However, the size of the solar facilities evaluated ranges from about 0.2 MW up to 80 MW and from an overall property site of 24 acres (4 MW facility) up to 2,034 acres (80 MW facility).

Kirkland removed transactions that would bias the matched pair comparison. These include “arms-length” transactions, other specific circumstances affecting sales prices unrelated to the solar facility, sales with multiple factors impacting value.

After making adjustments for such factors as date of sale, age of home, square footage, number of bedrooms and bathrooms and garage spaces, Kirkland compares the adjusted sales prices of each matched-pair set to determine the solar facility’s impact on the value of adjacent properties for each individual solar farm.

The Kirkland report presents the results of analyses completed for two sets of data:

1. 81 matched pairs (residential home sales) from the entire 37 facility data set.

- a) The distance between homes on adjacent properties and the closest solar panel ranges from 125 feet up to 2,020 feet, depending on the specific solar farm; the median distance is 380 feet.
 - b) Kirkland's conclusions state that "the range of differences (in sales prices) is from -10% to +9% with an average of +1% and median of +1%".
 - c) Ten land-only sales included in the analysis of all facilities shows property value impacts ranging from -12% to +17%, with a median impact of 0% due to adjacency to a solar facility.
 - d) Based on the results for raw land and land with a residential property, Kirkland concludes that "the data shows no negative or positive impact due to adjacency to a solar farm."
2. Kirkland's second analysis focuses on the twelve solar farms larger than 20 MWs, which includes five facilities larger than 70 MWs and seven facilities between about 20 and 30 MWs.
- a) The distance between homes on adjacent properties and the closest solar panel in this smaller data set ranges from 250 feet up to 2,020 feet, depending on the specific solar farm; the median distance is 435 feet.
 - b) Kirkland's analysis of 21 matched- pairs shows impacts ranging from -10% to +7%, with an average and median of +1%, which the report notes is similar to the larger data set.

By comparing these two data sets, Kirkland concludes that the size of the project has no bearing on the values of adjacent properties, and that the presence of a solar facility does not meaningfully affect property value.

Harmony of use/ compatibility. Based on past research, Kirkland states that the data strongly supports the compatibility of solar farms with adjoining agricultural and residential uses. He also notes examples of solar farms being located within a quarter mile of residential developments, including high-end gated golf communities featuring expensive homes. The report states that the subdivisions included in the matched pair analysis also show an acceptance of residential uses adjoining solar farms as a harmonious use. The report also includes notes regarding specific factors that might affect property values and harmony with the surrounding area: hazardous materials, odor, noise, traffic, stigma, and appearance. Given the characteristics of the Glover Creek solar facility, Kirkland concludes that the facility will be in harmony with the area.

Construction related impacts to property values. The analysis included in the Kirkland report does not address potential impacts to property values during the construction period due to increased traffic, noise, etc. In response to HE's inquiries, Kirkland responded that one matched pair set that showed a positive impact on property values during the construction

period. Kirkland concluded that activities and effects of construction of the solar facility would be similar to or perhaps less than the effects of other types of construction.

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) prepared further analysis of the data provided in the Kirkland report and (3) conducted interviews with several real estate professionals.

Literature review. HE reviewed the existing literature related to the relationship between property values and utility – scale solar facilities. Findings include the following:

- 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.”²⁵
- A 2019 article produced by the American Planning Association (APA) indicates that the “impact of utility-scale solar facilities is typically negligible on neighboring property values.” The issue of property value impacts “can be a significant concern of adjacent residents, but negative impacts to property values are rarely demonstrated.”²⁶
- Independent appraisers are often hired to conduct analyses related to property value impacts for solar companies, as is the case here for the Glover Creek facility. Those analyses focus on property value trends of lands adjacent to existing solar farms across the country, using a paired sales or matching pair approach. HE reviewed several appraisal reports (not completed by Kirkland Associates); those appraisals indicate differences in property values ranging from about -3.2% to as much as +27%, although generally in cases with positive impacts, property values increased by about 5% or less. Overall, the conclusions were that solar facilities do not negatively impact property values.²⁷
- The appraisal reports reviewed by HE also included the results of interviews with multiple appraisers and brokers in areas with existing solar farms. None of the

²⁵ 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.lbl.gov/sites/default/files/property-value_impacts_near_utility-scale_solar_installations.pdf.

²⁶ Coffey, Darren. *Planning for Utility-Scale Soar Energy Facilities*. American Planning Association, PAS Memo, September – October 2019. <https://www.planning.org/pas/memo/2019/sep/>.

²⁷ McGarr, P. and A. Lines, CohnReznick, Property Value Impact Study, Proposed Soar Farm, McLean County, IL, 2018; McGarr, P. and A. Lines, CohnReznick, Property Value Impact Study, Proposed Soar Farm, Kane County, IL, 2018; McGarr, P., CohnReznick, Property Value Impact Study, Adjacent Property Values Solar Impact Study: A Study of Nine Existing Solar Farms Located in Champaign, LaSalle, and Winnebago Counties, Illinois; and Lake, Porter, Madison, Marion, And Elkhart Counties, Indiana, 2018.

responses indicated any impacts (positive or negative) on marketing time, selling price or land or property values due to proximity to a solar farm.²⁸

It is interesting to note that although the few existing studies related to this issue generally indicate no impacts to property values, local residents often bring up concerns about property 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. HE is not aware of any concerns from local residents related to changes in property values resulting from the Glover Creek facility.

Review of Kirkland data. Although Kirkland concludes that there would be no impacts on property values from the Glover Creek 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 summarizes that effort.

**Exhibit 5-3.
Number of Matched Pair Sets with Negative, Positive or No Impact Results**

	Negative Impact		No Impact		Positive Impact	
	# of Pairs	% of Total	# of Pairs	% of Total	# of Pairs	% of Total
81 Pair Data Set	22	27.16%	12	14.81%	47	58.02%
21 Pair Data Set	4	19.05%	4	19.05%	13	61.90%

Note: The 81 pair data set includes solar facilities of all sizes. The 21 pair data set includes solar facilities greater than 20 MWs.

The outcome of the larger facility evaluation (21 pair data set) indicates that over 80 percent of matched pair comparisons resulted in no sales price difference or an increase in sales price due to adjacency to the solar facility property. Roughly one fifth reported a negative effect.

