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

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

February 3, 2023

Harvey Economics ♦ 469 South Cherry Street, Suite 100 ♦ Denver, Colorado 80246
tel. 720.889.2755♦ fax 720.889.2752 ♦ www.harveyeconomics.com ♦ he@harveyeconomics.com

February 3, 2023

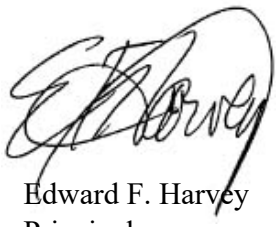
Ms. Heather Temple
Kentucky Public Service Commission
211 Sower Blvd.
Frankfort, KY 40601

Re: Harvey Economics' Review of Thoroughbred Solar, LLC's Site Assessment Report for Solar Facilities in Hart County, Kentucky

Dear Ms. Temple,

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

Yours truly,



Edward F. Harvey
Principal

Report

February 3, 2023

Review and Evaluation of the Thoroughbred 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

Harvey Economics
469 South Cherry Street, Suite 100
Denver, Colorado 80246
720.889.2755 fax 720.889.2752
www.harveyeconomics.com
he@harveyeconomics.com

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Exhibit 3-1.
Facility Layout Map for the Proposed Thoroughbred Solar Project

Note: The short access road on KY-335, east of the Construction Entrance on that same road, has been eliminated from the Project.

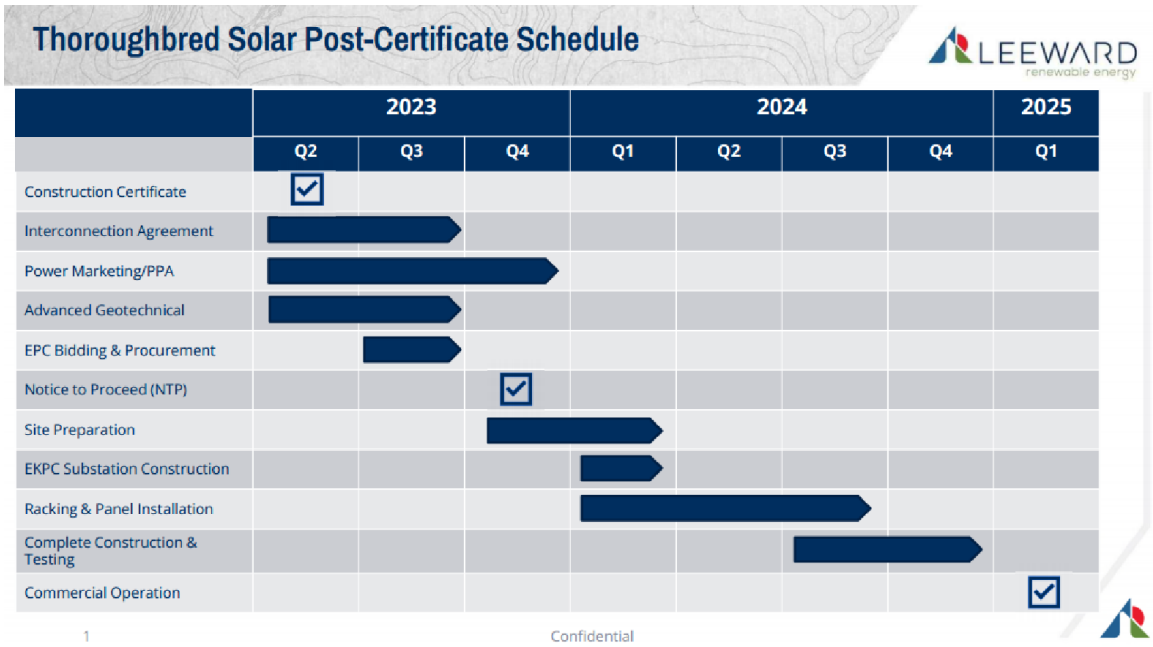
Source: Thoroughbred Solar, LLC, December 2022.

The Project site is located approximately 50 miles northeast of the City of Bowling Green, KY and about 70 miles south of the City of Louisville, KY. The northernmost portion of the Project site is approximately two miles south of the City of Munfordville.

Construction Activities

Construction of the Thoroughbred Solar facility, including substation construction, racking and panel installation and completion activities, is expected to occur over a period of about 12 months, as shown in Exhibit 3-2. Some site preparation activities would occur prior to facility construction and testing would be subsequent to construction completion. Peak construction activity is anticipated to occur over about a three-month period, when the bulk of the modules and trackers are being installed.

Exhibit 3-2.
Preliminary Construction Schedule for the Proposed Thoroughbred Solar Project



Source: Thoroughbred Solar, LLC, December 2022.

General construction activities and anticipated timelines include the following:[5]

Road construction: 30 – 45 days

Substation construction: 60 – 90 days

Trenching: 60 – 90 days

[5] As provided by the Applicant in response to the Siting Board's second request for information.

Inverter construction: 60 – 120 days

Inverters will be installed before adjacent piling and racking occurs; there may be about a 60 day overlap in inverter construction and piling and racking as construction work moves across the site.

Piling: 90 – 150 days

Piling will overlap with many other construction phases.

Racking: 90 – 150 days

Racking follows piling by about a month; therefore, there may be about a 90 day overlap in piling and racking.

Laydown area development: 30 – 60 days

Boring: 15 – 45 days

Boring activity will be minimal and may overlap with piling and racking.

Rock drilling: 90 days

Rock drilling will occur throughout piling, as necessary.

The Applicant has stated that delivery of construction materials will occur between 7:00 a.m. and 7:00 p.m. Monday through Friday. General construction activity, however, is anticipated to occur between 7:00 a.m. and 9:00 p.m. Monday through Saturday.[6] Construction will not be conducted on Sundays unless it is necessary to make up for delays or to meet deadlines. Some non-noise-causing and non-construction activities may take place on the site prior to 7:00 a.m.

Life of the Project

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

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. Hart County in general, and particularly areas outside the community of Rowletts and the City of Munfordville, is rural in nature, with low population

[6] Construction occurring later in the evening is more likely to take place in summer months, given the additional hours of daylight at that time of the year.

density and an agricultural emphasis. The Project site and surrounding properties can be described as rural and agricultural; however, the site is also located immediately to the east of I-65 and its Horse Cave Rest Area and west of US 31W. Section 4 of this report provides a general overview of the County's demographic and economic characteristics.

The SAR states that about 89 percent of the land within the Project site is currently used for agricultural purposes, including active row crops (294 acres) and pasture/hay (178 acres). About another 6.5 percent (34.5 acres) is forested and approximately four percent of the acreage within the Project site is described as infrastructure corridors (18.4 acres, also in use as agricultural land), or other (including a private cemetery and deep sinkholes (four acres).

The Applicant also provided information describing the distances between residences, businesses or other structures within 2,000 feet of the Project boundary and various Project facilities. A total of 93 residences are located within 2,000 feet of the Project boundary.[7] Two religious buildings and the Caveland Country Club are also located within 2,000 feet of the Project boundary line. That information is provided in Exhibits 3-3 and 3-4.

Exhibit 3-3.
Distances between Residences within 2,000 Feet of the Thoroughbred Solar Project Boundary and Project Facilities

	Number of Residences			
Distance (ft)	Residences to Boundary Line	Residences to Nearest Solar Panel	Residences to Nearest Inverter	Residences to Substation/ Switchyard
0 - 300	30	1	0	0
301 - 600	12	24	1	0
601 - 900	15	14	10	1
901 - 1,200	14	13	17	1
1,201 - 1,500	12	18	11	1
1,501 - 1,800	7	10	23	2
1,801 - 2,100	3	9	9	1
> 2,100	0	4	22	87
Total	**93**	**93**	**93**	**93**

Note: The smallest distance between a residence and a solar panel is 276 feet.

Source: Thoroughbred Solar, LLC, December 2022.

[7] Including homes located within the three areas identified as "Residential Neighborhoods" in the Applicant's Motion for Deviation from Setback Requirements.

Exhibit 3-4.
Distances between Non-Residential Structures within 2,000 Feet of the Thoroughbred Solar Project Boundary and Project Facilities

Feature	Distance to Boundary Line (ft)	Distance to Nearest Solar Panel (ft)	Distance to Nearest Inverter (ft)	Distance to Substation/ Switchyard (ft)
Kingdom Hall of Jehovah's Witness	120	522	782	3,433
Rowletts Baptist Church	420	799	1,250	4,050
Caveland Country Club	1,696	1,951	2,589	4,496

Source: Thoroughbred Solar, LLC, December 2022.

Legal boundaries. The legal boundaries of the proposed site are described in Attachment B (Project Area Legal Description) of the SAR. According to the Applicant, the Project area consists of portions of land owned by three families, each of which will continue to use property not leased to the Applicant for residential and / or agricultural purposes.

Access control. The facility layout map shown in Exhibit 3-1 labels three separate proposed construction entrances.[8] The entrance on Johns Lane is noted as limited use; that entrance is intended for construction of the substation/ switchyard only. An additional entrance will allow for emergency access to the Project site from Rowletts Cave Springs Road on the north side of the site. The Applicant or its contractor will control access to the site during construction and operations. Access to the Project Area will be controlled in accordance with applicable guidelines of the North American Electric Reliability Corporation (NERC), National Fire Protection Association (NFPA), the National Electric Safety Code (NESC), the Occupational Safety and Health Administration (OSHA), and specific requirements of EKPC for the electrical components of the Project.

Project solar arrays and associated equipment will be enclosed by a 7-foot-tall agricultural-style fence with 8-foot-tall wooden posts and wire mesh fencing. Locked access gates will be provided at each of the five entrances to the Project. The Project Substation and Utility Switchyard will each be separately enclosed, using 7-foot-tall chain link fencing around each area. Security lighting will be available at each entrance that can be activated if maintenance access is necessary at night. Remote monitoring of the Project will occur for security as well as operational performance purposes. Appropriate signage will be installed at the Project in locations visible to the public to warn potential trespassers, including within areas where electrical equipment could pose particular hazards.

[8] The construction entrances on G Wilson Lane and KY-335 will also be used to access the site during operations.

Project representatives have met with the Hart County Sheriff and with the Hart County Office of Emergency Management to open lines of communication regarding site safety, security practices, and emergency response. The Applicant will continue to coordinate with local emergency response entities on issues of security and emergency response protocols.

Location of buildings, transmission lines and other structures. Approximately 130,000 solar panels and 15 inverters will be located on about 530 acres within the Project site, as illustrated in the Applicant's Facility Layout map provided in Exhibit 3-1.

The Project Substation and Utility Switchyard will be located in the southern portion of the Project site, along Johns Lane and adjacent to the existing EKPC 69-kV overhead electric transmission line. Laydown areas will be located in the northwest and southwest portions of the site. The Project will also include up to two weather monitoring stations; it is expected that one will be located within the northwestern portion of the Project, and the other in the southwestern area.

From the inverters, AC collection lines will extend toward the Project Substation. The AC collection system is anticipated to be underground and/or in cable trays below panel height. Underground segments of the AC collection system will be buried a minimum of 3 feet below grade. Approximately 18,000 linear feet of collection system cable routing is reflected within the Project Area. Where possible, collection cables will be co-located in common trenches and run adjacent to one another.

Location and use of access ways, internal roads and railways. As noted previously, proposed entrances will allow access to different areas of the Project site. Two construction entrances are located on the southern edge of the Project site, including one along G Wilson Lane and one along Johns Lane. A third construction entrance is located along KY-335 on the eastern side of the site.[9] An entrance on Rowletts Cave Springs Road allows for emergency access.

Approximately 23,240 linear feet of private gravel access roads will be built for use within the Project Area during construction and operations. The roads are planned to be no more than 20 feet in width.

The CSX Transportation (CSXT) rail line runs in a north-south direction immediately east of the proposed Project site. The Project will not use the railroad for any deliveries during construction or operations. Project vehicles (including worker commuter vehicles and delivery trucks) will not cross the rail line directly; those vehicles will use KY-335, which spans the rails via a bridge.

Existing or proposed utilities to service facility. During construction, electricity, internet, and telephone service may be required from local providers, while sanitary services

[9] As noted previously, the construction entrances on G Wilson Lane and KY-335 will also be used to access the site during operations.

are expected to be provided using portable facilities. Lighting requirements for the Project will be met via the connection to local electrical services as well.

Compliance with applicable setback requirements. Applicable portions of the setback statute (KRS 278.706(2)(e)) state that "all proposed structures or facilities used for generation of electricity be 2,000 feet from any residential neighborhood, school, hospital, or nursing home facility".[10] Hart County has no planning and zoning ordinances governing relevant setback requirements; therefore, the State statutory setback requirements apply to the Thoroughbred Solar facility. Three "residential neighborhoods" are located within 2,000 feet of Project facilities; there are no schools, hospitals or nursing homes within 2,000 feet of the Applicant's proposed location of Project structures or facilities.

The Applicant has submitted a document titled Motion for Deviation from Setback Requirements (Motion for Deviation). The Motion for Deviation poses some questions as to whether the three identified residential groupings meet the criteria of a "residential neighborhood." Therefore, Thoroughbred Solar is requesting "two alternative forms of relief": (1) an approval of a deviation from the statutory setback requirements or (2) a determination that no deviation is necessary because none of the groupings is a "residential neighborhood". This report and evaluation of the Thoroughbred Solar Project assumes that the Project will require an approval for deviation from the Siting Board.

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 Motion for Deviation addresses each of the statutes listed above, describing the Applicant's or facility's compliance with each. That document also provides descriptions of the three residential neighborhoods within 2,000 feet of Project facilities.

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

> Residential Neighborhood 1 is located to the east of the Project, along Maple Grove Lane, and consists of a portion of the unincorporated community of Rowletts. Residential Neighborhood 1 encompasses approximately 11 acres and includes 24 residences.
>
> Residential Neighborhood 2 is located farther east of Residential Neighborhood 1, separated from Residential Neighborhood 1 by existing infrastructure (a railroad and, for some of the residences, a state roadway). Residential Neighborhood 2 encompasses approximately six acres and includes nine residences.

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

Residential Neighborhood 3 is located near the Project, along G Wilson Lane. Residential Neighborhood 3 encompasses approximately six acres and includes six residential structures.

Exhibit 3-5 provides information about the minimum distances between Project structures and nearby residences for each identified Residential Neighborhood.[11]

Exhibit 3-5.
Minimum Distances between Residential Neighborhoods and Proposed Thoroughbred Solar Project Facilities

Residential Neighborhood	Minimum Distance to Nearest Solar Panel	Minimum Distance to Nearest Inverter	Minimum Distance to Substation/ Switchyard
1	301 feet	772 feet	3,438 feet
2	960 feet	1,439 feet	3,981 feet
3	534 feet	1,340 feet	4,048 feet

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

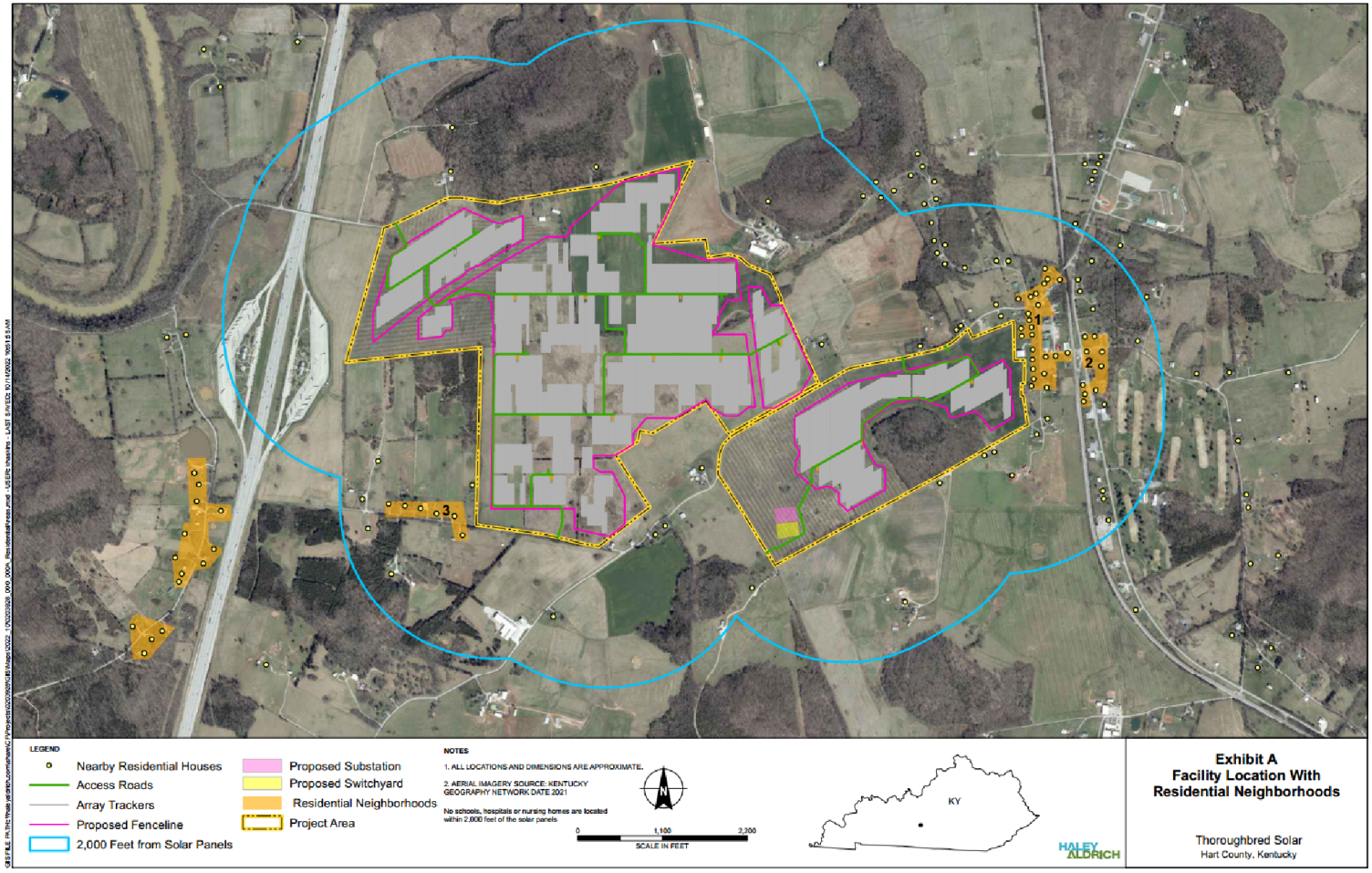
Source: Thoroughbred Solar, LLC, December 2022.

Exhibit 3-6 illustrates the Project boundary, Residential Neighborhoods 1, 2 and 3 and nearby Project infrastructure. Residential neighborhoods 1 and 2 are located along the eastern side of the Project boundary; Residential Neighborhood 3 is located to the southwest of the Project site. Photos of Residential Neighborhood 1, which includes 24 residences, are provided in Appendix B of this report.[12]

[11] Distances between Residential Neighborhood 1 and Project facilities, as stated in the Motion for Deviation, were revised as part of the Applicant's response to the Siting Board's first request for information.

[12] Photos were taken by HE staff as part of the Project site visit.

Exhibit 3-6.
Thoroughbred Solar Project Boundary, Project Infrastructure and Location of Residences within 2,000 Feet of Solar Panels



Note: The short access road on KY-335, east of the Construction Entrance on that same road, has been eliminated from the Project.

Source: Thoroughbred Solar, LLC, October 2022.

