

**EXHIBIT I**  
**SITE ASSESSMENT REPORT**

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# Unbridled Solar Facility Site Assessment Report


Kentucky State Board on Electric  
Generation and Transmission  
Application


Case No. 2020-00242



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Project Name Unbridled Solar Facility Site  
Assessment Report  
Kentucky State Board on Electric  
Generation and Transmission  
Application

Job Reference E320301100  
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## Acronyms

Applicant	Unbridled Solar, LLC
CWA	Clean Water Act
dBA	A-weighted Decibel
Kentucky DOW	Kentucky Energy & Environment Cabinet, Department for Environmental Protection, Division of Water
kV	Kilovolt
NWP	Nationwide Permit
O&M	Operations and Maintenance
Project	Unbridled Solar Facility
Unbridled	Unbridled Solar, LLC

# 1 Description of Proposed Site

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## 1.1 Requirement

KRS 278.708 (3)(a); A description of the proposed facility that shall include a proposed site development plan that describes:

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

## 1.2 Compliance

### 1.2.1 Solar Facility

Unbridled Solar, LLC (Unbridled, or the Applicant), a wholly owned subsidiary of National Grid Renewables Development, LLC, is proposing the Unbridled Solar Facility (the Project) that will be an up to 160-megawatt alternating current photovoltaic electricity generation facility. Project facilities will include solar modules, inverters, tracking racking, fencing, access roads, a substation, an operations and maintenance (O&M) building, parking lot, below- and above-ground electrical collection lines, up to six weather stations (up to 20 feet tall), and temporary construction laydown yards. The Project will be located on approximately 1,680 combined acres of connected properties in Webster County (540 acres) and Henderson County (1,140 acres) near and within the 4 Star Industrial Park. No street address has been established at this time for the Project; the coordinates for the location are 37.650688° N and 87.550852° W. For interconnection, Unbridled also will construct a 161 kilovolt (kV) nonregulated transmission line from the project substation in Webster County to the Big Rivers Electric Corporation's Reid Substation approximately two miles east of the Project boundary in Webster County.

The solar panels will be mounted on a racking system that will provide a foundation for the panels and support them above the ground on pile-driven piers. This racking system will have a minor footprint, and concrete foundations are unlikely to be required, resulting in low impact to the area beneath the panels. Final geotechnical studies will identify any possible deviations from standard pile driving conditions. Rainfall will run off the panels onto the ground surrounding the panels, which will be vegetated with herbaceous plants to provide infiltration into the groundwater.

The Project will be surrounded by a seven-foot-tall fence consisting of six-feet of chain link fence and one foot of barbed and/or smooth wire for security, meeting National Electrical Code Article 110 and Henderson County Zoning Ordinance, Article XXX, Section 30.02.D, Solar Energy Systems requirements. Fences at the periphery of residential properties will not use barbed or other forms of sharp-pointed fences. Outside the fence, vegetative buffers will be planted as screens in locations where the panels and other electrical equipment are adjacent to residences. Vegetative buffers will consist of evergreen and/or

deciduous trees and shrubs, subject to approval by the Henderson County Planning Commission in accordance with the County Zoning Ordinance, Article XXX, Section 30.02.D.

A map showing the location of residential structures, schools, and public and private parks in relation to the proposed Project is presented in Attachment A, Figure 1. Detailed maps showing proposed vegetative buffers are presented in the Exhibit K Application Plan Set, with notes and details shown in Exhibit K, Sheet UNB-L-900-01.

### **1.2.2 Transmission Line**

The Applicant proposes to construct a new 161 kV electric transmission line to transmit the electric power generated by the solar facility to the existing Big Rivers Electric Corporation's Reid Substation approximately two miles east of the Project boundary in Webster County (Attachment A, Figure 2).

The transmission line will begin at the Project substation located within the central area of the Project site, exit from the east boundary of the property, and terminate at the existing Reid Substation in Webster County. The maintained right-of-way corridor will be 125 feet wide and approximately 3.15 miles long from the Project substation to the existing Reid Substation. Current land use in the corridor is primarily agricultural with some forested and developed areas. Agricultural land within the right-of-way can return to normal use by landowners after construction of the transmission line is completed. The Applicant has acquired all of the required easements for the right-of-way.

