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March 26, 2021

TO: FILINGS DIVISION

RE: Case No. 2020-00190  
ELECTRONIC APPLICATION OF HORSESHOE BEND SOLAR, LLC FOR A  
CERTIFICATE OF CONSTRUCTION FOR AN APPROXIMATELY 60  
MEGAWATT MERCHANT ELECTRIC SOLAR GENERATING FACILITY IN  
GREEN COUNTY, KENTUCKY PURSUANT TO KRS 278.700 AND 807 KAR  
5:110

Please file in the administrative record of the above-referenced case the attached copy of the final report of Wells Engineering, "Solar Generation Final Report – Horseshoe Bend Solar," dated March 26, 2021.

Sincerely,

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

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

Attachment

cc: Parties of Record

March 26, 2021



**Solar Generation Siting Final  
Report – Horseshoe Bend Solar**

KY State Board on Electric Generation and  
Transmission Siting

Customer:  
Kentucky Public Service  
Commission

Prepared for:  
Quang D. Nguyen





March 26, 2021

Prepared by:

A handwritten signature in black ink, appearing to read 'V. Chikkeruru'.

---

Vasu Chikkeruru, P.E.  
Sr. Power Systems Engineer

A handwritten signature in black ink, appearing to read 'Hanling Chen'.

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Hanling Chen, Ph.D., P.E.  
Sr. Power Systems Engineer

A handwritten signature in blue ink, appearing to read 'Matt Ackerman'.

---

Matt Ackerman  
Sr. Electrical Designer

Reviewed by:

A handwritten signature in blue ink, appearing to read 'Jim Cook'.

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Jim Cook  
Chief Operating Officer

Approved by:

A handwritten signature in blue ink, appearing to read 'Patrick A. Wells'.

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Patrick Wells, P.E.  
President/CEO

## **Solar Generation siting Final Report – Horseshoe Bend Solar**

### **Synopsis**

This document is the Final Report prepared by Wells Engineering for Horseshoe Bend Solar siting in Green county, KY.

WEpsc Order: WE21021845

Public Service Commission PO:  
PON2 123 2100001588 Version 2





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## REVISIONS

<b>Revision</b>	<b>Date Issued</b>	<b>Issue Type</b>	<b>By</b>	<b>Description</b>
0	03-26-2021	For Review	VC	Issue for Review & Record

## ABOUT WELLS ENGINEERING

### Power Systems Engineering

Since 2004, Wells Engineering has served utility, industrial, and commercial facilities for all their power needs. Quality and innovation have established Wells as the go-to engineering firm specializing in the planning, design, control, and analysis of electrical power systems. With a great reputation of working closely with our clients and listening to their requests, our team diligently provides solutions that fit every need.

### Our Mission

Our mission is to provide unsurpassed quality engineering service and customer support. We will conduct our business in the most professional manner possible and provide the highest quality product in a timely manner. Our value-added engineering will be recognized and provide the opportunity to earn our customers' confidence. We will use proven technology to create advanced power systems designs to support the development of the safest and most reliable systems for our clients.



*Wells Engineering delivers innovative solutions aligned with rigid standards and best engineering practices.*

### Services

**PLANNING AND STUDIES.** Arc Flash Hazard Analysis • Short Circuit Analysis • Equipment Evaluation Analysis • Coordination Analysis • Load Flow Analysis • Power Factor Correction • Harmonic Analysis • Cable Ampacity Analysis • Motor Starting Analysis • Power Quality Analysis • Voltage Flicker Analysis • Insulation Coordination Analysis • Switching Transient Analysis • Generator Stability Analysis • Ground Mat Analysis • Grounding and Bonding Study • DC Power System Analysis • Project Feasibility Studies

**DESIGN ENGINEERING AND EPC SERVICES.** Generator Protection & Control • T&D Line • Power Substation • Transmission Switching Stations • Gas Insulated Substations • SCADA • Capacitor & Harmonic Filter Banks • Motor Protection & Control • Protection Relaying Schemes • Underground Duct banks • Unit Substations • LV/MV Motor Control Centers • AC/DC Traction Power Substations • LV/MV Power Cable Distribution • Emergency Generator Integration • ATS Specifications & Design

**APPLICATION ENGINEERING.** Relay Protection & Control • RTU & RTAC Programming • Induction Motor Control • Synchronous Motor Control • Capacitor & Filter Banks • SVC Systems • FACTS/STATCOM • Forensic Investigation • Sequence of Events Failure Analysis • Power Systems Planning • Grounding & Bonding • Maintenance Planning & Audits • Troubleshooting • Disaster Recovery Plans • Technical Witness.

**PROJECT AND CONSTRUCTION MANAGEMENT.** Equipment Specifications • Bid Document Facilitation • Subcontractor Qualification • Vendor Selection • Construction Estimates • Contract Administration & Implementation • OEM Factory Witness Testing • Resource Management • Master Project Schedule • Material Tracking • Spare Parts Management • Warranty Negotiation • Procurement Leveraging • Cash Flow Management

**TESTING AND COMMISSIONING.** MV/HV/EHV Circuit Breakers • Circuit Switchers • MV Switchgear • GSU & Power Transformers • Capacitor Banks • Harmonic Filter Banks • PTs & CCVTs • CTs • Substation Relay Protection & Control • Overcurrent, Fault Locators, & Distance Relays • Generator Protection Relaying Disconnect Switches • Surge Arrestors • Station Batteries • Grounding Resistors/Reactors/Transformers • Ground Grid • Reclosers • Reactors • Thermography • Relay protection & controls • Substation Commissioning • Predictive & Preventative Maintenance • Field Engineering & Troubleshooting • Arc Flash Hazard Analysis & Training • Refurbishment & Repair Electrical System Upgrades • NERC Compliance Testing

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# 1 General Statement

The present document is the Final report prepared for the Solar Generation siting project of Horseshoe Bend Solar, LLC who is applying for a certificate of construction for an approximately 60MW Merchant Electric Solar Generation Facility in Green County, KY.

## 1.1 Scope

As part of the personal service contract for the 'Generation Siting Board Fall 2020', between The Commonwealth of Kentucky Energy Environment Cabinet/Public Service commission and Wells Engineering, in the matter of the order issued for case number 2020-00190, Wells Engineering was appointed to review the Application documents and the Site assessment report submitted by the applicant as per the Kentucky Revised Statutes KRS 278.706 & KRS 278.708 and submit a Final report on the Solar Generation Siting for the application for a construction certificate by Horseshoe Bend Solar in Green County KY.

Wells Engineering performed the review of the Application documents and the Site Assessment report submitted by the applicant by assigning it to the Senior Engineers and Designers at Wells Engineering and also by hiring experts as per different requirements of the siting project as seen by Wells Engineering.

Wells Engineering contracted 'Clover lake Consulting Services' for Noise & Environmental assessment and Mary McClinton Clay, MAI for the review on impact on property values.

## 1.2 Reference Document

The following documents are referenced for the creation of this document.

- i. Commonwealth of Kentucky Order for Case no. 2020-00190
- ii. Application Documents for Case No. 2020-00190 by Carolina Solar Energy
- iii. Site Assessment Reports for Case No. 2020-00190 by Carolina Solar Energy
- iv. Responses to Siting Board's First Request for information for Case No. 2020-00190 by Horseshoe Bend Solar, LLC
- v. Responses to Siting Board's Second Request for information for Case No. 2020-00190 by Horseshoe Bend Solar, LLC
- vi. Responses to Siting Board's Wells Engineering Request for information for Case No. 2020-00190 by Horseshoe Bend Solar, LLC
- vii. Kentucky Revised Statutes<sup>1</sup>, KRS 278-706, 708, 710

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<sup>1</sup> For UpToDate statutes, reference, <https://apps.legislature.ky.gov/law/statutes/chapter.aspx?id=38583>

## 2 Solar Electric Power – ‘Know-how’

We all know that the energy from Sun is received on earth in the forms of heat and light. The light energy we receive can be converted into electricity by using something called a Solar Cell or a PV Cell. PV is the short form for the term **PhotoVoltaics**. As a solar cell produces Electric ‘Volts’ from the ‘Photons’ of the sunlight and so is the name given to it.

A simple solar cell is relatively small in size and can only produce couple watts of electricity, which is not sufficient for utilization. In order to increase the power production, several cells are combined together to form a ‘Solar Module’, which can produce sufficient levels of electric power. A systematic arrangement of Solar modules is called a ‘Solar System’. In industry the term ‘Solar Array’ is also popular in usage, and it is the term used for an array of Solar Modules.

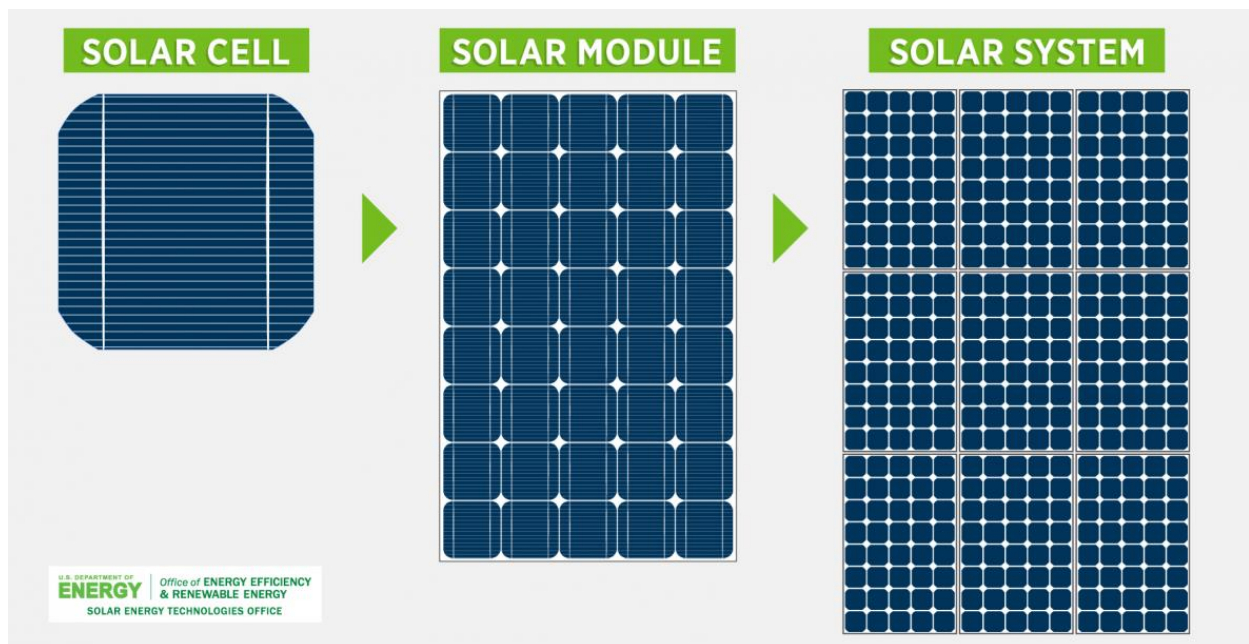


Fig. (1) Solar System<sup>1</sup>

Now, for generating electricity for the utilization of the consumers like, industries, commercial and general household the solar energy that comes from the solar modules has to be supplied to the electric grid of the electricity provider in the region. And this is achieved by constructing a Solar Power Plant with the use of a Solar System, in which the quantity and arrangement of Solar modules is determined as per the electrical system design of the plant.

<sup>1</sup> Picture from the official website of ‘Office of Energy Efficiency & Renewable Energy’

## 2.1 Solar Power Plant

A Solar Power plant is an electric power plant constructed for generating electric power using solar modules that produce energy using sun light. A Solar Power Plant will consist of a solar system and the other associated electrical and plant equipment like, Inverters, Batteries, Transformers, Switchgear, Switchyard, Power Lines, Steel and Concrete structures, Fencing, Access ways, etc.

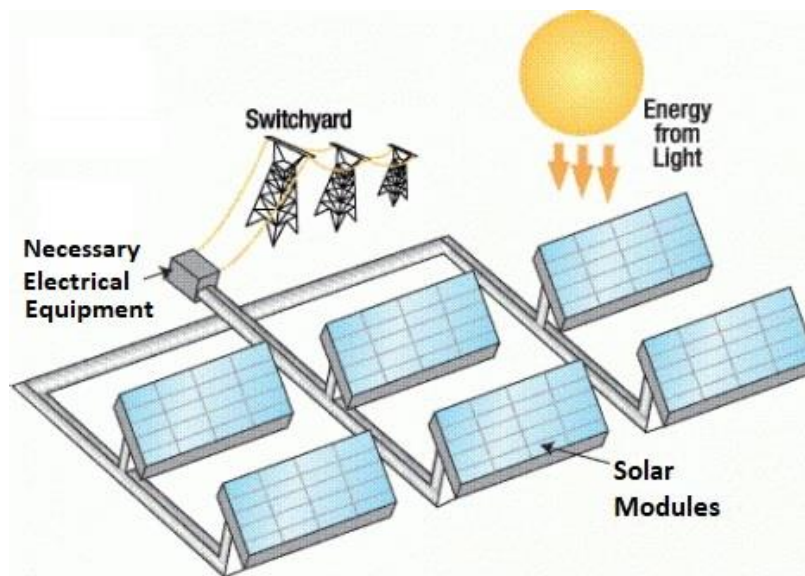


Fig. (2) A Solar Power Plant<sup>1</sup>

Some of the commonly seen equipment in a solar power plant,

- i) Steel A frame or H frame structure for the transmission lines,
- ii) High voltage switches,
- iii) High voltage circuit breakers,
- iv) Inverters,
- v) Batteries
- vi) Power transformer,
- vii) Surge arrestors,
- viii) CCVT's for metering to the utility,
- ix) Overhead electrical bus or cabling, and
- x) Medium voltage switches.

A Solar Power plant constructed by a private entity after making power purchase agreements with the local Electric Power grid to supply electric power, is known as a 'Merchant Electric Solar Power Plant'.

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<sup>1</sup> Reference the scholarly article <http://holbert.faculty.asu.edu/eee463/SOLAR.HTML>



## **2.2 Role of Inverters**

The power produced by a solar system, because of its basic principle of operation, produces the electric power in the form of Direct Current or in short, DC. This form of DC Power is not suitable for utilization. The electric power which is in usage is in the form of 'Alternating Current' or in short AC.

A 'Solar inverter' or a 'PV inverter' is a power electronic device which converts the DC Power Produced by the Solar system, into AC Power, to make it useful for utilization.

## **2.3 Role of Batteries**

As a Solar system can produce electric power only when the sunlight is available. It is because of this drawback a Solar power plant cannot produce electricity during night. In order to overcome this drawback Solar power plants are installed with batteries so that some portion of electricity produced by the solar modules during the day is stored in the batteries and retrieved during night.

The Solar Modules and the Batteries function on DC. A proper combination of Solar Modules and Batteries can produce electricity all day long.

## **2.4 Role of Transformers and Other associated switchyard equipment**

A Transformer is an electrical power equipment which is used either to step-up or to step-down the voltage of an electrical power source without changing the frequency of the voltage. A Transformer is an AC power equipment.

In a Solar Power plant, the power produced by the solar modules is converted into the useful form of AC by Inverters. The AC Power produced by inverters are at a relatively lower voltage compared to the voltage available at the electric power grid. A Transformer, which can step-up the voltage to match it with the grid, is used to overcome the difference in voltages and to establish an interconnection for the supply of power.

In a large Solar Power plant, every Inverter is installed with a Transformer locally to the inverter, to step-up the voltage to a medium level, other than the voltage available at the grid. This is done to form a network of Transformers to collect the power coming from each Inverter.

This Electric network of transformers will have one high-capacity Main Transformer, which does the final step-up for the connection with the grid.

Besides the Transformers, Solar Power plants are installed with some other electrical equipment like,

- i) Electric Switchgear
- ii) Electric Bus system
- iii) Electric Protection system &
- iv) Electric Energy measurement system

## **2.5 Role of Steel & Concrete Structures, Roadways & Fencing**

Steel & Concrete structures form the necessary structures for installing the Solar Modules and all other necessary equipment. Roadways provide access for the operations and maintenance. Fencing determines the boundary and is installed for access control and safety.

## **3 Horseshoe Bend Solar – Application Review & Findings**

The present document, as mentioned in the previous sections, is a review report created after reviewing the application documents submitted by the applicant, Horseshoe Bend Solar, LLC.

The application submitted by the applicant consists of the following documents,

- i) Application filed at the office of the Kentucky Public Service commission, required as per KRS 278.706 (1)
- ii) Site Assessment report, required as per KRS 278.706 (2)(l)

In this section, a detailed discussion is made on the Initial review, Site visit and the Final review from Wells Engineering.

### **3.1 Initial Review**

As part of the requirements of the state order, for the applicant's Case No. 2020-00190, Wells Engineering, after the initial review of the application documents, provided list of questions for the Second Request for Information.

The initial review included the review of 'Application document for project siting' & the 'Site Assessment report' submitted by the applicant.

The corresponding document submitted by Wells Engineering is attached as Appendix-A with the present document.

### 3.2 Site Visit

As part of the requirements of the state order, for the applicant’s Case No. 2020-00190, Wells Engineering, made a visit to site as organized by the Siting board, on March 17<sup>th</sup>, 2021.

The locations visited are indicated on the site layout below.

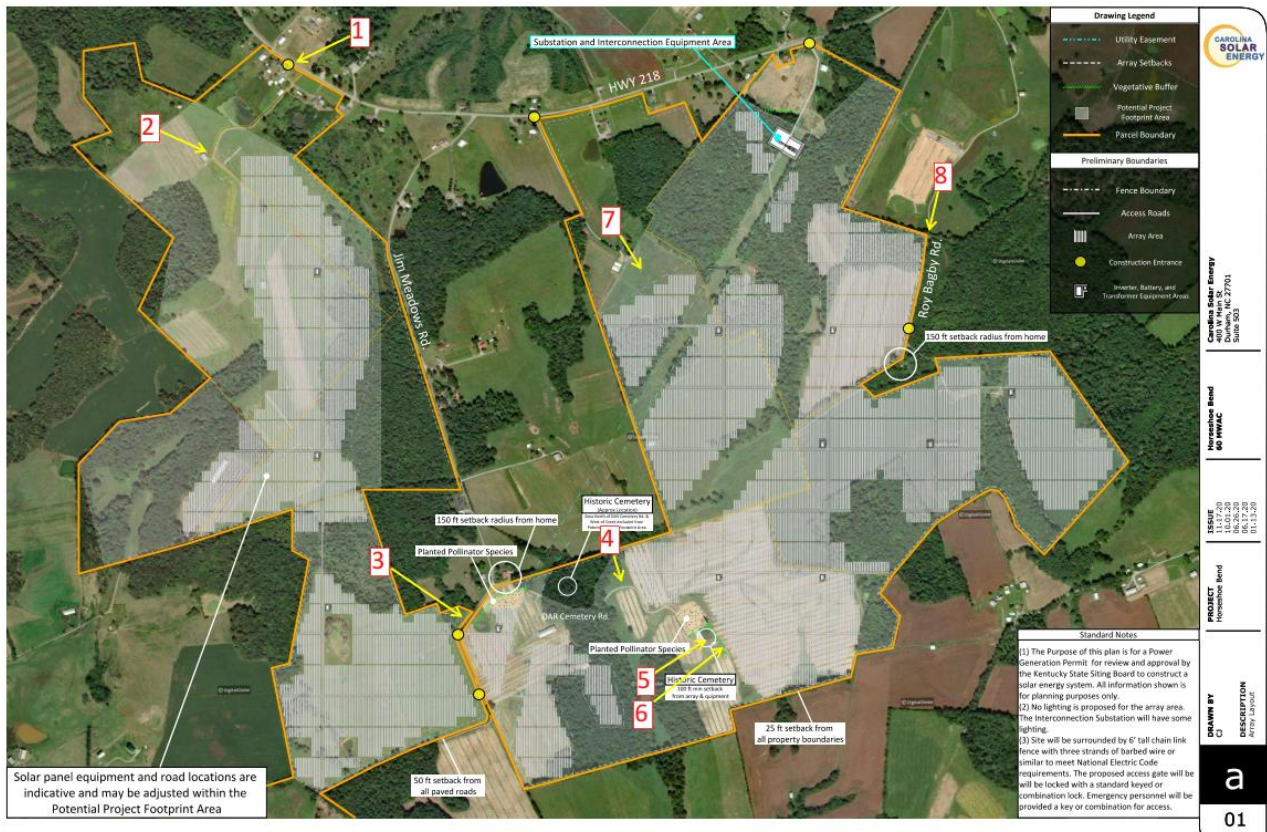


Fig. (3) Site Layout

Pictures from Site visit are shown in the following pages.