Compliance with statutory requirements. The Motion for Deviation described the Applicant's or facility's compliance with applicable requirements as follows:

> !# $ " % & ' (& 'The Applicant has provided a CEA that addresses air pollutants, water pollutants, waste, and water withdrawal. That report (included as Attachment N to the SAR) provides a detailed discussion of each topic area and concludes the following:
>
> * +Construction and operation of the completed Project would produce air pollutants. Emissions will predominantly originate from the construction and personnel vehicles, operating equipment, and supplies. The anticipated emissions generated by construction are expected to be minor due to the scale and duration of operations. Construction activities would also generate dust and other suspended particulates. Best management practices (BMPs) will be implemented onsite, requiring measures such as covering loads and applying water for dust suppression. With the use of appropriate BMPs, ambient air quality standards would not be exceeded, and construction activities would result in temporary, negligible impacts to air quality.
>
> Any emissions from the operation of the Project would be generated by worker vehicles and maintenance equipment. Project operations would generate negligible levels of air pollutants.
>
> , * + One wetland is present within the proposed Project boundary (no ponds or streams are present). The wetland could be impacted by erosion and sedimentation generated by ground-disturbing construction activities. The Project will follow BMPs to limit surface water pollution from dust and sediment. In compliance with Kentucky Division of Water (KDOW), Thoroughbred Solar will design and implement a stormwater pollution prevention plan. Furthermore, the Project will comply with the KDOW Construction Storm Water Discharge General Permit on actions that will influence one or more acres of land.
>
> The Project is not expected to generate adverse impacts to groundwater. Hazardous materials, including but not limited to fuel, lubricants, hydraulic fluids, herbicides, and fertilizers, will be limited to essential use only, properly stored and used following proper techniques.
>
> , +Project construction will generate very small quantities of hazardous waste. To avoid any on- and offsite impacts, all waste will be stored, handled, and disposed of in accordance with local, state, and federal regulations. Solid construction waste will be recycled, if possible. Non-recyclable solid materials will be removed from the Project Area and disposed of at an appropriate regulated landfill. Anticipated solid waste includes construction debris, recyclables, and garbage, including packaging materials, storage boxes, wooden pallets, and building materials. To accommodate

increased personnel during construction, portable chemical toilets will be provided. These portable toilets will be properly maintained and regularly pumped by a licensed sewage waste contractor. The waste will be disposed of at a regulated wastewater treatment plant.

, +Construction and standard Project operations will require water. The Project plans to use either a new well developed within the Project Area or available municipal water. Anticipated use of water for construction is expected to be relatively minor and would not negatively impact groundwater resources.

- $ " ! " % . * * / % The Motion for Deviation states that to the extent relevant, Thoroughbred Solar has satisfied any goals of KRS 278.010 by preparing and presenting its Project proposal and Application in terms consistent with the statutory definitions.

- $! % 0 * 1 * The Motion for Deviation states that Thoroughbred Solar anticipates having an executed interconnect agreement with East Kentucky Power Cooperative in the first quarter of 2023 to connect to the existing transmission grid via an on-site tap and pay the related costs.

- $! % & * The Motion for Deviation states that, to the extent this section applies to the operation of Thoroughbred Solar's proposed generation or the Project, the Applicant commits to following all appropriate and legally binding operating procedures.

- $! 2 % * / 1 * 1 * * The Motion for Deviation states that Thoroughbred Solar's filing of a Site Assessment Report as part of its Application in the present proceeding satisfies the goals of KRS 278.216.

- $! $ % * * * / Thoroughbred Solar is not a utility as defined by the applicable statute; therefore, the Motion for Deviation states that this statute does not apply to the Applicant. However, the Motion for Deviation also states that "to the extent Board approval may at some time be required for change of ownership or control of assets owned by Thoroughbred Solar or its parent company, Thoroughbred Solar will comply with the applicable rules and regulations which govern its operation."

- $ - "+" - $ - ! 2 % ' 3 4 The Motion for Deviation states that Thoroughbred Solar's Application and timely participation in the present proceeding demonstrates that the Applicant's proposed facility is designed to, and as located, would meet the goals of KRS 278.700 *et seq.*, including the allowance for deviation from setback requirements in KRS 278.704(4).

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

Results of SAR Review – Proposed Site Development Plan

Conclusions. Based on HE's review of the Thoroughbred Solar SAR, the subsequent information provided by the Applicant in response to two rounds of inquiries, direct discussions with the Applicant, and other secondary area research, HE offers the following conclusions regarding the proposed site development plan:

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

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

1. A final site layout plan should be submitted to the Siting Board upon completion of the final site design. Deviations from the preliminary site layout plan, which formed the basis for HE's review, should be clearly indicated on the revised graphic. Those changes could include, but are not limited to, the location of solar panels, inverters, transformers, substation, operations and maintenance building or other Project facilities or infrastructure.

2. Any change in Project boundaries from the information which formed this evaluation should be submitted to the Siting Board for review.

3. The Siting Board will determine if any deviation in the boundaries or site layout plan is likely to create a materially different pattern or magnitude of impacts. If not, no further action is required, but if yes, the Applicant will support the Siting Board's effort to revise its assessment of impact and mitigation requirements.

4. A final, Project-specific, construction schedule, including revised estimates of commuter vehicle traffic, should be submitted to the Siting Board. Deviations from the preliminary construction schedule should be clearly indicated.

5. The Siting Board will determine whether any deviation to the construction schedule or workforce estimates is likely to create a materially different pattern or magnitude of impacts. If not, no further action is required. If so, the Applicant will support the Siting Board's effort to revise its assessment of impacts and mitigation requirements.

6. The Applicant or its contractor will control access to the site during construction and operation. All construction entrances will be gated and locked when not in use.

7. The Applicant's access control strategy will include appropriate signage to warn potential trespassers. The Applicant will ensure that all site entrances and boundaries have adequate signage, particularly in locations visible to the public, local residents and business owners.

8. According to National Electrical Safety Code regulations, the security fence must be installed prior to any electrical installation work. The substation will have its own separate security fence and locked access installed.

9. The Applicant will develop an emergency response plan prior to the start of construction. The Applicant will meet with local emergency management representatives to ensure familiarity with plans and procedures. The emergency response plan will be revised following completion of construction to reflect operational measures, and a meeting will be held with local emergency response representatives for an updated review.

10. The Applicant will post contact information for Project representatives and emergency agencies on signs at each entrance to the Project site.

SECTION 4
Project Setting

Description of the Area

This section provides a description of the area surrounding the proposed Project site. The Project site is located in Hart County, south of the City of Munfordville and west of the unincorporated community of Rowletts. The area's topography is mostly plateau with a few streams and many sinkholes, mixed with some small and irregular hills and ridges. Hart County includes a portion of the Mammoth Cave Plateau, which is home to Mammoth Cave National Park, as well as the Green River.[13] Additionally, the Fisher Ridge Cave System is located in Hart County; as of 2018 it has been mapped to a length of 125 miles (201 km) and is the fifth-longest cave in the United States and the tenth-longest cave in the world.[14]

Population and housing density. As of mid-2021, approximately 19,500 people resided in Hart County.[15] The County's population has grown slowly over the past 20 years; in 2000 the population was 17,445 and in 2010 the population was 18,200.[16,17] About 93 percent of the population is white and the median age of residents is 40.[18] Currently, there are about 7,100 households in Hart County, with an average of about 2.7 persons per household.[19] The population density of Hart County is 46.8 people per square mile, which makes the county one of the least dense in Kentucky.[20]

[13] Kentucky Geological Survey. Groundwater Resources of Hart County, Kentucky. http://www.uky.edu/KGS/water/library/gwatlas/Hart/Topography.htm
[14] Wikipedia. https://en.wikipedia.org/wiki/Hart_County,_Kentucky
[15] U.S. Census Bureau. Hart County QuickFacts. https://www.census.gov/quickfacts/hartcountykentucky
[16] U.S. Census Bureau. Hart County, Kentucky, Profile of General Demographic Characteristics. https://data.census.gov/cedsci/table?q=hart%20county%20kentucky&y=2000&tid=DECENNIALDPSF420000.DP1&hidePreview=true
[17] U.S. Census Bureau. Hart County, Kentucky, Annual Estimates of the Resident Population: April 2010 – July 1, 2019. https://data.census.gov/cedsci/table?q=hart%20county%20kentucky&tid=PEPPOP2019.PEPANNRES&hidePreview=true
[18] U.S. Census Bureau. Hart County, Kentucky, Age and Sex. https://data.census.gov/cedsci/table?q=hart%20county%20kentucky&tid=ACSST5Y2019.S0101&hidePreview=false
[19] U.S. Census Bureau. Hart County QuickFacts. https://www.census.gov/quickfacts/hartcountykentucky
[20] Statistical Atlas. Hart County, Kentucky. https://statisticalatlas.com/county/Kentucky/Hart-County/Population

The population of Hart County is predicted to remain relatively stable in the future; the Kentucky State Data Center estimates 18,900 people will reside in the County in 2040, which is less than a three percent decrease from 2021.[21]

The City of Munfordville, population 1,600, is the county seat, although it is not the largest city in Hart County; Munfordville is less than three miles north of the Project site. An Amish settlement was founded near Munfordville in 1989; it is one of the fastest growing Amish settlements in the U.S. The City of Horse Cave is 11 miles south of Munfordville and has a slightly larger population of 2,200. With a population of 73,500 in 2021, the closest metropolitan city to the Project site is Bowling Green, Kentucky, which is located about 40 miles to the south-southwest of the Project site.[22]

Income. In 2021, the per capita personal income in Hart County was $22,779. This was 26 percent less than the average per capita personal income of the Commonwealth of Kentucky, and 39 percent less than the average in the United States. As of mid-2021, about 20 percent of the Hart County population lived in poverty.[23]

Business and industry. In 2021, there were about 8,960 jobs in Hart County, with 60 percent classified as wage and salary jobs and 40 percent being proprietors' employment.[24]

> Manufacturing and nonfarm proprietors are the two largest employment sectors in Hart County, with 2,299 and 2,382 jobs, respectively.[25] The area is centrally located near many U.S. highways and interstates and the existent of railways and commercial airways provides direct access to much of the U.S. Some of the major manufacturers in the county: Dart Container Corporation (food service products such as Solo brand cups, plates, lids, etc.), Sister Schubert Homemade Rolls (frozen baked breads), T. Marzetti Company (national brand salad dressings, croutons, frozen breads), Interstate Hardwoods (housing lumber), Roundstone Native Seed (plant seeds for a variety of regions across the US), Geothermal Supply Company (geothermal products such as polyethylene pipe, prefabricated vaults, and custom headers).[26,27]
>
> Farm work is the next largest sector in Hart County, with about 1,200 jobs as farm proprietors and 300 jobs as farm employees. In 2017, crops made up 52 percent of the

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[21] Kentucky State Data Center, Projections of Population and Households, State of Kentucky, Kentucky Counties, and Area Development Districts 2015 – 2040.
http://www.ksdc.louisville.edu/wp-content/uploads/2016/10/projection-report-v16.pdf
[22] U.S. Census Bureau. Bowling Green City QuickFacts.
https://www.census.gov/quickfacts/fact/table/bowlinggreencitykentucky,KY,US/PST045222
[23] U.S. Census Bureau. Hart County, State of Kentucky, and US QuickFacts.
https://www.census.gov/quickfacts/fact/table/hartcountykentucky,KY,US/PST045222
[24] U.S. Bureau of Economic Analysis. Hart County, Total Full-Time and Part-Time Employment.
https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&acrdn=6
[25] U.S. Bureau of Economic Analysis. Hart County, Total Full-Time and Part-Time Employment.
https://apps.bea.gov/iTable/iTable.cfm?reqid=70&step=1&acrdn=6
[26] Hart County Chamber of Commerce. Directory.
https://business.hartcountyky.org/directory/Search/manufacturing-production-wholesale-340949?cid=341010
[27] Hart County Chamber of Commerce. Industries. https://hartcountyky.org/hc-me/industry/

agricultural market in Hart County and livestock accounted for 48 percent. The top crops by acreage are forage (hay), soybeans for beans, corn for grain, and tobacco.[28]

The Government sector includes 900 jobs. Retail trade follows with 760 jobs.

Outside of Hart County, two Ford Motor Company plants will soon begin operations in Glendale, Kentucky, about 25 miles north of Munfordville. Those facilities include a battery plant and a production plant for Ford Escapes and Ford Explorers; together, those two plants are expected to require about 5,000 employees. In the opposite direction, a Nissan battery plant is planned for the Bowling Green area. The location of Hart County between those new developments may make the county an attractive place to live, which may potentially lead to increasing population, income and property values.[29]

Major and minor roads and railways. The Project site is bounded on the north by Rowletts Cave Springs Road, on the east by U.S. Highway 31W (US 31W), and on the west by Interstate 65 (I-65). The Louisville and Nashville (L&N) Turnpike Road (KY-335) generally borders the Project site to the south. U.S. Highway 31W is the direct route north to the city of Munfordville and south to the city of Horse Cave from the Project site. Interstate 65 is directly west of the Project site and runs from the southern border of Alabama to the northern border of Indiana. A CSX Transportation railway route runs north-south to the east of the Project site, but there are no rail stops in Hart County.

Overall area description. Based on HE's research, the area around the Project site can be generally described as rural with a few residences and farms nearby, as well as the small community of Rowletts. Just north of the Project site is the Battle of the Bridge Historic Preserve, the location of a civil war battle fought over control of the bridge over the Green River (built in 1859).[30] The Project site is also about 13 miles east of the easternmost access points to Mammoth Cave National Park.[31] Some caves extend into the City of Horse Cave.

Overall, Hart County is a relatively rural county. The population is expected to remain relatively constant over the next 15 to 20 years, with the potential to grow given the development of the auto industry to the north and south of the County. Manufacturing and agriculture are major sources of employment and income. Income levels are low, and county residents currently experience a slightly higher rate of poverty as compared to the Commonwealth of Kentucky.[32]

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[28] Kentucky Food and Farm. County Ag Data. Hart County. https://www.kyfoodandfarm.info/county-data/2021/3/8/washington-county-skg9n-awt5k-c5g7e-4w75n-sywsl-nxwez-ekpms-2rptb-83csm-acxnc-a8hb7

[29] It is possible that the Kentucky State Data Center population projections for Hart County did not consider the effects of the Ford and Nissan plants to the larger region.

[30] Battle for the Bridge Preserve. The L&N Rail Bridge History. https://battleforthebridgepreserve.com/the-l%26n-rail-bridge

[31] Adventures of Mammoth Cave. https://adventuresofmammothcave.com/

[32] U.S. Census Bureau. Kentucky QuickFacts. https://www.census.gov/quickfacts/fact/table/KY/POP060210

SECTION 5
Description of Impacts

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

Compatibility of the facility with scenic surroundings;

Potential changes in property values and land use for adjacent property owners;

Anticipated peak and average noise levels;

Road and rail traffic, fugitive dust and anticipated degradation of roads and lands; and

Economic impacts on the region and the state.

The 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 Siting Board also directed HE to address the potential effects of decommissioning activities, and that discussion is included in this section.

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

Facility Compatibility with Scenic Surroundings

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

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

Visual Impact Assessments for Renewable Energy Projects; that document is a guide designed to help planners evaluate the quality and completeness of visual impact assessments for solar and wind facilities.[33] Additional reports have been published from public agencies and private firms on visual impact assessments for solar facilities.

Most visual impact assessments focus on visualization of the appearance of the project from key observation points (KOPs). Since it is impossible to visualize proposed projects from every observation point, it is common for planners to utilize a "worst-case" potential visual impact, i.e., locations where perceived change may be greatest. The overarching goal of visual impact assessments is to determine potential visual impacts that may result from construction, operations, and decommissioning of a project, in a manner that is logical, repeatable, and defensible.[34]

A standard visual analysis generally proceeds in this sequence:[35]

Description of the project's visual setting;

Identification of KOPs. KOPs are locations near the project site where there is potential for solar facility components to be seen from ground-level vantage points, i.e., a nearby residence or a passing vehicle;

Analysis of the visual characteristics of the project, i.e., height of solar panels, descriptions of other facility components; and

Evaluation of impacts from KOPs.

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

Safety impacts, such as the potential to disorient motorists when driving or pilots when taking off or landing; or

Annoyance impacts, such as distraction, after-image in the viewer's vision, or temporary avoidance of a view due to the presence of reflected light.

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

[33] 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/.
[34] Dean Apostol, James Palmer, Martin Pasqualetti, Richard Smardon, Robert Sullivan. (2016). *The Renewable Energy Landscape: Preserving Scenic Values in our Sustainable Future*. September 2016.
[35] Environmental Design & Research. *Visual Impact Analysis*. May 2019.

including the use of anti-glare panels, appropriate panel location and growth of vegetative buffers.

Summary of information provided by the Applicant. The existing scenic setting of the area, potential visual impacts associated with the Project and proposed mitigation are addressed in several portions of the SAR.

Scenic surroundings. As described in Section 2, the Project Area is predominantly agricultural fields, with limited forested areas. Agricultural uses include row crops, hay fields, and grazing pastures. Similar to its surroundings, the Project Area is located on gently rolling terrain. The northwestern portion of the Project Area is traversed by an existing natural gas pipeline right-of-way (ROW), as well as a portion of the EKPC 69-kV overhead electric transmission line ROW to which the Project will connect. This portion of the Project Area consists of open pastureland interspersed with trees along internal fencerows; some portions of the property are occasionally used for row-crop agriculture. Dense fencerow vegetation also exists along much of the Project Area boundary. The southeastern portion of the Project Area includes vegetated fencerows and a 23-acre area of forest that will be preserved by the Project. The existing EKPC 69-kV overhead electric transmission line extends within this portion of the Project Area as well.

The area surrounding the Project site is described as consisting of rolling terrain of a generally rural character. Scattered residences and farms are located along Rowletts Cave Springs Road. Several homes are located along G Wilson Lane; some of the homes in this area qualify, on a density basis, as a "residential area." Residences, businesses and religious facilities are located along KY-335. The Town of Rowletts is located to the east of the Project site; rental residences and a storage facility are located adjacent to the Project site. Other areas surrounding the Project site generally consist of farmed or wooded open land.

The CSX Transportation Railroad (CSXT) rail line runs in a north-south direction along the eastern edge of the Project site. I-65 runs in a generally north-south direction to the west of the Project site; the Horse Cave Rest Area on I-65 is located west of the Project site.

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

Potential visual impacts from Project operations. During operations, different Project components may result in visual impacts to local residents and drivers. Sections 2 and 3 of the SAR describe the look of various components:[36]

> *Solar panels:* The Project would include approximately 130,000 solar panels.[37] Solar panel heights will not exceed 15 feet from the ground at maximum tilt and will be at

[36] The locations of the panels, inverters, and the substation and switchyard are shown in Exhibit 3-1 of this report.
[37] Figure 7 of the SAR provide an illustration of the tracking panels.

lower heights during much of the day, as the panel angle shifts to follow the sun. The panels will use anti-reflective technology to minimize reflection.

Inverter skids: A total of 15 inverters will be installed throughout the Project site. Equipment will be placed on a concrete slab or pier foundation, which may be precast and assembled off-site.[38]

Project Substation and Switchyard: The Project Substation and Utility Switchyard will be located adjacent to the existing approximately 85- foot-tall EKPC 69-kV overhead electric transmission structures and will be surrounded by a 7-foot-tallchain link fence that complies with required security standards.

Weather stations: The Project will include up to two monitors of up to 15 feet in height, which will track weather conditions that have an impact on the Project's performance and efficiency. It is expected that one will be located within the northwestern portion of the Project, and the other in the southwestern area.

Collection lines: The modules will be connected using DC cables that can either be buried in a trench or attached to the racking system. From the inverters, AC collection lines will extend toward the Project Substation to allow generated electricity from all of the modules to interconnect at that point. The AC collection system is anticipated to be underground and/or in cable trays below panel height. Underground segments of the AC collection system will be buried a minimum of 3 feet below grade. Approximately 18,000 linear feet of collection system cable routing is reflected within the Project Area. Where possible, collection cables will be co-located in common trenches and run adjacent to one another.

Fencing: Solar panels will be secured by an agricultural-style, 7-foot-tall fence, with taller wooden posts.[39] Approximately 38,150 linear feet of perimeter fence will surround the Project.

Internal roadways: Approximately 23,240 linear feet of private gravel access roads will be built for use within the Project Area. The roads are planned to be no more than 20 feet in width.

Proposed setbacks and location of facilities. The SAR states that Project features other than roadways, stormwater management grading, and landscaping will be set back at least 50 feet from the perimeter of the Project Area and at least 275 feet from any existing residence.

Exhibits 3-3 and 3-4 provide information regarding the proximity of residences and specific non-residential structures in relation to various Project structures. A total of 93 residences are located within 2,000 feet of the Project boundary. Two religious buildings and the Caveland Country Club are also located within 2,000 feet of the Project boundary line.