### **1.2.3 Site Plan Details**

The following list provides site plan details pursuant to the requirements in in KRS 278.708(3)(a):

1. Current land use was assessed within the proposed Project boundary. Approximately 85 percent of the land within the Project boundary is currently used for agriculture. A detailed breakdown of land cover was obtained using data from the National Land Cover Database (Table 1).

**Table 1 Land Cover within the Study Area**

Land Cover Category	Type	Acreage	Portion of Project Area
Agriculture	Cultivated Crops	1411.9	82.34%
	Pasture/Hay	48.1	2.80%
Developed	Developed, High Intensity	<0.1	< 0.01%
	Developed, Medium Intensity	0.6	0.03%
	Developed, Low Intensity	5.3	0.31%
	Developed, Open Space	67.5	3.94%
Forested	Woody Wetlands	19.1	1.16%
	Deciduous Forest	128.4	7.49%
	Evergreen Forest	4.5	0.26%
	Mixed Forest	24.0	1.40%
Grassland	Grassland/Herbaceous	0.3	0.02%
Wetland	Open Water	0.2	0.01%
	Emergent Herbaceous Wetlands	4.6	0.27%

Source: NLCD 2016

2. The legal boundaries of the proposed site are shown in the Exhibit K Application Plan Set.
3. The proposed facility access control is displayed in Exhibit K, Sheet UNB-E-500-03. A locked gate will secure the access points.
4. The location of facility buildings, the transmission line, and other structures are presented in Exhibit K Sheets UNB-T-100-01 and UNB-E-500-03. A description of the project structures is included in Application Exhibits B and C.
5. The proposed locations of access ways and internal roads are presented in Attachment A, Figure 1. Approximately 53,032.51 feet (10.04 miles) of graveled access roads will be installed in segments 754.38 to 11,368.02 feet in length. The Project will not use railways for any construction or operation activities.
6. For interconnection, the Applicant will also construct a 161 kV nonregulated transmission line from the Project substation in Henderson County to the Big Rivers Electric Corporation's Reid Substation approximately two miles east of the Project boundary in Webster County. Additional detail is available in Attachment A, Figure 2. Electric and water/sewer services will likely be required by the O&M building.
7. A map of surrounding residential structures is provided in Attachment A (Figure 1).
8. The report in Attachment B details anticipated sound levels from the Project. Sound during the construction phase is expected to temporarily increase during daylight hours and generated by heavy equipment, passenger cars and trucks, and tool use during assembly of



the solar facilities. Sound will be present on the Project site during construction; however, because of the size of the Project site and the distance to the nearest receptors, construction will not contribute to a significant sound increase when compared to sound currently occurring onsite (i.e., the operation of farming and crop harvesting equipment). In addition, periodic sound associated with the solar panel tracking system and the relatively constant sound of inverters will occur during operation. This increase in sound will also be negligible because of the distance of sound-generating solar equipment from the nearest sound receptor. The sound produced by the inverters will not be a contributor of sound to the nearest receptor. Site visits and maintenance activities, such as mowing, will take place during daylight hours and will not significantly contribute to sound. The sound associated with these activities is very similar to those currently generated onsite by farming activities and offsite by commercial and farm uses.

## 2 Compatibility with Scenic Surroundings

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### 2.1 Requirement

KRS 278.708 (3)(b); Evaluate the facility's compatibility with scenic surroundings

### 2.2 Compliance

#### 2.2.1 Facility Compatibility

Sections of the proposed Project will be adjacent to residential properties. If a vegetation buffer is not already present between the Project boundary and adjacent residential structures, one will be planted. An estimated 41 buffers are planned, each ranging from 15 feet to 5,500 feet in length. The majority of buffers will be planted along the perimeter of the Project, and a smaller proportion will be planted within the Project boundary. The proposed screening plan in Exhibit K, Sheet UNB-L-900-01 shows where these buffer additions are planned. Designs for a vegetation buffer include evergreen and/or deciduous trees and shrubs, subject to approval by the Henderson County Planning Commission in accordance with the County Zoning Ordinance, Article XXX, Section 30.02.D.

Project representatives have worked closely with adjacent landowners who expressed concern regarding their viewshed impacts. Based on landowner feedback, Unbridled prepared a screening plan, presented in Exhibit K, Sheet UNB-L-900-01 to mitigate potential visual impacts to the landowners' property. Unbridled also prepared visual renderings of the Project with the proposed screening plan that was reviewed by and discussed with the interested landowners. Screening plan agreements with these landowners will be finalized prior to construction.