Picture (1) Location #1 – Access Point on NW of KY 218



Picture (2) Location #2 – NW Corner of the West side Solar Modules



Picture (3) Location #3 – South on Jim Meadows Road



Picture (4) Location #4 – DAR Cemetery Road





Picture (5) Location #5 – DAR Cemetery



Picture (6) Location #6 – East of DAR Cemetery



Picture (7) Location #7 – NW of Proposed Substation area



Picture (8) Location #8 – NE Roy Bagby Road



### **3.3 Final Review & Findings**

In this section a detailed discussion is made on the major aspects of the application documents submitted for their compliance as per the statutes KRS 278.706, 708 & 710.

#### **3.3.1 Review of 'Site Assessment Report'**

Wells Engineering reviewed the 'Site Assessment report' submitted by the applicant and the corresponding findings were submitted as 'List of Questions' for Second RFI.

The document submitted for Second RFI is attached as Appendix-A

#### **3.3.2 Surrounding Land Uses**

Wells Engineering reviewed the Site Layout and the 2-mile vicinity maps submitted by the applicant and performed Site Visit on Mar 17<sup>th</sup>, 2021. The finding after the site visit is discussed below.

Findings on the Site Layout & 2-Mile vicinity maps

1. Overhead tank: On the Site Layout & the 2- mile vicinity maps, the Overhead Tank shall be identified. Reference picture #9
2. Water bodies: On the site layout all the water bodies like ponds, lakes, creeks shall be identified. Reference picture (10) for a pond near to the East of Proposed Electric Substation.



Picture (9) Overhead Tank on KY218 near Jim Meadows Road





Picture (10) Pond to the East of proposed Substation

### 3.3.3. Legal Boundaries

After reviewing the legal descriptions of the land submitted as part of the application documents with the Green County PVA, the following finding were made.

Findings on the Legal descriptions

1. Landowner details on the records: For some parcels the names of the owners as per the records should be checked for the spelling. Ex: 44-31, 44-25.01
2. Land Value: For some parcels of land, the assessed values shall be recorded as per the PVA records. Ex: 44-17\_17.01, 44-20.

### 3.3.4 Proposed Access Control

As per the KRS requirements KRS 278.708 (3)(a)(3), the applicant has proposed the access control methods that are adopted for the site.

Finding on Proposed Access Control:

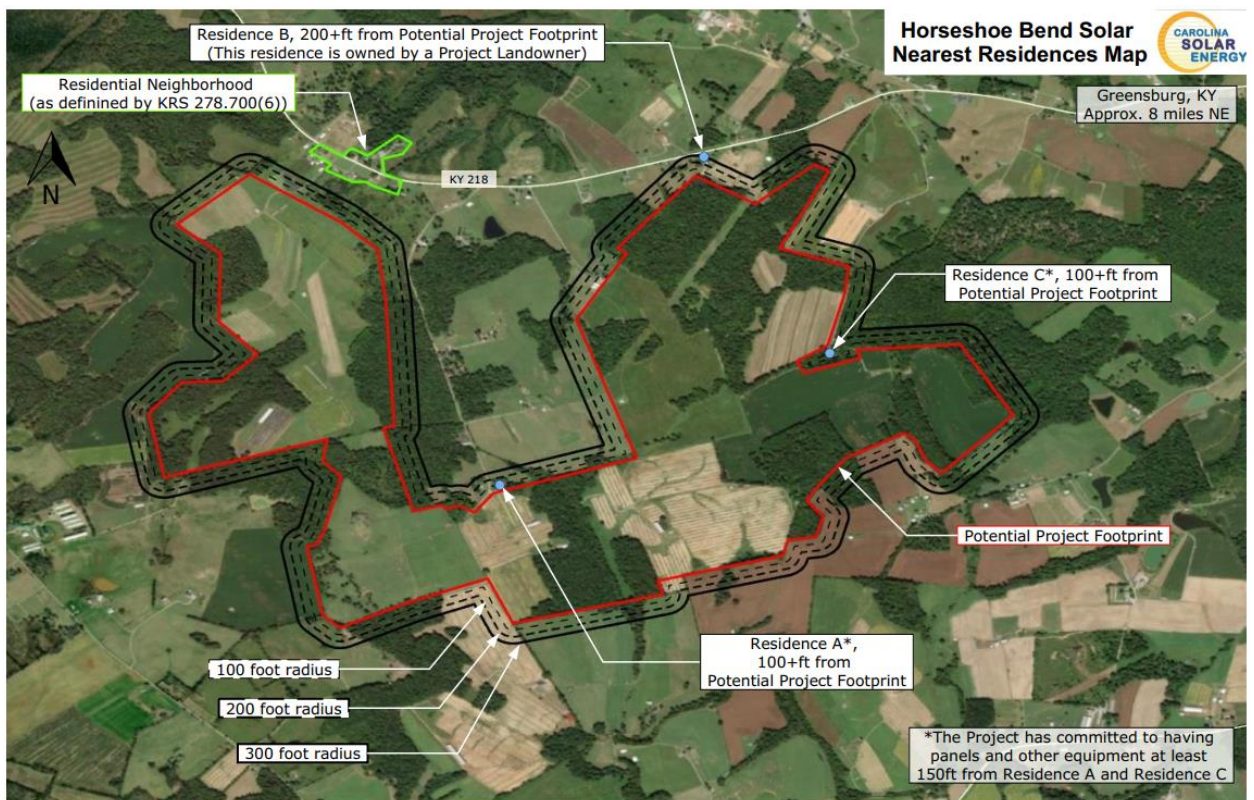
At the time of construction and operation of the plant, besides providing fencing (as proposed by the applicant), all necessary signage, caution boards and safety requirements as per OSHA shall be installed.

### 3.3.5 Location of Facility Buildings & Radial Tie lines

After reviewing the Site Layout and other plans submitted by the applicant and after visiting the site, the following findings were made.

#### Findings on Location of Facility Buildings and Radial Tie lines

1. **Nearby Residential Structures:** There are three (3) residential structures that are within 300' from the project boundary. Necessary approvals/deviations shall be obtained by the applicant for an acceptable clearance from the properties, as necessary.



Picture (11) Nearest Residences Map, Attachment C of the Site Assessment Report

Note: The Layout Map may be updated as necessary

2. **Existing Underground Utilities:** Necessary precautions shall be considered during the construction as there could be underground utilities as there is an Overhead tank in the vicinity of the project site.

### 3.3.6 Location and Use of Accessways, Internal Road & Railways

As part of the site visit, major access points are visited, and the following findings were made.

Findings on Location and Use of Accessways, Internal Road & Road

1. The internal roads are proposed to be gravel roads.
2. Rail roads are not applicable to site.
3. Public access to the historic cemeteries is required.

### 3.3.7 Existing or Proposed Utilities to Service the Facility

After reviewing the plot plans submitted by the applicant, it was found that the drawings do not indicate the utilities to the facility buildings of the plant, as the drawings are prepared as preliminary. Applicant has provide necessary utilities as required for the plant at the time of construction.

### 3.3.8 Compliance with Applicable setback requirements

The KRS required setback is 2000 feet. This setback is practical for turbine-based plants and the noise and view generated but not practical for a solar power plant. After reviewing the applications documents and the statutes it was found that there shall be necessary approvals/deviations obtained by the applicant as necessary.

### 3.3.9 Evaluation of Noise levels, Impact of Road Traffic/Fugitive Dust

Wells Engineering has appointed industry leading expert for the Environmental Assessment of site for Noise, Traffic & Fugitive dust.

The summary of findings of the expert's review is as under,

*“Based on a review of The Horseshoe Bend Solar Project Site Assessment Report, by W. Thomas Chaney of Cloverlake Consulting, all of the sections of the report are in compliance with the intent of KRS 278.708.*

*There are a few areas where additional conditions are needed. These proposed conditions are specified in Additional Mitigating Measures proposed by the consultant on page 25 of this report.*

*By title these measures are*

- *Traffic Safety*
- *Fugitive Dust*
- *Protection of water resources in the Project Area*
- *A more specific schedule for the beginning and completion of construction should be given to the Siting Board as soon as possible.”*

The complete report from the expert is attached as Appendix-B

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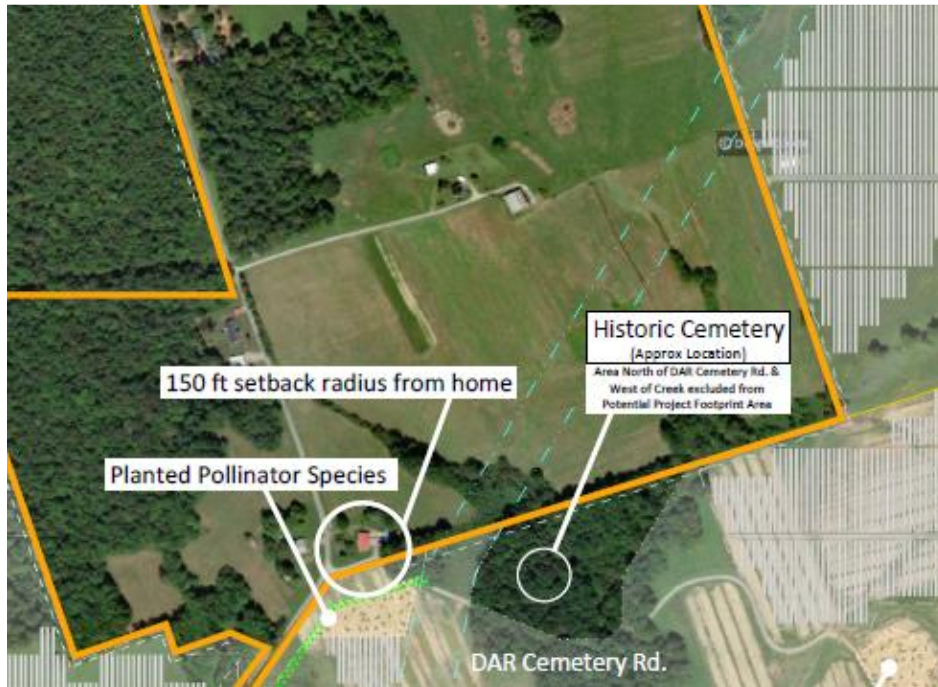
3.3.10 Compatibility with Scenic Surroundings KRS 278.708(3)(b)

The Applicant provided a narrative of the scenic surroundings, location of potentially affected non-participating residences, vegetative buffers, and the historic cemeteries. As indicated by the Applicant there are 3 residences within 300 feet of the solar power plant. Only two are non-participating. Residence A is the most effected and the Applicant has contacted that owner who they claim has not objected to the development. Additionally, the Applicant has provided screening for this residence and provided a 150-foot setback. Residence C, pictured below, already has natural screening and will likewise be provided a 150-foot setback. We are of the opinion that the solar power plant will not detract from the view of this residence's junk car collection.



Picture (12) Nearest Residences Non-participating

We noted that there is one other non-participating residence that will have a direct view of the solar power plant that outside of the 300' mentioned. This residence is a large land holder and will be approximately 1,100 feet from the solar power plant. Additionally, they have a high voltage transmission line running through the same viewshed. The impact will be minimal based on these factors.



Picture (13) Nearest Residences Non-participating

There is a neighborhood within 2000 feet as described by KRS. This is a small collection of houses where the closest house is 850' from the solar power plant and completely obscured from view of any of the residences. This is a picture of what those residents will see when looking in the direction of the solar power plant.



Picture (14) Site View

Overall, there is negligible impact to the viewshed.

### 3.3.11 Evaluation of Potential Changes in Property Values

Summary: While there will always be impact to the scenery of neighboring properties the impact of this project is minimal. The combination of the topography, existing tree line, and existing human made features works well to minimize the impact to property valuation. The major exceptions to this are the project participants and a few other directly neighboring landowners.

#### Evaluation of Property Valuation Impact

The data contained in the Site Assessment Report for Horseshoe Bend regarding an evaluation of the facility and its impact on property values is in compliance with the intent of KRS 278.216. The report created by Kirkland as part of the application has 38 examples it cites where there are relatively no impacts on land values of the neighboring properties. As we read further in this report, we realized that the methodology for the finding in the report were missing from the report. The report was funded by the Applicant and that all the cases cited had the same conclusion. Our research found a large number of published materials indicating there is little or know impact on neighboring properties to the solar farm, however, a deeper dive showed that all these papers were funded by solar developers. Without the methodology to use to confirm the findings we found it necessary to hire an expert appraiser to review the report and research the cases.

Mary McClinton Clay, MAI who is long time resident of Central Kentucky and currently performs consulting work for the Commonwealth's department of transportation was requested to review the report for conformity with the Uniform Standards of Professional Appraisal Practice. The report is located in Appendix C. The report is not an appraisal estimate but an analysis of the potential flaws with the case studies in the applicant's report. Ms. Clay's review points out some inconsistencies with the case study data as well as omissions to change.

Some of the more interesting information is the number of effected property owners who received compensation through a neighborhood agreement, or had their property directly purchased by the developer. This does not mean that there is an actual impact, but that the developers were attempting to remove or reduce negative responses from property owners.

In the North Star case study Ms. Clay has listed the purchase history of the most effected neighboring properties which were purchased by the developer. The developer then flipped the property a couple of years later at a loss. In total the seven properties listed were sold for a total loss of \$629,956 to the developer CER Land, LLC. One other interesting point is one of the sellers of the property to CER Land, LLC bought the house back from them a year and a half later. Common sense would conclude that there was a strong interest by some individuals in exacting compensation from the developer over protecting the viewshed of the housing.



Ms. Clay's review concludes that one size fits all in appraising the actual valuation effect of the Solar Power Plant does not work and that many more data points are needed. Further in the report she states that there is not enough solar development to have the necessary data points.

In order to establish a third point of reference we asked our environmental engineer, Mr. Tom Chaney, to consider the impact on valuation. Concerning the loss of valuation due to the change in viewshed he writes the following:

“Based on the data and analysis in this report, it is the professional opinion of the author that the solar farm proposed at the subject property will have no impact on the value of adjoining or abutting property and that the proposed use is in harmony with the area in which it is located. I note that some of the positive implications of a solar farm that have been expressed by people living next to solar farms include protection from future development of residential developments or other more intrusive uses, reduced dust, odor and chemicals from former farming operations, protection from light pollution at night, it's quiet, and there is no traffic.”

There is agreement that every site is different and every property within that site is different and to draw a consistent conclusion is difficult. To deny the property rights of those participating in the development for the viewshed of a neighbor when there are so many other “co-dominant” features, like the transmission line, would seem extreme.

In conclusion, there are differences of opinion as to the effect on property valuation created from a solar power plant. We do know that the area is lightly populated and there is no objections. In our opinion there will be no impact to property values.

### 3.3.12 Power System Study

As required, the Applicant must submit to the regional transmission organization (RTO) for approval to interconnect their generation into the system. For this region, PJM is the controlling organization. In order to connect to the transmission system a feasibility study must be supplied. We reviewed the study report to determine if there are any issues that would be of benefit in a Siting Board decision. We were unable to verify the mathematical model accuracy as that would require the model data that loads into the study software. Our response is limited to the report and we are assuming the modeling is correct.

Everything in the study indicates it is a good interconnection for the MW proposed. There are a few overload conditions identified, however, they provided estimated system reinforcements to eliminate the problem.

The study indicates that Applicant will need to provide meteorological data to the transmission provider information such as back panel temperature and irradiance. We have not seen any design information from the applicant to indicate the collection and transfer of this data.

## 4 Recommendations & Mitigations Measures

After reviewing the application documents and performing the site visit, Wells Engineering provides the following Recommendations & Mitigation measures.

1. Create an over-all plot plan indicating all water bodies, bridges, culverts, access roads, power lines, residential and public structures, etc.
2. Leaving existing vegetation between solar equipment and neighboring residences in place, to the extent practicable, to help screen the Project and reduce visual impact.
3. Provide Site access control as per NERC, NFPA and OSHA guidelines as necessary.
4. Evaluate the existing bridges for their load bearing capacity for construction, operation, and Maintenance. During our site visit between stop #1 and #2 there is a culvert designed for farm equipment but may not be able to sustain loaded tractor trailers used for delivering equipment.
5. Construct new bridge wherever required necessary.
6. Adhere to the setback distance at all locations as per guidelines from the local planning zone authority.
7. Notices to neighbors regarding potential construction and operation noises, as well as limits on working hours during the construction period, as described in Section 4.
8. Traffic Safety: Most of the roads adjacent and through the site are narrow and, in some cases, curvy. The Applicant should submit a detailed plan on how traffic safety will be maintained during the construction of the facility ten days before commencing construction.
9. Fugitive Dust & PM10: The applicant will submit in writing the specific plan to control fugitive dust and PM 10 during the construction process ten days prior to commencing construction.
10. Protection of Streams: Ten days prior to the commencement of construction, the Applicant will provide a detailed plan on how they will protect the water resources in the project area. The site assessment documents in several locations says that certain mitigation measures regarding erosion and protection of water resources “may” be carried out. This needs to be clearly specified. The primary focus should be on preventing turbidity being added to local water sources as a result of erosion during construction.





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# APPENDIX A

February 25, 2021



## List of Questions for Data Request-II

Horseshoe Bend Solar, LLC  
KY State Board on Electric Generation and  
Transmission Siting

Customer:  
Kentucky Public Service  
Commission

Prepared for:  
Quang D. Nguyen



February 25, 2021



Prepared by:

A handwritten signature in blue ink, appearing to read 'V. Chikkeruru'.

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Vasu Chikkeruru, P.E.  
Sr. Power Systems Engineer

Reviewed by:

A handwritten signature in blue ink, appearing to read 'Jim Cook'.

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Jim Cook  
Chief Operating Officer

Approved by:

A handwritten signature in blue ink, appearing to read 'Patrick A. Wells'.

---

Patrick Wells, P.E.  
President/CEO

## List of Questions for Data Request-II

### Synopsis

This document is a list of questions prepared for the data (or) information to be requested as part of the application process for Solar Electric Generation Plant in Madison, KY.

WEpsc Order: WE21021845

Public Service Commission PO:  
PON2 123 2100001588 Version 2



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## REVISIONS

Revision	Date Issued	Issue Type	By	Description
0	02-25-2021	For Review	VC	Issue for Review & Record



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## 1 Introduction

The present document is a list of questions prepared for the request of data (or) additional information in the matter of Application of Horseshoe Bend Solar, LLC for a certificate of construction for an approximate 60MW Merchant Electric Solar Generation Facility near Exie, Green County, KY pursuant to KRS 278.700 & 807 KAR 5:110

### Scope

As part of the application evaluation process Kentucky Public Service Commission has appointed Wells Engineering PSC for providing consultancy services.

The present document is created as part of the Second request for information required as per the order issued for case number.2020-00190, by the commission.

### Reference Document

The following documents are referenced for the creation of this document.

- i. Commonwealth of Kentucky Order for Case no. 2020-00190
- ii. Application Documents for Case No. 2020-00190 by Carolina Solar Energy
- iii. Site Assessment Reports for Case No. 2020-00190 by Carolina Solar Energy
- iv. Responses to Siting Board's First Request for information for Case No. 2020-00190 by Horseshoe Bend Solar, LLC
- v. Kentucky Revised Statutes, KRS 278-706, 708, 710

## 2 List of Questions

In this section a detailed list of questions is described.

### Question#1

#### *Electrical One-Line Diagram*

Electrical One-line diagram is very important document required for understanding and evaluating the Electrical Power Network and Interconnection of a Power Plant.

Applicant to submit Electrical One-line diagram of the installation.

### Question#2

#### *Project Schedule*

Applicant to submit an over-all tentative schedule of the project, starting from the receipt of the certificate for construction to the completion of the project.

This document helps in understanding the total time required and the major milestones involved.

### Question#3

#### *Overall Project Layout*

Please provide the information on the utilities like Water, Sewer, etc, to be provided to any of the buildings, warehouses, Project offices and Power Stations as applicable to site.

This is required for assessing the capability of the proposed utilities.

### Question#4

Applicant to provide pertinent information for,

*At end of life when the system is decommissioned will the area be restored? Will the soil be useful for farming after the demolition of the solar plant after 30 years? If not, will the companies do something to bring the soil back to normal?*

## **Question#5**

### *Storage Battery Potential Hazards*

Applicant to provide information on the potential hazards associated with the storage batteries if installed and what are the safety precautions taken?

## **Question#6**

### *Storage Battery Environmental Impact*

Applicant to provide information on the environmental impact these batteries impose if the project is installed with storage batteries.

## **Question#7**

### *Cell Phone Towers*

Applicant to provide information on any cell phone tower that may be required/constructed for the project.

## **Question#8**

### *Fiber Optic Communication & Associated excavation*

Applicant to provide information on any fiber optic or any kind of communication network installed as part of the project?

Applicant to provide information on excavation that may be required for the above.