[38] Figure 10 of the SAR provides an illustration of a representative inverter.
[39] Figure 7 of the SAR provides a photo of agricultural style perimeter fence; essentially the fence is see-through.

Only one residential structure would be located within 300 feet of a solar panel; that residence would be 276 feet from a panel.

28 residential structures would be located within 1,200 feet of an inverter - the closest home would be 520 feet from an inverter.

Six residential structures within about 2,100 feet from the substation and switchyard. The closest residence is 714 feet from the substation / switchyard area.

The Kingdom Hall of Jehovah's Witness and the Rowletts Baptist Church are both located more than 500 feet from the closest solar panel.

A small private family cemetery is located in the northern portion of the Project site, on property currently owned by one of the Project landowners (shown in Exhibit 3-1).[40] The few headstones present are surrounded by a grove of trees that will remain within the Project site. The Applicant's proposed mitigation measures listed in the SAR state that the existing vegetative buffer will be left in-place around the cemetery, and a 50-foot setback from the grove will be used to mitigate impacts to the on-site cemetery.

A relatively large, forested area (23 acres) is located within the southern portion of the Project site (see Exhibit 3-1). The Applicant has stated that the forested area will remain intact and that no trees will be removed from that area for Project construction or operations.

Vegetative buffers and lighting. Except in locations where access to the Project Area is required, existing perimeter trees will be maintained and will continue to provide their existing visual screening. Trees planned for clearing consist of scattered trees and vegetated fencerows, totaling approximately 20 acres. The stand of trees encircling the private cemetery will remain.

The Applicant's Landscaping and Lighting Plan (Attachment I of the SAR) states that the landscaping plan is designed to utilize native plant material to complement the existing vegetation within and adjacent to the Project Area. In most instances, plantings are not intended to provide complete screening of the Project; rather, the plantings are intended to provide intermittent screening and soften the view while providing ecological benefits through the creation of foraging and habitat areas for local wildlife. Depending on the location and distance of potential viewing locations adjacent to the Project, varying plant types and densities are proposed within the Project Area in order to provide an appropriate level of mitigation.

The Plan states that existing vegetation exists around the perimeter of the Project Area and that additional landscaping will fall under the heading of Standard Screening or Heavy Screening, depending on location.

Standard screening: primarily selected for use along roadways where panels are relatively proximate to local roadways, but specific dwellings are not adjacent. Consists of shrubs and trees of varying scale and form spaced to create visual

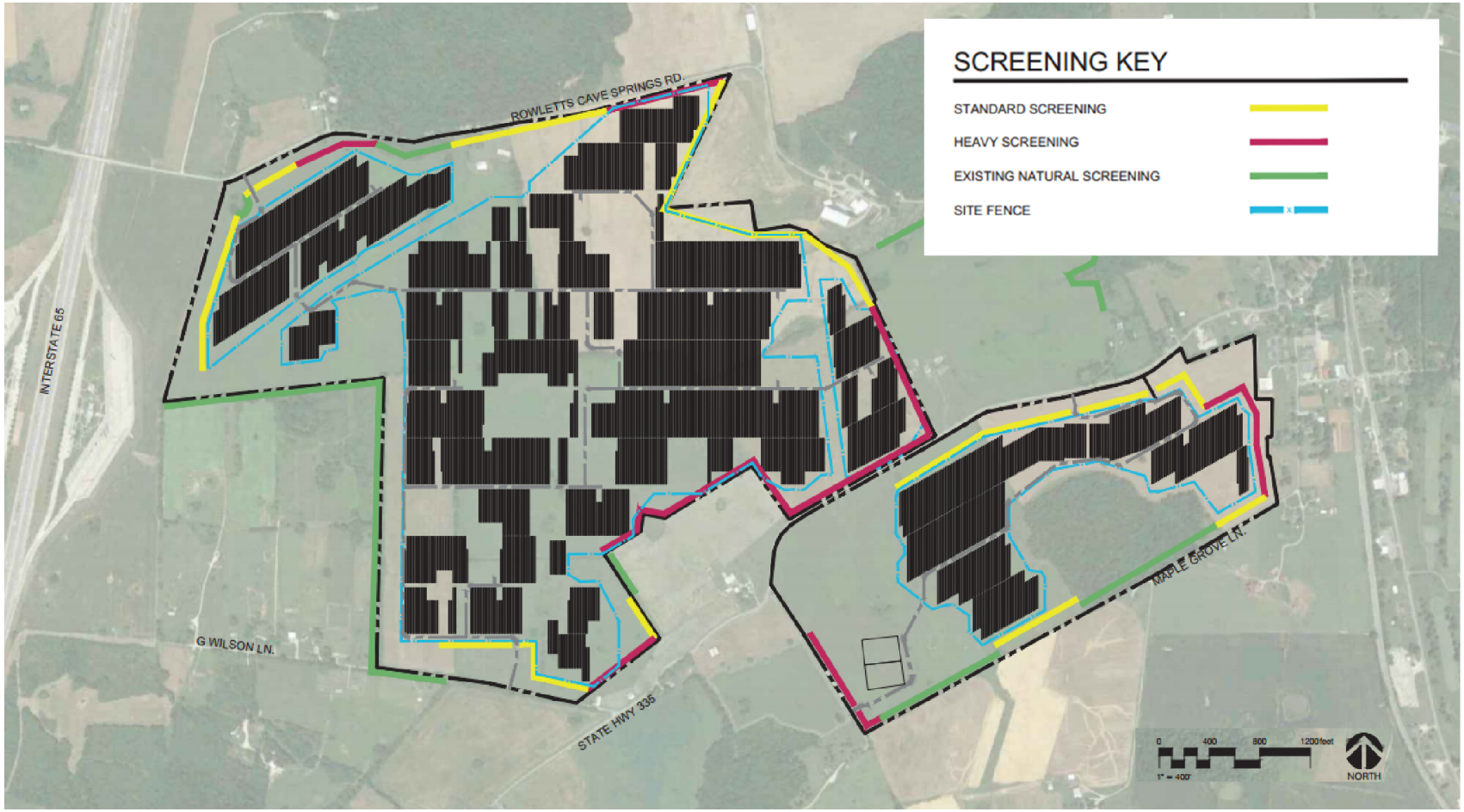
[40] The cemetery predates the current residents' ownership of the property. The current landowner is unaware of any requests for or need for public access to the cemetery.

interest, standard screening will provide partial screening and integration with the surrounding landscape.

Heavy screening: reflects an almost continuous stretch of plantings, consisting of tall deciduous and evergreen species as well as lower-growing shrubs. Species with varying coloration and size were selected for visual interest. While a considerably greater level of screening than standard screening, heavy screening is still intended to soften views toward the Project while allowing for longer-range line-of-sight.

Exhibit 5-1 provides the Applicant's landscaping plan, identifying areas of existing natural vegetation and proposed standard and heavy screening.

Exhibit 5-1.
Thoroughbred Solar Project Landscaping Plan



Source: Thoroughbred Solar, LLC, October 2022.

Figures 12 and 13 of the SAR provide "before and after" views of the Project site from two different locations (one on Rowletts Cave Springs Road and one on Maple Grove Lane).

The Applicant's Landscaping and Lighting Plan also addresses lighting during construction and operations. The Plan states that Lighting for the Project will be designed to have minimal impact on the surrounding community while providing for safe operations.

During construction, no lighting is proposed within laydown areas, although it could be added as needed, should safety or vandalism issues be identified. Lighting during construction is anticipated to be minimal and will be restricted to construction hours. To the extent practicable, lighting will be oriented toward the interior of the Project, away from roadways and adjacent residences.

Downlit security lighting will be used at Project entrances, the Project Substation, the Utility Switchyard, and at inverters. All fixtures will be oriented toward the Project and, to the extent appropriate for the purpose, be directed downward. Motion sensing lights can be used at site entrances, while inverter lighting can be task lighting that would be manually turned on only in the event nighttime maintenance was required. It is expected that the electrical substation and utility switchyard associated with the Project will require lighting to remain on for security purposes; full cutoff optics will be used to reduce unwanted fugitive light.

Potential for glare from Project panels. The Applicant provided a Glare Analysis (Attachment H of the SAR). The analysis states that since panels are designed to absorb sunlight to generate electricity, the potential for glare is anticipated to be minimal. In addition, Thoroughbred Solar proposes to install panels coated with an anti-reflective coating to further minimize the potential for glare.

The analysis evaluates potential glare from the Project at eight different route receptors (along roadways) and six different observation points at specific residences.[41] Using the GlareGauge solar glare modeling tool, results indicate that although glare could result from the Project for nearby modeled receptor locations, modeled impacts are limited, and actual impacts are expected to be even less. For example, the model does not account for intervening terrain or vegetation that may obstruct views of certain panel areas. Additionally, the analysis reflected in the glare study conservatively assumes that an anti-reflective coating is not used.

According to the modeling, certain locations might experience a few minutes of green or yellow glare at specific times of day, but given the topography, vegetation and anti-reflective coating on panels, no areas were identified for which glare is expected to be a significant concern.

HE's evaluation of impacts. HE reviewed maps and Google Earth satellite imagery of the site and used Google Maps to "drive" around the area to assess viewpoints of the Project from a vehicle commuter's point of view. In addition, HE staff made a visit to the Project site on December 8, 2022. During this site visit, we visited all proposed access points, drove around

[41] Locations of route receptors and observation points in relation to Project panels are illustrated in Figure 1 included in the Glare Analysis.

the property to gain line-of-sight to various viewpoints, and compiled a photo log of the Property boundary at different areas. The photo log index map and site photos can be found in Appendices A and B of this report, respectively.

Visual setting. With regard to the rural nature and "look" of the area, HE's site visit confirmed information provided by the Applicant and gathered as part of the Project evaluation. The area surrounding the Project is largely agricultural, but there are several homes in close proximity to the Project boundary, including several areas identified as residential neighborhoods.[42] Traffic in the Project area is generally light, especially on smaller, local roads; KY-335 and US 31W are more heavily traveled. The CSXT Railroad line runs along the east side of the Project site.

Local roads surrounding the Project site are paved; all local roads are relatively narrow. Existing vegetation includes trees, bushes and grasses, but vegetation is relatively sparse in different areas surrounding the Project site. Open agricultural fields occur throughout the area. The natural hilliness of the terrain surrounding the Project will help mitigate visibility for some residential areas, as well as for the nearby Rowletts Baptist Church, but increases visibility for other residences, such as those along Rowletts Cave Springs Road or John's Lane.

Construction activities. Some adjacent landowners and commuters driving along surrounding roads, including G Wilson Lane, Johns Lane, KY-335, Rowletts Cave Springs Road and Maple Grove Lane will be able to see construction equipment and activity as it occurs.

> There are relatively few homes surrounding the Project site, but some residences are close to the site and would be able to see trucks and other equipment during construction. These include homes along Wilson G Lane, Johns Lane, KY-335, Rowletts Cave Springs Road and Maple Grove Lane.
>
> Drivers on surrounding roadways, including local roads near the Project site, would be able to see construction activities occurring on the Project site since little vegetation exists in certain areas.
>
> The location of the three construction entrances suggests that construction traffic will be concentrated on KY-335, as well as small sections of G Wilson Lane and Johns Lane. Vehicle movement to other areas of the Project site would occur within the Project footprint and not on other local roads.[43]
>
> The Applicant has stated that it will implement a complaint resolution process to address potential issues during construction.

[42] Section 3 of this report describes the residential neighborhoods.
[43] Non-visual impacts of construction traffic, such as congestion or delays, are addressed later on in Section 5 of this report.

Because of the generally rural nature of the area, the small number of homes in close proximity to the Project site and the fact that construction will be temporary, occurring over about a 12-month period, HE expects the visual impacts from construction activities to be minimal.

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

> Existing vegetation in some areas surrounding the Project is sparse and the Project site has been largely cleared for agricultural purposes. Without the development of some type of visual barrier, the Project could be visible from many viewpoints (homes, roadways, etc.).[44]
>
> The Applicant's proposed buffering plan includes planting of trees and shrubs to mitigate potential viewshed impacts. As proposed, vegetative buffers appear to generally surround nearby residences, potentially shielding them from view of the Project. However, site specific circumstances (i.e., elevation) or time of year conditions (i.e., leafless trees in winter) may render portions of certain Project components visible in some locations at some point of the year.
>
> The Applicant has committed to working with local landowners and the public to resolve any potential issues related to operation of the Project.

Residences are scattered throughout the Project area, within varying distances from solar panels, inverters and other Project facilities. The smallest distance between a residence and a solar panel would be 279 feet; the smallest distance between a residence and an inverter would be 520 feet; and the smallest distance between a residence and the substation/ switchyard would be 714 feet.[45] Religious facilities in the area would be located at least 520 feet from a panel, at least 780 feet from an inverter, and more than half a mile from the substation.

An interview with the Hart County Judge Executive indicated that two homeowners adjacent to the Project site have voiced concerns about the Project, specifically related to the view of Project facilities from their properties.[46] One of those landowners may have a permanent view of the Project Substation and other facilities, even with the Applicant's landscaping plan, due to the topography in that area.[47] The Applicant is working with those landowners to mitigate concerns to the extent possible. An interview with the Hart County Assistant Property Value Administrator indicated some additional public concerns related to Project appearance.[48] The

[44] Homes located along Maple Grove Lane on the east side of the Project site may have the greatest view of Project facilities; many of these homes are rental units owned by a participating landowner.
[45] Of the 54 homes within 2,000 of the Project boundary, 48 are more than about half a mile from the substation/ switchyard.
[46] An interview with Mr. Joe Choate, the Hart County Judge Executive, was conducted during the site visit trip on December 8, 2022.
[47] Photos of this landowner's property and current viewshed were taken during the Project site visit and can be seen in Appendix B (see Exhibits B-2 through B-5).
[48] An interview with Ms. Missy Alvey, the Assistant Hart County Property Valuation Administrator, was conducted during the site visit trip on December 8, 2022.

Applicant's buffering plan and willingness to work with landowners to mitigate potential impacts should allay at least some of the public concern.

Without a vegetative buffer, the Project would be visible from some surrounding homes and roadways. However, if buffers are planted according to the Applicant's proposed buffering plan, HE would expect the visual impacts associated with the presence of Project facilities to be minimal for the majority of the area surrounding the Project site.[49] Visual impacts may be more moderate in some areas surrounding the Project while the vegetative buffers mature, during the winter months when vegetative cover is sparser, and for the few residences located at higher elevation in relation to the Project site.

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

> Construction vehicles and activity may be visible from local roadways and certain vantage points around the Project site, but these effects will be temporary as construction work moves around the site. Existing vegetation left in place along the Project boundary line may reduce visibility of construction activities occurring on-site in some areas, but natural vegetation surrounding the Project site is relatively sparse along most of the Project boundary. However, the area is relatively remote, with few residents or drivers along local roads, reducing the extent of visual impacts.
>
> Operational infrastructure, including the solar panels and inverter skids, will be mostly obscured to drivers along local roads, including, including G Wilson Lane, Johns Lane, KY-335, Rowletts Cave Springs Road and Maple Grove Lane, as well as to local residents surrounding the Project site, due to the planned vegetative buffering. Additionally, the existence of relatively few homes in close proximity to the Project will reduce the extent of visual effects.
>
> The substation/switchyard area will be located in the southern portion of the Project site, on the east side of Johns Lane. That area is relatively remote, located at a distance from most homes. In general, visibility of those components will be quite low. However, one neighboring property owner in opposition to the Project will likely have a permanent view of Project facilities due to the topography in that area.
>
> Only a small number of homes would be within 500 feet of any Project facilities. HE believes that the vegetative buffers proposed by the Applicant would largely shield Project components from view of local residents. A small number of homes may have partial views of certain Project facilities due to the topography of the area.

[49] Even with the proposed buffers, the homeowner on Johns Lane will likely be able to see the substation from the property, due largely to the existing topography.

The use of anti-glare panels will reduce, or eliminate, the potential for glare from solar panels for local residents and drivers. A glare study was performed by the Applicant's consultants and glare is not expected to be an issue.

Based on our understanding of the Project area in Hart County, HE believes that the Thoroughbred Solar facility would not be incompatible with existing scenic conditions with appropriate buffering. Development of vegetative buffers would support scenic compatibility between the Project and adjacent properties and land uses.

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

1. Existing vegetation between the solar arrays and nearby roadways and homes shall be left in place, to the extent feasible, to help minimize visual impacts and screen the Project from nearby homeowners and travelers.

2. The Applicant will not remove any existing vegetation except to the extent it must be removed for the construction and operation of Project components.

3. The Applicant shall implement planting of native evergreen along with some deciduous species as a visual buffer to mitigate viewshed impacts, particularly in areas directly adjacent to the Project without existing vegetation.

4. The Applicant shall carry out visual screening consistent with the plans proposed in its Application, including the Site Assessment Report, and ensure proposed new vegetative buffers are successfully established and develop as expected over time. Should vegetation used as buffers die over time, the Applicant shall replace them as appropriate.

5. Any changes to the vegetative buffering plan or site infrastructure layout (i.e., panels, inverters, etc.) included in the Application materials will be submitted to the Siting Board for review. If the Siting Board deems those changes to be significant, the Siting Board may require the Applicant to further modify the buffering plan.

6. The Applicant shall provide a visual buffer between Project infrastructure and residences or other occupied structures with a line of sight to the facility to the reasonable satisfaction of the affected adjacent property owners. If vegetation is used, plantings should reach eight feet high within four years. To the extent that an affected property owner indicates to the Applicant that a visual barrier or vegetative buffer is not necessary, Thoroughbred Solar will obtain that property owner's written consent and submit such consent in writing to the Siting Board.

7. Landscape screening will extend and connect to existing site vegetation, if any, to help create a more natural transition between existing vegetation and Applicant developed vegetation.

8. The Applicant will develop a written vegetation management plan that describes the approach and procedures for maintaining or replacing vegetative buffers as needed.

9. The Applicant shall use grasses and pollinator seed mixes that support native birds, insects and other species as part of the planned landscaping buffers.

10. The Applicant will avoid the tree grove surrounding the private family cemetery located within the Project site, leaving all existing vegetation surrounding the cemetery in place during construction and operations.

11. The Applicant will not remove any trees or other vegetation within the 23-acre forested area located within the Project site.

12. The Applicant will use anti-glare panels and operate the panels in such a way that glare from the panels is minimized or eliminated. The Applicant will immediately adjust solar panel operations upon any complaint about glare from those living, working, or traveling in proximity to the Project. Failing this, the Applicant will cease operations until the glare is rectified.

13. The Applicant will work with homeowners and business owners to address concerns related to the visual impact of the Project on its neighbors.

Potential Changes in Property Values and Land Use

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

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

Several methods are available to assess the impacts of a new development on nearby property values. A technique known as hedonic pricing analysis can be used to determine the impacts of a specific characteristic on the price or value of a property. However, this method of valuation requires large amounts of data, statistical experience, and careful evaluation. Formal appraisal is a technique which uses the concept of specific property characteristics in comparing different properties. Matched pair analysis is another technique. A matched pair

analysis makes a comparison between similarly situated properties that sold before and after a new industrial facility is constructed. This approach is described in more detail below.

Summary of information provided by the Applicant. The Applicant's consultant, CohnReznick LLP, completed the Adjacent Property Value Impact Report (Attachment J of the SAR). Referred to here as the CohnReznick report, that document, along with additional follow-up information from the consultant, provides the following relevant information:

* 5 * * +The *
CohnReznick report provides summaries of three academic reports addressing property value impacts of solar facilities. Several property value impact studies and real estate assessor reports prepared by other experts were also reviewed. The CohnReznick report concludes that "These published studies and other valuation expert opinions, conclude that there is no impact to property adjacent to established solar farms."

A 2020 University of Rhode Island study found no negative impact to residential homes near solar arrays in rural areas.[50]

A 2020 Georgia Institute of Technology Study found "no direct negative or positive spillover effect of a solar facility construction on nearby agricultural land values. Although there are no direct effects of solar facilities on nearby agricultural land values, we do find evidence that suggests construction of a solar facility may create a small, positive, option-value for landowners that is capitalized into land prices. Specifically, after construction of a nearby solar facility, we find that agricultural land that is also located near transmission infrastructure may increase modestly in value."