Additionally, a Glare Report, presented in Attachment C, was prepared for the Project, and found no impact to sensitive receptors from glare associated with facility infrastructure. Unbridled will place security lighting at entrances that are down-lit; this lighting will be manually controlled and motion activated. In addition, lights at each inverter will be switch controlled for repair purposes.

Implementation of vegetative screening buffers, and compliance with all regulatory requirements will ensure the Project is compatible with the scenic surroundings.

#### 2.2.2 Public Communication

The Project website (available at <https://nationalgridrenewables.com/unbridled/>) provided the public with details on how to attend the virtual public information meeting, a map showing the Project Area, aerial imagery; parcel information for all participating properties in Henderson and Webster counties; opportunity to submit questions and comments regarding the Project; a summary of frequently asked questions and responses; and instructions on how to request more information. A copy of the public information presentation was also posted on the website.

Unbridled representatives spoke to nearby landowners about the Project and proposed mitigation measures, such as screening, vegetation management, and setbacks. Project representatives kept in contact with landowners who were interested in visual mitigation measures for their property and coordinated screening plans. Visual renderings of the Project with the proposed setbacks and screening have been reviewed by and discussed with the interested landowners. Screening plan agreements with these landowners will be finalized prior to construction.

During the question and answer session at the public information meeting, Project representatives and landowners discussed local tax revenue, environmental surveys, profitability, decommissioning, solar

energy demand in Kentucky, community benefits, and construction questions about use of local labor and typical traffic and sound during construction.

## 3 Property Value Impacts

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### 3.1 Requirement

KRS 278.708 (3)(c); Analysis of the potential changes generated by the proposed facility siting, construction, and operation that would affect property values and land use for adjacent property owners

### 3.2 Compliance

A Property Value Impact Report (Attachment D), prepared by a certified real estate appraiser discusses impacts to potential property values for landowners adjacent to the proposed facility. The report found that “properties surrounding other solar farms operating in compliance with regulatory standards will not be adversely affected in either short- or long-term periods.” The research notes that “proximity to solar farms has not deterred sales of nearby agricultural land and residential single-family homes nor has it deterred the development of new single-family homes on adjacent land.”

## 4 Anticipated Noise Levels at Property Boundary

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### 4.1 Requirement

KRS 278.708 (3)(d); Evaluation of anticipated peak and average levels of noise at the property boundary generated by the facility's construction and operation

### 4.2 Compliance

Sound levels generated by facility construction and operations are discussed in the attached Noise and Traffic Assessment (Attachment B).

In summary, sound generated during construction is expected to only occur during daylight hours and will be generated by heavy equipment, passenger cars and trucks, and tool use during assembly of the Project. Sound will be present within the Project boundary during construction; however, because of the size of the Project and the distance to the nearest receptors, construction will not contribute to a significant sound increase when compared to sound currently occurring onsite (i.e., the operation of farming and crop harvesting equipment) and baseline ambient sound levels.

Sound generated during Project operation will include the motors on the solar panel tracking system and the inverters. The estimated sound produced by the loudest tracking motor option will be approximately 48 A-weighted decibels (dBA) at 100 feet, and sound produced by the loudest inverter option will be approximately 53 dBA at 100 feet. The nearest sensitive sound receptors will be 100 feet from solar panels and 200 feet from inverters. At this distance, the sound from Project operation will be quieter than an air conditioning unit and close to the sound created by light traffic.

The sound produced by the electrical transformers in the Project substation will be characterized as humming or buzzing. Estimated sound levels 200 feet from the substation will be 46 dBA. Sound impacts from substation operation to the nearest proposed sensitive receptor, approximately 800 feet away, will be quieter than light traffic at 100 feet.

## 5 Effect on Road, Railways, and Fugitive Dust

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### 5.1 Requirement

KRS 278.708 (3)(e); The anticipated impact on road and rail traffic by the facility's operation, including fugitive dust generated by the traffic and degradation of roads and lands within the vicinity of the facility.

### 5.2 Compliance

A report discussing the Project's anticipated impact on road and rail traffic levels, fugitive dust from traffic, and degradation of roads caused by Project-affiliated traffic is included in Attachment B. Railways will not be used during construction or facility operations. The results of the report presented in Attachment B are summarized below.