## **Question#9**

### *PV Cell/Solar Panel Manufacturing*

Applicant to provide indicative information on where the PV cells/Solar Panels are manufactured and what will be the % of import & % indigenous for the project.

## **Question#10**

### *DOE Compliant Transformer*

Applicant to provide information on the DOE Compliant transformers used at site.



## **Question#11**

### *Pollinator Maintenance*

Applicant to provide compliance on maintaining the pollinators, as long as the plant is in operation.

## **Question#12**

### *Cemetery Access and Maintenance*

Applicant to provide compliance on providing permanent public access and maintain the Cemeteries as long as the plant is in operation.



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# APPENDIX B



**Horseshoe Bend Solar, LLC Carolina Solar Energy Evaluation  
of the Site Assessment Report**

**Developed for Wells Engineering and the Kentucky Public  
Service Commission- State Board on Electric Generation and  
Transmission Siting**

**By Cloverlake Consulting, W. Thomas Chaney, President**

**March 24, 2021**



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**Cloverlake Consulting March 24, 2021**

**On Behalf of Wells Engineering, Florence, Kentucky For the Horseshoe Bend Solar Project-Kentucky State Board on Electric Generation and Transmission Siting Project Description**

The Project will consist of approximately 550 acres of solar photovoltaic panels and associated racking (approximately 60MW), 15 inverters, a dc-coupled energy storage system, to be co-located at each inverter as well as a Project substation transformer that will connect to East Kentucky Power Cooperative's Green County - Summer Shade 161 kilovolt transmission line near the community of Exie in Green County, KY. The street address of the proposed Project is 1648 KY 218, Greensburg, KY 42743. The Project is not located within the limits of any city.

The Project is situated in a rural area, significantly set back from most roadways and surrounding homes and businesses, and will be nearly completely surrounded by existing vegetation. Once the Project is complete, it will likely only be visible from a short stretch of Jim Meadows Road and Roy Bagby Road, small county roadways.

The generating facility will sell power on the wholesale market as a merchant power plant or independent power producer.

**1.01 Standard of Adequacy of the Site Assessment Report Submitted By Horseshoe Bend/Carolina Solar**

**Requirements of KRS 278.216**

Kentucky Revised Statutes require the following for applicants who desire to build a Merchant Generating Facility in the Commonwealth of Kentucky: 278.216 Site compatibility certificate -- Site assessment report -- Commission action on application. (1) Except for a utility as defined under KRS 278.010(9) that has been granted a certificate of public convenience and necessity prior to April 15, 2002, no utility shall begin the construction of a facility for the generation of electricity capable of generating in aggregate more than ten megawatts (10MW) without having first obtained a site compatibility certificate from the commission. (2) An application for a site compatibility certificate shall include the submission of a site assessment report as prescribed in KRS 278.708(3) and (4), except that a utility which proposes to construct a facility on a site that already contains facilities capable of generating ten megawatts (10MW) or more of electricity shall not be required to comply with setback requirements established pursuant to KRS 278.704(3). A utility may submit and the commission may accept documentation of compliance with the National Environmental Policy Act (NEPA) rather than a site assessment report. (3) The commission may deny an application filed pursuant to, and in compliance with, this section. The commission may require reasonable mitigation of impacts disclosed in the site assessment report including planting trees, changing outside lighting, erecting noise barriers, and suppressing fugitive dust, but the commission shall, in no event, order relocation of the facility. (4) The commission may also grant a deviation from any applicable setback requirements on a finding that the proposed facility is designed and located to meet the goals of this section and KRS 224.10-280, 278.010, 278.212, 278.214, 278.218, and 278.700 to 278.716 at a distance closer than those provided by the applicable setback requirements. (5) Nothing contained in this section shall be construed to limit a utility's exemption provided under KRS 100.324. (6) Unless specifically stated otherwise, for the purposes of this section, "utility" has the same meaning as in KRS 278.010(3)(a) or (9). Effective: June 24, 2003 History: Amended 2003 Ky. Acts ch. 150, sec. 3, effective June 24, 2003. -- Created 2002 Ky. Acts ch. 365, sec. 13, effective April 24, 2002.

## **102 Specific Requirements By the Statutes and Evaluation of the Performance of the Applicant's Site Assessment**

278.708 Site assessment report -- Consultant -- Mitigation measures. (1) Any person proposing to construct a merchant electric generating facility shall file a site assessment report with the board as required under KRS 278.706(2)(l). (2) A site assessment report shall be prepared by the applicant or its designee. (3) A completed site assessment report shall include:

**(a) A description of the proposed facility that shall include a proposed site development plan that describes:**

**1.02.1. Surrounding land uses for residential, commercial, agricultural, and recreational purposes; Horseshoe Bend Solar Project:**

COMPLIANCE:

The proposed facility is described in detail in Section 2 of the Application. The proposed site development plan is attached as Appendix A, and is described in detail below.

A detailed description of the surrounding land uses is identified in the Impact Study conducted by Kirkland Appraisals, LLC, and attached as Attachment B to the Applicants Site Assessment Report. A summary of the surrounding land use is contained below:

	<b>Acreage</b>	<b>Parcels</b>
Residential	3.13%	38.71%
Agricultural	35.78%	29.03%
Agri/Res	61.10%	32.26%

Pages 5-6 of the Kirkland Impact Study lists the adjoining parcels, states whether each parcel has a residential home, and states the number of feet between each adjoining residential home and the solar facility.

**Kentucky PSC Compliance Evaluation:**

*The data contained in the Site Assessment Report for Madison Solar, Volumes I and II for land use is in compliance with the intent of KRS 278.216.*

**1.02.2. The legal boundaries of the proposed site; See Appendix C of this report.**

**Kentucky PSC Compliance Evaluation:**

*The data contained in the Site Assessment Report for Horseshoe Bend Solar, is in compliance with the intent of KRS 278.216. The Appraisal Report by Kirkland Appraisals as well as construction and engineering documents including maps*

***and figures specifically identify the legal boundaries of the site as well as the legal boundaries of adjacent parcels of land. See the Site Assessment for the Horseshoe Bend Solar Project. See Appendix B-Project Vicinity Map. And Appendix C for the Project Legal Boundary Map.***

**1.02.3. Proposed access control to the site;**

Any entrances to the facility would likely be on KY-218. There are multiple dirt, blacktop and gravel roads into the site.

**Kentucky PSC Compliance Evaluation:**

***The data contained in the Site Assessment for Horseshoe Bend Solar for access control of the site is in compliance with the intent of KRS 278.216.***

**1.02.4. The location of facility buildings, transmission lines, and other structures;**

See the site map in Appendix A and in the Applicants Site Assessment Report.

**Kentucky PSC Compliance Evaluation:**

***The data contained in the Site Assessment Report for Horseshoe Bend Solar for the location of facility buildings ,transmission lines and other structures is in compliance with the intent of KRS 278.216.***

**1.02.5. Location and use of access ways, internal roads, and railways;**

See the map in Appendix A and the Site Assessment Report for the Horseshoe Bend Solar Project.



**Kentucky PSC Compliance Evaluation:***The data contained in the Site Assessment Report for the Horseshoe Bend for location and use of access ways, internal roads and railways is in compliance with the intent of KRS 278.216.*

**1.02.6. Existing or proposed utilities to service the facility;**

See the map in Appendix A.

**Kentucky PSC Compliance Evaluation:**

*The data contained in the Site Assessment Report for Horseshoe Solar,r for existing or proposed utilities to serve the facility is in compliance with the intent of KRS 278.216.*

**1.02.7. Compliance with applicable setback requirements as provided under KRS 278.704(2), (3), (4), or (5); a**

See the Horseshoe Bend Solar Application showing the site development plan. The setback requirements have been met.

**Kentucky PSC Compliance Evaluation:**

*The data contained in the Site Assessment Report for the Horseshoe Bend Solar project regarding applicable setback requirements is in compliance with the intent of KRS 278.216.*

**1.02.8-Noise and Scenic Surroundings**

There are 2 non-participating residential homes within 300 feet of the proposed location of solar panels and equipment, as shown on the map and table in Attachment C. One of the homes (Residence C marked on the map) has existing vegetation that will block much of the view of the solar facility. As noted in Section 6 of the Siting Board Application, representatives from Horseshoe Bend met with the owners of the other home (Residence A marked on the map) and explained the Project, setbacks and proposed vegetative buffer to the homeowners, who did not express concern or opposition to the Project.

An additional vegetative buffer is proposed at the historic family cemetery at the Southern end of the Project site. More information on this cemetery is provided in the Mitigation Measures section of this Site Assessment Report.

In order to provide the Siting Board with a feel for the scenic surroundings of the area there are copies of images taken from public areas around the proposed site, including Jim Meadows Road and Roy Bagby Road. These images are located at page of this Evaluation Report

For more information about the compatibility of solar facilities with rural land, please refer to Sections III-VI from Attachment B in the Site Assessment Report provided by the applicant which address appropriate setbacks, topography, harmony of use, and compatibility in detail.

An excerpt from Section IV, page 102, of Attachment B reads as follows:

“[L]arger solar farms using fixed or tracking panels are a passive use of the land that is in keeping with a rural/residential area. . . . The solar panels are all less than 15 feet high, which means that the visual impact of the solar panels will be similar in height to a typical greenhouse and lower than a single story residential dwelling. Were the subject property developed with single family housing, that development would have a much greater visual impact on the surrounding area given that a two-story home with attic could be three to four times as high as these proposed panels.”

**Kentucky PSC Compliance Evaluation:**

***The data contained in the Site Assessment Report for the Horseshoe Bend Solar project regarding 1.02.01-1.02.07 above is in compliance with the intent of KRS 278.216.***

**The potential changes in property values and land use resulting from the siting, construction, and operation of the proposed facility for property owners adjacent to the facility;**

REQUIREMENT: per KRS 278.708 (3)(c); The potential changes in property values and land use resulting from the siting, construction, and operation of the proposed facility for property owners adjacent to the facility.

COMPLIANCE: See Attachment B in the Applicants Site Assessment Report for a report studying potential property value impacts to owners adjacent to the proposed facility by a certified real estate appraiser. The conclusion of the report, Section VII on page 107, reads as follows:

“The matched pair analysis shows no impact in home values due to abutting or adjoining a solar farm as well as no impact to abutting or adjacent vacant residential or agricultural land. The criteria that typically correlates with downward adjustments on property values such as noise,

odor, and traffic all indicate that a solar farm is a compatible use for rural/residential transition areas and that it would function in a harmonious manner with this area.

Very similar solar farms in very similar areas have been found by hundreds of towns and counties not to have a substantial injury to abutting or adjoining properties, and many of those findings of no impact have been upheld by appellate courts. Similar solar farms have been approved adjoining agricultural

uses, schools, churches, and residential developments. Industrial uses rarely absorb negative impacts from adjoining uses.

Based on the data and analysis in this report, it is the professional opinion of the author that the solar farm proposed at the subject property will have no impact on the value of adjoining or abutting property and that the proposed use is in harmony with the area in which it is located. I note that some of the positive implications of a solar farm that have been expressed by people living next to solar farms include protection from future development of residential developments or other more intrusive uses, reduced dust, odor and chemicals from former farming operations, protection from light pollution at night, it's quiet, and there is no traffic."

***The data contained in the Site Assessment Report for Horseshoe Bend , regarding an evaluation of the facility and its impact on property values is in compliance with the intent of KRS 278.216.***

### **Evaluation of anticipated peak and average noise levels associated with the facility's construction and operation at the property boundary.**

The Project will consist of approximately 550 acres of solar photovoltaic panels and associated racking (approximately 60MW), 15 inverters, a dc-coupled energy storage system, to be co-located at each inverter as well as a Project substation transformer that will connect to East Kentucky Power Cooperative's Green County - Summer Shade 161 kilovolt transmission line near the community of Exie in Green County, KY. The street address of the proposed Project is 1648 KY 218, Greensburg, KY 42743. The Project is not located within the limits of any city.

## **2.0 Sound Impact Evaluation**

Per KRS 278.708 (3)(a)(8), (3)(d) and KRS 278.710 (1)(b), the facility has been evaluated for the anticipated peak and average sound levels associated with its construction and operation at the property boundary. The project location of Green County does not have a noise control ordinance applicable to this proposed project.

The existing local sound environment is currently and expected to continue being dominated by several existing significant sources of sound, which may be classified as sources of noise by sensitive receptors. These existing sources primarily consist of primary (HWY 218) and secondary roadways.

As identified on Figure 3 Nearest Residences, two noise sensitive areas (NSAs) were identified within 300 feet (ft.) of the proposed site boundaries. There are two historic cemeteries located near the southern limits of the proposed Project. Refer to Figure 2 for the Site Plan referencing the specific locations. These NSAs were determined using existing and publicly available areal imagery for the Project area surrounding the proposed site. Professional judgement was used to estimate which structures within the study extents meet the criteria of sensitive receptors.

## **2.1 Sound Level During Facility Construction**

During construction of the Project, sound levels generated by equipment used on the site are anticipated to range from 70 to 125 A-weighted decibels (dBA) at the source, based upon professional judgement and past experience of equipment in typical use for similar types of projects.

[Reference:[https://www.fhwa.dot.gov/environment/noise/construction\\_noise/handbook/handbook09.cfm](https://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm) Table 9.1 RCNM Default Noise Emission Reference Levels and Usage Factors Federal Highway Administration (FHWA)

Construction Noise Handbook for example construction equipment and their associated sound levels.]

Construction activities are anticipated to be transient in nature and of a limited duration, ending once construction has been completed, and taking place daily during the hours of 7 AM to 9 PM.

The loudest source from construction is expected to be pile driving equipment (approximately 125 dBA at three ft. from source) used in the construction of the solar panel racking system.

**Anticipated Noise Produced by Very Loud Construction Equipment (pile driver)**

**Distance from Source to Receptor ft.) Sound Level Experienced at Receptor(dBA)**

25	106.6
50	100.6
100	94.5
150	91.0
200	88.5
300	85.0
500	80.6
1,000	74.
51,500	71.0

**2.2 Sound Level During Facility Operation**

Based on profiles for equipment associated with solar energy production facilities, the following sound levels (at

approximately three ft. from source) are expected:

Inverters.

☒ String Inverters – 74 dBA/each.

☒ Central Inverters – 85.6 dBA/each.

Heating, Ventilation, and Air-Conditioning (HVAC) units – 67.0 dBA/each.

Substation – 71 dBA/each.

Sound levels generated by operating equipment are assumed to include all applicable sound sources within the equipment package (for example, fan.)

To quantify the sound level impacts of the Project on nearby NSAs, Tables 1, 2, 3, and 4 are provided in the Applicants Site Assessment Report to illustrate how sound level contributions for each piece of equipment change over distance from a given source.

### **2.3 Sound Level Impact During Facility Operation**

Based on professional judgement and experience, the ambient daytime sound level for the area surrounding this project is anticipated to be between 50 and 60 dBA.

Applicable minimum setbacks pertaining to this project are as proposed as follows:

Central Inverters/Energy Storage System/HVAC:

☒ 150 ft. from non-participating adjoining parcels.

☒ 300 ft. from non-participating residences.

All other equipment:

☒ 150 ft. from non-participating residences. Based on information presented in Section 2.2, Table 1, it is anticipated at 300 ft. the sound level contribution from the operation of a Central Inverter will be approximately 47.6 dBA.

***The data contained in the Site Assessment Report Horseshoe Bend Solar Project above is in compliance with the intent of KRS 278.216.***

### ***3.0 Traffic Evaluation Including Fugitive Dust***

***3.1 Existing Road Network and Traffic Conditions*** *The proposed solar facility, location shown in Appendix A, will be constructed along the south side of KY 218, located from two to three miles west of US 68. Refer to Figure 2 for the Site Plan and Figures 2 and 4 showing the proposed construction entrances. Three entrances will be along KY 218, two along Jim Meadows Road, and one along Roy Bagby Road. All construction vehicle access points from KY 218 will be from existing driveway locations. Both KY 218 and US 68 are Major Collectors not on the National Highway System, though US 68 is on the National Highway System in the eastern portion of Green County from the KY 793 intersection to Taylor County. KY 218 consists of two, 10-foot lanes in each direction, and US 68 consists of two, 11-foot lanes in each direction. Both Jim Meadows and Roy Bagby roads are single-lane paved roads. Jim Meadows Road connects to Liletown Road to the south and Roy Bagby Road is a dead-end road. Figure 4 shows the construction site entrances and traffic information including count station locations for KY 218 and US 68.*

### ***3.2 Traffic Impacts During Facility Construction***

*Construction of the solar facility is expected to take eight to 12 months, with working hours from 7 AM to 9 PM daily. Trips to the facility during construction are anticipated to consist of workers commuting to the site in*

*passenger vehicles and construction deliveries in larger trucks, including trucks with trailers. Based on the*



*company's experience with facilities of similar sizes, up to 150 workers are anticipated to be on-site each day. Workers will park on-site, but if space is inadequate, Horseshoe Bend may designate an off-site location and provide an employee shuttle. For construction deliveries, up to 15 trucks (Class 9) are anticipated to deliver components daily, weighing approximately 40,000 pounds each. Additionally, a few Class 21 trucks will be required. One Class 21 truck is anticipated for the delivery of the substation transformer. Additionally, approximately 10 Class 21 truck (or similar) deliveries are anticipated to deliver solar lulls to the facility. Deliveries are anticipated to occur at various times throughout each working day; group delivery is not common of the panels and racking, which is the majority of deliveries. Therefore, the worst-case, conservative daily total traffic would be less than 200 vehicles per day, with the majority of trips for workers (FHWA Class 2 and 3 vehicles). Two-way peak hour traffic volumes along nearby roads average fewer than 150 vehicles per hour (fewer than three vehicles per minute), due to this low background traffic volume no adverse traffic impacts are anticipated as a result of construction. The proposed solar facility is located beyond 15 driving miles from the nearest parkway exit (Cumberland Parkway, 19 miles) and beyond five driving miles from the nearest state highway that is on the National Truck Route (US 68, 14 miles). Construction site access points are anticipated along a state road (KY 218) and along local roads within one mile of that state road (Jim Meadows Road and Roy Bagby Road). Encroachment Permits will be required through the State and/or County governing agencies, and additional permits/agreements could be required for roads beyond the National Truck Route depending on the route(s) the contractor*

*determines will be needed for trucks to the site. Permitting will be performed by the contractor*

*once the project is awarded and these considerations finalized.*

*Construction is not anticipated to encroach onto a state right-of-way other than vehicles accessing the site from KY 218 and existing driveway locations. Horseshoe*

*Bend and/or the construction contractor will provide adequate Manual on Uniform Traffic Control Devices compliant traffic control signs and devices during*

*construction, including work zone signage and KY Transportation Cabinet-certified flaggers to facilitate safe construction deliveries. Due to its narrow width, the contractor may need to close Jim Meadows Road to through traffic during certain times of construction. There may be temporary stoppages on Roy Bagby Road to*

*facilitate deliveries. Disruptions to local property owners will be coordinated during construction. The construction contractor will document roadway conditions in accordance with all applicable transportation permits obtained from State and local road authorities before construction commences and will be responsible for restoring impacted roadway to pre-construction conditions as required through the permitting process.*

### **3.3 Traffic Impacts During Facility Operation**

*The operation of the Horseshoe Bend Solar Facility will not require on-site employees for its regular operation.*

*Approximately two employees may visit the site up to a few times a month for inspection and to perform or coordinate maintenance as needed. A few additional employee or contractor trips may occur during the vegetative growing system for activities such as grass cutting. With only a few occasional employee trips per month, operation of the facility is not anticipated to adversely impact area traffic, and a detailed traffic study is not required since it is below the 100 peak hour trips*

*per hour threshold detailed in KY Transportation Cabinet's 2012 policy, Traffic Impact Study Requirements.*

### **3.4 Fugitive Dust Impacts**

*While state and local area roadways are paved, fugitive dust is anticipated during construction from land disturbance and use of unpaved driveways. Due to the low-density housing and rural character near the site, and the large size of the site, fugitive dust minor impacts are expected. To reduce potential dust impacts, open bodied trucks will be covered while in motion. Internal roadways will be constructed from compacted gravel.*

*Due to an increase associated with dust from gravel roads and site use in general, water may be applied to reduce dust generation as needed. Under the KY Pollutant Discharge Elimination System, water used for dust control during facility construction is authorized as a non-stormwater discharge activity. Horseshoe Bend will apply best practices for dust mitigation.*

### **3.5 Railroad Impacts**

*The Horseshoe Bend Solar Facility will have no impact on railroad traffic as there are no railroads, spurs, or other rail facilities in the Project area.*

### **3.6 Traffic Assessment Summary**

*Due to the low traffic volumes of existing roadways near the proposed Horseshoe Bend Solar Facility (fewer than 1,500 vehicles per day), construction is not anticipated to cause level of service degradations, generating fewer than 200 additional vehicles per 14-hour working day (7 AM to 9 PM) during the eight to 12-month construction period. Appropriate traffic control such as warning signs and flaggers will be provided during construction to minimize traffic impacts. Once completed, the facility will have occasional employees on site (two or fewer daily vehicles), so long-term traffic impacts will be negligible. Horseshoe Bend will restore roadways impacted by construction as required through the permitting*

*process. Dust impacts are anticipated to be minor, and the contractor will work to minimize dust impacts.*

#### **4.0 Conclusions**

*Per evaluation based on KRS 278.708 (3)(a)(8) and (3)(d), KRS 278.710 (1)(b), KRS 278.708 (3)(e), and KRS 278.710 (1)(a), the Sound and Traffic Evaluation Report concludes that anticipated noise and traffic impacts for the construction and operation of the facility will be minimal, and further detailed sound and traffic studies will not be required.*

#### **4.1 Sound Level Assessment Conclusions**

*Due to the nature of this Project including the construction, types of equipment to be installed, and planned operation, it is anticipated the impacts to the existing sound level environment will be minimal in the Consultant's(GAI) opinion.*

*professional opinion based on the setback distances proposed in Section 2.3.*

***The data and conclusions contained in the Site Assessment Report for the Horseshoe Bend Solar Project for Traffic and Fugitive Dust meets intent of KRS 278.216.***

#### **4.2 Rail**

There are no Railroads in the immediate project area.