6 3 & 5 7 * 8 (8)+
The CohnReznick report describes an interview with the Grant County PVA, Mr. Elliot Anderson, regarding the impacts of a Duke Energy solar facility near Crittenden.[51] Based on completed and upcoming property sales subsequent to the commencement of project operations, Mr. Anderson concluded that "the solar facility had no impact either on adjoining home values or on marketability or desirability of those homes adjacent to the solar farm".[52]

9 7 – CohnReznick staff contacted market participants such as appraisers, brokers, and developers familiar with property values around solar facilities. A list of more than 30 people contacted across multiple states and summary findings of each conversation are provided in the report. All of the interviews indicated no impacts to property values due to adjacency to solar facilities.

[50] HE reviewed this study as part of the evaluation of property value impacts. HE's comments and conclusions related to that study are presented in a later portion of this report.
[51] It is unclear from the report whether the CohnReznick staff conducted the interview. The date of that interview is not cited.
[52] The Crittenden Solar Power Plant is a 2.7 MW facility on about 110 acres. It includes about 11,500 solar panels. At that scale, it is much smaller than the Thoroughbred Solar Project.

. * * * – The CohnReznick report employs an analytical approach described as a paired sale analysis, which "can be utilized to extract the effect of a single characteristic on value." The report provides the following description of this approach:

> *"One of the most useful applications of the sales comparison approach is paired sale analysis. This type of analysis may compare the subject property or similarity impacted properties called* 4 *with unimpaired properties called* & *A comparison may also be made between the unimpaired value of the subject property before and after the discovery of a detrimental condition. If a legitimate detrimental condition exists, there will likely be a measurable and consistent difference between the two sets of market data; if not, there will likely be no significant difference between the two sets of data. This process involves the study of a group of sales with a detrimental condition, which are then compared to a group of otherwise similar sales without the detrimental condition."*[53]

Essentially, assuming that the presence of a solar facility might constitute a "detrimental condition," the CohnReznick analysts compare sales prices of properties adjacent to (Test Areas) and further from (Control Areas) solar facility properties. The report provides detailed information for ten different solar facilities, including project data (acreage, generation, date of operation) and property sales data.

CohnReznick conclusions. The CohnReznick analysis focuses on data associated with 11 separate solar facilities (some facilities include multiple "groups" reflecting different locations or development phases around the solar project. The report states that "overall, the vast majority of the surrounding acreage for each comparable solar farm is made up of agricultural land, some of which have homesteads. There are also smaller single-family home sites that adjoin the solar farms analyzed in this report. Generally, these solar farms are sound comparables to Leeward Renewable Energy Development, LLC's' proposed solar project [Thoroughbred Solar] in terms of adjoining uses, location and size."

The CohnReznick report provides the following conclusions:

> The solar facilities analyzed reflected sales of property adjoining an existing solar farm (Test Area Sales) in which the unit sale prices were effectively the same or higher than the comparable Control Area Sales that were not near a solar farm. The report's conclusion is that there is no negative impact on improved residential homes adjacent to solar, nor agricultural acreage. This was confirmed with market participants interviews, which provided additional insight as to how the market evaluates farmland and single-family homes with views of the solar facility.
>
> CohnReznick concluded that since the Adjoining Property Sales (Test Area Sales) were not adversely affected by their proximity to the solar facility, that properties surrounding other proposed solar farms operating in compliance with all regulatory

[53] The CohnReznick report cites Randall Bell, PhD, MAI. Real Estate Damages. Third ed. Chicago, IL: Appraisal Institute, 2016. (Page 33).

standards will similarly not be adversely affected, in either the short- or long-term periods.

Based upon the examination, research, and analyses of the existing solar farm uses, the surrounding areas, and an extensive market database, CohnReznick concluded that __ * * * /
* , with regard to unit sale prices or other influential market indicators.

Together, Exhibits 5-2 and 5-2 provide a summary of the CohnReznick analysis and conclusions. Exhibit 5-2 focuses on residential sales, while Exhibit 5-3 focuses on land sales.

Exhibit 5-2.
CohnReznick Paired Sale Analysis Conclusions – Single Family Residential Properties

Solar Farm	Number of Test Area Sales	Number of Control Area Sales	Median Price per Sq Ft (Test Area)	Median Price per Sq Ft (Control Area)	% Diff	Impact Found
Single-Family Residential						
Sunshine Farms Group 1	2	6	$192.48	$190.99	**0.78%**	No Impact
North Star Solar Group 1	3	11	$151.93	$139.50	**8.91%**	No Impact
North Star Solar Group 2	1	10	$119.82	$116.33	**3.00%**	No Impact
North Star Solar Group 4	1	7	$172.41	$170.86	**0.91%**	No Impact
North Star Solar Group 5	1	8	$205.09	$170.88	**20.02%**	No Impact
North Star Solar Group 6	1	4	$114.48	$120.49	**-4.99%**	No Impact
North Star Solar Group 7	1	11	$156.84	$135.63	**15.64%**	No Impact
North Star Solar Group 8	1	5	$139.70	$132.68	**5.29%**	No Impact
North Star Solar Group 9	1	8	$101.63	$103.95	**-2.22%**	No Impact
Indy Solar III Group 2	4	8	$59.10	$57.84	**2.18%**	No Impact
Indy Solar III Group 3	7	11	$72.15	$71.69	**0.65%**	No Impact
Dougherty Solar	1	5	$74.55	$76.23	**-2.21%**	No Impact
Barefoot Bay Solar Group 2	5	126	$95.90	$93.95	**2.07%**	No Impact
Innovative Solar 42 Group 1	1	7	$107.09	$100.18	**6.91%**	No Impact
Innovative Solar 42 Group 2	1	7	$111.77	$105.34	**6.10%**	No Impact
Rutherford Farm	1	6	$53.46	$52.49	**1.85%**	No Impact
Elm City Solar	1	8	$56.60	$55.57	**1.85%**	No Impact
Woodland Solar	1	5	$144.63	$137.76	**4.99%**	No Impact
DTE Lapeer Solar Group 1	3	6	$105.26	$99.64	**5.65%**	No Impact
DTE Lapeer Solar Group 2	1	5	$114.12	$113.01	**0.98%**	No Impact
DTE Lapeer Solar Group 3	1	4	$94.84	$96.32	**-1.53%**	No Impact
Median Variance in Sale Price for Test to Control Areas - Residential					***2.07%***	

Notes: (1) Each solar facility included in the CohnReznick analysis is described in detail in the CohnReznick report included in the SAR.

(2) The average distance between a solar panel and a residence ranged from 180 feet (North Star Solar Group 4, Rutherford Farm) to 800 feet (North Star Solar Group 8).

Source: Thoroughbred Solar, LLC, October 2022.

Exhibit 5-3
CohnReznick Paired Sale Analysis Conclusions – Land Sales

Solar Farm	Number of Test Area Sales	Number of Control Area Sales	Median Price per Acre (Test Area)	Median Price per Acre (Control Area)	% Diff	Impact Found
Land (Agricultural / Single Family Lots)						
Sunshine Farms Group 2	1	9	$67,500	$49,900	**26.10%**	No Impact
Indy Solar III Group 1	1	4	$8,210	$8,091	**1.47%**	No Impact
Miami-Dade Solar	3	6	$82,491	$81,686	**0.76%**	No Impact
Barefoot Bay Solar Group	2	7	$54,500	$51,000	**6.86%**	No Impact
Median Variance in Sale Price for Test to Control Areas - Land					**4.17%**	

Notes: (1) Each solar facility included in the CohnReznick analysis is described in detail in the CohnReznick report included in the SAR.

(2) The average distance between a solar panel and the land lot ranged from 290 feet (Indy Solar III) to 766 feet (Miami-Dade Solar).

Source: Thoroughbred Solar, LLC, October 2022.

HE's evaluation of impacts. To assess the topic of impacts to property values, HE: (1) reviewed relevant existing literature related to solar facility impacts; (2) conducted an interview with the Hart County Assistant Property Valuation Administrator; (3) requested additional information from CohnReznick regarding their analyses and conclusions; and (4) examined the potential for impacts to residential and other properties closest to the Project.

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

> A 2020 study completed by economists at the University of Rhode Island found that in areas of high population density, houses within a one-mile radius depreciate by about 1.7 percent following construction of a solar array. The study found "substantially larger negative effects for properties within 0.1 miles and properties surrounding solar sites built on farm and forest lands in non-rural areas." However, additional analysis focused on impacts in more rural areas found that the "effect in rural areas is effectively zero (a statistically insignificant 0.1%) and that the negative externalities of solar arrays are only occurring in non-rural areas." The researchers note that this may be due to solar facilities being less visible in rural areas (due to land abundance for vegetative buffers).[54]
>
> A 2020 study focusing on the property value effects of wind turbines and solar facilities in the Netherlands states evidence suggesting that the negative effects of solar facilities (including noise (buzzing sounds), glare and visibility) results in

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

decreased residential housing prices (2-3%). They found these effects to be localized (within 1km of the facility, or a little more than half a mile). However, the researchers also note that the relatively small number of solar facilities in the Netherlands makes the results less precise (as compared to the wind farm analysis).[55]

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." [56]

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."[57]

Independent appraisers are often hired to conduct analyses related to property value impacts for solar companies, as is the case here for the Thoroughbred solar facility. Those analyses focus on property value trends of lands adjacent to existing solar farms across the country, using a paired sales or matching pair approach. HE reviewed several appraisal reports; those appraisals indicate differences in property values ranging from about -3.2% to as much as +27%, although generally in cases with positive impacts, property values increased by about 5% or less. Overall, the conclusions were that solar facilities do not negatively impact property values.[58]

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

[56] 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/.

[57] 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.

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

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.

Interview with the Hart County Assistant Property Valuation Administrator (PVA). HE spoke with Ms. Missy Alvey on December 8, 2022, as part of the in-person site visit; she has been employed at the PVA's office since 2002 and has a Senior Kentucky Assessor (SKA) designation. Ms. Alvey commented that the Project has not been a major topic of conversation in the PVAs office; no inquiries about the Project have come through the office and no one has voiced opposition to the Project to the PVA. Ms. Alvey attended a Chamber of Commerce luncheon where Thoroughbred Solar was present; she indicated that concerns were voiced by various attendees, some of which were related to the appearance of Project facilities and property values.

Ms. Alvey stated that property values in Hart County have doubled to tripled in recent years, beginning about the time that the COVID-19 pandemic began. For example, current farmland prices are at about $2,700 per acre, at a minimum, as compared to between $1,500 and $2,000 an acre historically. One particular property recently sold for $4-5,000 per acre; another for about $10,000 per acre. Some of the farmland properties will be developed as sub-divided residential housing. Ms. Alvey believes there are several factors contributing to the increase in property values, including the desire to move out of more urban areas as a result of COVID and employment opportunities and commercial growth supported by several large industrial developments coming into the general area (Ford Motors – battery plant and vehicle production; Nissan battery plant). Additionally, Hart County is located between Louisville and Bowling Green, both large growth areas.

Ms. Alvey did not provide much comment regarding the potential for the Thoroughbred Solar Project to affect property values, but believes the Project could have a negative effect on values.

Evaluation of the CohnReznick report and conclusions. The CohnReznick report concludes that there are no impacts on property values associated with proximity to a solar facility (Exhibits 5-2 and 5-3). HE closely examined the solar projects, data and conclusions provided in the CohnReznick report and we offer the following observations and comments:

> For the 11 solar facilities analyzed, the average distance between a residence and a solar panel ranged from 180 feet to 800 feet. For the Thoroughbred Solar Project, homes are located between 279 feet and 2,165 feet from solar panels, with an average of distance between residence and panel of about 1,082 feet.[59] Therefore, the CohnReznick analysis and conclusions may also reflect outcomes related to the Thoroughbred Solar Project in Hart County.

[59] This includes all 93 residences within 2,000 feet of the Project boundary.

For the 11 solar facilities analyzed, the size of the solar facilities evaluated ranged from about 8.6 MW up to 120 MW and from an overall property size of 121 acres (20 MW facility) up to 1,037 acres (120 MW facility). At 50 MWs and about 530 acres, the proposed Thoroughbred Solar Project is similar in scale and size to the analyzed properties.

Portions of three separate solar projects (a total of four unique "groups") included in the analysis indicated negative differences in sales prices. The negative differences for three of those groups was small, -2.22 percent or less; the fourth group showed a larger negative difference. The majority of paired sales indicate positive price differentials.

The presence of vegetative buffers could be a factor in the sales prices of homes near solar facilities. Vegetative buffering surrounding the solar farms included in the CohnReznick analyses varied from existing vegetative buffering to vegetation planted by the developer to no buffering at all. CohnReznick stated that there appears to be no consistent difference in the paired sale analyses associated with the existence or extent of vegetative buffering around a solar facility.

Residential properties in close proximity to the Project site. Information obtained in HE's literature search indicates that impacts to the values of adjacent or surrounding properties may be related to the ability to see or hear the Project and that vegetation or other visual barriers may reduce the potential for adverse impacts to property values. Therefore, HE more closely examined the locations and situations of nearby residential properties in terms of distance to the Project and potential viewshed impacts when considering potential impacts to property values.

A small number of homes located along local roads adjacent to the Project site would be located close to Project facilities – one home would be 279 feet from a solar panel and 25 total residences would be within 600 feet of the panels (Exhibit 3-3). The closest home to an inverter would be 520 feet from that component. The substation/switchyard is more than 1,050 feet from nearby residences, with the exception of one home located about 714 feet from that specific area.

If vegetative buffers are developed as proposed by the Applicant to shield the Project from view, most residential property owners may not be able to see the solar panels or other infrastructure from their homes.

Due to the topography of the area, the one home located closest to the substation area will likely have a view of some Project facilities, even with the proposed vegetative buffering. That residence would be located more than 1,500 feet from the closest solar panel and more than 1,700 feet from the closest inverter.

Additionally, as described in the next section of this report (noise evaluation), operational noise levels are expected to be low, and Project generated noise level may not be noticeable to nearby residents.

Homes located at further distances from the Project panels may also benefit from vegetative buffers, in terms of alleviating any concerns related to property value impacts in general.

Conclusions and recommendations. Based upon review of the CohnReznick 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:

Certain literature and our interviews suggest that concerns surrounding impacts to property values from solar facilities stems from visibility of panels and other infrastructure. If that is the case, the creation of vegetative or other buffers may go a long way to reducing concerns or mitigating potential reductions in property values.[60]

Current research suggests that the existence of solar facilities does not, in general, measurably result in negative influences on property values for adjacent landowners in rural areas. HE's data analyses also generally point to a conclusion of no discernible impacts to property values, although there may be a small risk of negative impacts and there may be specific exceptions.

Construction activities will be temporary, occurring over a period of about 12 months. Those activities will result in increased traffic and noise in the vicinity of the Project; however, homebuyers and those interested in buying other types of properties often have a longer-term mindset when deliberating a purchase.

Existing vegetation is sparse in some areas surrounding the Project site, which may allow for partial views of the Project from some nearby locations, including homes and roads. The Applicant's vegetative buffering plan will reduce impacts related to the change in viewshed.

Operational noise levels are estimated to be below the World Health Organization's estimates of moderate or annoying noise levels for all nearby residences.

The Hart County Assistant Property Valuation Administrator (PVA) believes that property values could be affected by the presence of the solar facility but did not offer any specific evidence of that. The PVA's office has not fielded any specific concerns related to property values with regard to the Thoroughbred Solar Project.

According to the Hart County Assistant PVA, the real estate market in Hart County is currently strong and property (home and land) prices are increasing, due in part to upcoming planned commercial and industrial development in the region. The desirability of the area for both residential and commercial purposes appears high.

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

HE concludes that property values in the Project area and in Hart County are unlikely to be affected by the siting of the Thoroughbred Solar facility. This conclusion assumes that the mitigation strategies discussed in Section 6 are adopted by Thoroughbred Solar.

Need for mitigation. No unique mitigation measures are recommended related to potential impacts to property values or adjacent land uses because other mitigation can accomplish this. However, close coordination by the Applicant with impacted and concerned homeowners regarding potential visual impacts and impacts from noise, traffic or other Project activities should be initiated.

Anticipated Peak and Average Noise Levels

Noise issues stem from construction activities and operational components of the solar facility. During construction, noise emitting equipment will include a rock drill, forklifts, a boom truck, horizontal directional drilling, concrete trucks, a pile driver, a trencher, a bulldozer, and other construction equipment. During operations, noise will be emitted from transformers, inverters, and the tracking motors that tilt the panels to track the sun throughout the day. Distance from noise emitters to noise receptors is important since noise levels decrease the further a noise receptor is from a noise emitter. Hart County does not have a noise ordinance.

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

Generally speaking, an increase in 10 dBA is perceived as a doubling of loudness, which is to say, 70 dBA is perceived as twice as loud as is a level of 60 dBA.[61] A change of three decibels is barely noticeable, but a change of five decibels is typically noticeable. Once sounds reach 90 dBA humans can experience pain from the noise and sounds above 150 dBA can cause permanent hearing damage.[62] For additional context, 30 dBA is the sound emitted by a whisper, 55 dBA are emitted from a percolating coffeemaker, and 90 dBA would be the sound emitted by an individual's yell.

A standard noise impact assessment focuses on several key factors:[63]

Measurement of existing ambient noise levels;

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[61] 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

[62] 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.

[63] 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;

Identification of noise-sensitive receptor sites;

Calculation of distances between noise sources and sensitive receptors;

Estimation of project-related (construction or operational) noise production and exposure, including cumulative noise effects.

Summary of information provided by the Applicant. Attachment G of the SAR is the Thoroughbred Solar Sound Modeling Study prepared by RSG, Inc. (RSG). That technical report provides an assessment of sound emissions during both the construction and operational phases of the Project. Additional data on baseline ambient conditions and expected noise conditions during construction were provided in the Application and in response to the two Siting Board data requests.

Baseline (ambient) noise levels. As previously described, existing land uses in the Project area are mainly agricultural with rural residences and farmsteads and some undeveloped forest land. The area surrounding the Project site also includes the unincorporated community of Rowletts, a CSX Transportation (CSXT) railway line and US 31W (South Dixie Highway) to the east; Interstate-65 (I-65) and the Horse Cave Rest Area to the west; and local roads and scattered commercial and residential structures.

The CSXT railway is primarily a freight line that runs in a north - south direction to the east of the Project site. Traffic noise from I-65 and US 31W also contributes to the existing ambient noise profile of the area. The Applicant indicated that baseline noise levels varied across the Project site by time-of-day and location, with higher levels in the western part of the Project Area closer to I-65. The Applicant reported ambient sound levels across the Project site ranging from 47 to 59 dBA midday and from 38 to 50 dBA at night, although windy conditions would increase noise levels.[64]

Construction noise emitters. During the construction phase, a variety of heavy equipment will be utilized. Peak construction noise will be created by rock drills, boom trucks, forklifts, horizontal directional drills, pile drivers, concrete trucks, trenchers, rollers, dump trucks, and additional heavy equipment. At a distance of 50 feet, maximum noise levels for that equipment may range from about 67 dBA for a diesel generator to 92 dBA for a rock drill.[65]

The Applicant's consultant, RSG, utilized the equipment manufacturers' published maximum broadband sound power levels and CadnaA modeling software to conduct sound propagation modeling. RSG provided both the sound pressure levels by individual type of equipment and, separately, organized by construction phase, reflecting the types of equipment likely to be used. For each phase, cumulative sound pressure levels (multiple types of equipment used

[64] Ambient sound level ranges are representative of the L90s (the sound level exceeded 90 percent of the time) from four short-term monitors distributed across the Project Area, as provided in Applicant's response to the Siting Board's First Request for Information.

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

simultaneously) are provided by distance. Representative sound pressure levels by construction phase and distance are provided in Exhibit 5-4.