Interviews. HE conducted interviews with two individuals familiar with property valuation and real estate in Metcalfe County:²⁹

- **Michael Welsh, Metcalfe County Property Valuation Administrator.** Mr. Welsh was familiar with the Glover Creek project, but he indicated that the solar facility is a new type of project for this county. As a result, he stated it was difficult to project the impact the facility might have on property values. He has received no calls or heard any concerns from landowners related to the Glover Creek facility. Overall, he thought it would be difficult to identify any specific issues relating to the solar facility and changes in property values.

²⁸ Ibid.

²⁹ Michael Welsh, Metcalfe County Property Valuation Administrator and Jason Charles, Sales Associate with Metcalfe County Realty and Auction, Inc. Telephone interviews conducted with Susan Walker of Harvey Economics on June 29, 2020.

- **John Charles, Sales Associate, Metcalfe Realty and Auction Inc.** Mr. Charles was also familiar with the Glover Creek project and overall, did not think that there would be any negative concerns or associations made in relation to the solar facility. He described the regional real estate market as a “hot market” right now, with properties selling quickly. As a quiet, less-intensive use, he thought the solar facility would not deter buyers from the area or result in lower prices.

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:

- Construction activities will be temporary, occurring over a period of about one year. Those activities will result in increased traffic and noise in the vicinity of the project; however, homebuyers and those interested in buying other types of properties often have the longer-term in mind when deliberating a purchase. Additionally, the high level of market activity and low inventory will likely have a larger influence on prices than the solar facility construction. Even so, some sales might be delayed because of uncertainty.
- The current research indicates that the existence of solar facilities does not, in general, influence property values for adjacent landowners. HE’s research, in combination with local interviews, point to a conclusion of no discernible impacts to property values. That conclusion is also supported by the specifics of operational activity at the Glover Creek facility, including minimal increased traffic or noise, no odors, panels which will be largely hidden from view by shrubbery, and no emissions of any kind.
- Given the operations of the facility as described by the Applicant, there is no reason to believe that the Glover Creek solar facility would affect the current or future desired land uses of surrounding agricultural or residential properties.

Need for mitigation. No mitigation measures are recommended related to potential impacts to property values or adjacent land uses.

Anticipated Peak and Average Noise Levels

Noise issues stem from construction activities and operational components of the solar facility. During construction, noise will include graders, bulldozers, excavators, dozers, dump trucks, and other equipment. During Glover Creek operation, noise will be emitted from transformers, inverters, and the tracking motors which rotate the panels to track the sun. Distance from noise emitters to noise receptors also matters, since the further a noise receptor from a noise emitter, the less noise impact overall. Metcalfe County and Summer Shade do not have any noise ordinances applicable to the Project.

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. Generally speaking, an increase in 10 dBA is perceived as a doubling of loudness, that is to say, 70 dBA is perceived as twice as loud as is a level of 60 dBA.³⁰ Once sounds reach 90 dBA, humans can experience pain and sounds above 150 dBA can cause permanent hearing damage.³¹

A standard noise impact assessment focuses on several key factors:³²

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

Summary of information provided by the Applicant. Section 4 of the SAR contains a summary description of anticipated noise levels from the Project. The Applicant's consultant, Pond, submitted a report that addresses noise impacts of the Glover Creek Facility. Section 2 of that report focuses on project related noise during construction and operation. The Kirkland report (Section VI-3) contain additional information regarding noise. The Applicant also provided additional information in response to HE's inquiries.

Sensitive noise receptors. Exhibit 3-5 listed the distances between the property boundaries and nearby residences and between solar panels and nearby residences. That Exhibit is presented again in Exhibit 5-4 below for ease of reference.

³⁰ 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>

³¹ 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.>

³² 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;

Exhibit 5-4.
Distance of Residences from the Boundary and Solar Panels of the Glover Creek Solar Facility

<u>Distance from Property Boundary (feet)</u>	<u># of Residences</u>	<u>Distance from Solar Panels (feet)</u>	<u># of Residences</u>
<100	4	<100	0
100 - 200	4	100 - 200	2
200 - 300	1	200 - 300	3
300 - 400	0	300 - 400	2
400 - 500	5	400 - 500	1
500 - 600	0	500 - 600	3
600 - 700	4	600 - 700	1
700 - 800	4	700 - 800	3
800 - 900	3	800 - 900	6
900 - 1,000	<u>7</u>	900 - 1,000	<u>3</u>
Total Residences:	32		24

Note: Due to topography, floodplains and specific solar panel locations, the residences closest to the Project boundary may not also be the residences closest to the solar panels.

The nearest noise receptor is a residential dwelling approximately 55 feet from the proposed Project boundary, but, due to the existing floodplain, that home is at least 200 from the closest solar panel. Several properties that are relatively close to the Project boundary are further from the panels or other equipment due to the location of the floodplain and the specific panel location within the site. Two other properties are about 150 feet from the nearest solar panel. Construction activities may be located as close as 150 feet from the nearest noise receptor.

As noted in the Pond report, the nearest noise receptors are single family homes; no noise-sensitive facilities (i.e., schools or libraries) are located in the vicinity of the Project site.

Baseline noise levels. The areas surrounding the project site are dominated by active farmland, which contributes to noise typical of active hay production, crop planting and harvesting, and transportation of agricultural products and equipment. Other noises on-site include sounds from personal trucks and all-terrain vehicles. According to the Pond report, those noises typically range from 80 to 120 dBA during normal business hours.

Anticipated noise levels generated from construction. The facility construction will require equipment typical for site development (e.g., graders, bulldozers, excavators, dump trucks, etc.). The SAR does not identify which equipment or vehicles will be used during construction, so HE cannot predict the estimated noise levels from equipment or vehicles at any one time. However, construction equipment outlined in the Pond report ranges from 70 dBA to 100 dBA from a distance of 50 feet. At its source, the loudest construction equipment produces a sound of 110 dBA. The Applicant has indicated that construction activities would take place from 7am to 6pm, Monday through Friday. All construction is expected to cease on weekends.

In supplemental inquiries, HE discovered that the method used to place the solar array structures into the ground will be a hydraulic pneumatic pile driver. Instead of pouring concrete and fastening the solar array structures into the ground using cement, the solar array structures will be tamped down using a hydraulic press. This press will tamp down posts, with each post requiring 10 to 30 hits, until the post is seven feet deep in the ground. According to the Construction Noise Assessment prepared by Pond, the noise level for this piece of equipment is about 91.5 dBA at a distance of 150 feet. There could be as many as three or four pile drivers on site during the installation process, although the Applicant assumes that “no more than two pile drivers will be operating simultaneously in any specific portion of the Project site.” The Pond report states that the sound level of two pile drivers operating simultaneously amounts to 94.5 dBA at a distance of 150 feet. This installation process could take anywhere from one to two and a half weeks, depending on the number of concurrent hydraulic presses. Based on the dBA noise levels provided in the SAR for typical construction equipment, this piece of equipment is expected to be the loudest.