During construction, the traffic volume will temporarily increase from the delivery of construction materials and personnel traveling to and from the Project. Appropriate signage and traffic directing will occur as necessary to increase driver safety and reduce risk of collisions for approaching traffic. No damage to the existing roadway infrastructure are anticipated. For facility O&M activities, a small maintenance crew will regularly drive through the area in pick-up trucks but this activity will not impact traffic function.

Activities that disturb land during the construction of the Project may temporarily add airborne materials. To reduce the contribution of airborne materials, application of water and covering of spoils may occur. Vegetative buffer and revegetation measures along fencerows and property boundaries will help mitigate fugitive dust impacts to adjacent areas. Water used for dust control is authorized under the Kentucky Pollutant Discharge Elimination System as a non-stormwater discharge activity that is required for the Project.

The Louisville and Nashville railroad track extends nearly north to south on the eastern Project boundary. Construction traffic will use the existing public roadway system to access the Project. The Project will not impact railroads. It should be noted the transmission line will cross an existing Class I railroad; however, no impacts are anticipated.

## 6 Mitigation Measures

### 6.1 Requirement

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 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.

### 6.2 Compliance

Unbridled will undertake a series of mitigation measures to avoid or minimize potential Project impacts, as outlined below in Table 2.

**Table 2 Project Mitigation Measures**

Category	Mitigation Measures
Viewshed Protection	1. Unbridled representatives and neighboring residents of the Project have discussed viewshed impact concerns. To address these concerns, Unbridled prepared a screening plan and visual renderings that were reviewed by and discussed with the landowners who expressed concern. Screening plan agreements with these landowners will be finalized prior to construction.
	2. Unbridled will plant a vegetative buffer in areas adjacent to non-participating residences. The buffer will consist of a mix of evergreen and deciduous trees and shrubs in accordance with the vegetative buffer locations indicated on the preliminary site layout plan. The evergreen and deciduous trees will be planted at a height of 3 feet or greater and will reach 20 feet or greater at maturity. The shrubs will be planted at a height of 2 feet or greater and will reach 10 feet or greater at maturity. The vegetative buffer is subject to approval by the Henderson County Planning Commission.
	3. In addition to the screening plan and visual renderings, Unbridled considered feedback from concerned landowners while designing the Project's site plan to ensure sufficient setbacks from homes of concern. The site plan was designed to alleviate concerns of impacts to the viewshed from neighbors' homes and was discussed with the neighbors expressing concern.
	4. A portion of leased land in the northeastern area of the Project was not used in the site plan for the purpose of mitigating impacts to homes in the town of Robards to allow an existing row of vegetation to remain intact and act as an existing vegetative buffer.
Public Safety and Security	1. Unbridled will place "High Voltage Keep Out" or equivalent warning signs along the perimeter at approximately every 100 to 200 feet and at all gates or entrances.
	2. Unbridled will control access to the site during construction and operation. All construction entrances will be gated and locked when not in use.
	3. The fence surrounding the property boundary will be installed after grading of the site and before the main array installation begins. According to National Electrical Safety Code regulations, the security fence will be installed prior to any electrical installation work. The substation and construction staging area will also have their own separate security fences installed.
Air Quality	1. Unbridled will apply best management practices regarding dust mitigation, including, but not limited to, water applied to internal roads as needed; internal roads