Exhibit 5-4.
Representative Sound Levels from Construction by Phase

Construction Phase	Equipment	Sound Pressure Level at 50 feet (dBA)	Sound Pressure Level at 280 feet (dBA)	Sound Pressure Level at 1,500 feet (dBA)	Distance to 55 dBA (feet)
Road Construction	Excavator, Dozer, Grader, Roller, Dump Truck	87	72	58	2,027
Substation Construction	Excavator, Dozer, Grader, Roller, Dump Truck, Concrete Trucks (Mixing & Pumper), Man-lift, Flatbed Truck, Crane (2)	90	75	60	2,759
Trenching	Excavator, Dozer, Trencher, Roller, Compactor, Flatbed Truck, Forklift	91	76	61	3,061
Inverter Construction	Excavator, Dozer, Grader, Roller, Dump Truck, Concrete Trucks (Mixing & Pumper)	90	75	60	2,663
Piling	Flatbed Truck, Boom Truck, Pile Driver	90	75	60	2,678
Racking	Flatbed Truck (2), Forklift (2)	91	76	62	3,221
Laydown Area	Flatbed Truck, Forklift (2), Skid Steer, Diesel Generator	89	74	59	2,420
Boring	Horizontal Bore Drill, Excavator	87	72	58	2,068
Rock Drilling	Rock Drill	92	77	62	3,342

Note: This is a cumulative representation of sound pressure levels by construction phase, assuming all sources operating simultaneously and in their loudest state.

Source: Thoroughbred Solar, LLC, December 2022, Harvey Economics.

RSG noted that its models were based on assumptions that the construction site was surrounded by hard ground without vegetation, and that the actual sound levels are likely to be lower than those presented in Exhibit 5-4 given the softer terrain and vegetative presence throughout the Project Area.

The Applicant has indicated that they will predominantly employ a 12-hour workday, from 7:00 am to 7:00 pm, Monday through Saturday. No construction will occur on Sundays. The SAR states that louder construction activities, such as racking and drilling, will be limited to daytime hours.

Pile driving activities are expected to occur over a period of about three to five months. Piling activity will move across the Project site such that noise impacts to individual residences will not occur over the entire three-to-five-month period; however, piling will overlap with many other construction activities, potentially including inverter construction, racking and boring.

The Applicant has indicated that non-participating residences will be located at a minimum of approximately 280 feet from any solar panel, where pile driving during construction will occur. As shown in Exhibit 5-4 above, sound levels during the piling phase of construction will reach approximately 75 dBA for a noise receptor located 280 feet away. Sound levels will be higher than 60 dBA for residences and other noise receptors within 1,500 feet and higher than 55 dBA for those located within 2,678 feet during the piling phase.[66] There are 70 residences within 1,500 feet of a solar panel and all 93 residences surrounding the Project site are within a 2,678-foot distance from any solar panel.

The Applicant has committed to additional measures to reduce construction sound levels in noise-sensitive locations. These measures include configuring construction so that loud equipment and activities occur further from those locations when feasible; utilizing construction equipment fitted with exhaust systems and mufflers when available; maintaining equipment and surfaces to prevent unnecessary noise; using back-up alarms that are the minimum increment above background noise allowable by OSHA requirements; staging materials and equipment away from these locations when feasible; and requiring use of approved haul routes to minimize noise near residences and noise-sensitive receptors

Operational noise emitters. RSG's noise modeling accounted for the following:

> Inverter skids – 15 skids scattered throughout the Project and a medium voltage transformer (MVT). The inverters have fans that typically operate both day and night.
>
> Substation transformer – a 69 kV transformer, which includes cooling fans. Cooling fans will typically operate only during daylight.
>
> Tracking motors – 1,654 tracking motors, one per row of panel modules. Tracking motors typically operate briefly and intermittently during daylight only.

Exhibit 5-5 provides the anticipated sound levels produced by this equipment during daytime and nighttime operations under the modeling performed by RSG.

[66] These sound levels do not account for existing ambient noise around the Project Area.

Exhibit 5-5.
Equipment Sound Levels during Operation, Day and Night Scenarios

Sound Source	Modeled Sound Power Level (dBA)	Operation Scenario	
		Day	Night
Inverter Skids	96	Y	Y
Tracking Motors	70	Y	N
Substation Transformer w/ Fans	95	Y	N
Substation Transformer w/o Fans	82	N	Y

Note: The distance at which these noise levels were measured was not stated in the RSG noise report.

Source: Thoroughbred Solar, LLC, October 2022.

RSG modeled operational noise from the Project using software designed to calculate the sum of individual sources of sound. Using the WHO's "Guidelines for Community Noise" of day/night sound levels to protect against moderate annoyance as a starting point, RSG adopted a design goal of 50 dBA for daytime and 45 dBA for nighttime operations to be conservative.

RSG placed a total of 79 discrete receivers at residences within 1/4 mile of the Project at a height of 13 feet above ground level. Most of the operational noise will occur during daylight hours; however, the substation transformer remains energized at night, which may produce some sound. The noise report provides sound modeling results at each location, for daytime and nighttime hours during operations. Exhibit 5-6 provides a summary of the model results.

Exhibit 5-6.
Summary of Operational Sound Levels for Residences near the Thoroughbred Solar Project

Receptor Type	Daytime Sound Level L_{eq} (dBA)			Nighttime Sound Level L_{eq} (dBA)		
	Min.	Max.	Avg.	Min.	Max.	Avg.
Residences	26	41	32	24	41	31

Note: These sound levels do not account for existing ambient noise around the Project Area.

Source: Thoroughbred Solar, LLC, October 2022.

Maximum sound levels (41 dBA) would be experienced by one residence located in the central portion of the Project area, about 525 feet from an inverter; sound levels at that location are lower at night without operation of the trackers, but the difference is less than 1 dB. The closest residence to the substation is located about 714 feet from that facility; modeling predicts sound levels of 36 dBA during daytime operations and 33 dBA at night for that residence.

Modeling results are illustrated in Exhibits 5-7 and 5-8, which show the distance from each inverter skid and from the substation at which sound levels are 55 dBA (red circles), 50 dBA

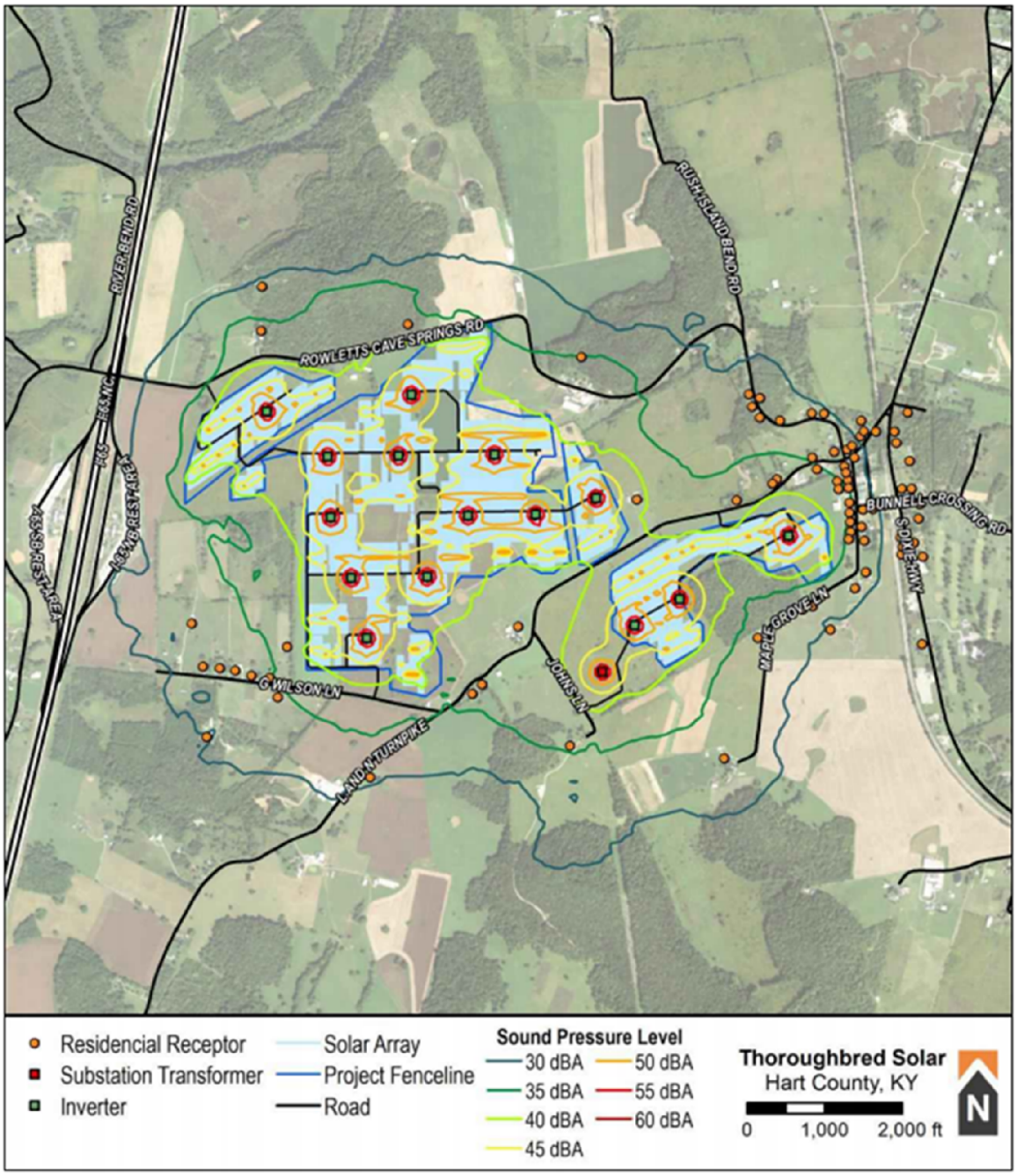
(orange contour circles) and 45 dBA (yellow contour lines) during daytime and nighttime operations.

Focusing on daytime operations and noise levels, Exhibit 5-7 indicates that all residences are outside of the 45 dBA sound contour. As described in Exhibit 5-6, the highest predicted sound level is about 41 dBA. Modeling of nighttime noise levels gives similar results. The RSG report concludes that "modeled sound levels at the worst-case residence are 41 dBA for both the daytime and nighttime scenarios."

In addition to the inverters and the substation transformers, routine maintenance and repair activities will occur during operations but will not materially impact noise levels in the area. Mowing will occur during daylight hours and will be similar to other farm-related noise in the area.

Exhibit 5-7.

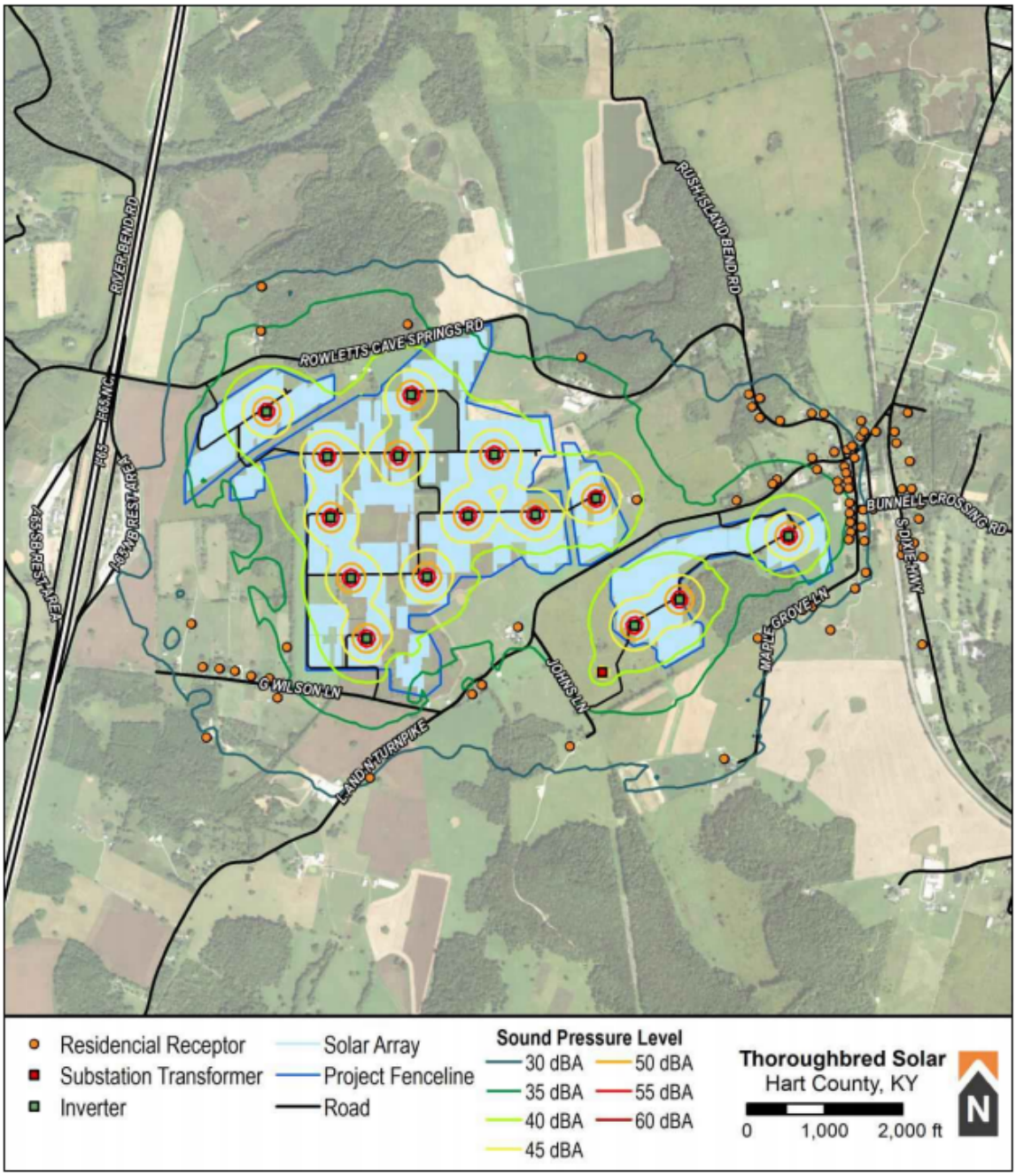
Sound Propagation Modeling Results for the Thoroughbred Solar Facility, Daytime Scenario



Note: These sound levels do not account for existing ambient noise around the Project Area.

Source: Thoroughbred Solar, LLC, October 2022.

Exhibit 5-8.
Sound Propagation Modeling Results for the Thoroughbred Solar Facility, Nighttime Scenario



Note: These sound levels do not account for existing ambient noise around the Project Area.

Source: Thoroughbred Solar, LLC, October 2022.

HE's evaluation of impacts. Neither the Commonwealth of Kentucky nor Hart County have a noise ordinance that is applicable to the Project. As such, HE utilized the noise limit recommendations generated by the Environmental Protection Agency (EPA) and the World Health Organization (WHO) to gauge acceptable levels of sound.

> The EPA determined that a constant sound of 70 dBA over a 24-hour period is enough to start causing permanent hearing loss for individuals, and a sound of 55 dBA outdoors is enough to cause activity interference and annoyance.[67]
>
> The WHO determined that daytime noise emissions greater than 55 dBA over a 16-hour period can cause serious annoyance, and noise emissions greater than 50 dBA over a 16-hour period can cause moderate annoyance. The WHO recommends limits of 45 dBA over an 8-hour period during the night.[68]

Construction noise. Construction activities will produce sporadic noise that will exceed 55 dBA during daytime hours. Residential noise-sensitive receptors less than 1,500 feet from pile driving locations will experience estimated sound levels of 60–75 dBA during pile driving. Rock drilling, trenching activity, road construction and other construction activities will also generate noise greater than 55 dBA at 1,500 feet. However, the nature of the Project, which requires that construction activities move around the site as each task is completed, will minimize the duration of the annoyance created by loud, though sporadic, noise.

The Project has the potential for a number of loud activities to occur simultaneously, but the timing of activities is such that it is not realistic to predict which sources of noise will contribute to these periods of cumulative sounds. The anticipated construction timeframe provided by the Applicant indicates a six-month site preparation period and many subsequent construction activities will overlap. The Applicant did provide some data on cumulative noise for different construction phases; however, it is unlikely that construction noise would be limited to that shown in Exhibit 5-4. Therefore, HE examined methods for calculating cumulative sound levels.

As a reference, one decibel is the "just noticeable difference" in sound intensity for the human ear.[69] However, the frequencies of different sounds will affect the perceived loudness of cumulative noise. "Compared with dB, A-weighted measurements underestimate the perceived loudness, annoyance factor, and stress-inducing capability of noises with low frequency components, especially at moderate and high volumes of noise."[70] This means that very different types of noises could have a greater cumulative impact than expected. Cumulative impacts from two noise sources can be calculated based on the difference in the sound levels as shown in Exhibit 5-9.

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

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

[69] http://hyperphysics.phy-astr.gsu.edu/hbase/Sound/db.html#c3

[70] https://www.softdb.com/difference-between-db-dba/

Exhibit 5-9.
Calculation of Additional Sound Power, in Decibels

Signal Level Difference between Two Sources (dB)	Decibels to Add to the Highest Signal Level (dB)
0	3
1	2.5
2	2
3	2
4	1.5
5	1
6	1
7	1
8	0.5
9	0.5
10	0.5
>10	0

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

This suggests that even multiple sources of loud noise will produce only modest increases to overall sound levels, providing the sources of noise are not of very different frequencies.

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

Operational noise. The nature of solar projects dictates that noise from operations will occur mainly during daylight hours. During operations, the closest residential receptor will experience noise levels of about 41 dBA. This is within the WHO's recommended maximum noise level of 50 dBA. HE concludes that, overall, noise impacts from Project operations will not create negative impacts.

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

> Construction phase noise will likely be annoying for residents surrounding the Project area for short periods of time. The intermittent nature of the noise might ameliorate the impacts, but residents close to the Project site might find construction noise to be troublesome even if it does not present actual damage to hearing.
>
> Thoroughbred Solar has stated that during the construction phase, general construction activity could take place as late as 9:00 pm and some non-noise-causing and non-construction activities may take place prior to 7:00am. However, it is likely that some noise, for example from worker vehicles, would occur during the early morning hours.

Noise occurring in the early hours of the morning and later hours of the evening will be minimized.

The current trend of employees working from home could make daytime noise more of an issue than it would have been previously.

Noise from Project components during operations (inverters, motors, transformer) is anticipated to result in small, if any, increases to the local sound environment, depending on location. In most locations, those increases would be unnoticeable to residents or drivers in the area.

The topography and existing vegetation in some areas might help mitigate noise emissions that may be caused by construction or operational components of the Project. Vegetative buffering proposed by the Applicant would also help to reduce operational noise impacts.

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

1. The Applicant shall notify residents and businesses within 2,400 feet of the Project boundary about the construction plan, the noise potential, and the mitigation plans at least one month prior to the start of construction.

2. The Applicant shall respond to any complaints related to noise levels or noise causing activities occurring during construction or operations via a formal and clearly developed complaint resolution program.

3. If pile driving activity occurs within 1,500 feet of a noise sensitive receptor, the Applicant shall implement a construction method that will suppress the noise generated during the pile driving process (i.e., semi-tractor and canvas method; sound blankets on fencing surrounding the Project site; or any other comparably effective method).

4. The Applicant should limit the noise-producing construction activity, process and deliveries to the hours of 8:00 am to 6:00 pm, Monday through Saturday. No construction work should be conducted on Sundays.

5. The Applicant shall place panels, inverters and substation equipment consistent with the distances to noise receptors indicated in the Applicant's noise study and with the Applicant's proposed setbacks. Nevertheless, the Applicant shall not place solar panels closer than 275 feet from a residence, church or school and shall not place inverters closer than 490 feet from a residence, church or school. These setbacks shall not be required for residences owned by landowners involved in the Project that explicitly agree to lesser setbacks and have done so in writing. All agreements by participating landowners to lesser setbacks must be filed with the Siting Board prior to commencement of construction of the Project.

Road and Rail Traffic, Fugitive Dust and Road Degradation

Traffic concerns related to the development of the Thoroughbred Solar facility during the construction or operational phases are addressed in this section. The 12-month long construction phase would include commuting construction workers, vehicles, and equipment on-site, plus the delivery of heavy loads of solar components, infrastructure, and other equipment. Increased traffic during operations will occur as employees travel to and from the property to monitor and maintain the site.