It is expected that a temporary increase in traffic will occur during the construction phase. The SAR does not provide estimated noise levels due to the increase in traffic at the Project site. The increased traffic is expected to be minimal, as supplemental inquiries with the Applicant indicated there would be at most 90 cars coming to the site in one day. This period of peak commuting is expected to last three to six months, during the ‘solar panel installation’ and ‘staging and wiring installation’ phases of the Project. If commuting construction workers are shuttled to the site, traffic related noise would be reduced.

Anticipated noise levels generated from operation. The solar arrays include single-axis tracking panels distributed evenly across the site. The tracking motors are 24-volt brushless DC motors which rotate the solar panels to follow the arc of the sun to maximize each panel’s potential for solar absorption. The tracking motors are a source of mechanical noise, and typically produce a sound of approximately 78 dBA. These motors are at the ends of the solar equipment, which means the motors are closest to the property boundary, and thus, closest to noise receptors such as homes. The motors will be at least 100 feet from the property boundary and at least 150 feet from the nearest house.

The 13 inverters used by the solar facility will produce a sound of 67 dBA each. The transformers used by the solar facility produce a sound of 56-68 dBA. The transformers and inverters will be co-located, and these will be located at least 150 feet from the Project boundary.

The noise emitted from workers traveling in/out from the solar facility is expected to be minimal. The facility is expected to be visited by a maximum of one technician for as many as 365 days a year, and up to three technicians for as many as 70 days in a year. Typical services will be check-ups on the solar panels and electrical equipment, and vegetative maintenance.

HE evaluation of impacts. HE utilized the noise standards generated by the Environmental Protection Agency (EPA) to gauge acceptable levels of sound, since the local area does not have any sound ordinances. Per the EPA, a constant sound of 70 dBA over a

24-hour period is enough to start causing permanent hearing loss for individuals, a sound of 55 decibels outdoors is enough to cause activity interference and annoyance.³³

Construction noise. It is not expected that the Project will cause permanent hearing loss for any residents in the area, but it will be disturbing for a small number of residences for a brief period. Typical construction activities may occur anytime between 7am and 6pm on weekdays. Some construction activities, such as the hydraulic press, are much louder than 70 dBA, but since these activities are not sustained, no hearing loss to residents or longer-term annoyance is expected. Construction noise should be zero during the night and early mornings and on weekends.

Operational noise. Operational noises are also expected to approach zero dBA during the night and early mornings. At other times of the day, transformers, inverters, and tracking motors will emit sound. The sound produced by transformers is expected to be between 56 and 68 dB and sound produced by inverters is expected to be around 67 dBA (at a distance of 10 meters). This sound will be constant throughout the day, but these noises will be at least 150 feet from the property boundary, which means they will be at least 200 feet away from the closest residence.

Based on a study estimating sound attenuation of a solar facility and a series of online noise calculators, which estimate sound pressure levels at a distance, it is reasonable that the sound from transformers and inverters will decrease to about 50 dBA at a point at least 200 feet away, even without a vegetative buffer.^{34,35,36} Thus, the noise produced by transformers and inverters is not expected to cause any annoyances, since the sound is outdoors, and the vegetative buffer will act as a barrier that will further reduce the estimated noise levels. Moreover, most of the transformers will be further inside the site, thereby decreasing the probability that any sound will bother residents.

The sound produced by the tracking motors is expected to be around 78 dBA; since the Applicant did not specify, HE assumed this noise is calculated at a distance of 10 meters away. This sound will occur for less than one minute, but every 15 minutes, for about as many hours of sunlight as there are in a day. Since the sound is not constant, the motors are not expected to cause any hearing loss for any residents. However, at a distance of 150 feet, HE estimates that the sound is only expected to decrease to 65 dBA. This decibel level is above the level of sound that the EPA says could cause activity interference and annoyance. However, the vegetative buffer would have a mitigating effect on noise levels at a distance. It is HE's belief that the solar panel motors could cause minor annoyance to the eight residences within 500 feet of the closest solar panels for the first three years of operation. Once the vegetative buffer reaches six feet tall, the barrier should greatly reduce the

³³ U.S. Environmental Protection Agency, Office of Noise Abatement and Control. 1974.

<https://nepis.epa.gov/Exe/ZyPDF.cgi/2000L3LN.PDF?Dockey=2000L3LN.PDF>

³⁴ <https://www.omnicalculator.com/physics/distance-attenuation>

³⁵ <http://hyperphysics.phy-astr.gsu.edu/hbase/Acoustic/isprob2.html#:~:text=Nevertheless%2C%20the%20inverse%20square%20law,in%20a%20reasonably%20open%20area.&text=You%20can%20explore%20numerically%20to,the%20intensity%20by%2020%20dB.>

³⁶ <https://www.maine.gov/dep/ftp/projects/three-rivers/application/sloda/section%205.%20noise.pdf>

annoyance for residents. The Applicant maintained that there is no cumulative noise effect from the operational components of the solar panels.

Conclusions and recommendations. Based on review of the SAR and other materials provided by the Applicant, along with secondary noise research conducted by HE, we offer the following conclusions:

- During construction, almost all the noise from the Glover Creek site will be intermittent and will not be permanently damaging to nearby residents. Per the Pond report, baseline noise levels in the area are about as loud as the construction noises. However, the tamping process that drives the solar posts into the ground will be particularly annoying for up to two and a half weeks, especially to the closest residences. Other construction equipment, especially earth-moving equipment (such as backhoes and bulldozers) will produce noises that the EPA classifies as annoying for residents within 1,500 feet from the originating sound. Thus, construction has the potential to be annoying, but not harmful, to residents in the area for as many as eight months, based on the construction schedule shown in Exhibit 3-2.
- Operational noises have the potential to impact a small number of nearby residences. During operation, the co-located transformers and inverters are not expected to have a noticeable noise impact on residences due to distance and vegetative buffering. The transformers and inverters will be at least 200 feet away from the nearest residence, and the constant hum of the equipment (during the day) is anticipated to be less than what the EPA classifies as a nuisance or annoyance. However, the solar panel tracker motors, which are louder than the transformers and inverters and will be closer to residences, might create an annoying noise impact for a small number of residents.
- In sum, there could be up to eight months of potentially annoying noise impacts during construction, with a peak of up to two and a half weeks of particularly loud and annoying construction activity. There will most likely be noticeable noise from solar tracker motors during operation, especially during the first three years of operation before the vegetative buffer reaches six feet high and can help reduce noise impacts. However, the motors will likely impact fewer than nine residences. Buffering, undulating lands and background noise from agriculture will likely diminish this annoyance.