***The data and conclusions contained in the Site Assessment Report for the Horseshoe Bend Solar Project regarding rail is in compliance with the intent of KRS 278.216.***

**(5) The board shall have the authority to hire a consultant to review the site assessment report and provide recommendations concerning the adequacy of**

**the report and proposed mitigation measures. The board may direct the consultant to prepare a separate site assessment report. Any expenses or fees incurred by the board's hiring of a consultant shall be borne by the applicant.**

The board has hired Wells Engineering and Cloverlake Consulting to review the adequacy of the Site Assessment Report.

**(6) The applicant shall be given the opportunity to present evidence to the board regarding any mitigation measures. As a condition of approval for an application to obtain a construction certificate, the board may require the implementation of any mitigation measures that the board deems appropriate. Effective: April 10, 2014 History: Amended 2014 Ky. Acts ch. 88, sec. 4, effective April 10, 2014. -- Created 2002 Ky. Acts ch. 365, sec. 5, effective April 10, 2014.**

## **5.0 Historic Resources**

Assessment of the impact of the project on Historic Resources is not specifically called for, However due to the rich history of the area and the location of historic cemeteries in the project boundary, the applicant has provided an assessment of the impact of the project on these historic resources. This is a mitigating measure of the applicant to protect these important resources.

Copperhead Environmental Consulting, Inc. (Copperhead) was contracted to conduct site characterization studies and was asked to provide information on two cemeteries identified in the PSA. A review of historic United States Geological Survey topographic maps identified one cemetery, the Sandidge Cemetery, starting with the 1961 map (Appendix A). The second cemetery was identified from discussions with the property owner and a site reconnaissance.

The site reconnaissance and records review identified that both cemeteries are located off DAR Cemetery Road (see the project map in Appendix A). While no records were located related to the road name, it is expected that DAR is an acronym for the Daughters of the American Revolution. The Daughters of the American Revolution is a non-profit lineage-based membership service

organization for women who are directly descended from a patriot of the American Revolution. The organization is dedicated to historic preservation, education, and patriotism. The Kentucky Society of the American Revolution has 4,500 members but does not currently have a chapter in the Green County area. The name of the road is an indication that a veteran of the American Revolution was buried in the cemetery at the end of DAR Cemetery Road (see below).

## **Cemeteries Identified on the Horseshoe Bend Solar, LLC Project Study Area**

### **Sandidge Cemetery**

Based on discussions with the landowner and a review of cemetery databases, the Sandidge Cemetery was identified next to a barn at the end of DAR Cemetery Road (see Figure 2). The Sandidge Cemetery is a historical cemetery containing approximately 45 graves. The burial dates on the cemetery markers range from 1824 to 1963. It is approximately 0.27 acres in size. The cemetery includes the grave of Captain John Sandidge who fought in the American Revolution. Captain John Sandidge, who lived from November 25, 1760 to July 27, 1832, was a planter in Virginia and served in the Revolutionary War. He was as a captain under George Washington. The Daughters of the American Revolution include him in their list of people identified for their "Patriotic Service."

Around 1803, John Sandidge purchased 1,000 acres of land near Liletown, Green County along Greasy Creek. He moved the Sandidge family from Albemarle County, Virginia, in 1810 to Green County, Kentucky. Early deed books in Green County record numerous transactions by John Sandidge for land and tobacco. He was employed as a large farmer until his death.

Over time, the Sandidge Plantation became one of the largest and wealthiest in Green County. Later, the Sandidge Plantation became known as Wilson Hill. The Wilson Hill House was located approximately 300 yards east of the Sandidge Cemetery. The Wilson Hill House no longer exists and no ruins or remnants of the house were visible during the informal site reconnaissance. In John Sandidge's will dated February 25, 1827, he stated: "It is my will and desire that forty yards of

ground including the graves of my wife and mother on the farm on which I now live shall be reserved in making the division of my estate for the purpose of a burying ground for my family & all the members thereof” (Find A Grave 2020). Thus, the Sandidge Cemetery came into being. Photographs of the Sandidge Cemetery are shown on the following pages:

### **Cox Cemetery**

A second cemetery was identified along DAR Cemetery Road during the site reconnaissance, the Cox Cemetery (approximately 0.1 acre in size), which is approximately 0.25-mile from the Sandidge Cemetery (see Figure 2). Three grave markers were identified including those for Samuel Cox, Henrette Johnson, and Samuel Johnson. The burial dates on the cemetery markers range from 1944 to 1953. No date is on the Samuel Cox marker. It appears additional unmarked

graves may occur at this location. No additional information concerning this cemetery was readily available from online databases. The Cox Cemetery may be an African American cemetery as Samuel Cox’s grave marker identified that he served with the United States Colored Infantry 107th Regiment, Company C during the Civil War (see photographs below). Records of the 107th Regiment identified that the 107th Regiment was organized in Louisville, Kentucky, from May 3 to September 15, 1864. Company C was organized from men from Lebanon, Marion County and Louisville, Jefferson County, Kentucky. Samuel Cox’s regiment was attached to the Military District of Kentucky, Department of the Ohio, in October 1864. The regiment was ordered to Baltimore, Maryland and then to City Point, Virginia. It participated in the Siege of Petersburg, Virginia; the capture of Fort Fisher, Sugar Loaf Hill, and Wilmington, North Carolina; the Carolina Campaign; and the surrender of General Joseph E. Johnston and his Confederate army in Durham, North Carolina. The 107th Regiment was mustered out in November 22, 1866.

No information was readily available in historical databases concerning Henrette and Samuel Johnson.

## **6.0 Impact on the Local and Regional Economy**

Project documents show that the impact on the local economy will be positive by providing construction jobs for the approximate one year duration of that process. Additionally, when staff performs operational functions at the site, they will add to the local economy. Additionally, this facility will provide substantial tax revenue to local jurisdictions. However, the schedule for construction and other specifics were not found in project documents. “There are two primary impacts expected from the project. A professor from the University of Louisville, Paul A. Coomes, Ph.D performed an assessment of how this project will affect the local and regional economy. Below is a summary of the findings:

First, there will be a one-time spike in construction and linked jobs as the site is constructed over approximately one year. Second, there will be four decades of new tax (PILOT) payments to local jurisdictions in Green County due to the increased value of real estate and the new tangible property installed at the site. Using company estimates of construction jobs and payroll, I estimate that there will be a total of 186 new jobs in the County in year one, with new payroll of \$9.92 million. And, the PILOT agreement will result in \$1.44 million in payments to County jurisdictions over the next forty years.”



## **6.1 Applicant's Mitigation Measures**

REQUIREMENT: per KRS 278.708(4); The site assessment report shall also suggest any mitigating measures to be implemented by the applicant to minimize or avoid adverse effects identified in the site assessment report; and per KRS 278.708(6); The applicant shall be given the opportunity to present evidence to the board regarding any mitigation measures. As a condition of approval for an application to obtain a construction certificate, the board may require the implementation of any mitigation measures that the board deems appropriate. COMPLIANCE: Proposed mitigation measures are listed below:

As described in Section 1 of this Site Assessment Report:

1. Setbacks for solar equipment from roads and property lines, with increased setbacks for certain equipment, and additional setbacks from 2 non-participating residential homes that are located relatively close to property lines.

Applicant proposes the following setbacks for solar equipment:

- 50 feet from adjacent roadways
- 25 feet from non-participating adjoining parcels
- 150 feet from non-participating residences

Applicant proposes the following additional setbacks for central inverters, if used, and energy storage systems:

- 150 feet from property boundaries
- 300 feet from non-participating residences

The security fencing, vegetative buffer and pollinator plantings shall not be subject to these setback restrictions.

2. Planting of native evergreen species as a visual buffer to mitigate viewshed impacts; see the site development plan in Attachment A for proposed planting areas, and Section 1 of the Application for the proposed specifications of the vegetative buffer. Plantings are primarily proposed in areas directly adjacent to the Project that lack existing vegetation.

Members of the development team have met with neighbors to ensure they are aware of the Project and the locations of the proposed vegetative buffers.

3. Cultivation of at least 2 acres of native pollinator-friendly species onsite; see the site development plan in Attachment A for the anticipated pollinator area, and Section 1 of the Application for information about pollinators and solar. Additional mitigation measures:

1. Complying with all applicable requirements of the National Electrical Safety Code, including requirements that apply to security fencing and signage. The community has provided feedback that frequent signage along the security fence is unsightly, and should be tempered in use. The National Electric Safety Code includes requirements on safety signage along the security fence, which the Project will comply with.

2. Leaving existing vegetation between solar equipment and neighboring residences in place, to the extent practicable, to help screen the Project and reduce visual impact

3. Setbacks of at least 100 feet from two historic cemeteries that are located on the Project site. Information on these cemeteries is provided below.

4. Retrofit plan, as described below.

5. Notices to neighbors regarding potential construction and operation noises, as well as limits on working hours during the construction period, as described in Section 4.

6. The Project will obtain and comply with permits regarding impacts to wetlands, waters of the US, and stormwater, as described below.

7. The Project has completed an assessment of the current and historical uses of the Project site (ESA Phase I), and will comply with its recommendations where they apply to the solar facility. Retrofit Plan If Horseshoe Bend 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.

## **6.2 Below are the additional mitigating measures recommended by the Consultant (Cloverlake Consultants)**

### **Traffic Safety**

Most of the roads adjacent and through the site are narrow and in some cases curvy. The Applicant should submit a detailed plan on how traffic safety will be maintained during the construction of the facility ten days before commencing construction.

### **Fugitive Dust and PM10**

The applicant will submit in writing the specific plan to control fugitive dust and PM 10 during the construction process ten days prior to commencing construction. The applicant mentions in the application that they will use best practices for dust control during construction of the project. Provide the specific plan that will apply these best practices ten days prior to the beginning of constructions.

### **Protection of Water Resources in the Project Area**

Ten days prior to the commencement of construction, the Applicant will provide a detailed plan on how they will protect water resources in the project area. The site assessment documents in several locations say that certain mitigation

measures regarding erosion and protection of water resources “may” be carried out. This needs to be clearly specified.

### **Summary of the Adequacy of the Applicants Site Assessment Report**

Based on a review of The Horseshoe Bend Solar Project Site Assessment Report, by W. Thomas Chaney of Cloverlake Consulting, all of the sections of the report are in compliance with the intent of KRS 278.708.

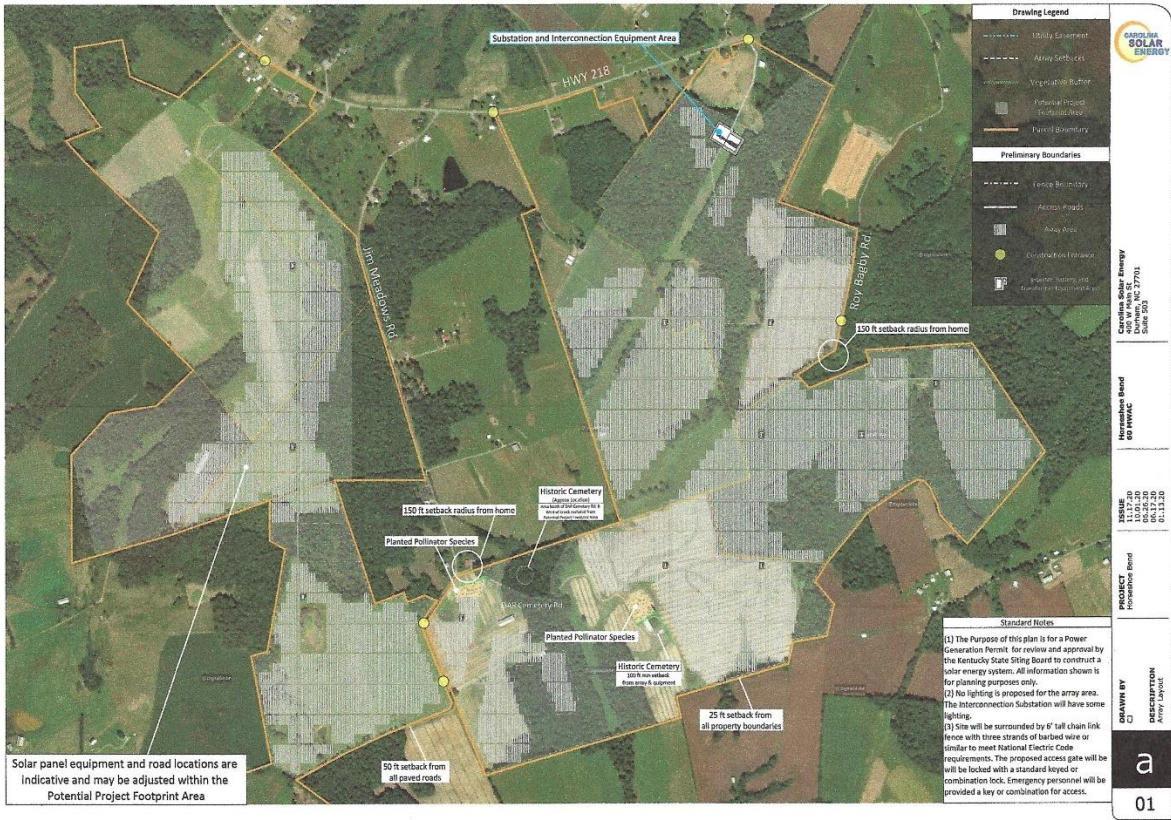
There are a few areas where additional conditions are needed. These proposed conditions are specified in Additional Mitigating Measures proposed by the consultant on page 25 of this report.

By title these measures are

- Traffic Safety
- Fugitive Dust
- Protection of water resources in the Project Area
- A more specific schedule for the beginning and completion of construction should be given to the Siting Board as soon as possible.

**APPENDIX A-Site Map**





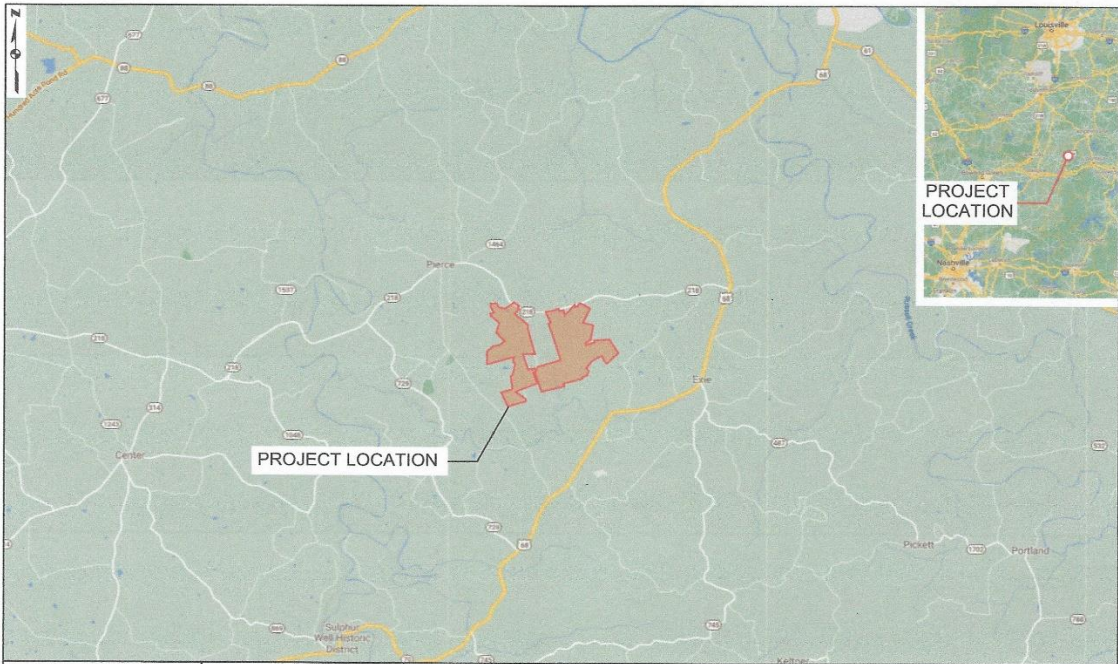
Solar panel equipment and road locations are indicative and may be adjusted within the Potential Project Footprint Area





**APPENDIX B-Vicinity Map**





**PROJECT LOCATION**

GREEN COUNTY, KENTUCKY

**REFERENCE:**  
© GOOGLE MAPS 2020

**LEGEND**

PROJECT LOCATION BOUNDARY

SCALE: 1 MI

**FIGURE 1**  
**PROJECT LOCATION MAP**

HORSESHOE BEND  
CAROLINA SOLAR ENERGY

DRAWN BY: TMW      DATE: 9/24/2020  
CHECKED: RAK      APPROVED: 9/25/2020

**Appendix C-Parcel Map**







## **REFERENCES**

Applicant's Site Assessment Report Horseshoe Bend Solar Project

Find A Grave. 2020. <https://www.findagrave.com/cemetery/75929/sandidge-family-cemetery>  
(accessed August 8, 2020).

Kentucky Department of Highways 1937, 1955, 1990, and 2019. General Highway Map, Green County, Kentucky. Prepared by the Kentucky Department of Highways in Cooperation with the Federal Works Agency, Public Roads Administration. Frankfort, Kentucky.

Library of Congress. 2020. Band of the 107th Regiment, United States Colored Infantry Photograph. <https://www.loc.gov/resource/ppmsc.02781/> (accessed August 8, 2020).

National Park Service. 2020. Civil War. Battle Unit Details – 107th Regiment, United States Colored Infantry.

<https://www.nps.gov/civilwar/search-battle-units-detail.htm?battleUnitCode=UUS0107RI00C>  
(accessed August 9, 2020).

**Gallery of Photographs Taken During the Site visit on March 21, 2021**





























**Resume W. Thomas Chaney**





W. THOMAS CHANEY, PRESIDENT AND  
CEO CLOVERLAKE CONSULTING  
11997 CLOVERBROOK DRIVE  
UNION, KY 41091  
EMAIL ADDRESS:  
[TOM.CHANEY@ZOOMTOWN.COM](mailto:TOM.CHANEY@ZOOMTOWN.COM)

Tom retired in 2019 as a Partner with ERM, based in the Cincinnati Office. In this capacity he directed the work of expert natural resource management teams of engineers and scientists. He has a distinguished background in utility management, organizational development, consultant service to utility companies for environmental and planning work as well as a body of work in land use planning.

He has performed career management service for large utilities including Cinergy, Cincinnati Gas & Electric, Duke, and has consulting experience with Power Engineers, BHE Environmental, GAI Consultants, Booz-Allen Hamilton, Woolpert Consultants, Dames and Moore and the Northern Kentucky Area Development District.

Mr. Chaney's current practice involves Land Use Planning, Zoning, Siting and Environmental Planning for large utility, industrial and commercial facilities. He has developed testimony and testified in front of state siting agencies PSCs and Corporation Commissions in Ohio, Kentucky, Virginia, West Virginia, and Texas.

He is a certified mediator and holds a license as a Program Leader for Kepner-Tregoe rational process.