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

Establishing existing traffic conditions in the area;

Identifying primary access points that will be used by the project;

Estimating changes in traffic due to construction and operations; and

Assessing the impacts of project-related traffic on local areas. This includes determining whether additional traffic will lead to congestion, changes in service levels of existing road networks and identifying any potential degradation to existing roadways.

Summary of information provided by the Applicant. Attachment K of the SAR is a Traffic Impact Study prepared by Palmer Engineering. That document provided a narrative on existing road and traffic conditions; average daily traffic statistics for select roads; estimates of the Project's construction and operational traffic, and estimated impacts on traffic conditions during Project construction and operation. More detailed and updated information was provided in the Applicant's subsequent responses to the Siting Board's data requests including an opinion on potential impacts to road infrastructure. HE assumes that responses to the second data request are the best available information; that information was used if it conflicted with previous information.

Site access, vehicle parking and internal roadways. Vehicles traveling to the Project site will use I-65 and US 31W to reach local roads accessing the site. Both of these roadways are weight rated for 80,000 pounds. Local roads used to reach the four separate access points proposed for the Project are listed in Exhibit 5-10.[71]

[71] Exhibit 3-1 in this report illustrates the location of each proposed access road/construction entrance. The short access road on KY-335 (to the east of the Construction Entrance) was for the proposed O&M site, which has been eliminated from the Project.

Exhibit 5-10.
Local Roads Leading to Proposed Access Points for the Project

Entrance Location	Local Roads to Reach Access Points
NW	KY-335 Rowletts Cave Springs Road
SW	KY-335 G Wilson Lane
E	KY-335
SE	KY-335 Johns Lane

Notes: (1) Proposed entrance locations are identified in Exhibit 3-1 of this report.

(2) The NW entrance will only be used during emergency situations.

Source: Thoroughbred Solar, LLC, December 2022, and Harvey Economics.

A bridge on KY-335 near Rowletts will be utilized for delivering the 56-ton transformer to the switchyard/substation location. That bridge has a weight limit of 22 gross tons, in line with the weight rating for that highway. With the exception of the transformer delivery, the Applicant has stated that construction traffic across this bridge will be restricted to below the 22-ton limit. Thoroughbred Solar will obtain and be in compliance with all necessary permits from applicable State and local road authorities.

Three temporary work areas, including laydown yards, construction management trailers and stormwater management features, are anticipated to be developed within the Project site. The laydown yards will include parking areas for construction workers and receiving/staging areas for Project components during construction. The locations of those areas have not been finalized but are anticipated to be located in areas accessible from main roads and near construction entrances.

Approximately 23,240 feet of graveled roadways will be constructed across the Project site, extending from four access points, shown in Exhibit 3-1, allowing internal access to equipment throughout the site. Internal roads will be no greater than 20 feet wide. Construction of access roads will take approximately 30-45 days to complete.

Baseline traffic volumes and road conditions. The Applicant provided some traffic data for roads used to access the Project and adjacent to the Project. Current daily traffic volumes (2022) and projected future traffic levels (2024) for local roads during the morning and evening peak hours are provided in Exhibit 5-11.[72]

[72] Projected traffic levels represent anticipated background traffic volumes during the anticipated year of construction.

Exhibit 5-11.
Average Daily Traffic Volumes, during Peak Periods, for Local Roads in the Project Area, 2022 and 2024

Year	Roadway				
2022 (Actual)	**KY-335**	**Rowletts Cave Springs Road**	**G Wilson Lane**	**Johns Lane**	**Maple Grove Lane**
AM Peak (# of vehicles)	63	21	7	1	7
PM Peak (# of vehicles)	69	32	13	3	8
2024 (Projected)	**KY-335**	**Rowletts Cave Springs Road**	**G Wilson Lane**	**Johns Lane**	**Maple Grove Lane**
AM Peak (# of vehicles)	65	21	7	1	7
PM Peak (# of vehicles)	71	34	13	3	8

Note: Peak numbers represent a combined vehicle traffic count for both directions.
Source: Thoroughbred Solar, LLC, October 2022 and December 2022.

Peak AM and PM traffic counts were not available for US 31W, but data from the Kentucky Transportation Cabinet's (KYTC) Traffic Count Reporting System was provided, indicating the Annual Average Daily Traffic (AADT) counts in the vicinity of the intersection of US 31W with KY-335 ranged from 4,132 vehicles per day to 4,949 vehicles per day.

The Applicant's traffic study also provided images and brief descriptions of local roads conditions, including lane widths and speed limits. Weight limit ratings for these roads were provided in response to the first data request. That information is summarized in Exhibit 5-12. Further observations of baseline road conditions from HE's site visit are provided later in this section.

Exhibit 5-12.
Description of Local Roads in the Project Area

Roadway	No. of Lanes	Lane Width (ft)	Speed Limit (mph)	Striping	Weight Limit	Access
KY-335 (L and N Turnpike)	2	~9 (18 total)	55	Y	22 tons	Regional
Rowletts Cave Springs Road	1	17	55*	N	N/R	Local
G Wilson Lane	1	17	30	N	N/R	Local
Johns Lane	1	12	55*	N	N/R	Local
Maple Grove Lane	1	12	55*	N	N/R	Local

Notes: (1) *Speed limits on unposted roadways default to 55mph per Kentucky law.

(2) N/R indicates not rated.

Source: Thoroughbred Solar, LLC, October 2022 and December 2022.

Construction related traffic volumes. Construction related traffic will include passenger vehicles (commuting workers) and heavy vehicles for delivery (trailers, flatbeds, other large vehicles). The rate of commuting workers and deliveries on site varies by month throughout the 12-month construction period, shown below in Exhibit 5-13.

Exhibit 5-13.
Anticipated Project Related Construction Traffic, by Month

Time Period	Daily AM Trips Worker Vehicles	Daily PM Trips Worker Vehicles	Monthly Trips Heavy Vehicles
Month 1	15	15	21
Month 2	40	40	74
Month 3	52	52	76
Month 4	58	58	80
Month 5	103	103	71
Month 6	120	120	57
Month 7	106	106	48
Month 8	96	96	41
Month 9	58	58	27
Month 10	20	20	5
Month 11	16	16	4
Month 12	10	10	2

Source: Thoroughbred Solar, LLC, December 2022.

During construction:

Between 10 and 120 workers will be on-site on any individual day, driving personal vehicles, likely pickup trucks. The weight of these vehicles is unknown.

The average number of delivery vehicles per month is anticipated to be 55 during the initial nine months of construction, with a maximum of 70-80 vehicles during peak

periods. The final three months of construction are anticipated to have five or fewer delivery vehicles per month.

Delivery vehicles will vary from Class 2 Trucks (light duty; up to 10,000 pounds gross vehicle weight) to Class 8 Tractor-Trailers (heavy duty; above 33,000 pounds gross vehicle weight). The heaviest load will be delivery of the transformer, with an expected load weight of 112,000 pounds in addition to the gross vehicle weight of the delivery vehicle.

It is assumed that water trucks would be needed to apply water for dust suppression, but no specific details regarding the weight, use or frequency of water trucks were provided by the Applicant.

The Applicant has stated that large deliveries will occur via US 31W and KY-335; however, travel on local roads to the site will also be necessary for direct site access. Thoroughbred Solar will obtain all necessary permits for oversized or overweight deliveries. The Applicant also indicated that improvements to local roads may occur if determined to be necessary. Such improvements may include road widening, adding aggregate, widening curves or adding turning radii, and adding driveway aprons to transition to Project access roads. Improvements for Johns Lane, the delivery route for the transformer, could include stabilization methods (bituminous/chemical/mechanical) and the use of matting or other load-distribution methods.

The number of construction vehicles utilizing specific individual roads to access the Project site has not been determined. The Project plan for construction entrances and access roads has changed several times since the initial Application and Traffic Impact Study, reducing the number of construction entrances and access roads. As of the Applicant's response to the second data request, all three construction entrances for the Project need to be accessed from KY-335 and local roads off KY-335, aggregating the construction-related traffic impacts on that roadway. The Applicant's traffic study, based on the initial Project plan, did not anticipate significant changes to the level of service, average speeds, or travel times for local roadways during construction, despite the increase in traffic volume. Thoroughbred Solar indicated that they would develop and coordinate construction routes with the local authorities.

Construction traffic management. The Applicant did not provide any specific traffic management strategies to be implemented during construction.

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

Road degradation. Thoroughbred Solar does not anticipate any damage to existing roadway infrastructure. Planning the delivery routes for heavy loads will take into consideration the number of road enhancements required. The Applicant will "review road conditions with local officials prior to construction and will make any necessary repairs prior to finalizing the construction effort."

Railways. There is one freight railway line in the Project area, CSX Transportation (CSXT). Thoroughbred Solar has indicated that large equipment, such as the main power transformers,

will not be delivered by railroad. Construction vehicles will not directly cross the railroad but will utilize a bridge on KY-335 that crosses over the CSXT rail lines in traveling to or from US 31W. No crossing agreement is needed.

Fugitive dust. The Applicant expects some dust generation from Project construction and has indicated that best management practices (BMP) will be employed in accordance with the Kentucky Stormwater Construction general permit requirements. These BMPs include covering loads and applying water to suppress dust, incorporating natural wind breaks and barriers, and reducing vehicle speed on-site. Compacted gravel internal roads may also contribute to airborne dust particles. Thoroughbred Solar will apply water to local gravel roads and will also wash equipment prior to leaving the site as needed to reduce tracking dust off-site. During operations, the Project site will be irrigated on an as needed basis, depending on weather conditions and vegetation establishment.

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

Local road conditions. In addition to I-65, both US 31W and KY-335 will likely be the larger roadways used by delivery vehicles. According to the KYTC's Truck Weight Classification Map, both I-65 and US 31W near the Project site are rated for 80,000 pounds (40-ton) gross vehicle weights.[73] Gross vehicle weight is the total weight of the vehicle, including passengers and cargo. No weight limit information is available for local roads surrounding the Project site.

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

> *KY-335 (L and N Turnpike Road)* – two-lane, striped, blacktop road with no shoulder, adequate width for two cars to pass.
>
> *G Wilson Lane* – two vehicle, chip seal road with no shoulder, in reasonable condition.
>
> *Maple Grove Lane* – narrow, blacktop, one vehicle road, with no shoulder, in reasonable condition. Difficult for two vehicles to pass here.
>
> *Rowletts Cave Springs Road* – two vehicle, blacktop road with no shoulder, in reasonable condition.
>
> *Johns Lane* – narrow, chip seal, one vehicle road in good condition with some gravel and no shoulder. Difficult for two vehicles to pass. A tight turn is required to access this road from either direction off KY-335.

Baseline traffic volumes. The Applicant provided traffic counts for roads in the Project area, as shown previously in Exhibit 5-11 and supplemented with KTC data for US 31W. HE confirmed that no additional data for other roads is available, which is likely due to the low volumes of traffic expected on those roads.

[73] https://transportation.ky.gov/Planning/Documents/Weight%20Class.pdf

During the site visit (a weekday morning), there was some traffic on KY-335 and little to no traffic on local roads surrounding the Project site. Appendix B provides photos from the site visit, including several of local road conditions.

Construction related traffic impacts. Estimates of the number of worker vehicles and heavy trucks anticipated to access the Project site (Exhibit 5-13) allowed HE to estimate the increase in the number of daily vehicle trips on local roads during construction. Exhibit 5-14 presents the worker vehicle traffic on local roads during the peak month of construction, along with the resulting percentage increase in traffic volumes on those roads. KY-335 will see significant increases in vehicle traffic during the peak month of construction, assuming that all worker vehicles will use that road. G Wilson Lane will also see significant increases in vehicle traffic during the peak month of construction, even assuming that only half of daily worker vehicles access the Project site from the entrance on that road.

Exhibit 5-14.
Change in Average Daily Traffic Volumes during Peak Periods for Local Roads in the Project Area, during the Peak Month of Construction

	Roadway				
Construction Period	KY-335	Rowletts Cave Springs Road	G Wilson Lane	Johns Lane	Maple Grove Lane
AM Peak (# of Project vehicles)	120	0	60	NA	0
PM Peak (# of Project vehicles)	120	0	60	NA	0
AM Peak (% chg in traffic)	285%	0%	957%	NA	0%
PM Peak (% chg in traffic)	269%	0%	562%	NA	0%

Note: (1) This Exhibit only considers worker vehicles. An average of about three truck deliveries per day will occur during the peak month of construction.

(2) The number of worker vehicles and trucks using Johns Lane is unknown at this time.

(3) The entrance on Rowletts Cave Springs Road is expected to be used only in emergency situations; therefore, no construction traffic is anticipated on that road.

(4) According to the Traffic Impact Study, no construction vehicles will use Maple Grove Lane to access the Project site.

Sources: Harvey Economics, 2023.

Traffic impacts from vehicle workers and trucks will be less than shown in Exhibit 5-14 in other months of the construction period, but will still be considerable during the majority of construction. For example, traffic on G Wilson Lane will more than double in all months of construction. Local roads are lightly traveled, so even small increases in traffic volume will be

noticeable to local drivers. At a minimum, some delays in drive times on KY-335 and G Wilson Lane should be expected. However, the Applicant indicated that they would coordinate with the community to "ensure that construction schedule and major deliveries will not occur during peak hours."

Construction activity in the area to the east of Johns Lane may result in significant delays or disruptions in travel for vehicles accessing the private residence at the end of that road. As described previously, Johns Lane is a narrow, one vehicle road with no shoulder. The residence belongs to a non-participating landowner who does not reside at that location full time. That landowner may be prevented from entering or leaving the property if construction delivery vehicles are present, as it is difficult for vehicles to pass along the road and there are no pull-offs or turnarounds.

Construction traffic may create noticeable, but perhaps acceptable, increases on US 31W. With a baseline traffic volume of about 4,500 vehicles per day, the Project's construction traffic may increase that volume by about five percent.

HE offers the following observations:

> On peak days, the increased traffic on local roads could be dramatic. While it will likely be predominantly local residents who are impacted, this change may create negative attitudes about the Project.
>
> Average day traffic will also create noticeable changes in traffic volumes in the Project area, especially on KY-335 and G Wilson Lane.
>
> The narrow roads and lack of shoulders on many local roads in the Project area will require drivers to pull over to pass and will increase the inconvenience to local residents during the construction period.
>
> Large trucks and a lack of shoulders may create untenable situations where there is nowhere for either the truck or oncoming vehicles to pull over.

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

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

Impacts to railways. Project traffic will not impact the CSXT railway operations. The Applicant has indicated that Project construction vehicles will not use the railway crossing on Bunnell Crossing Road.

Road degradation. The lack of information about weight limits on some roads and construction delivery plans (especially vehicle weights and distribution of delivery across

traffic routes) makes it difficult to predict if road degradation will occur. Despite this, the nature of the local roads to be used to access the Project site suggests that either extensive work will need to be done in advance of Project onset or that degradation will occur, and Thoroughbred Solar will need to work with Hart County road authorities to correct the damage.

Johns Lane, for example, is a narrow, chip-seal, dead-end local road with no weight rating and very limited daily traffic that will be used for delivery of the transformer and other heavy materials related to the substation and construction entrance/access road. Reaching Johns Lane requires a sharp right hand turn off KY-335 from the west and a moderately tight left-hand turn when traveling from the east. These turns will likely be difficult for large vehicles and those carrying heavy loads. Multiple heavy deliveries and numerous construction vehicles will need to travel this road to reach the substation/switchyard site during Project construction, exposing the road to higher than typical traffic flows and weight loads, increasing the likelihood of degradation.

The KYTC's Pavement Conditions interactive map provides data regarding road conditions for individual segments of state and county roads; pavement conditions data are not available for local or city roads.[74] Pavement conditions are measured by several factors, including an International Roughness Index and a Pavement Distress Index; higher values of these indices indicate rougher pavement or poorer pavement conditions. The portion of US 31W extending from Exit 65 on I-65 (north of the Project site) into Munfordville is color coded yellow, indicating fair condition, and treatments are recommended to occur by 2026. However, just south of Munfordville, the color code for US 31W changes to red (poor condition), and the recommended treatment year is 2024. US 31W remains red at the intersection with KY-335 east of the Project site and continuing south into the next county. HE interprets these data to mean that US 31W near the Project site is currently in poor condition. No pavement conditions data is available for KY-335 or other local roads.

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

Local and regional bridge conditions. The Applicant provided only general details regarding the locations, conditions and weight limits for bridges in the vicinity of the Project area. HE acquired specific data for bridges in the vicinity of the Project area from the Kentucky Transportation Cabinet's (KTC) Bridge Data Miner[75] and Bridge Weight Limits[76] interactive map resources. For the purposes of this review, HE selected a map area inclusive of the exits on I-65 to the north and south of the Project site and US 31W to the east – the proposed routes for construction deliveries.

Of the eight bridges within this vicinity, the majority are identified as being in good condition, three are in fair condition and none are in poor condition, as illustrated in Exhibit 5-15.

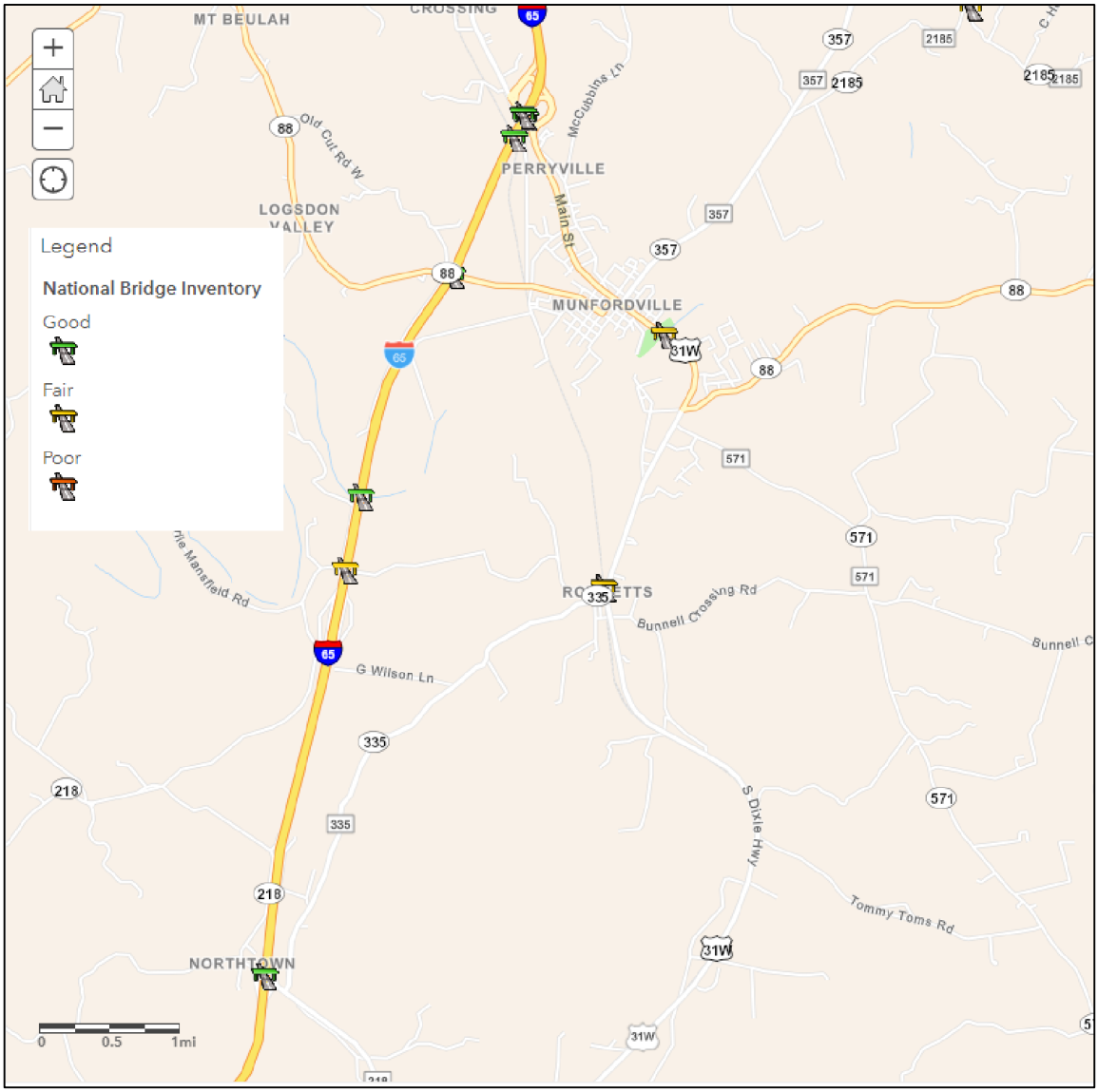
[74] https://maps.kytc.ky.gov/pavementconditions/
[75] http://maps.kytc.ky.gov/bridge/
[76] https://maps.kytc.ky.gov/bridgeweightlimits/

In terms of weight limits, the majority of these bridges are listed as "Open, No Restrictions", as shown in Exhibit 5-16. Two bridges are weight restricted:

> The bridge on KY-88 (Cub Run Highway) crosses I-65 at the northwest corner of Munfordville and is rated for 44 tons gross weight.
>
> As noted previously, the bridge on KY-335 near Rowletts, which will be used for delivering the 56-ton transformer to the switchyard/substation location, has a weight limit of 22 gross tons.