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

1. Residents within 1,500 feet of the property boundaries should be notified about potential construction noises. Residents within 500 feet of the solar panels should be notified about potential operational noises.
2. The Applicant should remain in contact with nearby residents to confirm that noise levels are not unduly high or annoying after the pounding and placement of the solar panel racking begins.

3. If noise levels during this period are unacceptable to nearby residents or landowners, the Applicant will take such steps to mitigate the noise impact.
4. The Applicant should contact nearby residents to confirm that noise levels are not unduly high or annoying after operations begin.
5. Additional buffering or fencing should be considered in those areas where noise impacts are annoying residents or will potentially annoy them.

Road and Rail Traffic, Fugitive Dust and Road Degradation

Traffic concerns related to the development of the Glover Creek solar facility during the construction or operational periods are addressed here. The year-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 could occur as employees travel to and from the property to monitor and maintain the site. Railway-related issues are not a concern for the Glover Creek facility, as none of the related construction deliveries or operational activities will involve railroads.

General methods of assessment. Standard components of the evaluation of traffic related impacts include³⁷:

- Establish existing traffic conditions in the local area;
- Identify primary access points that will be used by the Project;
- Estimate changes in traffic due to construction and operation; and
- Assess 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 network and identifying any potential degradation to existing roadways.

Summary of information provided by the Applicant. Section 5 of the SAR provides a summary of traffic impact-related information specific to the construction and operation of the proposed facility. Additional information on traffic is included in the Pond report (Section 3) and Kirkland report (Section VI-4).

Access. Access to the property is available from entrance points on SR 90, SR 640 and Big Jack Road. SR 90 and SR 640 are both two-lane, non-divided highways; these roadways are the primary routes going through Summer Shade. Big Jack Road is a single-lane unpaved road.³⁸ All equipment, materials and personnel will be transported to the site via existing roads. The Applicant has no plans to expand current public road networks or to create new

³⁷ Hexagon Transportation Consultants, Inc. *Panoche Solar Farm Traffic Study*. May 27 2010.
<http://www.cosb.us/Solargen/feir/apps/app08a.pdf>

³⁸ The entrance on Big Jack Road is primarily used to success the substation.

roads. Within the Project site, internal roads may be constructed as necessary to access specific areas of the property.

Baseline traffic volumes. The SAR provides average daily traffic (ADT) data for a counting station along SR 640 and another along Hilltop View Road. Supplemental information provided by the Applicant included additional counting stations along SR 90. A summary of Applicant provided traffic data on roads nearby the project site is provided in Exhibit 5-5.

**Exhibit 5-5.
Applicant Provided Baseline Traffic Data for Roads near the Glover Creek Project Site**

<u>Station ID</u>	<u>Roadway</u>	<u>Average Daily Traffic</u>	
		<u>(ADT)</u>	<u>Year Assessed</u>
085502	SR 640	358	2019
085746	Hill Top View Road	108	2012
005293	SR 90	5,960	2018
085296	SR 90	3,351	2018

Traffic data for stations located on SR 640 and SR 90 are applicable to the evaluation of traffic related impacts, but the Project is not likely to utilize Hill Top View Road when driving to or leaving the site.³⁹

Construction related traffic volumes. In response to HE’s inquiries, the Applicant provided data about commuter vehicles and truck traffic during construction (peak and average day), as shown in Exhibit 5-6.

**Exhibit 5-6.
Average Day and Peak Day Construction Traffic Volumes, by Vehicle Class**

<u>Vehicle Class</u>	<u>Vehicle Type</u>	<u>Maximum Weight</u>	<u>Traffic Volume Average Day</u>	<u>Traffic Volume Peak Day</u>
2 and 3	Light duty commuter vehicles, including pickup trucks	10,000 - 14,000 lbs	50	90
9	Multiple axle trucks with trailers	40,000 lbs	2	15
21	Multiple axle trucks designed to carry very heavy cargo	120,000 lbs	11 total trips during construction	

The substation transformer will be delivered via one Class 21 vehicle trip. That shipment is expected to be a maximum of 120,000 pounds. Additionally, the equipment used to unload cargo will be delivered on Class 21 trucks (or similar), requiring a maximum of approximately 10 additional Class 21 trucks.

³⁹ Hilltop View Road is a small local road located on the south side of SR 90, generally across from Big Jack Road.

The Applicant estimates that 80 percent of construction workers will be hired from the local workforce and would commute to the project site from the local area. Construction worker commuting will peak daily early in the morning and evening. If parking at the site becomes an issue, the Applicant would consider shuttling construction workers in from a point outside the property.

Extended project-related lane closures are not planned for SR 90 or SR 640; however, signage, signaling, fragment, and temporary lane closures may be employed to reduce the risk of collisions on the roadways. Big Jack Road may be limited to construction commuters and local traffic only during the construction process. Appropriate signage and traffic direction will occur as necessary during construction to ensure vehicular safety.

Operations related traffic volumes. The Glover Creek solar facility will have no onsite employees or staff. Approximately two employees will be making site visits a few times a week to inspect the site, ensure proper equipment operation, and note any maintenance needs. Employees will be in mid- or full-size trucks (Class 2 or 3) when traveling to and on the project site. The SAR states that there will be no noticeable impact on transportation once the facility is in operation.

Road degradation. The SAR states that “significant degradation to the existing roadways is not anticipated for the proposed project”, but does acknowledge that “the increase in localized traffic and continued entry and exit of heavy trucks or equipment has potential to result in additional wear of the existing roadway or shoulders of SR 90 and 640.”

Fugitive dust. From the SAR and supplemental inquiries, the Applicant has pledged to follow best management practices (BMPs) regarding dust mitigation. During operations, virtually no dust is expected to be generated at the Project site. Vegetative maintenance, such as mowing, is not expected to cause any dust issues for the surrounding areas.

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

The Applicant provided traffic volume information at multiple stations along SR 90 (Exhibit 5-5). Exhibit 5-7 presents road and traffic data at two additional stations along SR 90, which are more relevant to the flow of vehicles to and from the Project site. These stations are closer to the Project site and are, therefore, better at approximating current traffic levels in the area.