#### **Fields of Competence**

- Strategic training and mentoring of employees
- Management and direction of multidiscipline natural resource management consulting teams
- Leadership Development Training and Facilitation
- Advanced Project Management Training
- LandUse Planning and Zoning

#### **Certificates and Training**

- Certified Family Court Mediator, 2004
- Certified Kepner-Tregoe Rational Process Program Leader, 2003

#### **Key Areas of Expertise**

- Gas Utilities
- Electric Utilities
- Renewables, Wind and Solar
- Planning and Zoning
- Environmental Planning
- Transportation Planning
- Aviation Environmental Planning

#### **Pertinent Experience**

- Planning Manager for the NKADD
- Development of many land use and zoning plans while at Woolpert Consultants in Dayton, Ohio
- LandUse Plans for the Greater Pittsburgh International Airport
- Landuse(ANCLUC) Plan for the Chicago Airports(Both Midway and O'Hare)
- EIS for the Delta Terminal at O'Hare International Airport
- EIS For the International Terminal at Miami-Dade County International Airport
- Multi County Land Use Plan for the Midwest Ohio Joint Planning Commission plus numerous county zoning regulations and subdivision regulations for member counties.
- Land Use Plan and Zoning Regulations for Lockland, Ohio
- Numerous siting and environmental planning projects for natural gas and electric transmission lines, generating facilities and renewable facilities.

#### **Previous Positions Held**

- LandUse Planner-Dames and Moore
- Senior Land Use Planner-Woolpert consultants
- Planning Division Manager-NKADD
- Licensing Associate-CG&E

*W. Thomas Chaney*

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- Licensing Division Director-CG&E, Cinergy, Duke
- Cincinnati Managing Officer-GAI Consultants
- Natural Resources Vice President-BHE Environmental
- Eastern US, Director of Biology Services-Power Engineers
- Partner-Environmental Resources Management(ERM)
- Project Manager Advisor Boone County Planning Commission
- President and CEO Cloverbrook Consulting

#### **Key Projects**

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##### **NIPSCO Permitting In Indiana**

Mr. Chaney, likewise was involved in several Transmission Line permitting projects in Indiana for NIPSCO.

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##### **GAI Consultants, Constance-Zimmer Natural Gas Transmission Line, Ohio**

Project Manager responsible for the siting, routing and certification of this transmission line. The project required numerous environmental permits and a Certificate of Environmental Compatibility and Public need from the Ohio Power Siting Board (OPSB).

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##### **Dominion East Ohio Gas, Akron-Canton Gas Transmission Line, Ohio**

Project manager responsible for siting, certification (OPSB) and permitting.

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##### **Management Consulting, Large Aviation and Environmental Projects**

As a management consultant for a private management consulting firm, Mr. Chaney was responsible for numerous large aviation and environmental projects, including the Chicago, O'Hare International Airport Delta Concourse project, the Miami International Airport Runway Environmental Impact Statement (EIS) project, and the Greater Pittsburgh International Airport Midfield Terminal Studies project that required noise and land use compatibility studies.

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#### **Regional Planning Manager**

As a planning manager for the Northern Kentucky Area Development District, Mr. Chaney covered all aspects of regional planning for eight counties in northern Kentucky. He supervised professional and clerical staff dealing with issues on the environment, housing, land use and recreation in compliance with the Older Americans Act (Title III) and the Social Security Act (Titles XIX and XX).

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#### **Senior Environmental Planning Consultant**

Mr. Chaney's experience as a Senior Environmental Planner with a private consulting firm required management of numerous land use planning and environmental assessment projects. His duties included marketing, proposal preparation, budget preparation, staffing, and project management that included accountability to the client.

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##### **Duke Energy, Edwardsport IGCC Start-Up Natural Gas Line, Indiana**

Project Manager for the routing and permitting of a gas transmission line used to start-up the Edwardsport

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Indiana IGCC. This project is a clean coal endeavor that utilizes Illinois Basin high sulfur coal.

**Dominion East Ohio Gas Company, Solid Waste Natural Gas Siting Study and Application, Ohio**

Project Manager for the OPSB application for this complex project, which was rerouted due to the construction of a large municipal landfill.

**GAI Consultants, Rockies Express Line, Ohio**

Project Manager for cultural resources projects associated with this gas transmission line.

**CG&E, Gas Storage Site, Kentucky**

Project Manager responsible for the environmental permitting of this large gas storage site, formerly a depleted gas and oil production field.

**CG&E/Cinergy, Natural Gas Licensing Projects, Multiple States**

Reviewed and led the licensing and environmental permitting for all natural gas transmission line projects.

**CG&E/Cinergy, Numerous Power Plant, Transmission Line and Gas Line Siting and Permitting Projects**

In his capacity as Licensing Division Director, Mr. Chaney was involved in more than 100 Transmission Line, Gas Line and Power Plant projects during his tenure with CG&E/Cinergy/Duke.

**Education**

- \* MBA, Point Park University, 2011
- M.A., Environmental Planning, Eastern Kentucky University, 1973-Planning and Environmental Planning
- B.A., Wetlands, Physical Geography and Geology, Eastern Kentucky University, 1972
- Leadership Training Certificate from the Harvard Business School 2008
- MBA, Point Park University, 2011



# APPENDIX C

MARY MCCLINTON CLAY, MAI  
218 Main Street  
Paris, Kentucky 40361  
859-987-5698

March 25, 2021

Mr. Jim Cook  
Chief Operating Officer  
Wells Engineering  
6900 Houston Road  
Suite 38  
Florence, KY 41042

Re: Review of Horseshoe Bend Solar Impact Study  
Prepared by Richard C. Kirkland, Jr., MAI, Kirkland Appraisals, LLC

Dear Mr. Cook:

As requested, I have reviewed the above captioned report which was prepared for the Kentucky State Board on Electric Generation and Transmission Siting for Merchant Facilities on February 5, 2021. This report is part of the application process for the proposed 60 megawatt (MW) utility scale solar facility on 550.00 acres in Green County, Kentucky. The solar developer is Horseshoe Bend Solar, LLC Durham, North Carolina.

The purpose of the Siting Board “is to review applications and, as appropriate, grant certificates for the construction of electric generating facilities and transmission line that are not regulated by the Public Service Commission.” Among the information included within the siting application is “a site assessment report containing a detailed description of the project and thorough analysis of the impacts to be considered by the Siting Board (visual impacts, traffic, **property values**, etc.).”

In this review I have considered the report methodology, claims and omissions. It is my professional opinion that this report is fundamentally flawed, noncredible and is not consistent with the Uniform Standards of Professional Appraisal Practice (USPAP). The report should not be used for any decision-making purposes relating to the proposed Green County solar electric generating facility. The following report is the basis of my conclusions.

## **INADEQUACIES OF THE REPORT**

### **METHODOLOGY**

The fundamental flaw throughout this report is that it is a simplistic approach to a complex problem. Damage studies include several types of analysis to determine if a land use, is in fact a detrimental condition. There is no discussion of damage study theory and methodology, as documented in three editions of *Real Estate Damages*, by Randall Bell, PhD, MAI and published by the Appraisal Institute. The appraiser’s methodology of only analyzing two or more paired sales for each of the 38 solar farms in his survey is inadequate to form an opinion as to whether there is diminution of value or not.



Although the trend to industrial scale solar farms is relatively recent and data is limited, it is even more relevant to analyze all the available data as thoroughly as possible.

The following is the correct methodology for a damage study.

1. The first step is to determine the area affected by the detrimental condition. Once the area of influence is determined, this may be expanded as the research progresses.
2. The second step is to determine a control area that is not near a solar farm. This location is not only free of any influence from the disamenity, but it represents a competing area to the subject area with respect to land and improvement values, demographics and other economic and environmental factors that make the two groups interchangeable with the exception of the disamenity.
3. The third step is to collect the sales data. This includes useful data on either side of the date of knowledge or appearance of the detrimental condition.
4. Once the data has been gathered the sales need to be analyzed with respect to value change (appreciation or depreciation) for the years prior to the event and then after the event. This will determine how the overall community or neighborhood responded to value change, as well as the control area and the subject area. Any difference between these market movements could be attributable to the disamenity. Increased time on the market and decreased sales volume are also indicators of diminution of market value. In addition, proximity to solar farms may affect the absorption rates of vacant lots.
5. After the sales are gathered, they need to be confirmed with a principle to the transaction. It is paramount to gain an understanding of the motivation behind a sale and to determine if it is indeed an arms-length transaction. Any of the latter sales or bank involved sales must be eliminated from the sample.
6. The cleanest way of analyzing paired sales is on a one to one basis since it avoids comingling sales that could lead to distortion. Sale-resales of the same property both before and after the event are alternative indicators.
7. If a large amount of sales data is available a multiple regression analysis is an alternative or an addition to the above methodology.

#### OMMISSION OF CONSDIERATION OF THE VIEW SHED

The second fundamental flaw of the reports is that the primary issue of diminution in value, as the result of proximity to solar farms is the alteration of the viewshed. This concept was not addressed.

The Kirkland report discussed the typical detrimental conditions that result in damages including hazardous materials, odor, noise, traffic, stigma, and appearance. Because these nuisances do not exist with respect to solar farms, the appraiser concluded that the proposed solar farm would be in “harmony with the area in which it is to be developed.”

Real Estate appraisers recognize that view affects property value. According to *The Appraisal of Real Estate*, “The physical characteristics of a parcel of land that an appraiser **must consider** are size and slope, frontage, topography, location and **view**.”<sup>1</sup>

“View diminution, therefore, is any impact on the ability to see or be seen that is perceived by the market as negative. As usual, what the market considers to be a negative impact depends on the actual property in question.”<sup>2</sup>

With respect to Kentucky, and particularly the Bluegrass region, the landscape is inherent with respect to the expectations of the market. Few agricultural regions of the country have a real estate market demand that spans the globe. This is not only true because of the fertility of the soil, but the beauty of the landscape. Despite its threat due to development, the surrounding natural landscape is enhanced by the manicured condition of thoroughbred farms that populate the entire area. This unique, protected and scenic landscape is a large component of the property characteristics that constitute demand for the land. As a result of the scenic viewsheds, roadways throughout the region are designated by the state as scenic byways. In fact, in 2006, the World Monument Fund included the Bluegrass region on its global list of 100 most endangered sites.

As further indication of the emphasis the region places on the preservation of agricultural lands, farm owners have placed approximately 70,000 acres under conservation easements in the area and Bourbon County, to the north, has six rural historic districts—more than any other county in Kentucky.

“Clearly, view amenities are valuable, and different types of good views can have significantly different quantitative effects on property values.”<sup>3</sup>

“A view is normally considered a scene or outlook from a property. Views of bodies of water, city lights, natural settings, parks, golf courses and other amenities are considered desirable features, particularly for residential properties. Such desirable views are typically an enhancement to value. In some cases, however, a view can be considered a negative attribute. A vista of incompatible land, dilapidated buildings, junk vehicles and other undesirable features can be detrimental to value. Allegations of value diminution most often arise from situations in which the view is altered or changed. Examples might include the blockage or obstruction of a desirable view or the creation of an undesirable view. The rezoning of a neighboring property to allow for an undesirable land use could legitimately result in a negative impact on value when such rezoning was not known or anticipated on the date of value.”<sup>4</sup>

Ultimately, issues relating to view diminution are dependent on relevant market data. The value of an obstructed view can be measured by the difference between properties with and without similar views.<sup>5</sup>

Although only limited peer reviewed published studies of solar farms currently exist, studies of the impact of high voltage transmission lines have the most reliance to the impact of solar farms on surrounding property.

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<sup>1</sup> Appraisal Institute, *The Appraisal of Real Estate*, 11<sup>th</sup> Ed. (Chicago, Illinois: Appraisal Institute, 1996): 323.

<sup>2</sup> Anderson, *Ibid.*: 28.

<sup>3</sup> James R. Rinehart, PhD. and Jeffery J. Pompe, PhD., “Estimating the Effect of a View on Undeveloped Property Values,” *Appraisal Journal*, January, 1999: 61.

<sup>4</sup> Bell, *Ibid.*: 146.

<sup>5</sup> *Ibid.*

Of the “three critical drivers of HVTL effect on residential property values that are generally assumed—proximity, visibility and encumbrance,” the first two apply to solar farms.<sup>6</sup>

“The two concerns of aesthetics and property values are intrinsically linked. It is well established that a home’s value will be increased if high-quality scenic vista is enjoyed from the property (e.g. Seiler, et al, 2001). Alternatively, it is reasonable to assume that if a home’s scenic vista overlaps with a view of a disamenity, the home might be devalued, as has been found for high-voltage transmission lines (HVTL) (Kroll and Priestly, 1992; DesRosier, 2002)...Additionally, there is evidence that proximity to a disamenity, even if that disamenity is not visible and is not so close to as have obvious nuisance effects, may still decrease a home’s sales price, as has been found in the case for a land fill (Thayer et al., 1992).<sup>7</sup>

The 2002 published study by Des-Rosier measured how views of a disamenity affected sales prices. This study found that homes adjacent to a power line and facing a HVTL tower sold for as much as 20.0 percent less than similar homes that are facing a HVTL tower.”<sup>8</sup>

Solar farms could be substituted for wind turbines in the following observation from the Hoen study:

It is unclear how well the hedonic literature on other disamenities applies to wind turbines, but there are likely some similarities. For instance, in general, the existing literature seems to suggest that concerns about lasting health effects provides the largest diminution in sales prices, followed by concerns for one’s enjoyment of the property, such as auditory and **visual nuisances** (emphasis added), and that all the effects tend to fade with distance to the disamenity – as the perturbation becomes less annoying.<sup>9</sup>

With respect to the potential diminution in value to properties in proximity to solar farms, there are no current empirical peer reviewed studies in the valuation literature. This is because the proliferation of solar farms is relatively new. However, data from other disamenity studies can offer some indication that the market would likely discount proximity to such structures upon the landscape, particularly one recognized as world class, as is the Bluegrass region of Kentucky.

Unlike most adverse influences upon adjacent properties that have a direct impact upon their utility to function, solar farms’ predominant impact is to the viewshed.

The impact of views upon property values has been studied extensively for the past 25 years. These studies have indicated a range of marginal price effect for homes abutting amenities such as lakefront vacant lots: 91.00 to 223.00 percent; ocean front lots: 47.00 to 147.20 percent; lake front 7.50 to 126.70 percent; golf course vacant lots: 7.00 to 85.00

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<sup>6</sup> James A. Chalmers, “High-Voltage Transmission Lines and Residential Property Values in New England: What Has Been Learned,” *Appraisal Journal*, Fall, 2019: 266.

<sup>7</sup> Ben Hoen, et al, “The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-site Hedonic Analysis,” Ernest Orlando Lawrence Berkley National Laboratory Publication No. LBNL-289E, December 2009: 52.

<sup>8</sup> *Ibid.*: 55.

<sup>9</sup> *Ibid.*: 55.



percent; rivers/streams: 3.00 to 54.4 percent; forest/farms: 1.50 to 35.00 percent; golf course: 7.00 to 28.00 percent; trails and greenways: 3.40 to 20.20 percent; urban parks: 1.00 to 20.00 percent.<sup>10</sup>

With respect to the intrusion of solar farms into the landscape, what happens when desirable views are blocked? “In real estate, a view can generally be defined as the ability to see or be seen. View diminution, therefore, is any impact on the ability to see or be seen that is perceived by the market as negative.”<sup>11</sup>

“Since views from a residential property often carry a large premium, changes to a desirable view may be perceived by the market as having a negative impact on value. When a desirable view is blocked, the question of damages is often a question of abutter’s rights—a property owner’s rights to air, light, view, visibility and access.”<sup>12</sup>

## MAJORITY OF THE CASE STUDIES ARE NOT RELEVANT TO THE GREEN COUNTY PROPOSED INDUSTRIAL SCALE SOLAR FACILITY

The following chart summarizes the 38 case studies that the appraiser included. Of these case studies, only five had more than 30 MWs. These include No. 10 (Wildwood, 80 MW); No. 13 (Manatee, 74.50 MW); No. 14 (McBride Place, 74.90 MW); No. 33 (Innovative 46, 78.50 MW); and No. 34 (Innovative Solar 42, 71.00 MW). With regard comparability, these are the only case studies that are truly comparable to the proposed 60 MW Green County project.

## OMMISSION OF MCBRIDE PLACE SALE-RESALES

With respect to the McBride Place solar farm in Midland, North Carolina, the appraiser concluded after two matched pair analysis of residential tracts (4380 Joyner Road and 5811 Kristi) adjoining the 74.9 MW generating plant that there was no diminution in value.

In the process of reviewing this case study, this office observed several sale-resales of adjoining properties to the McBride Place solar farm which the appraiser did not include in his analysis. Sale-resales are a superior indicator of value change than matched pairs because the comparison is made to the same property with generally the only difference being time of sale. The sales are depicted on the following chart.

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<sup>10</sup> Jay Mittal, “Valuation Capitalization Effects of Golf Courses, Waterfronts, Parks, Open Spaces, and Green Landscapes—A Cross Disciplinary Review,” Auburn University, *JOSRE*, Vol. 8. No. 1, 2016: 62.

<sup>11</sup> Orell Anderson, MAI, “The Value of a View,” *Right of Way*, March/April 2017: 28.

<sup>12</sup> *Ibid.*: 28.

Kirkland solar chart

McBride Place

The evidence indicates that three sale-resales occurred in Vanderburg Estate (Sale/Resales No. 1 through 3) and a recent sale in Pressley Grove sold for significantly less than the assessment. Sale-resale No. 1 and No. 2 adjoin the solar farm to the west and indicate a loss of value of **-15.65 percent and -15.51 percent**, respectively. Sale-resale No. 3 is one lot removed from the solar farm to the west and it indicates **-16.44 percent**.

It is notable that No. 4, 5811 Kristi Lane, although is not a resale, its recent sale price of \$530,000 when compared with its tax assessment of \$637,100 indicates a difference of **-16.81 percent**.

#### OMMISSION OF A LITERATURE REVIEW AND AVAILABLE DAMAGE STUDIES BY OTHER APPRAISERS

Typically, at the beginning of the discussion of any empirical damage study is a discussion of available peer review journal articles or publicly available reports by other appraisers. This provides context of the instant report and the opportunity for the appraiser to critique the studies or defend his findings, if they are contrary to those of others. The Kirkland report includes no such studies.

This omission is a fundamental flaw of the report because, though limited, all the studies, outside those offered by the solar developers, provide contradictory conclusions. The following chart summarizes their findings. A detailed description of the studies is included in the Addendum.

The first two studies appeared in peer reviewed journals and though the first study was a survey and the second study was a multiple regression analysis of properties out to a distance of 3.0 miles from a solar facilities, nonetheless, acknowledged a negative impact as a result of proximity to solar farms. The University of Texas Study concluded that the impact would increase with the increased size and close distance to the solar farm. The University of Rhode Island study concluded that properties declined **-1.70 percent** within a 3.0 mile radius and the average decline was **-7.00 percent** within 0.1 mile.

Fred H. Beck and Associates, LLC documented the antidotal evidence of the cancelation of a sales contract after the purchaser learned of the abutting solar plant, as well as the failure to sell lots after the announcement of a solar farm. As a result, the assessor reduced the affected property assessments **-30.00%**. An incompatible intensive commercial use adversely impacted adjoining nearby properties **-10.70 to -25.10 percent**, or an average of **-15.20 percent**. Beck also discussed the lack of diminution in value at the AM Best solar farm do to pre-existing industrial zoning for the solar farm.

Mark W. Heckman testified in a Pennsylvania solar case that the loss of view resulted in a **-15.00 to -20.00 percent** loss in value.

At a Madison County Indiana hearing a property owner testified by affidavit that she offered **-16.43 percent** less than the appraised value after learning of the proposed solar plant.

To generalize, these studies indicate a conservative **-15.00 percent** diminution in value as a result of proximity to solar facilities.

## Study summary chart

Considering how few industrial scale facilities exist with sufficient time to experience sales, it is significant that the appraiser did not include the available sales data from the North Star Solar Farm in North Branch, Minnesota. This 1,100.00 acre, 138 MW facility was the largest of its kind in the Midwest at the time of its construction in 2016. This office recently analyzed this data and the results are included on the following chart, as well as a discussion in the Addendum with the other appraiser studies.

The sales include 7 tracts that were surrounded by the solar farm that were purchased voluntarily by the developer at a premium and subsequently exposed to the market on the local multiple listing service and sold at market value. An analysis comparing the sale to the original owner and to the current owner indicate that the North Star solar farm has negatively impacted property values ranging from **-6.30 percent for -28.00 percent**, with a median decline of **-16.90 percent** and an average decline of **-16.80 percent**.

## OMMISSION OF NEIGHBORHOOD AGREEMENTS

Richard Kirkland is not the only appraiser who has concluded that solar farms have no impact on value. The Solar Energy Industries Association (SEIA) published the following claim that “large-scale solar arrays often have no measurable impact on the value of adjacent properties, and in some cases many even have positive effects.”<sup>13</sup> This publication also included the following quotes from appraisers used by the solar developers.