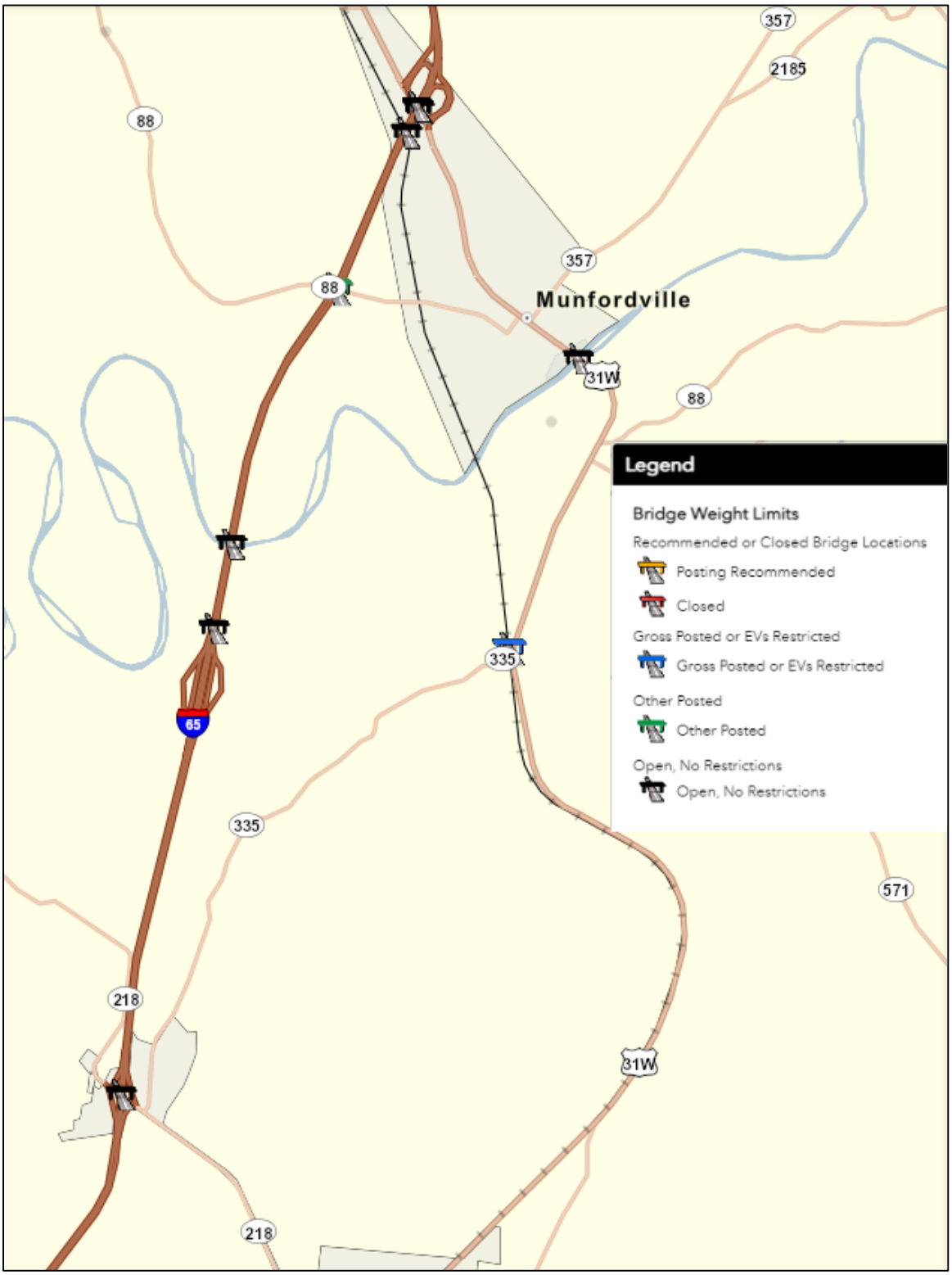
These restrictions should be taken into account when developing routes for semi-trailers and any heavy vehicles. The Applicant should be prepared to repair any damage to affected bridges due to commuting workers or heavy trucks traveling to the Project site.

Exhibit 5-15.
Bridge Locations and Conditions in the Thoroughbred Solar Project Area



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

Exhibit 5-16.
Bridge Weight Limits in the Thoroughbred Solar Project Area



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

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

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:

> The lack of weight or speed restrictions for local roads used to access the Project site is a concern. Special care should be taken in developing a plan to consider road conditions, the presence or lack of road shoulders, and vehicle weights.
>
> Access to the Project site from I-65 or US 31W will require cars and semi-trucks to travel on small local roads. The construction entrances planned for the Project might distribute construction vehicles across the site, minimizing traffic impacts, or might result in a feeling of overwhelming traffic in the general area for local residents.
>
> Construction traffic will likely be noticeable on local roads surrounding the Project site, including KY-335, G Wilson Lane, and Johns Lane. Few homes are located in that area and vehicle trips will likely be distributed across several roads near and within the Project site, potentially reducing impacts to residents and drivers. However, construction traffic could be disruptive to some local residents. The nature of the local access roads will require that drivers pull over for large vehicles and construction deliveries. While residents may be accustomed to this, it might be a point of dissatisfaction. Additionally, some local roads may not be wide enough to allow for safe passage of multiple vehicles, in their current condition.
>
> Delivery of the transformer down Johns Lane will require pre-construction improvements and mitigation methods for that road and the turn onto Johns Lane from KY-335 to prepare it for a delivery of that size and weight.
>
> Construction traffic will be more noticeable on KY-335 as construction vehicles originating from any direction will need to travel on KY-335 to access the Project site. The combination of construction and local traffic will likely cause congestion when construction occurs in that area.
>
> Road degradation may be an issue in some areas on local roads, depending on the amount of traffic using certain smaller or less maintained roads.
>
> Thoroughbred Solar should consider incentives or other means of encouraging carpooling to reduce the number of worker vehicles and to minimize traffic-related effects, including the potential for congestion, accidents, noise or dust issues.
>
> While KY-335 and US 31W are rated to support the weight of most of the Project deliveries, the transformer delivery far exceeds the weight limits of either of those roads and the weight limit for the bridge over the CSXT rail lines on KY-335. A plan

to accomplish these deliveries is needed, as well as special overweight/over-dimensional hauling permitting.

Given the small number of employees on-site during operations, HE does not anticipate any noticeable traffic impacts during the operational period.

Fugitive dust should not be an issue given the Applicant's proposed efforts to reduce dust with the application of water and other best management practices.

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

1. The Applicant shall comply with all laws and regulations regarding the use of roadways and bridges.

2. The Applicant will fix or pay for damage resulting from any vehicle transport to the Project site. For damage resulting from vehicle transport in accordance with all permits, those permits will be controlling.

3. The Applicant shall implement ridesharing between construction workers when feasible, use appropriate traffic controls or allow flexible working hours outside of peak hours if practicable, to minimize any potential delays during AM and PM peak hours.

4. The Applicant shall consult with the Kentucky Transportation Cabinet (KYTC) regarding truck and other construction traffic and obtain necessary permits from the KYTC.

5. The Applicant shall consult with the Hart County Road Department (HCRD) regarding truck and other construction traffic and obtain necessary permits from the HCRD.

6. The Applicant should work with the Commonwealth road authorities and the HCRD to perform road surveys, before and after construction activities, on all roads to be used by construction vehicles.

7. The Applicant should work with the local community and authorities to ensure that construction commuting schedules and major deliveries do not occur during peak hours.

8. The Applicant should coordinate with the homeowner on Johns Lane regarding the construction schedule specific to that road.

9. The Applicant shall comply with any road use agreement executed with the HCRD. Such an agreement might include special considerations for overweight loads, routes utilized by heavy trucks, road weight limits and bridge weight limits.

10. The Applicant shall develop and implement a traffic management plan to minimize the impacts on traffic flow and keep traffic and people safe. Any such traffic management plan shall also identify any noise concerns during the construction phase and develop measures that would address those noise concerns.

11. The Applicant shall properly maintain construction equipment and follow best practices related to fugitive dust throughout the construction process. Dust impacts shall be kept at a minimum level.

Economic Impacts

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

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

Detailed understanding of the project: Specific activities to occur, the timeline of those activities, geographic extent of project effects;

Quantification of direct effects: Number of employees and range of wage levels, materials purchases, supplies and equipment and associated sales tax payments, other tax payments including property taxes. Determining the portion of purchases to occur in the local area or within the Commonwealth is key;

Estimation of total effects: Use of region and industry specific multipliers to estimate indirect and induced effects to calculate total effects such as employment, income and overall economic activity;

Other social or economic benefits, including potential non-monetary benefits, to the local community or surrounding area; and

Potential curtailments or impacts to other industries.

Summary of information provided by the Applicant. The Thoroughbred Solar Application included an Analysis of Economic Effect (Exhibit 10) prepared by Dr. Gilbert Michaud, principal researcher of the Michaud Energy Policy Research Group. That report includes a discussion and explanation of the Project's economic benefits, including estimates of employment, labor income, total economic output and tax revenues generated by Project construction and operations for the Commonwealth of Kentucky. In response to HE inquiries, the Applicant provided additional information regarding potential tax payments.

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

Capital investment: The Thoroughbred Solar project represents a multi-million dollar investment. Much of that investment is expected to be purchases of materials and supplies outside of Kentucky, including solar panels and inverters. Because those components are typically manufactured outside of Kentucky, spending on those items is not expected to directly affect the economies of Hart County or Kentucky. Thoroughbred Solar is likely to purchase vegetation and landscaping services within Hart County. Additionally, aggregate base, concrete, vehicle fuel and other consumables may also be purchased from vendors within the county. Additional project expenditures will include construction labor. Overall, the Project will generate about $36.3M of economic output for Kentucky, including $19.4M in labor income, from direct construction activities and associated secondary effects.

Construction employment and earnings: Construction of the facility is anticipated to require approximately 141 full-time equivalent (FTE) workers over the course of about 12 months.[77] Wages for construction services typically range from between $18 and $50 per hour. Based on the applicable skill or trade, salaries can range from approximately $50,000 to $150,000 per year. Given the circulation of construction-related monies throughout the local area, the Project would also generate about 150 additional (temporary) new jobs, or FTEs, and associated income in other economic sectors.[78]

The Applicant states that the Project's intent is to hire qualified workers, and that the Project is open and amenable to hiring as many Hart County residents as appropriate for Project needs.

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

Exhibit 5-17.
Estimated Economic Benefits of the Proposed Thoroughbred Solar Project, Construction Phase

	Commonwealth of Kentucky		
	Employment	Labor Income	Economic Output
Direct	141	$10,342,700	$12,542,600
Total	294	$19,425,900	$36,313,800

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

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

Source: Thoroughbred Solar, LLC, October 2022.

[77] 1 job = 1 FTE = 2,080 hours worked in one year. A part-time or temporary position would constitute a fraction of one job or FTE. Therefore, the number of individual people hired for construction will likely be greater than the estimated number of FTEs.

[78] These are referred to as indirect and induced jobs.

Operational employment and earnings: Thoroughbred Solar project will require approximately four employees to perform the Project's regular operation and maintenance work, including grounds and vegetation maintenance. Salaries for those employees are estimated to be approximately $100,000 per FTE per year.

Exhibit 5-18 presents the employment, income and economic output generated by Project operations, anticipated to occur in Kentucky.

Exhibit 5-18.
Estimated Annual Economic Benefits of the Proposed Thoroughbred Solar Project, Operations Phase

	Commonwealth of Kentucky		
	Employment	Labor Income	Economic Output
Direct	4	$415,900	$1,008,900
Total	7	$596,200	$1,543,200

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

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

Source: Thoroughbred Solar, LLC, October 2022.

Property tax revenues: The Project intends to pursue an Industrial Revenue Bond (IRB) and / or payment-in-lieu-of-taxes (PILOT) agreement with Hart County. Discussions with the Hart County Judge Executive have been initiated but are in the early stages. In the absence of an IRB and PILOT, Thoroughbred Solar is estimated to generate approximately $3.1 million in total tax revenue over the 35-year life of the Project, including approximately $1.4 million in State taxes (approximately $40,000 per year) and $1.7 million in local taxes (approximately $48,600 per year).

Of the local tax revenues, approximately 29.7 percent, or about $14,400 per year is estimated to go directly to the County and other local jurisdictions (library, ambulance, fire) and approximately 58.6 percent, or about $28,500 per year, is estimated to go to the Hart County school district.[79]

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

> For most solar facilities, the purchase of materials, supplies and equipment makes up a large portion of total project construction costs. The majority of the Project's capital expenditures are anticipated to occur out-of-state, limiting the economic benefits to the

[79] Additional local property tax revenues go to the Commonwealth.

Commonwealth. In response to HE inquiries, the Applicant noted that major Project components (panels and inverters) would be sourced from outside Kentucky, although there would be some local purchase of materials such as aggregate and concrete. Therefore, the economic benefits of construction will come mainly from labor activities.

It is also important to note that direct construction jobs, as well as indirect and induced, will be temporary, resulting from the approximately 12-month construction period. Additionally, the portion of construction period jobs realized for Hart County residents will depend on the number of available and qualified workers in the area.

Economic benefits generated during operations would result from employee earnings, other expenditures and property tax payments.

Property taxes distributed to local entities within Hart County, including the Hart County School District, will provide additional revenue for these agencies; however, those payments will generally amount to a small percentage of total tax revenues for any individual entity.

Landowner leases are not mentioned in the economic analysis. Those landowners will realize direct benefits from the Project via lease payments.

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

Operational economic benefits will include property tax revenues, although these are assumed to be relatively minor in terms of total County tax revenues. Those payments will generally amount to a small percentage of total tax revenues for any individual public entity. Operational employment will be minimal, but will generate local income, and local purchases of materials or supplies will generate additional economic activity.

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

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

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

Decommissioning Activities

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

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

Summary of information provided by the Applicant. Attachment Q of the SAR provides the Applicant's Decommissioning Plan, which lays out the procedures for removing "all structures, foundations, underground cables, and equipment and to reclaim and restore the land altered during the construction and operation of the solar project to its predevelopment condition to the extent feasible." The Thoroughbred solar facility is anticipated to have an expected useful life of about 35 years.[80]

Decommissioning plan and activities. The Decommissioning Plan identifies components that may be removed and areas that may be restored once the Facility has not operated for twelve consecutive months, or when the Facility has surpassed the useful lifespan of the modules and facilities. The Applicant anticipates that decommissioning activities can be completed over a 25-week period. The following general decommissioning activities will occur:[81]

> Removal of solar panels, solar panel racking, steel foundation posts and beams, inverters, transformers, overhead and underground cables and lines, equipment pads and foundations, equipment cabinets, and ancillary equipment.
>
> Removal of civil facilities, access road, security fence, drainage structures, and sedimentation basins.

Some Project infrastructure, such as the access roads, may be left in place at the landowners' requests. Underground utility lines, if deeper than three feet below ground surface elevation, may be left in place to minimize land disturbance and associated impacts on future land use.

Standard decommissioning practices will be utilized, including dismantling and repurposing, salvaging/recycling, or disposing of the solar energy improvements. All dismantling, removal,

[80] The Decommissioning Plan also notes the possibility that the project could be repowered with newer technology.

[81] Detailed descriptions of specific decommissioning activities associated with individual project components are provided in the Decommissioning Plan.

recycling, and disposal of materials generated during decommissioning will comply with rules, regulations, and prevailing Federal, State, and local laws at the time decommissioning is initiated and will use approved local or regional disposal or recycling sites as available. Best management practices (BMPs) applicable to erosion control and sediment control will also be implemented and are outlined in the Decommissioning Plan.

Additionally, lease agreements with participating landowners obligates the Applicant to remove Project structures and restore the property to "substantially the same physical condition," while allowing for certain elements to remain based on landowner preferences.

Anticipated decommissioning costs. The total estimated cost of decommissioning the Thoroughbred Solar Project is approximately $2,823,772 ($46,134 per MW). The estimated salvage/scrap value of the modules, racking, transformers, and other materials is approximately $6,237,431. The net decommissioning costs after accounting for resale and salvage values is approximately $3,413,660 in surplus, or $55,775 in surplus per MW.82 The Plan notes that estimate of net costs should be updated periodically/every five (5) years to recognize price trends for both decommissioning costs and the salvage and resale values of the components.

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

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

The Applicant has suggested that economic incentives exist for decommissioning, but HE believes that is highly uncertain due to costs for decommissioning and metal prices 35 years in the future.

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

1. The Applicant shall file a full and explicit decommissioning plan with the Siting Board or its successors as well as Hart County. This plan shall commit the Applicant to

[82] According to the Plan, decommissioning costs were calculated using current pricing.

removing all facility components, above-ground and below-ground from the Project site. Internal roadways and other structures shall also be removed unless the landowner states in writing that they prefer those to remain in place. The decommissioning plan shall be completed at least one month prior to construction of the Project.

2. The Applicant, its successors, or assigns shall decommission the entire site of the Project once it ceases producing electricity for a continuous period of 12 months. Decommissioning shall include the removal of all solar panels, racking, and equipment including concrete pads and trenched electrical wiring.

3. The Applicant will notify Hart County officials of upcoming decommissioning activities at least 30 days prior to the commencement of decommissioning.

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

5. The Applicant shall file a bond with Hart County Fiscal Court, equal to the amount necessary to effectuate the explicit or formal decommissioning plan, naming Hart County as an obliged or a third-party (or secondary, in addition to individual landowners) beneficiary of that bond, so that Hart County will have the authority to draw upon the bond to effectuate the decommissioning plan as needed. For land in which there is no bonding requirement otherwise, Hart County shall be the primary beneficiary of the decommissioning bond for that portion of the Project. The bond(s) shall be in place at the time of commencement of operation of the Project.

6. The bond amount should be reviewed and updated every five years at the expense of the Applicant to determine and update the cost of facility removal. This review shall be conducted by an individual or firm with experience or expertise in the costs of removal or decommissioning of electric generating facilities. Certification of this review shall be provided to the Siting Board or its successors and the Hart County Fiscal Court. Such certification shall be by letter and shall include the current amount of the anticipated bond and any change in the costs of removal or decommissioning.

7. If the Applicant proposes to retrofit the current proposed facility, it shall demonstrate to the Siting Board that the retrofit facility will not result in a material change in the pattern or magnitude of impacts compared to the original project. Otherwise, a new Site Assessment Report will be submitted for Siting Board review. The term retrofit is defined as the facility being re-designed such that the facility has a different type of operations or function, i.e., no longer operates as a solar electric generation facility.

8. The Applicant shall also prepare a new Site Assessment Report for Siting Board review if the Applicant intends to retire the currently proposed facility and employ a different technology.

9. The Applicant or its assigns must provide notice to the Siting Board if during any two-year period, it replaces more than twenty percent of its facilities. The Applicant shall

commit to removing the debris and replaced facility components from the Project site and Hart County upon replacement. If the replaced facility components are properly disposed of at a permitted facility, they do not have to be physically removed from Hart County. However, if the replaced facility components remain in Hart County, the Applicant must inform the Siting Board of where the replaced facility components are being disposed of.