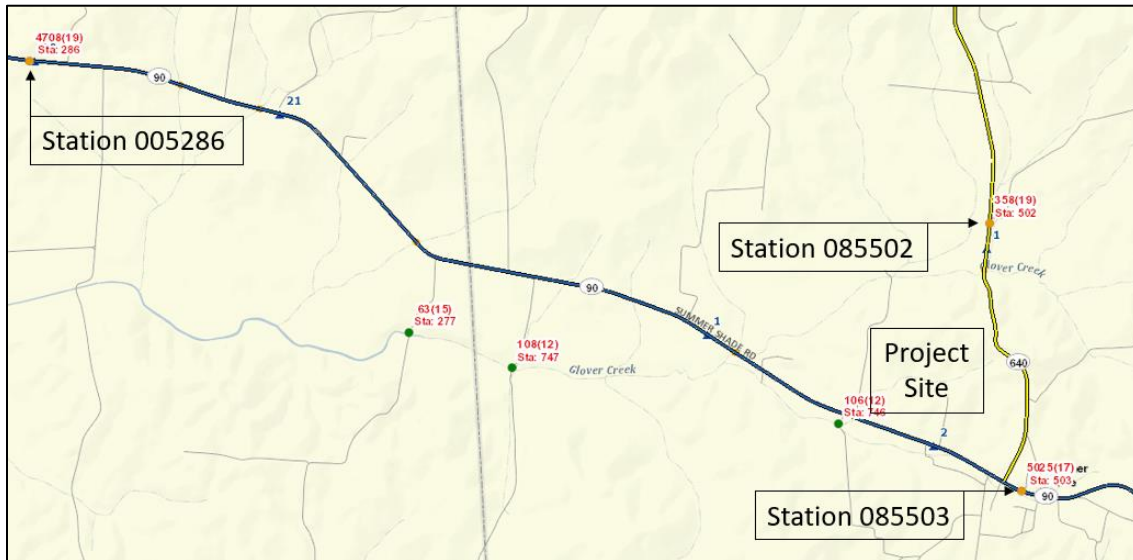
Exhibit 5-7.
Average Daily Traffic Volumes on SR 90 near the Glover Creek Solar Facility Site

<u>Station ID</u>	<u>Roadway</u>	<u>Average Daily Traffic (ADT)</u>	<u>Year Assessed</u>
085503	SR 90	5,025	2017
005286	SR 90	4,708	2019

Source: Kentucky Transportation Cabinet, May 2020.

Exhibit 5-8 illustrates the relevant stations on SR 90 and SR 640.

Exhibit 5-8.
Locations of Traffic Counting Stations near the Glover Creek Solar Facility



Source: Kentucky Transportation Cabinet, May 2020.

Construction related traffic impacts. Because materials for the Project will not be purchased until immediately prior to construction, the exact routes to be used for delivery of those items and solar components is unknown at this time. HE assumes that SR 90 and SR 640 will both be used when transporting workers and equipment.

As described in Exhibit 5-6, about 50 total vehicles would travel to and from the project site on an average day and about 90 vehicles would travel to and from the project site on a peak day. That would amount to an increase in traffic of about one percent on SR 90 and 14 percent on SR 640 on an average day, and an increase of about two percent on SR 90 and 25 percent on SR 640 on a peak day. However, if as many as 250 construction workers were on site at one time during the peak period, traffic impacts could be greater than described above.⁴⁰ Alternatively, as suggested by the Applicant, those workers could be shuttled to the site from

⁴⁰ Section 3 of this report describes construction activities and scheduling, including the peak period.

a central location. Regardless, the affected roadways have limited traffic now, so impacts should be minimal.

Since the construction staging area would most likely be located on SR 640, that road would likely see the majority of vehicle and truck traffic. SR 640 has much less traffic than SR 90, but neither highway is expected to see substantial traffic increases from other sources in the future.⁴¹ There is currently no traffic signal at the intersection of SR 640 and SR 90. If construction workers are shuttled to the site, increases in construction related traffic volumes would be less than shown above.

Fugitive dust. Properly maintained construction equipment and BMPs can reduce fugitive dust emissions by as much as 95 percent.⁴² HE believes dust resulting from construction activities will not have a noticeable impact on off-site air quality. The area's humid climate will also help mitigate against dust within the Project site / surroundings.

Road degradation. According to the Kentucky Transportation Cabinet (KTC), SR 90 is rated at 80,000 pounds, meaning the road is capable of handling vehicles and their shipments that weigh at most 80,000 pounds. SR 640 is rated at 44,000 pounds.⁴³ Class 2 and 3 commuter vehicles would not be expected to cause undue road degradation due to their weight or expected traffic volumes during construction or during operations. It also appears that the Class 9 trucks used during construction can safely travel on SR 90 and SR 640 without risk of noticeably degrading the roadways, and their numbers are small. However, at 120,000 pounds, the weight of the Class 21 truck delivering the substation transformer and other Class 21 truck trips will exceed the weight ratings for both SR 90 and SR 640. Because that shipment will be so heavy, it is possible that those deliveries could cause road degradation.

Attempts were made to discuss road degradation issues with the Metcalfe County Road Department, but staff were unable to speculate on potential impacts on roadways. As an alternative, HE spoke with staff at the Cumberland County Road Department (CCRD, adjacent county to the east of Metcalfe) and the KTC to discuss potential road degradation.^{44,45} They agreed that truckloads of less than 44,000 pounds would not likely affect SR 640, but truckloads of 120,000 pounds have a distinct potential to cause damage to SR 90 and especially SR 640. The KTC explained that because road degradation depends on a combination of the number of axles of the vehicles, the vehicle weight and the resulting weight distribution on each tire, impacts to roadways are impossible to estimate at this time. The CCRD explained that the Applicant would be liable for citations if permits were not acquired from the KTC prior to any shipments within/ into Kentucky. The KTC has a Kentucky Weight Distance (KYU) tax issued for all carriers travelling on Kentucky roadways with a combined license weight greater than 59,999 pounds. The Applicant should

⁴¹ Kentucky Transportation Cabinet. Projections indicate annual growth in traffic of about 1.1 percent in the Summer Shade area through 2040.

⁴² Copperhead Environmental Consulting, Cumulative Environmental Assessment for Proposed Glover Creek Solar, LLC Project, April 2020.

⁴³ <https://transportation.ky.gov/Planning/Documents/Weight%20Class.pdf>

⁴⁴ Ricky Melton. Cumberland County Road Department, July 2020.