- A study conducted across Illinois determined that the value of properties within one mile increased by an average of 2 percent.<sup>14</sup>
- An examination of 5 counties in Indiana indicated that upon completion of a solar farm, properties within 2 miles were an average of 2 percent more valuable compared to their value prior to installation.<sup>15</sup>
- An appraisal study spanning from North Carolina to Tennessee shows that properties adjoining solar farms match the value of similar properties that do not adjoin solar farms within 1 percent.<sup>16</sup>

These conclusions, however, are belied by the actions of their solar developer clients who have not only acquired, in fee, adjoining residential properties to their solar farms and resold them (North Star Solar Farm, North Branch, MN), but have paid nearby adjoining property owners a “good neighbor” fee to refrain from objecting to their proposals.

The first “Neighbor Agreement” from Wisconsin, offering \$17,000, is such an offer. This agreement applies to adjacent owners whose property abuts the proposed Western Mustang Solar, LLC project on two or more sides. The agreement binds the adjacent property owners “to cooperate with Western Mustang’s development, construction and operation of the project.”

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<sup>13</sup> SEIA, “Solar and Property Values, Correcting the Myth that Solar Harms Property Value,” July, 2019, [www.seia.org](http://www.seia.org).

<sup>14</sup> Richard C. Kirkland, “Grandy Solar Impact Study,” Kirkland Appraisals, February 25, 2016.

<sup>15</sup> Andrew Lines, “Property Impact Study: Solar Farms in Illinois,” *Mcleancounty.gov*, Nexia International, August 8, 2018.

<sup>16</sup> Patricia McGarr, Property Value Impact Study, Cohn Reznick, LLP Valuation Advisory Services, May 2, 2018.







By cooperation, the solar developer expects the property owner to “fully support” the developer’s efforts to obtain any permits and approvals and to agree “not to oppose, in any way, whether directly or indirectly, any such application or approval at any administrative, judicial or legislative level.”

In return for this “cooperation,” the developer will pay the property owner a “signing payment” of **\$2,000.00** within 45 days after the effective date. In addition, within 45 days of vertical construction of the project, the developer will pay a one-time **additional payment of \$15,000**. The agreement is to remain confidential.

A second “Neighbor Agreement,” was discussed in a November 23, 2020 article in *The Lima News* of Lima, Ohio. This article described the second public forum which was required by the Ohio Power Siting Board (OPSB) that approves or rejects the proposed 2,600.00 acre 300 MW Birch Solar Project. Lighthouse BP, the developer, stated that: “Landowners who are adjacent to the project will be offered anywhere from **\$5,000 to \$50,000**, depending on their closeness to the solar farm.”

A third neighborhood agreement was recently issued by Posey Solar to the community of Posey County, Indiana. This agreement offered “**an upfront payment equal to 10% of appraised home value** for neighbors within 300 feet of the solar field. This is in addition to the **annual \$1,000 payment (\$35,000 for project life)** during operations for those who would like to sign a Good Neighbor Agreement.

The North Star solar facility is the example of a solar farm that resulted in the purchase and subsequent resale of adjoining properties. According to the Minnesota Public Utilities Commission in a February 4, 2021 email to this office:

At no time did the Minnesota Public Utilities Commission require the developer, North Star Solar LLC, to purchase any properties as part of the site permit application review process or as part of granting a site permit. A condition or requirement to purchase property is not something the Public Utilities Commission can require of an applicant/permittee. North Star Solar LLC, on its own accord, offered purchase options to landowners within or near their proposed project boundary.

At the time of its completion, in December 2016, North Star Solar PV was the largest industrial scale plant in the Midwest. This 1,000.00 acre, 138 MW solar farm is in North Branch, Minnesota. It is notable that it cost the North Star developer \$627,000 more to acquire these properties than the price for which they were sold.

These four examples of voluntary payments to the surrounding property owners by the solar developer are significant because their own appraisers have determined that their proposed solar farms will have no adverse impact on adjacent property values. However, these offers and purchases can only reasonably be interpreted as a **tacit admission of potential impairment**.

## DISCUSSION OF EXISTING KIRKLAND APPRAISAL

### LETTER OF TRANSMITTAL

According to the Kirkland report, he was “asked to determine “whether the proposed solar farm will have any impact on adjoining property value and whether ‘the location and character of the use, if developed according to the plan as submitted and approved, will be in harmony with the area in which it is located.”

The appraiser states that he has “researched and visited existing and proposed solar farms in Kentucky as well as other states, researched articles through the Appraisal Institute and other studies.

The appraiser concludes, “that the matched pair analysis shows no impact in home values due to abutting vacant residential or agricultural land” due to the lack of “noise, odor and traffic.” Without such influences, “a solar farm is a compatible use for rural/residential transition areas and that it would function in a harmonious manner with this area.” The basis of his conclusion is the siting of solar farms in “hundreds of towns and counties”...and adjoining agricultural uses, schools, churches and residential developments.” The appraiser also remarks that, “Industrial uses rarely absorb negative impacts from adjoining uses.” (It is unclear what this sentence means).

### STANDARDS AND METHODOLOGY

In this first section of the report, the appraiser stipulates that the report is based on “the standards and practices established by the Appraisal Institute (AI) and the Uniform Standards of Professional Appraisal Practice (USPAP). Apart from mentioning the “matched pair analysis” in the letter of transmittal, there is no discussion of the methodology for conducting a damage or impact study.

Despite the fact the appraiser claims that the report is predicated on USPAP, it lacks the first requirement for any report, whether it is an appraisal or a consulting assignment— Definition of the Problem. This section of the report establishes the relationship between the solar farm in question and the surrounding area; as well as determines the scope of work needed to solve the valuation problem. There is no such section to this report.

The appraiser failed to describe and explain the methodology he used in his analysis. The “matched pair analysis” is only one aspect of the methods used in impact or damage studies. Three editions of *Real Estate Damages* by Randall Bell, PhD, MAI have been published by the Appraisal Institute and the technique is mentioned with only one sentence in the letter of transmittal.

No discussion of a literature review or citing of published studies or studies within the public domain, despite the fact that the appraiser claims to have researched articles. These are particularly important to include due to the limited number of such studies. Even if these studies may contradict the appraiser’s conclusions, they must be included and with an explanation of why they should be disregarded if Kirkland believes they are flawed. However, the studies cannot be ignored.

There is no discussion of compatibility with respect to the zoning process and the expectations of the market for non-conforming uses, other than to state that because solar farms have been constructed in agricultural and residential areas, they are comparable.

## DETERMINING WHAT IS AN EXTERNAL OBSOLESCNE

This next section of the Kirkland report identifies external obsolescence that “might have a negative impact on the value of adjacent or nearby properties because of identifiable impacts.” The appraiser lists the following external obsolescence:

- Traffic. Solar Farms are not traffic generators.
- Odor. Solar farms do not produce odor.
- Noise. Solar farms generate no noise concerns and are silent at night.
- Environmental. Solar farms do not produce toxic or hazardous waste. Grass is maintained underneath the panels so there is minimal impervious surface area.

The appraiser concludes, that “I have observed and studied many solar farms and have never observed any characteristics about such facilities that prevents or impedes neighbor from fully using their homes or farms or businesses for the used intended.

This appraiser has concluded that if there is no traffic, odor, noise or hazardous waste, then, ceteris paribus, there is no diminution in value.

However, with respect to detrimental conditions, as a result of utility scale solar facilities, the appraiser does not discuss the loss of the viewshed, which is the primary impact of such industrial uses on the natural environment.

Also, the appraiser does not discuss the expectations of the market with respect to utility of their property. Utility scale solar plants affect properties in different ways relative to their proximity and degradation of the view. This is true of the effect of high voltage transmission lines, turbines and cell towers, as indicated in peer review studies.

## PROPOSED USE DESCRIPTION

The appraiser states that the proposed solar farm is to be constructed on a 550.00 acre farm, however, he has not divulged the megawattage of the facility, which is 60 MWs. This is a significant fact to know relative to comparability of the case studies he intends to present as evidence.

## ADJOINING PROPERTIES

The next section of the report merely lists the adjoining properties with their acreage, use, their percentage of adjoining acres and distance from nearest panel. There is no narrative discussion of the surrounding area to the proposed generating facility nor its impact upon the view shed or utility of those properties most affected. The appraiser states that the “closest adjoining home will be 285 feet from the closest panel and the average distance to adjoining homes will be 1,142 feet. Matched pair data presented later in this report shows no impact on home values as close as 125 feet. This conclusion can only be interpreted as the following: **“one size fits all” despite the size of the solar generating plant or the expectations of that market segment that is affected by the plant.**

## I. SUMMARY OF SOLAR PROJECTS IN KENTUCKY

This section of the report lists 4 solar facilities in Kentucky including their size, total and used acres, average and closest distance to home, as well as the percentage of land use. This chart is repeated for every solar generating facility throughout the report. Since nearly all solar plants adjoin either agricultural, residential or commercial use, such calculations are

only remarking the obvious. To conclude that “the similarity of the sites in terms of adjoining uses and surrounding demographics makes it reasonable to compare the lack of significant impacts in other areas would translate into similar lack of significant impacts” is inconclusive. Additionally, the four generating plants range in size from 2 to 8.5 MWs and are **not comparable** to a 60 MW utility scale plant such as the subject.

## II. MARKET ANALYSIS OF THE IMPACT ON VALUE FROM SOLAR FARMS

This section of the report provides the evidence that the appraiser uses to claim that solar utility scale generating facilities have no negative affect upon proximate property values. This appraiser has “researched hundreds of solar farms” in Virginia, South Carolina, Tennessee, Texas, Oregon, Mississippi, Maryland, New York, California, Missouri, Florida, Montana, Georgia, Kentucky and New Jersey and not one of these plants has had an adverse impact on adjacent property values.

The previously cited Kirkland chart summarizes all of the data provided by the appraiser relative to the 38 case studies that are included in the report. Several of these examples are incomplete relative to the description of the solar farm. Particularly important, relative to comparability, are the acres and megawattage of the solar facility. This **data is missing** on several of these examples.

### No. 1 KY Matched Pair – Crittenden Solar, Crittenden, KY

This analysis examines 34.10 acre solar farm with only 2.7 MW on a 181.70 acre tract of land adjoining I-75 in Crittenden, a community in northern Kentucky. The subdivision consists of manufactured and conventionally constructed residence. The test property is a \$120,000 manufactured house on 0.96 acres that is approximately 750.00 linear feet from the I-75 right of way and 360 linear south of the closest solar panel. In addition, there is a streambed with vegetation between the solar farm and the test property. The solar farm is partially screened with opaque fencing. Because of the price range and construction of the dwelling and proximity to the interstate, the solar farm would not diminish the utility of this property to the point of expecting it to impact the property value.

The two control sales do not appear to be from Crittenden according to Google Earth.

The second test example is 300 Claiborne Drive, which represents a conventionally constructed dwelling approximately 1,250.00 linear feet east of I-75 and 600 linear feet south of the closest panel. In addition, the dwelling is separated by two tree lines from the solar farm. The utility of this tract would not be expected to be impacted by the adjacent solar farm under these conditions.

The control sales either do not appear on Google Earth as listed or are possibly from a different town to the north.

The third test property 350 Claiborne Drive is 1,820 linear feet from I-75 and 750.00 linear feet north of the solar farm separated by a stream and tree line. No loss of utility would be expected under these circumstances.

The fourth example, 370 Claiborne Drive is approximately 2,000 linear feet to I-75 and 900.00 linear feet to the solar farm. This house is also separated by the ravine and tree line.

This sales analysis is not considered reliable as it represents a neighborhood that is impacted by its proximity to I-75, the size of the solar farm is minimal and not comparable in magnitude to the Green County proposal, and the expectations of this market do not include a scenic view shed. The expectation of this market is for a house, a yard and ease of access to employment.

#### No. 1 National Matched Pair – AM Best Solar Farm, Goldsboro, NC

The detailed analysis of this solar does not need review because the AM Best Solar Farm was constructed on Industrially (I-2, General Industrial) zoned land. Therefore, the market would have anticipated such a use and the effect of the solar farm would be inherent in the sales prices. The fact of the industrial zoning is not divulged by the appraiser. The size of the land area and solar farm generation capacity (6.65 MW) are not given. Because of the size and the zoning, this case study is not a reliable indicator.

In addition, none of the comparable sales addresses are given. This means that the reader of the report must go to the Property Valuation Office website, if available, or call the PVA to get the addresses of the comparable sales. Some of the comparable sales do not include the Tax ID number. USPAP states that

#### No. 2 Matched Pair – White Cross Solar Farm, Chapel Hill, NC

This study, from Chapel Hill compares the sale of 47.20 acres of excess land at the solar farm site in 2013 for \$5,614 per acre to a non-adjointing wooded tract that sold in 2010 for \$6,109 per acre. The appraiser attributed the \$500 per acre difference to the timber and concluded no difference. However, he did not address the issue of appreciation, did not provide a timber cruise, nor did he provide the motivation for the purchase of the wooded land or any other conditions of sale that may have impacted the sale price. There are too many unknowns for this comparison to have any credibility. No address is given for the comparable sales. Again, anyone reading this report must have access to the PVA data.

#### No. 3 Matched Pair – Wagstaff Farm, Roxboro, NC

The third study consists of the comparison of an 18.82 acre off-conveyance from a 594.00 acre farm of which the adjacent 30.00 acres contained a solar facility. The purchaser of the 18.82 acres was the adjoining owner. The sale price of \$8,714 acres was comparable to a 14.88 acre tract “not near” the solar farm that sold for \$8,739 during the same period of time. The appraiser concluded that “this matched pair again supports the conclusion that adjacency a solar farm has no impact.” This comparison is flawed because adjoining owners, based on my appraisal experience, typically pay a 10.00 to 25.00 percent premium for adjoining land. In fact, it is necessary to analyze an adjoining owner sale with numerous non adjoining owner sales within a market to even claim that the resulting value even fits the definition of market value. That is not to say that an adjoining owner sale cannot be used within an analysis, it must be fully discussed. In this case it was not. Also, no addresses are given.

#### No. 4 Matched Pair – Mulberry, Selmer, TN

The fourth study is from Tennessee and compares sale from the same subdivisions pre and post solar farm construction. This adjustment process is so convoluted that it makes an excessively large gross adjustments to the sales to make his point that there is no impact by the solar farm. This study suffers from the same criticisms cited in previous examples, including expectations for scenic view in a \$130,000 residential market.

In addition, Selmer is a small town in of 4,396 people in southwestern Tennessee. The terrain is generally woodland in the vicinity of the solar farm. According to the appraiser lots in the adjoining subdivision sell for \$15,000 and the houses are in the \$130,000 price range. Sales 6 and 7 are approximately 775 and 500 linear feet north of the closest panel, while Sales 12, 15 and 16 are 610, 690 and 480 linear feet, respectively. All these 1.00 acre+ lots have dense woodland separating them from the solar farm as well as rolling terrain. Considering the distance from the solar arrays and the price range of the neighborhood the solar farm would not affect the utility of this example and no diminution in value would be expected by this market. This example is not a reliable indicator of no loss in value due to the proximity of the solar farm.

#### No. 5 Matched Pair – Nixon’s Solar Farm, West Friendship, MD

The fifth study is from the 2.0 MW Nelson’s Solar Farm in West Friendship, Maryland. This case study compares the sale of a \$771,640 residence on less than one acre in a 12 unit subdivision that adjoins a small solar farm of less size than the subdivision. This sale is compared to a sale that is “not nearby” the solar farm that sold for \$690,000. After adjustment, the appraiser concluded no impact of the solar farm. The flaw in this analysis is that the nearby sale is within a one street subdivision of lots of approximately one acre that are opposite each other obstructing any view from the front of the properties. Moreover, the ‘nearby sale’s” view of the solar farm is obstructed by 10 other houses. It is not surprising that the appraiser concluded no impact by this solar farm. Also, since all occupants within the subdivision must drive past the facility to reach their homes, all the properties are impacted to some degree. This example is not a reliable indicator for no loss of value.

#### No. 6 Matched Pair – Leonard Road Solar Farm, Hughesville, MD

This case study is from the Lenard Road Solar Farm in Hughesville, Maryland. This study compared a 3.00 acre residential tract adjoining the solar farm to the south that sold for \$291,000. During the same time period in 2016 a 3.22 acre residential tract sold away from the solar farm for \$329,800. After adjustment for the physical differences in the houses, the appraiser concluded no impact from the solar farm. What the appraiser failed to consider was that there is sufficient woodland between the property and the solar panels effectively preventing the solar facility from visibility at the rear of the property. The control sale appears to be from Waldorf, MD, a different town than the test sale. In addition, the control sale required a gross \$47,240 adjustment which indicates that the sale is not truly comparable, aside from proximity. Also, the area and wattage of the solar farm is not divulged. It appears small from the photograph. This comparison is also not reliable.

#### No. 7 Matched Pair – Talbot County Community Center Solar Farm, Easton, MD

This case study is based on proximity to the Talbot Community Center Solar Farm in Easton, Maryland. Although not specified, this is a very small solar farm. (Appears to be less than 3.00 acres). This study compares two 50 to 60 year old dwellings selling for \$135,000 in 2012 “nearby” and “not nearby” the solar farm. The “nearby” sale is approximately 850.00 linear feet west of the solar farm while the control sale is 1,000 feet west of the solar farm and both sales are separated by a densely treed fence line. Both properties appear to be equally affected or not affected by the solar farm. Therefore, this study has no credibility.

#### No. 8 Matched Pair – Alamo II, San Antonio, Texas

The next case study is from Alamo II Solar Farm in San Antonio, Texas. This 98.37 acre solar farm with a 4.4 MW output is surrounded on three sides by minimally sized lot subdivisions with many hundreds of houses selling in the \$150,000 range. The sale-resale

analysis examines sales occurring in mid to late 2012 to those occurring after the solar farm was constructed in 2013. First, it is not credible to assume that the solar farm was constructed without any knowledge of the neighborhood given the time frame presented. The permitting process alone takes considerable time. Moreover, this market which consists of tightly packed housing does not consider the view shed as a predominant requirement in their purchase decisions. This study is not a credible indicator since no damage is the expected outcome of these comparisons.

#### No. 9 Matched Pair – Neal Hawkins Solar, Gastonia, NC

Another North Carolina case study concerns the Neal Hawkins Solar Farm in Gastonia, North Carolina. This is an anecdote of a \$270,000 residential sale abutting a proposed solar farm that was acquired by a purchaser who had “no concerns” about the solar farm. There are always potential purchasers who “don’t care” about a disamenity and are willing to pay without a discount, as well as potential purchasers who would not consider purchasing a property in proximity to a disamenity at any price. However, they are not representative of any market. Even if they don’t care, the lender who is lending them 75.0 percent or greater is more concerned about the next purchaser, if, and when the current purchaser is unable to pay his loan. This is not a credible example.

#### No. 10 Matched Pair – Summit/Ranchlands Solar, Moyock, NC

Although this case study has potentially more credibility than the previous case studies because it is based on a more comparable utility scale solar farm with 80 MW. However, Parcel 48, the test property, is a manufactured home on 4.29 wooded acres that offers protection from the solar farm 950.00 linear feet distant. In addition, there is a woodland directly behind this property within the solar farm which offers additional protection. The control sales are more distant however, they are sited on 1.00+/- acre lots. Given the distance from the solar farm compounded by the woodland protection of the view and the minimal quality of construction, it is not surprising that this example sold for as much as the control sales. Even considering these facts, the appraiser has estimated that the difference in the test sale and the control sales is **-3.0 percent**.

The next test sale, Parcel 53 is approximately 1,000.00 linear feet northeast of the closest solar farm and separated by approximately 675.00 linear feet of woodland. In addition, this sale adjoins an industrial tract immediately south and east of the solar farm. The 3 control sales are from seemingly the same subdivision, however, the third sale, 127 Ranchland is a similar distance from the solar farm and separated by only one lot. The gross adjustments to the sales are larger than are typically acceptable indicating that these comparisons are not credible.

The next test sale, No. 15 is 430.00 linear feet north of the solar arrays at the northwest corner of the solar plant. In addition, the property is separated from the solar farm by a mature row of trees, as well as the Guinea Mill Run Canal. Because of the distance and intervening tree line and canal, the effect of the solar plant upon the utility of the property is mitigated.

The fourth test sale, Parcel No. 29, is directly across from the interior of the solar facility, but is separated by Ranchland Road, and the tree lined Guinea Mill Run Canal. The house is approximately 420.00 linear feet north of the closest panel. This comparison of manufactured homes indicates a **-10.0 percent** diminution in value.