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

Public Outreach and Communication

The Application details the public involvement activities undertaken by Thoroughbred Solar, LLC staff (Exhibit 3 and Exhibit 6). Those activities included the following events and actions taken to notify and inform Hart County officials and residents about the Project:

Public meetings and events:

In January 2022, a formal introduction of the Project was made at a public meeting before the Hart County Fiscal Court.

A public information meeting for the Project was held on April 27, 2022, in Hart County. Notice of that meeting was published in *The Hart County News-Herald*, on October 6, 2022. A total of approximately 40 community members attended the meeting.

Spring / Summer 2022 – (1) the Senior Development Manager introduced himself at a local School Board meeting; (2) presentation to the Hart County Cattleman's Association; (3) meeting with the Hart County Historical Society; (4) participation / presentations at several local community events, in combination with the Chamber of Commerce' (5) staffed information booth at the Hart County Fair.

Outreach to surrounding landowners and others:

In October 2021, a presentation was given to the Judge Executive, District 1 Magistrate, and a county economic development representative to generally introduce the Project and understand the local permitting framework.

Through December 2021, Project representatives met with the local Chamber of Commerce to introduce the Project.

In April 2022, Project representatives visited the 35 closest residences in an attempt to engage people and to introduce the Project. Materials were provided to the residents who engaged. Where contact was not possible, Thoroughbred Solar left a "door hanger" behind. After Project representatives made initial

contact, Rob Kalbouss, the Senior Development Manager, followed up with several individuals at their request to answer certain questions in greater detail.

On October 6, 2022, a public notice was published in *The Hart County News-Herald*. Adjacent landowners to the Project were sent notice of application letters on October 4, 2022, via certified mail.

Summer / Fall 2022 – meetings took place with the Dutch Country Safari Park, local churches, University of Kentucky Extension Service (in Munfordville) and the Hart County Sheriff.

In March 2022, the Project launched its website, www.thorougbredsolar.com, and continues to use it to provide regular updates regarding Project status for the community throughout permitting and construction. A Project-specific phone number (800.342.9853) and email address (info@thoroughbredsolar.com) were also created around that same time and remain active and advertised on the Thoroughbred website.

In early May 2022, a Facebook page was launched for the Project, https://www.facebook.com/ThoroughbredSolar/?ref=py_c, that provided general Project information, details regarding the then-upcoming Public Information Meeting, and was intended as a platform for ongoing information sharing. Numerous follow-up communications and/or visits have resulted.

Communication and soliciting of feedback will continue throughout the permitting process. Thoroughbred Solar intends to issue a quarterly newsletter to abutting landowners, participating landowners, and other key stakeholders to provide status updates on project milestones and community involvement efforts. In addition, Facebook will continue to be used both to communicate information and receive feedback.

As part of HE's site visit to the Project area, HE met with the Hart County Judge Executive, Mr. Joe Choate. Mr. Choate indicated that Thoroughbred Solar has been open to communicating about the project and is doing their part with regard to public awareness of the Project. However, as noted earlier in this Section (Scenic Compatibility and Property Value Impacts), two local residents – landowners with property near the Project site – have expressed a general opposition to the Project. Mr. Choate expressed a concern regarding the use of Johns Road for delivery of the transformer and a desire that Thoroughbred Solar has a bond in place for any necessary county road improvements. He is also concerned about decommissioning and reclamation activities, and protecting the landowners directly involved in the Project.

HE also spoke with the assistant Hart County Property Valuation Administrator, Ms. Missy Alvey, during the site visit. Ms. Alvey commented that the Project has not been a major topic of conversation in the PVAs office; no inquiries about the Project have come through the office and no one has voiced opposition to the Project to the PVA. Ms. Alvey attended a Chamber of Commerce luncheon where Thoroughbred Solar was present; she indicated that concerns were voiced from various attendees regarding decommissioning activities, materials going into the landfill, appearance of Project facilities, maintenance activities, drainage and property values.

On January 23, 2023, Siting Board staff led a local public meeting at the Hart County Courthouse. The Siting Board presented information about the Project, explained the formal application review process and provided directions on submitting public comment. The meeting also allowed for in-person public comment at that time. Ten residents of Hart County spoke at the meeting, with about half citing support for the Project and others citing concerns including impacts to scenic surroundings, impacts to the Green River from Project runoff, potential for sinkholes to be created during construction and adverse impact to property values.

Need for mitigation. Thoroughbred Solar is taking its public engagement and outreach activities seriously and has been very diligent in working to promote awareness of the Project and communicate with local residents, community groups and County representatives. The following measures should be taken to ensure public awareness of the Project and Project activities:

1. The Applicant should continue to pursue public outreach and engagement activities within Hart County.

2. The Applicant should notify local officials and adjacent landowners regarding the start of the construction schedule.

3. The Applicant should update the Project website and Project Facebook page throughout construction and operations to describe current status and Project activities.

Complaint Resolution

According to the SAR, the Project will provide notification to abutting landowners prior to the start of construction, and a complaint resolution process will be publicized to allow for community feedback and response to specific issues of concern as they may arise. The complaint resolution process, which will be made available to the public and local officials prior to construction, will include a process for addressing complaints received during both construction and operation of the Project.

If a complaint is received during the construction phase, the construction manager or community liaison will be responsible for initiating review. If a complaint is filed during the operations phase, O&M staff or the community liaison will be responsible for initiating review. Thoroughbred Solar is committed to resolving complaints within 30 days of receipt, unless extenuating circumstances require a longer time, or it is determined that the complaint does not require a resolution or is unresolvable. If complaint resolution lasts longer than 30 days, Project representatives will communicate with the complainant, providing an explanation for the extended time and a timeline for addressing the complaint.

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

1. The Applicant should develop and implement a complaint resolution plan that describes the process for filing complaints during construction and during operations, and this plan should be provided to Hart County and the Siting Board. The complaint resolution plan should explain how the complaint will be addressed; the timeframe in which a complainant can expect a response; and an explanation of how resolution will be determined if the complainant is not satisfied with the response from the Applicant.

2. The Applicant should submit to the Siting Board, annually, a status report associated with the complaint resolution plan, recounting the individual complaints, how the Applicant addressed those complaints and the ultimate resolution of those complaints, and whether or not the resolution was to the complainant's satisfaction.

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 HE makes no recommendation as to their merit. Beyond those actions, HE recommends a list of mitigation actions for Siting Board and Applicant consideration.

Regulatory Actions and Mitigation Outside Siting Board Jurisdiction

The Siting Board should be aware of the following permitting and regulatory actions that will require Applicant compliance and possible mitigation efforts.[83] No action on these actions is required by the Siting Board since these are outside the Siting Board's jurisdiction. The SAR states that applicable approvals will be obtained prior to construction and operation of the Project.[84]

[83] Information provided in Attachment O of the SAR and in response to the Siting Board's First Data Request.

[84] Although a specific permit is not required, the Project will comply with fugitive emission standards during construction as required by the Kentucky Energy and Environment Cabinet in 401 KAR 63:010.

Exhibit 6-1.
Environmental Permits Required for Construction or Operation of the Thoroughbred Solar Facility

Agency	Permit/Approval	Type	Notes
Federal Review/Approvals			
US Fish and Wildlife Service (USFWS)	Endangered Species Act Section 7 Consultation; or Section 10 /Incidental Take Permit	Pre-Construction	Initial consultation completed.
Federal Aviation Administration (FAA)	Notice of Proposed Construction or Alteration	Pre-Construction	Determination of No Hazard received.
State Approvals			
Kentucky Electric Generation and Transmission Siting Board	Certificate of Construction of an electric generating facility	Pre-Construction	Review in process.
Kentucky Energy and Environment Cabinet - Division of Water, Bowling Green Regional Office	KPDES Construction General Permit KYR100000	Pre-Construction	Pending final design.
Kentucky Energy and Environment Cabinet - Division of Water	Water/Monitoring Well Reporting Record Form	Pre-Construction	Pending final design.
Kentucky Department of Fish and Wildlife Resources and Office of Kentucky Nature Preservers	Threatened and Endangered Species Review	Pre-Construction	Initial consultation completed.
Kentucky Transportation Cabinet	Driveway Encroachment Permit from a State Highway	Construction	Pending final design.
Kentucky Transportation Cabinet	Special Hauling Permit for State Highways	Construction	For oversized or overweight loads.
Local Approvals			
Hart County (Transportation Department)	Roadway use and Maintenance Agreement (RUMA)	Pre-Construction	Early consultation in process.
Hart County (Transportation Department)	Driveway Permit from a County Roadway	Either Pre-Construction or Construction	Pending final design
Hart County (Building and Electrical Department)	Electrical Permit	Construction	Building permit for O&M building.
Hart County Health Department	Septic System Approval	Construction	Pending final design.
Hart County Tax Administrators Office	Hart County Occupational License	Pre-Construction	Pending final design.

Source: Thoroughbred Solar, LLC, December 2022.

In addition to the above, as required by Section 224.10-280 of the KRS, which states that an electrical facility may not be constructed until the developing party submits a Cumulative Environmental Assessment (CEA) to the Kentucky Energy and Environmental Cabinet as part of its application documents, the Applicant has prepared and will submit the CEA provided in Attachment N (of the SAR) to the Kentucky Energy and Environmental Cabinet.

Mitigation for Siting Board and Applicant Consideration

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

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

A. Site development plan:

1. A final site layout plan should be submitted to the Siting Board upon completion of the final site design. Deviations from the preliminary site layout plan, which formed the basis for HE's review, should be clearly indicated on the revised graphic. Those changes could include, but are not limited to, the location of solar panels, inverters, transformers, substation, operations and maintenance building or other Project facilities or infrastructure.

2. Any change in Project boundaries from the information which formed this evaluation should be submitted to the Siting Board for review.

3. The Siting Board will determine if any deviation in the boundaries or site layout plan is likely to create a materially different pattern or magnitude of impacts. If not, no further action is required, but if yes, the Applicant will support the Siting Board's effort to revise its assessment of impact and mitigation requirements.

4. A final, Project-specific, construction schedule, including revised estimates of commuter vehicle traffic, should be submitted to the Siting Board. Deviations from the preliminary construction schedule should be clearly indicated.

5. The Siting Board will determine whether any deviation to the construction schedule or workforce estimates is likely to create a materially different pattern or magnitude of impacts. If not, no further action is required. If so, the Applicant will support the Siting Board's effort to revise its assessment of impacts and mitigation requirements.

6. The Applicant or its contractor will control access to the site during construction and operation. All construction entrances will be gated and locked when not in use.

7. The Applicant's access control strategy will include appropriate signage to warn potential trespassers. The Applicant will ensure that all site entrances and boundaries have adequate signage, particularly in locations visible to the public, local residents and business owners.

8. According to National Electrical Safety Code regulations, the security fence must be installed prior to any electrical installation work. The substation will have its own separate security fence and locked access installed.

9. The Applicant will develop an emergency response plan prior to the start of construction. The Applicant will meet with local emergency management representatives to ensure familiarity with plans and procedures. The emergency response plan will be revised following completion of construction to reflect operational measures, and a meeting will be held with local emergency response representatives for an updated review.

10. The Applicant will post contact information for Project representatives and emergency agencies on signs at each entrance to the Project site.

B. Compatibility with scenic surroundings:

1. Existing vegetation between the solar arrays and nearby roadways and homes shall be left in place, to the extent feasible, to help minimize visual impacts and screen the Project from nearby homeowners and travelers.

2. The Applicant will not remove any existing vegetation except to the extent it must be removed for the construction and operation of Project components.

3. The Applicant shall implement planting of native evergreen along with some deciduous species as a visual buffer to mitigate viewshed impacts, particularly in areas directly adjacent to the Project without existing vegetation.

4. The Applicant shall carry out visual screening consistent with the plans proposed in its Application, including the Site Assessment Report, and ensure proposed new vegetative buffers are successfully established and develop as expected over time. Should vegetation used as buffers die over time, the Applicant shall replace them as appropriate.

5. Any changes to the vegetative buffering plan or site infrastructure layout (i.e., panels, inverters, etc.) included in the Application materials will be submitted to the Siting Board for review. If the Siting Board deems those changes to be significant, the Siting Board may require the Applicant to further modify the buffering plan.

6. The Applicant shall provide a visual buffer between Project infrastructure and residences or other occupied structures with a line of sight to the facility to the reasonable satisfaction of the affected adjacent property owners. If vegetation is used, plantings should reach eight feet high within four years. To the extent that an affected

property owner indicates to the Applicant that a visual barrier or vegetative buffer is not necessary, Thoroughbred Solar will obtain that property owner's written consent and submit such consent in writing to the Siting Board.

7. Landscape screening will extend and connect to existing site vegetation, if any, to help create a more natural transition between existing vegetation and Applicant developed vegetation.

8. The Applicant will develop a written vegetation management plan that describes the approach and procedures for maintaining or replacing vegetative buffers as needed.

9. The Applicant shall use grasses and pollinator seed mixes that support native birds, insects and other species as part of the planned landscaping buffers.

10. The Applicant will avoid the tree grove surrounding the private family cemetery located within the Project site, leaving all existing vegetation surrounding the cemetery in place during construction and operations.

11. The Applicant will not remove any trees or other vegetation within the 23-acre forested area located within the Project site.

12. The Applicant will use anti-glare panels and operate the panels in such a way that glare from the panels is minimized or eliminated. The Applicant will immediately adjust solar panel operations upon any complaint about glare from those living, working, or traveling in proximity to the Project. Failing this, the Applicant will cease operations until the glare is rectified.

13. The Applicant will work with homeowners and business owners to address concerns related to the visual impact of the Project on its neighbors.

C. Potential changes in property values and land use:

1. No unique mitigation measures are recommended related to potential impacts to property values or adjacent land uses because other mitigation can accomplish this. However, close coordination by the Applicant with impacted and concerned homeowners regarding potential visual impacts and impacts from noise, traffic or other Project activities should be initiated.

D. Anticipated peak and average noise levels:

1. The Applicant shall notify residents and businesses within 2,400 feet of the Project boundary about the construction plan, the noise potential, and the mitigation plans at least one month prior to the start of construction.

2. The Applicant shall respond to any complaints related to noise levels or noise causing activities occurring during construction or operations via a formal and clearly developed complaint resolution program.

3. If pile driving activity occurs within 1,500 feet of a noise sensitive receptor, the Applicant shall implement a construction method that will suppress the noise generated during the pile driving process (i.e., semi-tractor and canvas method; sound blankets on fencing surrounding the Project site; or any other comparably effective method).

4. The Applicant should limit the noise-producing construction activity, process and deliveries to the hours of 8:00 am to 6:00 pm, Monday through Saturday. No construction work should be conducted on Sundays.

5. The Applicant shall place panels, inverters and substation equipment consistent with the distances to noise receptors indicated in the Applicant's noise study and with the Applicant's proposed setbacks. Nevertheless, the Applicant shall not place solar panels closer than 275 feet from a residence, church or school and shall not place inverters closer than 490 feet from a residence, church or school. These setbacks shall not be required for residences owned by landowners involved in the Project that explicitly agree to lesser setbacks and have done so in writing. All agreements by participating landowners to lesser setbacks must be filed with the Siting Board prior to commencement of construction of the Project.

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

1. The Applicant shall comply with all laws and regulations regarding the use of roadways and bridges.

2. The Applicant will fix or pay for damage resulting from any vehicle transport to the Project site. For damage resulting from vehicle transport in accordance with all permits, those permits will be controlling.

3. The Applicant shall implement ridesharing between construction workers when feasible, use appropriate traffic controls or allow flexible working hours outside of peak hours if practicable, to minimize any potential delays during AM and PM peak hours.

4. The Applicant shall consult with the Kentucky Transportation Cabinet (KYTC) regarding truck and other construction traffic and obtain necessary permits from the KYTC.

5. The Applicant shall consult with the Hart County Road Department (HCRD) regarding truck and other construction traffic and obtain necessary permits from the HCRD.

6. The Applicant should work with the Commonwealth road authorities and the HCRD to perform road surveys, before and after construction activities, on all roads to be used by construction vehicles.

7. The Applicant should work with the local community and authorities to ensure that construction commuting schedules and major deliveries do not occur during peak hours.

8. The Applicant should coordinate with the homeowner on Johns Lane regarding the construction schedule specific to that road.

9. The Applicant shall comply with any road use agreement executed with the HCRD. Such an agreement might include special considerations for overweight loads, routes utilized by heavy trucks, road weight limits and bridge weight limits.

10. The Applicant shall develop and implement a traffic management plan to minimize the impacts on traffic flow and keep traffic and people safe. Any such traffic management plan shall also identify any noise concerns during the construction phase and develop measures that would address those noise concerns.

11. The Applicant shall properly maintain construction equipment and follow best practices related to fugitive dust throughout the construction process. Dust impacts shall be kept at a minimum level.

F. Economic impacts:

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

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

G. Decommissioning:

1. The Applicant shall file a full and explicit decommissioning plan with the Siting Board or its successors as well as Hart County. This plan shall commit the Applicant to removing all facility components, above-ground and below-ground from the Project site. Internal roadways and other structures shall also be removed unless the landowner states in writing that they prefer those to remain in place. The decommissioning plan shall be completed at least one month prior to construction of the Project.

2. The Applicant, its successors, or assigns shall decommission the entire site of the Project once it ceases producing electricity for a continuous period of 12 months. Decommissioning shall include the removal of all solar panels, racking, and equipment including concrete pads and trenched electrical wiring.

3. The Applicant will notify Hart County officials of upcoming decommissioning activities at least 30 days prior to the commencement of decommissioning.

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

5. The Applicant shall file a bond with Hart County Fiscal Court, equal to the amount necessary to effectuate the explicit or formal decommissioning plan, naming Hart County as an obliged or a third-party (or secondary, in addition to individual

landowners) beneficiary of that bond, so that Hart County will have the authority to draw upon the bond to effectuate the decommissioning plan as needed. For land in which there is no bonding requirement otherwise, Hart County shall be the primary beneficiary of the decommissioning bond for that portion of the Project. The bond(s) shall be in place at the time of commencement of operation of the Project.

6. The bond amount should be reviewed and updated every five years at the expense of the Applicant to determine and update the cost of facility removal. This review shall be conducted by an individual or firm with experience or expertise in the costs of removal or decommissioning of electric generating facilities. Certification of this review shall be provided to the Siting Board or its successors and the Hart County Fiscal Court. Such certification shall be by letter and shall include the current amount of the anticipated bond and any change in the costs of removal or decommissioning.

7. If the Applicant proposes to retrofit the current proposed facility, it shall demonstrate to the Siting Board that the retrofit facility will not result in a material change in the pattern or magnitude of impacts compared to the original project. Otherwise, a new Site Assessment Report will be submitted for Siting Board review. The term retrofit is defined as the facility being re-designed such that the facility has a different type of operations or function, i.e., no longer operates as a solar electric generation facility.

8. The Applicant shall also prepare a new Site Assessment Report for Siting Board review if the Applicant intends to retire the currently proposed facility and employ a different technology.

9. The Applicant or its assigns must provide notice to the Siting Board if during any two-year period, it replaces more than twenty percent of its facilities. The Applicant shall commit to removing the debris and replaced facility components from the Project site and Hart County upon replacement. If the replaced facility components are properly disposed of at a permitted facility, they do not have to be physically removed from Hart County. However, if the replaced facility components remain in Hart County, the Applicant must inform the Siting Board of where the replaced facility components are being disposed of.

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

H. Public outreach and communication:

1. The Applicant should continue to pursue public outreach and engagement activities within Hart County.

2. The Applicant should notify local officials and adjacent landowners regarding the start of the construction schedule.

3. The Applicant should update the Project website and Project Facebook page throughout construction and operations to describe current status and Project activities.

I. Complaint resolution program:

1. The Applicant should develop and implement a complaint resolution plan that describes the process for filing complaints during construction and during operations, and this plan should be provided to Hart County and the Siting Board. The complaint resolution plan should explain how the complaint will be addressed; the timeframe in which a complainant can expect a response; and an explanation of how resolution will be determined if the complainant is not satisfied with the response from the Applicant.

2. The Applicant should submit to the Siting Board, annually, a status report associated with the complaint resolution plan, recounting the individual complaints, how the Applicant addressed those complaints and the ultimate resolution of those complaints, and whether or not the resolution was to the complainant's satisfaction.