⁴⁵ Skylar Hopper, P.E. Kentucky Transportation Cabinet. July 2020.

consult with the KTC to determine if they are subject to the KYU tax.⁴⁶ In addition to a KYU tax, the KTC may require the Applicant to acquire overweight/ over dimensional permits for trips in excess of 80,000 pounds.⁴⁷ These permits would almost certainly be needed for the substation trip, since it is estimated to be 120,000 pounds.

For the Class 21 trips, the Applicant may be forced to utilize Louie B. Nunn Cumberland Parkway, as this highway is approved for use by “increased dimensions” trucks.⁴⁸ Additional conversations will need to occur between the Applicant and the KTC to determine the best transportation routes after the Applicant has decided where to purchase operational equipment. The Applicant has pledged to rectify any damage caused to roadways or bridges due to heavy truckloads.

Operations related traffic impacts. Very few vehicle trips to and from the project site will occur during operations, contributing very little to existing or projected traffic volumes. Traffic projections indicate that traffic in the Summer Shade area is expected to grow at an annual rate of 1.1 percent per year until 2040, a small amount of growth.⁴⁹

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:

- Traffic impacts during construction will be limited, but somewhat higher during the peak construction weeks. There is the potential for traffic congestion to increase along SR 640, especially during the peak construction phase, but this road has only modest traffic now. The entrance to the Project site from SR 640 should be able to handle the increase.
- The Applicant has pledged to properly maintain construction equipment and follow BMPs related to fugitive dust throughout the construction process. This should keep dust impacts off site to a minimal level.
- Road degradation should not occur unduly from construction commuting and other vehicles except for the very large Class 21 truck trips. There are expected to be up to approximately 11 Class 21 truck trips, which will exceed the weight classification on roadways in the area. Road damage is quite possible from these vehicles.
- There will be no noticeable traffic impacts during operations.

⁴⁶ <https://drive.ky.gov/motor-carriers/Pages/KYU.aspx>

⁴⁷ <https://drive.ky.gov/motor-carriers/Pages/Purchase-Overweight-Over-Dimensional-Permits.aspx>

⁴⁸ <https://transportation.ky.gov/Planning/Documents/NTN%20Statewide%202020.pdf>

⁴⁹ Kentucky Transportation Cabinet. Projections were last developed in 2015, when population projections for Metcalfe County were greater than they are as of 2020. Therefore, traffic in this area may actually increase at a slower rate than stated in the 2015 projections.

Need for mitigation. The Applicant has agreed to the following steps for mitigating traffic-related impacts:

1. The Applicant will use appropriate signage and traffic signaling as needed to aid construction traffic and prevent severe traffic issues.
2. As needed, the Applicant will provide a temporary traffic signal at the intersection of SR 640 and SR 90.
3. As needed, the Applicant will shuttle commuting construction workers.
4. The Applicant's contractor will apply best management practices (BMPs) regarding dust mitigation, including but not limited to: water applied to internal roads as needed; internal roads compacted; internal roads constructed or improved as needed; loads of dirt and other air-pollution causing particles covered while in transit; revegetation measures and covering of spoil piles.
5. The Applicant will inform and obtain permits from State and local road authorities as pertaining to the Class 21 vehicle transport to the site. The Applicant will comply with those permit requirements.
6. The Applicant will fix or pay for damage resulting from Class 21 vehicle transport to the Project site and will coordinate with proper road officials prior to these trips.

Economic Impacts

Evaluation of the potential economic effects of the Glover Creek Project is based on knowledge of the Project's construction timeline and activities and the Project's long-term operational activities. Project employment needs, local expenditures (labor, materials/supplies, equipment) and payment of applicable taxes (sales tax, lodging tax, property tax) and other fees are considered over the short and long-term and placed within the context of existing demographic and economic conditions.

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

- Detailed understanding of the project itself - 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 State is essential;
- Estimation of total effects: Use of region and industry specific multipliers to estimate indirect and induced effects to calculate total effects such as employment, income and overall economic activity;

- Other social or economic benefits, including potential non-monetary benefits, to the local community or surrounding area;
- Potential curtailments or impacts to other industries.

Summary of information provided by the Applicant. Volume 1 of the Application provided a relatively brief overview of the economic benefits generated by the Project during the construction and operational phases. That economic impact analysis was largely narrative, except for estimated employment and income benefits related to the construction phase and estimates of property taxes paid over the first 20 years of operations. In response to HE inquiries, the Applicant revised its estimates of economic benefits. The Applicant's response to inquiries also noted an agreement with Metcalfe County regarding payments in lieu of property taxes.

Excerpts from the Applicant's economic impact analysis include the following:

- **Capital investment:** The Project will make a multi-million-dollar capital investment in rural central Kentucky. That expenditure will have direct, indirect, and induced impacts on a broad range of economic activities in the region and across the state and thus will have a widespread ripple effect on the economy at large.
- **Construction phase:** Construction of the facility is anticipated to create approximately 450 jobs – 300 direct and 150 indirect and induced, the vast majority of which will be filled by local craft and contract workers. These 450 jobs translate to a projected injection of approximately \$15M in new wages for the local economy, which will support local businesses, and a labor income multiplier impact of an additional \$2.31M. The total construction phase economic impact of the facility (exclusive of the capital investment and tax revenues) is projected to be at least \$17.31M.
- **Workforce development:** Local workers seeking utility-scale solar construction experience will be provided with on-site training in skills necessary for utility-scale solar construction jobs, including pile driving, tracker assembly, and panel installation.
- **Operational phase:** This facility will have a positive tax revenue impact on Metcalfe County over its lifetime. The Project will pay approximately \$1 million in county property taxes over the first twenty years of operation, with ongoing county tax payments continuing after this period.

The Applicant has stated that Project related construction employment will reduce unemployment or underemployment in the local area, bridge any gaps in local construction work for local construction workers and bring in outside workers who will have a positive impact on the local economy.

Further explanation from the Applicant regarding property tax payments revealed that an Industrial Revenue Bond (IRB) was approved by Metcalfe County for the Glover Creek

project. As explained by the Applicant, an IRB is a type of economic development tool used in the State of Kentucky in which no borrowing occurs and no money is exchanged, but which allows the developing entity to ensure that local taxes are paid, while offsetting some state level taxes. The payment in lieu of taxes (PILOT) agreement with Metcalfe County is based on payments of \$1,000 per MWac per year for the first 20 years of operation and \$200 per MWac for the following 20 years. Those tax payments benefit the following six taxing authorities: Metcalfe County, Metcalfe County Extension Board, Metcalfe County Soil Conservation District, Metcalfe County Library District, Metcalfe County Ambulance District and Metcalfe County School District.