The fifth test sale, 358 Oxford, is a from a 10.00 acre subdivision that adjoins the generating plant to the west. This tract abuts the solar plant and the dwelling is within 625.00

linear feet of the nearest panel. The first control sale is from the interior of the same subdivision and indicates a loss of value of **-3.0 percent**. The second control sale appears to be the original house from the subdivided farm requiring a gross adjustment of 24.0 percent, which would indicate this is not a reliable comparable sale. The third control sale is from Caratoke Hwy, a major 4 line divided highway and is diagonally opposite commercial development. This property is not a reliable comparable sale.

The next group of sales that the appraiser analyzed are from a 10.00 acre subdivision west of the solar plant and southwest of the above group of sales.

A Moyock, North Carolina study involves the 2,034.00 acre Wildwood Solar Farm. Among the adjacent properties is a subdivision to the north consisting of older conventional dwellings and newer manufactured homes on lots of minimal size. Two paired sales analysis are made of the respective dwelling types within the subdivision of both adjoining and non-adjoining lots. Credibility of this analysis is also compromised by using the same subdivision for both the test and control sales because the entire subdivision is affected to some degree by proximity to the solar farm.

This solar facility would have been a likely candidate for a search of sale-resales of the surrounding properties.

#### No. 11 Matched Pair – White Cross II, Chapel Hill, NC

This case study is also from Chapel Hill, North Carolina and compares two sales, one adjoining and one not adjoining the White Cross II solar farm. However, the address of the test sale is not given, only the tax ID number. Nonetheless, the solar farm is surrounded by woodland and is only 2.8 MWs. Regardless of where the test property is, any impact would be expected to be minimal, if at all. This comparison is not credible.

#### No. 12 Matched Pair – Tracy Solar, Bailey, NC

This comparison involves two communities within 5 miles of each other, which is not indicated in the report. The test sale is in Bailey, NC and the dwelling is within 790.00 linear feet of the closest solar panel. However, the 5 MW generating facility is screened by approximately 500.00 linear feet of dense woodland and it appears that the front of the property is encumbered by a transmission line. However, the appraiser does not indicate this fact. The analysis compares the land sale of the test property with sales from Bailey and Middlesex, NC. However, the location of 427 Young is undeterminable with the information provided, and no house number is given for Claude Lewis Road. The data is insufficient for comparison with the comparable sales, however, based on this description, the utility of the property would likely not be diminished. Therefore, this is not a credible analysis to deduce the impact of an industrial scale solar farm upon property values.

#### No. 13 Matched Pair – Manatee Solar Farm, Parrish, FL

This case study involves a 74.50 MW generating facility that adjoins Lake Parrish, that appears to be a reservoir. The test sale is approximately 1,200.00 linear feet north of the generating facility and separated by approximately 650.00 linear feet of dense woodland and a railroad at the edge of the woods. Because of the protection offered by the woods and the distance from the solar farm, the utility of the test property would be expected to be similar to that of the control properties. Without the reduction in utility or loss of the view shed, this case study is not a credible example to refute loss of value as a result of proximity to an industrial scale solar generating facility.



#### **No. 14 Matched Pair – McBride Place Solar Farm, Midland, NC**

See the sale-resale discussion in the first section of this report, which contradicts the appraiser’s finding of no damage.

#### **No. 15 Matched Pair – Yamhill II, Amity, OR**

The utility of this “adjoining” sale is not impacted by the 725.00 linear foot proximity to a 1.2 MW solar farm. In addition, the sale is additionally separated from the solar farm by another parcel. No damage should be expected in this example. This is another example of taking a property that is not impacted and declaring it not to be impacted by its proximity to a solar farm and supporting the claim by comparing it to arbitrarily selected sales from three different communities. Moreover, such a small solar farm has no relevance to the impact of an industrial scale farm.

#### **No. 16 Matched Pair – Marion Solar, Aurora, OR**

Another example of a very small 0.3 MW solar farm that is diagonally across from a 15.75 acre tract with multiple locations for a house site without being in the direct view of this facility. The comparable sales are from three different towns. Moreover, such a small solar farm has no relevance to the impact of an industrial scale farm.

#### **No. 17 Matched Pair – Clackamus II, Aurora, OR**

This is another example of a property that is not impacted by a 0.22 MW solar garden that is on the opposite side of a major highway from the rear of the tract. Dense treed screening is at the rear property line. The houses in this subdivision appear to have approximately a 6.0 foot side yard. This tiny solar array has no impact on any houses in this neighborhood and to attempt to prove this with comparable sales defies credulity. Of course, there is no damage.

#### **No. 18 Matched Pair – Grand Ridge Solar, Streator, IL**

In this example, a \$186,000 house is northwest of a 20 MW facility and 480.00 linear feet to the closest panel from the rear of the house. The property is compared to four sales, one of which is from the opposite side of town in Streator, however, the other three sales are from any number of possible communities in Illinois, according to Google Earth. The appraiser does not explain how these various communities relate to the subject and how they are a reliable indicator of value. It is insufficient to merely list four sales from different locations, reducing them to a size per square foot and declaring there to be no diminution in value. Considering the price range of the house the orientation of the property to the solar farm, its utility is likely not diminished. However, this cannot be supported by this analysis.

#### **No. 19 Matched Paris – Portage Solar, Portage, IN**

This case study involves a 2 MW solar farm at the NW corner of a 56 acre tract. The test property is a 57 year old house abutting the farm at the southeast corner with 5 other houses shielding its view. The house is 1,320 linear feet from the closest solar panel and considering these aspects of the property, the solar farm does not diminish the utility of this test property. Also, the size of the solar farm has no relationship to a 100 MW generating plant.

No. 20 Matched Pair – Dominion Indy III, Indianapolis, IN

The test sale and control sales are from a modestly priced subdivision opposite the 8.6 MW solar farm. The rear of the closest houses are within 400 feet of the solar farm and the subdivision is separated by a 65.00 right of way, a two lane road, and nearly 250.00 linear feet depth of woodland. The solar farm has no effect upon the utility of these residential tracts.

No. 21 Matched Pair – Beetle-Shelby Solar, Cleveland County, NC

This test property is 950.00 linear feet north of a 4 MW solar farm. Between the solar farm and the property are two roads and the view from the dwelling is completely blocked by dense woodland that abuts the structure. This solar farm has no effect upon the utility of the 10.08 acre property.

No. 22 Matched Pair – Courthouse Solar, Gaston, NC

It is doubtful that the utility of a \$111,000 house diagonally opposite the proposed 5 MW solar farm would be impacted, or that the view shed would be an important consideration for this market. The second example is shielded from the proposal by dense forest. This analysis lacks credibility for application to other situations.

No. 23 Matched Pair – Gaston County, NC

The first example is a 17.74 acre forested site with a 63 year old dwelling that is on the opposite side of the road and approximately 1,165 linear feet from the solar farm which appears to slope downward from road grade. The utility of this property is clearly not impacted by the 5 MW facility. A second example includes a \$180,000 2.91 acre tract that sold in 2015 after the solar farm was approved, but before it had been constructed. A mitigating influence may have been that the rear third of the property is woodland that separates the front third of the tract that contains the dwelling from the solar farm. Since the solar farm was not yet constructed, the potential purchaser may have taken this fact into his calculus for purchase. A third example is an unimproved 21.15 acre tract approximately 1,500 linear feet south of the solar farm and on the opposite side of Blacksnake Road. Also, across from the example on the north side of the road is a highly improved farm and woodland which blocks the view of the solar farm. Any reduction in utility of this property is speculative.

No. 24 Matched Pair – Clark County Solar, Clarke County, VA

This test tract is 1,230 linear feet north east of the closest panel to this 20 MW facility. The tract was purchased prior to the construction of the solar farm. The potential purchaser may have considered the distance to be sufficient. The comparable sales require so much adjustment and appear to be from different towns that that any conclusion as to damage or not is speculative. The analysis is not credible.

No. 25 Matched Pair – Flemington Solar, Flemington, NJ

The size of this solar farm, with respect to area or megawattage is not specified, but it appears small. It adjoins the commercial thoroughfare of the town to the east and is south of the residential development in question. It is not surprising that the properties closest to the solar farm are not impacted because of the natural woodland and is heavily screened within the solar farm.

No. 26 Matched Pair – Frenchtown Solar, Frenchtown, NJ

The size of this solar farm, with respect to area or megawattage is not specified, but it appears small. The appraiser reported that the solar farm was not a factor in the purchaser's decision to buy the property. Therefore, this analysis is unnecessary.

No. 27 Matched Pair – McGraw Solar, East Windsor, NJ

*This paired sales analysis is the first truly reliable indication of this report. The discussion does not include the size of the solar farm or its megawattage. It compares an impacted townhouse abutting the solar farm to nearly identical townhouses within the same area, but sufficient distance away that they are unimpacted. **The difference between these sales range from -9.00 percent to -19.00 percent.***

The sale that indicated **-13.00 percent** is across the street from the subject, while the sale that indicated **-19.00 percent** is in the next block. The **-9.00 percent** sale is the furthest way at the rear of the subdivision. However, the condition of the property or other differences are not divulged.

The second example examines a single-family dwelling in proximity to the solar farm, but compares it to sales from different subdivisions, though less reliable, this analysis shows a -2.0 percent adjustment. This house is farther way from the solar farm than the townhouse example including a field and large trees that separates the house from the plant.

No. 28 Matched Pair – Tinton Falls Solar, Tinton Falls, NJ

*This case study examines sales from a condominium development that is on the edge of a densely populated community and adjoins an unspecified solar farm with respect to size and megawattage. Several comparisons **indicate diminution in value ranging from -1.0 percent to -7.0 percent**, which would be expected and is consistent with No. 27 considering the property types. Accuracy is possible when the comparable sales are similar such as these two examples.*

No. 29 Matched Pair – Simon Solar, Social Circle, GA

The size of the solar farm is not given and the comparable sales are not sufficiently described to interpret this case study.

No. 30 Matched Pair – Candace Solar, Princeton, NC

*This case study consists of a paired sales comparison of a single-family lot, as well as the subsequent sale of the lot as improved with a modular home. The most reliable comparison of the first analysis is between the subject which adjoins the solar farm and a lot on the opposite side of Herring. This comparison indicates **a loss of value of -18.0 percent**. The second analysis, as improved indicates a range of -3.0 percent to 26.0 percent. This is an unreliable comparison due to the number of adjustments required.*

No. 31 Matched Pair – Crittenden Solar, Crittenden, KY

This is the first solar farm that is discussed.

No. 32 Matched Pair – Walker-Correctional Solar, Barham Road, Barhamsville, VA

According to the appraiser, the purchaser of the property directly opposite the solar farm and within 250.00 linear feet, stated that he preferred the privacy the solar farm offered him and paid more than the asking price. Therefore, no analysis is needed. This is another example of a purchaser's indifference to a detrimental condition. As with potential purchaser's who would not pay any amount regardless of discount for a property with a detrimental condition, these extremes are not indicative of the market and should be eliminated from the data pool.

No. 33 Matched Pair – Innovative Solar 46, Roslin Farm Road, Hope Mills, NC

This 78.5 MW generating plant has potential of being a relevant indicator for the Green County proposal given its size. This single paired sales analysis uses comparable sales which two of the three required over 30.0 adjustment, which results in an unreliable indication. With such a large solar generating plant, the proper analysis would be to examine all the adjacent properties for sale-resales prior to and after construction, such as the case of No. 14, McBride Place Solar Farm in Midland, N.C.

No. 34 Matched Pair – Innovative Solar 42, Country Line Road, Fayetteville, N.C

This case study examines two adjacent properties opposite this 71 MW generating plant. With respect to the first study, the Shaw Mill Road sale appears in the center of a commercial/industrial intersection and the address of the second sale is incomplete for identification on Google Earth. The first sale required a 40.0 percent adjustment and the second, a 20.0 percent adjustment.

Regard to the second comparison, the sales are within the general vicinity and are comparable to the subject. The Hemingway sale is directly behind the test sale and may be influenced by the solar facility. Assuming the data is correct, this example may not be adversely affected by the solar farm. However, because of the number of adjoining tracts, a search for sale-resales should be made to support the indication of no diminution of value.

**No. 35 Matched Pair – Demille Solar, Demille Road, Lapeer, MI**

The first case study of a 28.4 MW solar farm compares an adjacent residence at 1120 Don Wayne to the property directly across the street which results in a **-10.0 percent** difference in value. The second comparison is with a dwelling in the same neighborhood a greater distance from the solar farm which indicates a -4.0 percent adjustment. The third comparison is a larger single lot in proximity to commercial development, and not in a subdivision. This comparison indicates a 10.0 percent adjustment in favor 1120 Don Wayne. Since the third sale is not considered comparable, the other two indicators result in a **-4.0 to -10.0 adjustment for proximity the solar farm. The other comparisons of properties on Don Wayne indicate a range of diminution of value from -1.0 to -7.0 percent. This is consistent with the other evidence for modestly price subdivisions.**

**No. 36 Matched Pair – Turrill Solar, Turrill Road, Lapeer, MI**

This case study involved two analysis. The first tests 1060 Cliff Drive, a residence opposite the 19.6 MW solar plant and in proximity to a commercial area. The first control sale is from a similar neighborhood and indicates **-6.0 percent diminution**. The other two sales are from subdivisions and are not considered to be comparable. The second analysis was inconclusive as admitted by the appraiser.

### No. 37 Matched Pair – Sunfish Farm, Keenebec Road, Willow Spring, NC

This case study examines a \$185,000 house whose rear corner is diagonally across from a 6.4 MW generating plant. The appraiser concluded that the property was not affected and due to the property's alignment with the solar farm and the woodland and field directly behind the property the likelihood of a reduction in utility is minimal.

### No. 38 Matched Pair – HCE Johnstone I, LLC, Benson, NC

This case study examines two woodland lots that adjoin this 2.5 MW solar farm. Due to the small size of the facility and the screening, the utility of these lots is not diminished and consequently indicate no diminution in value compared to competing tracts.

### Conclusions

The appraiser concludes that the 83 matched pairs of comparable sales from solar farms throughout the United States have indicated a range of value differences from -10.00 percent to +9.00 with an average of +1.00 percent and a median of +1.00 percent. He has concluded “that this data shows no negative or positive impact due to adjacency to a solar farm.”

The primary flaw of this report is that with any damage or amenity study involving any detrimental or affirmative condition, the result cannot be reduced to a single “one size fits all” percentage in order to accurately describe the impact, whether positive or negative. Typically, a multiple regression analysis which analyzes hundreds, if not thousands of data points results an average or median result. However, even this kind of mass analysis qualifies the conclusion with respect to distance or some other qualifier. It is understood that on either side of the average is a range of values.

The fallacy of these case studies is that the appraiser has chosen certain proximate sales to solar farms and compared them to random sales without any explanation as to why they were chosen. The inherent weaknesses of the selection are described above in the review comments of each case study. These include certain facts as to why no damage or loss of utility should even be expected, which would eliminate the necessity for the convoluted adjustment process the appraiser has performed in each case study. This is particularly evident regarding the small solar farms.

This is analogous to citing the sales of properties that are impacted by high voltage transmission lines (HVTL). If, for example, a HVTL traverses the rear corner of a rural acreage residential tract and the dwelling or potential house sites are on the other side of the property and remain intact, there is no loss of utility, and consequently no damage. On the other hand, if a transmission line diagonally bisects a comparable property, it may reduce the value by 50.00 percent. To conclude, just using the first sale that there is no impact from HVTLs, is fundamentally flawed. The appraiser has chosen one or more examples from numerous solar farms throughout the country and has concluded that even those containing 1,000.00+ acres are not detrimental conditions.

Another technique that this appraiser relied upon was establishing the percentage of uses surrounding the solar farms and concluded because the mix of residential, farm, or commercial use was similar, then the electrical generating system was deemed compatible with the surround land uses, regardless of whether it was 0.22 MW or 100 MW. As previously described, there was no discussion of what constitutes compatibility and the real estate market.

### **III. Distance Between Homes and Solar Panels**

The appraiser “has measured distances at matched pairs as close as 105 feet between panel and home to show no impact on value.” This claim is not credible due to the unreliable and noncredible matched pair analysis as described in the case study reviews.

### **IV Topography**

The appraiser concludes that regardless of the topography whether it is flat or rolling, no diminution exists as the result of proximity to solar farms, based on his prior case studies, most of which lack credibility as described.

### **V. Harmony of Use/Compatibility**

The appraiser again, lists the percentage uses of different land uses as they exist in proximity to existing solar farms and declares that they are compatible. There is no discussion of the concepts of conforming and nonconforming uses within the context of planning. The fact that studies other than this appraiser’s have documented loss of value due to proximity to solar facilities indicates that the market perceives an incompatible use and discounts for it accordingly.

A non-conforming use in the agricultural zone has the potential of negatively impacting the value of adjacent properties as a result of its lack of compatibility<sup>17</sup> and risk of hazard or nuisance. In other words, compatibility maximizes real estate values, and in the reverse, incompatibility diminishes market value. Any issue or condition that may cause a diminution to value to real estate is defined as a detrimental condition.<sup>18</sup>

### **VI. Specific Factors Related to Impacts on Value**

The appraiser has determined, from his experience in completing Impact Studies “that the most common areas for impact on adjoining values follow a hierarchy with descending levels of potential impact” and he discussed them as they relate to solar farms.

1. Hazardous material: The appraiser states that, “a solar farm presents no potential hazardous waste byproducts as part of normal operation.”
2. Odor: “Solar farms produce no odor.”
3. Noise: “There is no negative impact associated with noise from a solar farm.”
4. Traffic: “The solar farm will have no onsite staff.”
5. Stigma: “There is no stigma associated with solar farms and people generally respond favorably towards such a use.”
6. Appearance: “Larger solar farms...are a passive use of the land that is in keeping with a rural/residential area.”

The appraiser did not address the view shed as previously described.

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<sup>17</sup> Definition of compatibility: The concept that a building is in harmony with its uses and environment. Dictionary of Real Estate Appraisal, 5<sup>th</sup> Edition.

<sup>18</sup> Randall Bell, PhD, MAI, *Real Estate Damages*, 3<sup>rd</sup> edition, (Chicago, Appraisal Institute, 2016): 458.

## **VII. Conclusion**

The appraiser concludes that “the matched pair analysis shows no impact in home values due to abutting or adjoining a solar farm as well as no impact to abutting or adjacent vacant residential or agricultural land. Furthermore, it is his “professional opinion is that the solar farm proposed at the subject property will have no impact on the value of adjoining or abutting property.”

The most relevant examples cited by the appraiser that either required the least amount of adjustment or represented obvious impacts due to the solar farm are the following which indicated a range of diminution from -1.0 percent to -19.0 percent.

No. 10 Matched Pair – Summit/Ranchlands Solar, Moyock, NC:	-3.0% to -10.0%
No. 27 Matched Pair – McGraw Solar, East Windsor, NJ:	-9.0% to -19.0%
No. 28 Matched Pair – Tinton Falls Solar, Tinton Falls, NJ:	-1.0% to -7.0%
No. 30 Matched Pair – Candace Solar, Princeton, NC:	-18.0%
No. 35 Matched Pair – Demille Solar, Demille Road, Lapeer, MI:	-1.0% to -10.0%
No. 36 Matched Pair – Turrill Solar, Turrill Road, Lapeer, MI:	- 6.0%

These indications are not unlike those of the peer reviewed journals and analysis of other appraisers that are summarized on the following chart. The preponderance of evidence based on these empirical studies indicates that industrial scale solar farms do negatively impact adjacent properties to the extent that their utility, as interpreted by the market, is affected. For this reason, the market considers electric generating facilities to be a detrimental condition.

chart



chart

If you have any questions, or need further documentation, please call.

Sincerely,

Mary McClinton Clay, MAI

## **ADDENDUM**

## **SOLAR ENERGY GENERATION POWER SYSTEMS DAMAGE STUDIES**

Because the proliferation of SEGPSs is relatively recent, both peer reviewed journal articles, as well as professional appraisal studies concerning the subject are limited. However, the following currently available data document the adverse effect of SEGPS and their negative impact on property value.

### **I. PEER REVIEWED JOURNALS**

#### **IA UNIVERSITY OF TEXAS STUDY**

The first study to discuss any diminution in value as a result of proximity to SEGPSs is a May 2018 study conducted by economists at the LBJ School of Public Affairs at the University of Texas at Austin.<sup>19</sup> This Policy Research Project “investigates where large solar installations are located, the housing and income characteristics of the surrounding areas, and if the installations affect nearby residential properties.”<sup>20</sup> The study area ranged from a 100.00 foot to 3.00 mile radius from solar facilities ranging from 1 MW to 100 MW+.

The study was based on geospatial analysis and a survey of residential property assessors’ opinions of the impact. The respondents included both assessors who have “and have not assessed nearby solar installations.”<sup>21</sup> The study “results show that while a majority of survey respondents estimated a value impact of zero, some estimated a **negative impact associated with close distances between the home and the facility, and larger facility size.**”<sup>22</sup>

Although the study was based on assessor opinions, rather than empirical data, the conclusions of the assessors that a negative impact is associated with close distance between

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<sup>19</sup> Leila Al-Hamoodah, et al, “An Exploration of Property-Value Impacts Near Utility-Scale Solar Installations,” LBJ School of Public Affairs, The University of Texas at Austin, May 2018.