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

- For solar facilities in general, the purchase of materials, supplies and equipment makes up a large portion of total Project construction costs. In response to HE inquiries, the Applicant noted that those types of items, including the panels, racking system, inverters and transformers will likely be purchased outside of Kentucky and imported to the site. Therefore, most of the Project's capital expenditures will actually occur out-of-state, limiting the economic benefits to Kentucky. Economic benefits related to local or regional purchases will focus mainly on labor activities and construction sub-contracts, including fencing, grading, and electrical contractors. Some equipment rentals will also be made regionally. No estimates of the dollar amount of purchases to be made within Kentucky were provided by the Applicant.
- The income benefits stated by the Applicant are likely optimistic for several reasons: (1) the estimate of 300 full-time construction workers is likely high, given more specific workforce estimates provided by the Applicant in response to inquiries. Based on the Applicant's total estimated person hours for the Glover Creek project, full-time equivalent (FTEs) positions are closer to about 130. (2) The Metcalfe County employment multiplier for the Electric power generation, transmission and distribution industry is 1.23, indicating generation of fewer than 150 indirect and induced jobs.⁵⁰
- It is also important to note that direct construction jobs, as well as indirect and induced jobs, will be temporary, resulting from the one-year construction period. The benefits related to workforce development and training in solar installation may only extend past that period if other solar projects are developed within reasonable commuting distance.

⁵⁰ In response to HE's inquiries, the Applicant submitted the detailed industry RIMS II multipliers for Metcalfe County (Bureau of Economic Analysis) used in the economic impact analysis.

- In response to HE inquiries, the Applicant noted that during the operational phase, local purchases would consist of fuel and food for operations for staff and local landscaping contractors. These benefits will be relatively minimal on an annual basis.
- No quantification of local, regional, or statewide purchases of materials or supplies is included in the economic analysis for either the construction phase or the operational phase. No quantification of any sales and use or other tax benefits to the State are provided. HE assumes that most construction purchases will occur out of state and that operations purchases will be limited.
- The PILT would amount to \$55,000 per year for the first 20 years of operations and \$11,000 per year for the following 20 years. Those amounts are likely very small percentages of total Metcalfe County property taxes.
- Landowner leases are not mentioned in the economic analysis. Those landowners will realize real direct benefits from the Project via lease payments.

Conclusions and recommendations. Construction and operation of the Glover Creek Solar facility will provide some, limited economic benefits to the region and to the State. Overall, the Glover Creek 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 which needs it. Many construction purchases will be made outside of Kentucky.

Operational economic benefits will be confined mostly to property taxes, although these will be relatively minor. Operational employment will be minimal, and purchases of materials or supplies will be very small on an annual basis. Annual property tax payments made to Metcalfe County taxing authorities will be larger in the first half of the 40-year operational phase and smaller in the latter half, but those payments will generally amount to a small percentage of total tax revenues for any one group.

Need for mitigation. Socioeconomic impacts of the Glover Creek Solar Facility represent a positive contribution to the region, so no mitigation is required.

Decommissioning Activities

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

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

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

Summary of information provided by the Applicant. According to the economic impact analysis provided in Volume 1 of the Application and the Applicant's responses to the Siting Board's First Request for Information, the solar facility would have an expected useful life of 40-years. The Pond report states that, "at the end of the project's life, the equipment and electrical infrastructure will be removed from the site, and land may return to farming or other development."

According to the Applicant's responses to the Siting Board's First Request for Information, decommissioning activities would include the removal of all solar facility equipment, substation equipment and fencing, as well as land restoration and erosion control for about 450 acres. Land restoration would entail removal of gravel access roads and re-seeding of disturbed area. Erosion control would include installation of perimeter erosion control measures prior to the start of decommissioning and removal of those measures following decommissioning. The Applicant also suggests an economic incentive to remove the solar equipment, citing estimates that the material value of items such as aluminum, copper and steel would be greater than the cost of removing the equipment and restoring the property.

After additional inquiries and discussions with the Applicant, three outcomes are possible after the 40-year facility life, including:

- The land could be returned to its prior agricultural conditions with future uses determined by the landowners.
- Solar equipment could be retrofitted with updated technology to extend the operations of the Glover Creek facility.

- Given the Applicant's valuable interconnection to the Summer Shade-Patton Rd Jct 69kv transmission line, the asset and could be sold to another company for power generation purposes.

According to the Applicant, 40-year leases were signed with each of the landowners of the Project site. As part of the lease terms, the Applicant is committed to decommissioning and reclaiming those lands. For the Glover Creek facility to either extend its life or for other power generation activities to occur, those leases would have to be re-negotiated with the landowners.

Summary of secondary source information. It is possible that a large portion of the project will be recycled, but it is also possible that at least some portion of materials will become waste. Removal of facility equipment from the Project site necessitates a place to put all those materials. Multiple scrap metal recycling companies are in Kentucky in relative proximity to the Project site; the Applicant could sell aluminum, copper and steel to any one of those locations. The Glasgow Regional Landfill (operated and maintained by the City of Glasgow) serves 16 counties in south-central Kentucky, including Metcalfe County. The landfill, which is located about 18 miles from the project site, accepts over 100,000 tons of waste every year. Glasgow also operates and maintains a Construction and Demolition Debris Landfill. Non-metal waste materials from the solar facility could end up at either of those landfills.

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 lower than those described for the construction phase.

Aside from the recycling of metals, it seems likely that some volume of material from the solar facility would be brought to the Glasgow landfills. The specific type and volume of materials to be delivered to those landfills is unknown and would be somewhat dependent on what items would be salvageable or recyclable after 40 years, at the time of decommissioning.

Conclusions and recommendations. HE considered three possible outcomes for the Glover Creek Solar facility and site after the 40-year useful life. We cannot know which of the three (decommissioning, extending the present plant life, or re-purposing the site for power generation) is more likely at this time:

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

- Power generation facilities often have a useful life beyond 40 years. Perhaps with modernized retrofitting, the Glover Creek facility can continue to operate indefinitely. Given the discrete component nature of this plant, switching out elements seems possible. In this case, operational impacts discussed in this report would also continue indefinitely.
- As part of its development, Glover Creek Solar LLC also has interconnection rights to the Summer Shade -Patton Rd Jct 69kv transmission line. Together, the substation transformer and the interconnection rights at the point of interconnection (POI) will remain valuable assets at the end of the Project lifetime. That value is likely to grow over time. As a result, there will be an incentive for some type of power generation at this site in the future once the Glover Creek facility is fully depreciated or closed. Impacts under this circumstance will also continue indefinitely, although at an unknown magnitude.