<sup>20</sup> Ibid.: 1.

<sup>21</sup> Ibid.: 15.

<sup>22</sup> Ibid.:1

the home and the facility, as well as larger facility size is a correct assumption. This trend is typical of most damage studies, including the 9 environmental damage studies performed by this office that are included in the Addendum.

This study is not considered a reliable indication of potential diminution in value because it measures only the opinion of assessors, who generally are not licensed, certified or designated appraisers. Their charge is not the estimation of market value, but the equalization of property assessment. Though they are concerned with recent sales, the emphasis is on the relationship of assessments to sale ratios in the aggregate.

## **I.B UNIVERSITY OF RHODE ISLAND STUDY**

A study documenting the effect of solar development in Rhode Island and Massachusetts was published in September 2020.<sup>23</sup> “The purpose of this paper is to quantify the externalities associated with proximity to utility-scale solar installations using hedonic valuation.”<sup>24</sup> This study used “a difference-in-difference (DID) identification strategy, which compares changes in housing prices after construction for nearby properties with those further away.”<sup>25</sup> The study included 208 solar installations, 71,337 housing transactions occurring within one mile (treated group), and 347,921 transactions between one to three miles (control group).

The study’s “results suggest that solar installations negatively affect nearby property values...Property values in the treatment group decline on average 1.7% (or \$5,671) relative to the control group.”<sup>26</sup> The study also found, with respect to proximity, substantially larger negative impacts on homes located within 0.1 mile of solar installations (-7.0%, or \$23,682).

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<sup>23</sup> Vasundhara Gaur and Corey Long, “Property Value Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island,” Department of Environmental and Natural Resource Economics, University of Rhode Island, September, 29, 2020.

<sup>24</sup> Ibid.: 3.

<sup>25</sup> Ibid.: 4.

<sup>26</sup> Ibid.: 4.

This confirms the hypothesis that nearby solar installations are a disamenity.<sup>27</sup> Also, “these results suggest extremely large disamenities for properties in very close proximity.”<sup>28</sup>

This study, which is based on hundreds of thousands of transactions, **unequivocally has determined that SEGPSs negatively affect nearby property values**, contrary to the claims of solar developers that they have no negative impact.

It is notable, that the conclusions represent an average of all the 208 sites, with both large and small installations, of which some may or may not have a negative affect upon the utility of the nearby property. If the utility of the property is not diminished, or if the expectations of the market are not impacted by the solar facility, then no diminution should be expected. This average includes such properties. For example, this would include modestly priced houses with small lots in large subdivisions opposite a relatively small scaled industrial solar facility where the owner would not have expectations of a view nor would the utility of their homes be impacted by the solar installation. This is evident in the following discussion of the AM Best solar farm.

## **II. PROFESSIONAL APPRAISAL REPORTS**

### **II.A FRED H. BECK & ASSOCIATES, LLC**

The first widely available report documenting property value diminution as a result of proximity to SEGPSs was prepared in 2013 by Fred H. Beck, Jr., MAI, CCIM, MRICS of Denver, North Carolina. The report was prepared for the proposed Webbs Road Solar Farm adjacent to the Sailview Subdivision on Webbs Road and Burton Lane in Denver, Lincoln County, North Carolina. This report summarized the available relevant data from North Carolina at the time it was prepared.

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<sup>27</sup> Ibid.: 15.

<sup>28</sup> Ibid.: 17

## II.A.1 Strata Solar Case Study

The first case study involves a sale contract that was canceled upon knowledge of the proposed Strata solar farm on Webbs Road. Mr. and Mrs. Daniel McLean owned a 0.60 acre tract with a 2,000 square foot residence at 4301 Burton Lane opposite Sailview Subdivision. The owners listed the property for sale in July 2013 for \$225,000. In mid-August 2013, they received an offer to purchase contract for \$200,000 with settlement to occur on October 30<sup>th</sup>. During this period, the public became aware of Strata Solar's proposal. With this knowledge, **the potential purchasers canceled the contract.**

According to the Beck report, the potential purchaser stated:

The public announcement of the solar farm was the impetus to cancel the contract. Mr. Hibben is in the construction business. He commented the solar farm would be unattractive, and the view would not be complimentary to single family dwellings. He mentioned he could not justify putting money in a dwelling that would be negatively affected by the solar farm for many years. We asked Mr. Hibben if he would reconsider if the purchase price was reduced by \$50,000. He said that he would not even consider a more substantial reduction in the purchase price.

**Table 1. Impact of Solar Farms on Property Value – Denver, Lincoln County, NC  
By Fred H. Beck & Associates**

Location	Denver, NC
Property Owner	Mr. & Mrs. Daniel McLean
Property Description	2,000 Ft <sup>2</sup> House on 0.6 acres
Advertised Price & Date Listed	\$225,000 in July 2013
Event causing potential Buyer to reduce offer	Impaired view caused by Solar Farm
Offer Amount & Date Made	\$200,000/August 2013
Potential Settlement Date	October 30, 2013
Event causing Potential Buyer to cancel purchase	Impaired view of Solar Farm caused by potential Buyer to cancel purchase

## II.A.2 Clay County Solar Farm Case Studies

Tusquite Trace Subdivision is a 15 lot, primarily second home development in Hayesville, Clay County, NC. The subdivision was developed in 2006 prior to the 2007 to 2009 recession with houses in the \$325,000 range. No lots were sold during the recession. However, from 2009 through 2010, three lots were sold with prices increasing from \$73,000 to \$75,000. In 2011 an adjacent farmer leased his farm for a small solar facility which was opposite the entrance to the subdivision. As of the date of the report, October 2013, **no additional lots sold.** Real Estate brokers have reported, the “buyers are turned off by the solar array on the adjacent farm, and they chose other lots without impaired views.”

In June 2011, Clay County residents successfully petitioned the Board of Equalization to **reduce their assessments an average of -30.0 percent** as a result of the solar farms in the county “hampering their views.”

**Table 2. Impact of Solar Farms on Property Values – Hayesville, Clay County, NC  
By Fred H. Beck & Associates**

Location	Hayesville, NC
Type of Development	Subdivision
Date of Development	2006
Price Range of homes	In \$325,000 range
Economic Climate	Recession, 2007 - 2009
Activity in 2009 - 2010	Three lots sold in \$73,000 - \$75,000 range
In 2011, Solar Developer Leases Land across from Subdivision Entrance	Potential purchasers of land adjacent to Subdivision entrance are turned off by impaired view and lose interest.
Subsequent Activity in 2011 - 2013	Potential Buyers were turned off by the solar array to be erected opposite the Entrance.
Subsequent Action by land purchasers	<b>Purchasers changed their minds and chose other lots in Subdivision without impaired views.</b>
Community Response	County residents petitioned Clay County Administration to <b>reduce their assessment by an average of 30% as a result of “impaired views.”</b>



### **II.A.3 Non-residential Use View Impairment Case Study**

This case study examines the effect of an incompatible commercial use on a higher priced residential subdivision in Elgin, Richland County, South Carolina. Southridge is a gated community of houses ranging from \$400,000 to \$800,000 that were constructed in the mid-2000s. In the fall of 2010, Verizon Wireless completed a 146,000 square foot call center on 29.00 acres adjacent to Southridge. The appraiser analyzed sales within the subdivision both before and after construction of the call center. Prior to construction, the sales appreciated in value, while after construction, **they declined from -10.70 percent to -23.10 percent, or an average of -15.2 percent.**

### **II.A.4 AM Best Solar Farm Study**

This study examines the effect of smaller scaled solar farms on moderately price houses. As of the date of the report, AM Best was one of the few solar facilities adjacent to a developing subdivision. This 6.65 MW Strata Solar plant is in Goldsboro, Wayne County, North Carolina and adjoins Spring Garden Subdivision to the east. Construction, which began in March 2013 was completed in June 2013 on land zoned I-2 (General Industrial). This zoning classification “is established to accommodate the widest range of manufacturing, wholesale and distribution uses, provided the use does not create smoke, dust, noise, vibration or fumes beyond the property line.”

The appraiser included a graph indicating the average median housing prices within a 1.00 mile radius of the 42 completed major NC solar farms. The majority of solar farms adjoin houses ranging from \$90,000 to \$140,000 compared to the \$153,000 median price of Spring Garden. Also, a chart is included that represents the average household income within 1.00 mile of the NC solar farms indicating \$50,000 to be predominant, which compares to the average Spring Garden household income of \$51,543.

This subdivision began development in the late 1990s and at the time of the report had 60 home sites. Most of the lots have dense trees separating them from the solar farm,

however, it is visible during the winter months to potential lots not yet developed. **With no indication of diminution in value, the appraiser concluded that due to the industrial zoning of the solar farm, this market would be aware of the potentially incompatible use to residences and at this price level, the expectations of this market would not discount for proximity to such a use.**

In reviewing reports prepared for various solar developers, this office examined recent sales from this subdivision. Based on their indication of no diminution in value when compared to earlier sales from the same subdivision with more protection from the solar plant, this office concurs with the Beck conclusion. This is an example of a market's perception and expectation of property utility. **Because of the pre-existing industrial zoning of the solar plant, the market does not perceive there to be loss of utility and therefore, no damage to their property value.**

### **III.A MARK W. HECKMAN REAL ESTATE APPRAISERS**

Mark W. Heckman, a Pennsylvania certified general real estate appraiser testified in September 2020 at a Mount Joy Township, Gettysburg, Adams County, PA Board of Supervisors meeting concerning the application of Brookview Solar I, proposed a 75 MW SEGPS on 1,500 acres. Based on the following case studies, the appraiser concluded that the property values of the 114 residences within 1,000 linear feet of the SEGPSs would decline up to 20.00 percent.

#### **III.A.1 Adams County View Case Study**

This appraiser compared sales of properties with a Multiple Listing Service (MLS) reported "view" with those without such a designation. "View" was defined as: City, Creek/Stream, Golf Course, Lake, Mountain, Panoramic, Pasture, Pond, River, Scenic Vista, Trees/Woods, Valley and Water.

The MLS search was based on a 3-4 bedroom ranch style single family dwelling on a lot of less than 5.00 acres with and without a "view." The result of the search included a data

set of 85 properties with a “view” which indicated an average sale price of \$251,274 and median sale price of \$235,000. The data set without a “view” included 410 properties with an average sale price of \$227,808 and a median sale price of \$215,000. **The difference between the average sale prices was -9.34 percent and the difference between the median sale prices was -8.51%.** (However, the appraiser concluded in the affirmative that the view added 10.31 percent to the average sale price and 9.30 percent to the median sale price).

**Table 3. Impact of View on Property Value – Adams County, PA  
By Mark W. Heckman Real Estate Appraisers**

	With a “View”	Without a “View”
Number of Properties included in study	85	410
Average Sale Price	\$251,274	\$228,808
Median Sale Price	\$235,000	\$215,000

- The Impact of View on Property Value is summarized in the Table below:

	<b>Dollar Increase in Price based on “View”</b>	<b>Percent Increase in Price based on “View”</b>
Based on Average Sale Price	\$22,466	9.34%
Based on Median Sale Price	\$20,000	8.87%

The appraiser concluded that, “In Adams County a Good View adds approximately 10% to the value of residential property. So, it is **reasonable to conclude that a loss of 15-20% for degradation of view** is reasonable and credible since many properties would go from Good View to Objectionable View if they now had to see thousands of solar panels.”

#### **IV.A MADISON COUNTY INDIANA CASE STUDY**

On August 29, 2019 Bethany Keller appeared before the Madison County, Indiana Board of Zoning Appeals to testify with regard to her purchase of an 18.42 acre tract improved with a 2,000 square foot single family residence at 3764 W State Road 28 in Alexandria, Indiana. The property would be surrounded by the proposed Lone Oak Solar

Plant. Aware of the proposed 120 MW solar power plant on 1,890.00 acres, the potential purchasers made an offer of \$117,000 on July 31, 2019. The property was appraised on August 14, 2019 for the loan. The appraiser did not know about the proposed solar plant when he appraised the property. The appraised value was \$140,000, or a **difference of -16.43 percent**.

According to Mrs. Keller's testimony, "We wanted this property. Then after we found out about the solar farm, we were very hesitant. We are moving forward with it, because this is our dream... We are getting this 16.5% less than appraisal value, and we are still gambling our financial future, our son's financial future, and our future health on this. So if you think this isn't going to affect property values, we are not willing to pay more than this, because we are scared."

#### **VIA MARY MCCLINTON CLAY, MAI**

This office has recently reviewed two reports prepared by Cohn Reznick and Marous & Company for proposed solar farms in Michigan and Indiana, respectively. Included within both reports was an analysis of a case study of the North Star Solar Farm in North Branch, Minnesota. As a result of the errors found within these reports, this office has analyzed the same data that both reports used and refutes their conclusion that there is no negative impact upon adjacent property values.

##### **VIA.1 North Star Solar PV Case Study – Sale-resales Analysis**

As indicated in the previous Western Mustang LLC's Neighborhood Agreement discussion, the North Star SPGPS is the example of such a facility that required the purchase and subsequent resale of adjoining properties.

At the time of its completion, in December 2016, North Star Solar PV was the largest SEGPS in the Midwest. This 1,000.00 acre, 138 MW facility is in North Branch, Minnesota. As a result of pressure from property owners who abutted at least three sides of the SEGPS and as a condition of approval by the Minnesota Public Utilities Commission, the developer

purchased their seven properties and subsequently resold them. The following chart summarizes the sale-resales data of these seven properties.<sup>29</sup> Two maps depicting these properties follow.

The chart depicting the seven sales purchased and resold by the developer, CER Land, LLC, for deed transfer purposes, includes three transfers for each property. The first deed represents the sale to the original property owner, which is an arms-length or market sale because it meets the definition of market value.<sup>30</sup> The second sale is from the original owner to CER Land, LLC. This is not considered a market value sale because it does not meet the definition of market value, primarily because it was negotiated under duress. The third sale is from the developer to new owner (except for Sale-resale No. 1 which was sold back to the original owner). The third sale is considered to be a market value sale because, with the exception of

No. 1, the sales were adequately exposed to the market having been placed on the local Multiple Listing Service.

Because the first and third sale for each property are market value sales, it is possible to apply the sale-resale methodology to these sales to determine if they indicate a “before and after” change in value. The first sale represents a sale that occurred before any knowledge of the solar development existed, while the third sale occurred after construction of the facility. Generally, the only difference between the two sales is time, also referred to as market condition.

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<sup>29</sup> The sales data was obtained from county records, MLS data, and information present to the Minnesota Public Utilities Commission on March 15, 2016 regarding the resolution of the negotiations with landowners.

<sup>30</sup> Definition of Market or Arms-length Sale: A transaction between unrelated parties who are each acting in his or her own best interest. *The Dictionary of Real Estate Appraisal*, 5<sup>th</sup> ed., s.v. “arms-length transaction.”  
Definition of Market Value: The most probable price that the specified property interest should sell for in a competitive market after a reasonable exposure time, as of a specified date, in cash, or in terms equivalent to cash, under all conditions requisite to a fair sale, with the buyer and seller each acting prudently, knowledgeably, for self-interest and assuming that neither is under duress. *The Dictionary of Real Estate Appraisal*, 5<sup>th</sup> ed., s.v. “market value.”

In order to compare the two sales, an adjustment must be made to the older sale to bring it up to the value level of the second sale. This is done by making a time adjustment based on supporting data from the market. The following chart represents the annual median and average sale price for houses in North Branch and Chisago County.<sup>31</sup> The median sale price for North Branch, specifically, was judged to be the most relevant of the two sources since it does not include the extreme values.

This data was used to calculate the compound rate of increase from the date of the first sale to the second sale and then increase the first sale by the indicated rate. After this adjustment is made, then the adjusted sale price of the first sale can be compared to the sale price of the third sale and a difference in the two sale prices will indicate if there is a diminution in value as a result of the construction of the SEGPS.

#### Description of the Sales Chart

For ease of comparing the sales data at once, the North Star sales are depicted on the North Star Solar Farm Sale-resale Comparison Chart. The following describes each column of the chart.

**Sale-resale:** This column identifies the 7 transactions that involved the developer of North Star.

**Parcel No.:** This is the Chisago County Tax Assessors identifying number of the property.

**Address:** This is the street address of the property being analyzed.

**Sale Date:** This is the date that the deed was transferred, i.e. the date on the deed. This date is not to be confused with the date that the deed was recorded, which is sometimes a few days later.

**Grantor:** This is the seller of the property.

**Grantee:** This is the buyer of the property.

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<sup>31</sup> The time adjustment chart was prepared by David Abbot, a statistician with the Minneapolis Area Board of Realtors.

**Net Sale Price:** The net sale price is the gross sale price less any money paid by the seller that was applied to reduce the sale price. If the sale price includes any seller paid amount, it will be described in the note after the property transactions.

**\$ Change:** This is the dollar amount difference between the first and second sale, as well as the dollar amount difference between the second and third sale.

**% Change:** This is the percentage difference between the first and second sale, as well as the percentage difference between the second and third sale.

**Annual % Change:** This is the annualized rate of change between the first and second sale.

**Sale Tax Assessment:** This is the property tax assessment of the property as of the date of sale.

**Comments:** The comments include a description of the property in the following order: date of construction; square footage above ground level; architectural design (3 or 4 level split, 1-story, tri-level, split entry); basement square footage of finish; number of bedrooms and baths; location of solar farm, i.e. rear and front.

Also, under comments, the time adjustment is made from the date of the first sale to the date of the third sale. This includes calculating the number of years between the two sales and determining the rate or percentage change between these two years based on the North Branch median sale price chart. After the number of years is determined and the rate of increase between that time, these numbers are applied to the first sale price which adjusts it the level of the third sale price. In other words, this indicates, in the first example, that the value of the \$216,000 sale price in 7.9 years increased at 6.8 percent, is \$364,296.

### Sale-Resale Analysis

The following is a discussion of the results of each of the seven properties with the first sale adjusted for time from its sale date to the date of the third sale and the resulting comparison of the two sales, adjusted for time, to determine if there is a change in value.

Regarding Sale-Resale No. 1, Scott Dornbusch not only sold his property to CER Land, LLC, for \$360,000, but he bought it back for \$302,500. However, with respect to the comparison between the first sale price, increased for time, to the date of the third sale, this example indicates a **diminution in value of -17.0 percent**. Although this sale-resale is not arms-length, it is nonetheless, consistent with the other 6 arms-length sales. Because this sale was repurchased by the same individual, it is reasonable that his prior invested interest in the property would indicate this to be a minimal indication of value loss.

Sale-resale No. 2 is the property on the south side of 367<sup>th</sup> surrounded on three sides by the solar plant. The rear 6.24 acres of this property was encumbered by a 30 year lease to North Star Solar PV, LLC at a rate of \$1,000 per year to be increased at 1.0 percent annually. This example represents a highest rate of **decline in value of -28.0 percent**. The most predominant rate of decrease is 17.00 percent (Sale/resales No. 1, No. 3, and No. 4), which suggests that this encumbrance would add an additional 11.00 percent, despite that it contributes an annual income stream of \$12,000.

Sale-resale No. 3 represent an original sale that occurred in 2000 that was extensively renovated, subsequent to that sale, with the additional construction of a pole barn. The seller indicated that the cost of such improvements was approximately \$100,000. Adjusted for these improvements, this sale-resale **indicates -16.0 percent diminution in value**.

Sale-resale No. 4 is at the corner of Keystone Avenue and represents a **diminution in value of -12.9 percent**.

Sale-resale No. 5 **does not indicate a decrease in value** between the original sale and the second resale. However, the sale price does not reflect the addition of a pole barn in the estimates. According to reports from the Chisago County Assessor's office more than one purchaser indicated that they did not consider the solar plant to be detrimental—in fact, they preferred this industrial use to having neighbors.

Sale-resale No. 6 **indicates a -6.3 percent diminution in value**.



Sale-resale No. 7 is the largest property among this group on the west side of Keystone Avenue. This example indicates a **diminution in value of -3.5 percent**. The first purchaser reported that the last purchaser stated that, “he did not want neighbors.”

The sale-resales indicate a range of diminution in value from 0 to -28.0 percent, or an average of -12.5 percent and a median of -15.9 percent. **The median of -15.9 percent diminution in value is consistent with the indication from the Madison County Indiana case study with a -16.43 percent value decline.**

It is notable that CER Land, LLC purchased the seven properties for a total of \$2,773,000 and sold them for \$2,143,044. This represents a loss of -\$629,956, or -22.72 percent.

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