Need for mitigation. The Applicant suggested that economic incentives exist for decommissioning, but HE believes that is highly uncertain due to costs for decommissioning and future metal prices. The land lease provisions also might not cover the entire site or be easily enforceable. Therefore, we recommend;

1. The Applicant, its successors or assigns will decommission the entire site and complete reclamation to its original or a superior state after the Project has served its useful life. This mitigation requirement should be deferred if Glover Creek continues with its currently proposed operation beyond 40 years.
2. If the Applicant, its successors or assigns retrofit the current proposed facility to produce solar energy beyond 40 years, it must demonstrate to the Board that the retrofit facility will not result in a material change in the pattern or magnitude of impacts as addressed herein. Otherwise, a new SAR must be submitted for Board review.
3. The Applicant, its successors or assigns will prepare a new SAR for Board review if the power producer intends to retire the currently proposed facility and employ a different technology.

SECTION 6

Recommended Mitigation

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

Regulatory Actions and Mitigation Outside Board Jurisdiction

The Board should be aware of the following permitting and regulatory actions which will require Applicant compliance and possibly mitigation efforts. No action on these actions is required by the Board since these are outside the Board's jurisdiction. The SAR notes an on-going wetlands delineation and the need for an Approved Jurisdictional Determination through the Army Corps of Engineers. Glover Creek will also obtain a Kentucky Department of Environmental Protection Stormwater Construction General Permit from the Kentucky Division of Water in compliance with the National Pollutant Discharge Elimination System (NPDES) of the Clean Water Act (CWA). The SAR states that the Kentucky Pollution Discharge Elimination System (KPDES) permit (KPDES No: KYR100000) is a general permit for stormwater discharges associated with construction activity.

Glover Creek Solar, LLC completed an Environmental Site Assessment (ESA) Phase 1 for the site.⁵¹ The ESA Phase 1 report includes several recommendations related to existing water wells onsite and the potential for asbestos in existing structures on the property:

1. Properly abandon the water wells if they will not be used in the future.
2. Perform an asbestos survey on older structures prior to demolishing.

The Applicant has not addressed those recommendations or committed to undertaking those actions in any of their submitted materials.

Mitigation for Board and Applicant Consideration

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

In performing this comprehensive review of the Glover Creek SAR, HE has gained an understanding of the Project, the location, the construction and operational activities, the

⁵¹ Although referred to as "Turkey Creek Solar" in the SAR, the referenced ESA was completed for the Glover Creek Solar site.

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 might include location of solar panels, transformer/ inverter/ ESS groupings, panel motors, the substation or other Project facilities or infrastructure.
2. Any change in Project boundaries from the information which formed this evaluation should be submitted to the Board for review.
3. The Board will determine if any deviation in the boundaries or site development plan is likely to create a materially different pattern or magnitude of impacts. If not, no further action is required, but if yes, the Applicant will support the Board's effort to revise its assessment of impacts and mitigation requirements.
4. 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.
5. The fence surrounding the property boundary will be installed after grading of the site and before the main array installation begins. According to National Electric Code regulations, the security fence must be installed prior to any electrical installation work. The substation and construction staging area will also have their own separate security fences installed.

B. Compatibility with scenic surroundings:

1. The Applicant will strategically plant a vegetative buffer around certain areas of the Project. Plantings of native evergreen species will serve as visual and noise buffers to mitigate viewshed impacts. Plantings will primarily be in areas directly adjacent to the Project without existing vegetation. At the time of planting, the buffer will be three feet in height, expected to grow to six feet high after a period of three years, and hopefully continue to grow thereafter. Once the vegetative buffer has grown six feet high, the panels will be hidden throughout most of the day. The Applicant met with numerous landowners near the Project site, and the landowners had input in the placement of some of the visual buffers associated with the facility.
2. Applicant will monitor growth of vegetative buffer, ensuring that its plantings are thriving to at least six feet in height.
3. Applicant will cultivate at least two acres of native pollinator-friendly species within the solar facility site, among the solar panels.

C. Potential changes in property values and land use. No mitigation measures are recommended related to potential impacts to property values or adjacent land uses.

D. Peak and average noise levels:

6. Residents within 1,500 feet of the property boundaries should be notified about potential construction noises. Residents within 500 feet of the solar panels should be notified about potential operational noises.
7. The Applicant should remain in contact with nearby residents to confirm that noise levels are not unduly high or annoying after the pounding and placement of the solar panel racking begins.
8. If noise levels during this period are unacceptable to nearby residents or landowners, the Applicant will take such steps to mitigate the noise impact.
9. The Applicant should contact nearby residents to confirm that noise levels are not unduly high or annoying after operations begin.
10. Additional buffering or fencing should be considered in those areas where noise impacts are annoying residents or will potentially annoy them.

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

1. The Applicant will use appropriate signage and traffic signaling as needed to aid construction traffic and prevent traffic issues.
2. As needed, the Applicant will provide a temporary traffic signal at the intersection of SR 640 and SR 90.
3. As needed, the Applicant will shuttle commuting construction workers.
4. The Applicant's contractor will apply best management practices (BMPs) regarding dust mitigation, including but not limited to: water applied to internal roads as needed; internal roads compacted; internal roads constructed or improved as needed; loads of dirt and other air-pollution causing particles covered while in transit; revegetation measures and covering of spoil piles.
5. The Applicant will inform and obtain permits from State and local road authorities as pertaining to the Class 21 vehicle transport to the site. The Applicant will comply with those permit requirements.
6. The Applicant will fix or pay for damage resulting from Class 21 vehicle transport to the Project site and will coordinate with proper road officials prior to these trips.

F. Economic impacts. Socioeconomic impacts of the Glover Creek Solar Facility represent a positive contribution to the region, so no mitigation is required.

G. Decommissioning:

1. The Applicant, its successors or assigns will decommission the entire site and complete reclamation to its original or a superior state after the Project has served its useful life. This mitigation requirement should be deferred if Glover Creek continues with its currently proposed operation beyond 40 years.
2. If the Applicant, its successors or assigns retrofit the current proposed facility to produce solar energy beyond 40 years, it must demonstrate to the Board that the retrofit facility will not result in a material change in the pattern or magnitude of impacts as addressed herein. Otherwise, a new SAR must be submitted for Board review.
3. The Applicant, its successors or assigns will prepare a new SAR for Board review if the power producer intends to retire the currently proposed facility and employ a different technology.

Deviation from Setback Requirements

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

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