Category	Mitigation Measures
	compacted; internal roads constructed or improved as needed; loads of dirt and other air-pollution causing particles covered while in transit; and the implementation of revegetation measures and covering of spoil piles.
Traffic and Noise	1. Unbridled will develop a traffic management plan to minimize the impacts of any traffic increase and keep roadways safe. Part of this traffic management plan will be to maintain all traffic and staging onsite. In addition, the traffic management plan will identify any noise concerns during the construction period and develop measures that will address those noise concerns.
	2. Unbridled will remain in contact with nearby residents about any complaints related to noise levels and to ensure that noise levels are not unduly high once the pounding and placement of the solar panel racking begins. Any noise generator that creates noise levels in excess of 120 decibels at the property boundary will be considered unduly high.
	3. Construction activities, processes, and deliveries will be limited to the hours of between 7:00 a.m. and 7:00 p.m. Monday through Saturday.
	4. Unbridled will use appropriate signage and traffic signaling as needed to aid construction traffic and prevent severe traffic issues.
	5. As needed, Unbridled will shuttle commuting construction workers.
	6. Unbridled will inform and obtain permits from state and local road authorities as pertaining to any Class 21 vehicle transport to the site. Unbridled will also comply with those permit requirements and will coordinate with proper road officials prior to these trips.
	7. Unbridled will fix or pay for damage resulting from any vehicle transport to the Project site in accordance with all transportation permits obtained from state and local road authorities.
Decommissioning	1. Unbridled, its successors or assigns, will decommission the entire site and complete reclamation to its original or a superior state after the Project has served its useful life. This mitigation requirement will be deferred if Unbridled continues with its currently proposed operation beyond 40 years.
	2. Unbridled will provide Henderson County with a decommissioning financial surety in accordance with the Henderson County Zoning Ordinance, Article XXX, Section 30.02.G.
Additional Measures	1. Residents within 1,500 feet of the property boundaries of the Unbridled solar facility will be notified prior to the start of construction. Residents within 500 feet of the solar panels will be notified prior to the start of commercial operation. Each notification will include contact information for complaint resolution.
	2. Unbridled will comply with all applicable conditions relating to electrical interconnection with utilities by following the Midcontinent Independent System Operator (MISO) interconnection process. Unbridled will also accept responsibility for appropriate costs that may result from its interconnecting with the electricity transmission grid consistent with the obligations imposed by KRS 278.212.
	3. If Unbridled, its successors or assigns, retrofits the current proposed facility to produce solar energy beyond 40 years, it will demonstrate to the Siting Board that the retrofit facility will not result in a material change in the pattern or magnitude of impacts. Otherwise, a new SAR must be submitted for Siting Board review.
	4. Unbridled, its successors or assigns, will prepare a new Site Assessment Report for Siting Board review if the power producer intends to retire the currently proposed facility and employ a different technology.



Upon its completion, a final site layout plan will be submitted to the Siting Board. Material deviations from the preliminary site layout plan that formed the basis for the instant review will be clearly indicated on a revised graphic. Those material changes might include substantive changes in the location of the Project substation, the vegetative buffer, or any of the setbacks described in the preliminary site layout. Inverters will be set back at least 200 feet from property boundaries. Any change in the Project boundaries from the information that formed the basis of this evaluation will be submitted to the Siting Board for review.

### **6.2.1 Stormwater Discharges Associate with Construction Activity**

Because the Project will disturb one or more acres of land, it must therefore comply with the National Pollutant Discharge Elimination System requirements of the Clean Water Act (CWA). Unbridled will implement all mitigation measures required in the Kentucky Department of Environmental Protection Stormwater Construction General Permit that will be obtained from the Kentucky Energy & Environment Cabinet, Department for Environmental Protection, Division of Water (Kentucky DOW). In addition, Unbridled will obtain a Kentucky Pollution Discharge Elimination System (KPDES) (KPDES No: KYR100000) General Permit for Stormwater Discharges Associated with Construction Activity.

### **6.2.2 Wetlands and Waters of the United States**

An application for an Approved Jurisdictional Determination will be submitted to the U.S. Army Corps of Engineers (USACE), Louisville District. The Approved Jurisdictional Determination will contain the USACE determination on which aquatic features within the Project boundary are designated by the CWA as under federal jurisdiction. A USACE Section 404 CWA permit will be required if the Project will impact jurisdictional wetlands or Waters of the United States.

The USACE authorizes Nationwide Permits (NWP) for specific activities within jurisdictional waters, and each NWP has a corresponding Water Quality Certification status from Kentucky DOW.

The extent of impacts to jurisdictional wetlands or Waters of the United States will determine whether an NWP or Individual 404/401 Permits are required. An NWP and the corresponding 401 General Certification will be authorized if the Project is determined to have minimal impacts to federal and state waters. If the Project qualifies for coverage under the NWP and the corresponding General Water Quality Certification, the DOW can authorize the facility by letter, at the request of the applicant, with no further documentation required.

If the activity does not qualify, Unbridled will apply for an Individual 404 Permit from the USACE and an Individual Permit to Construct Across or Along a Stream and/or Water Quality Certification from the DOW.

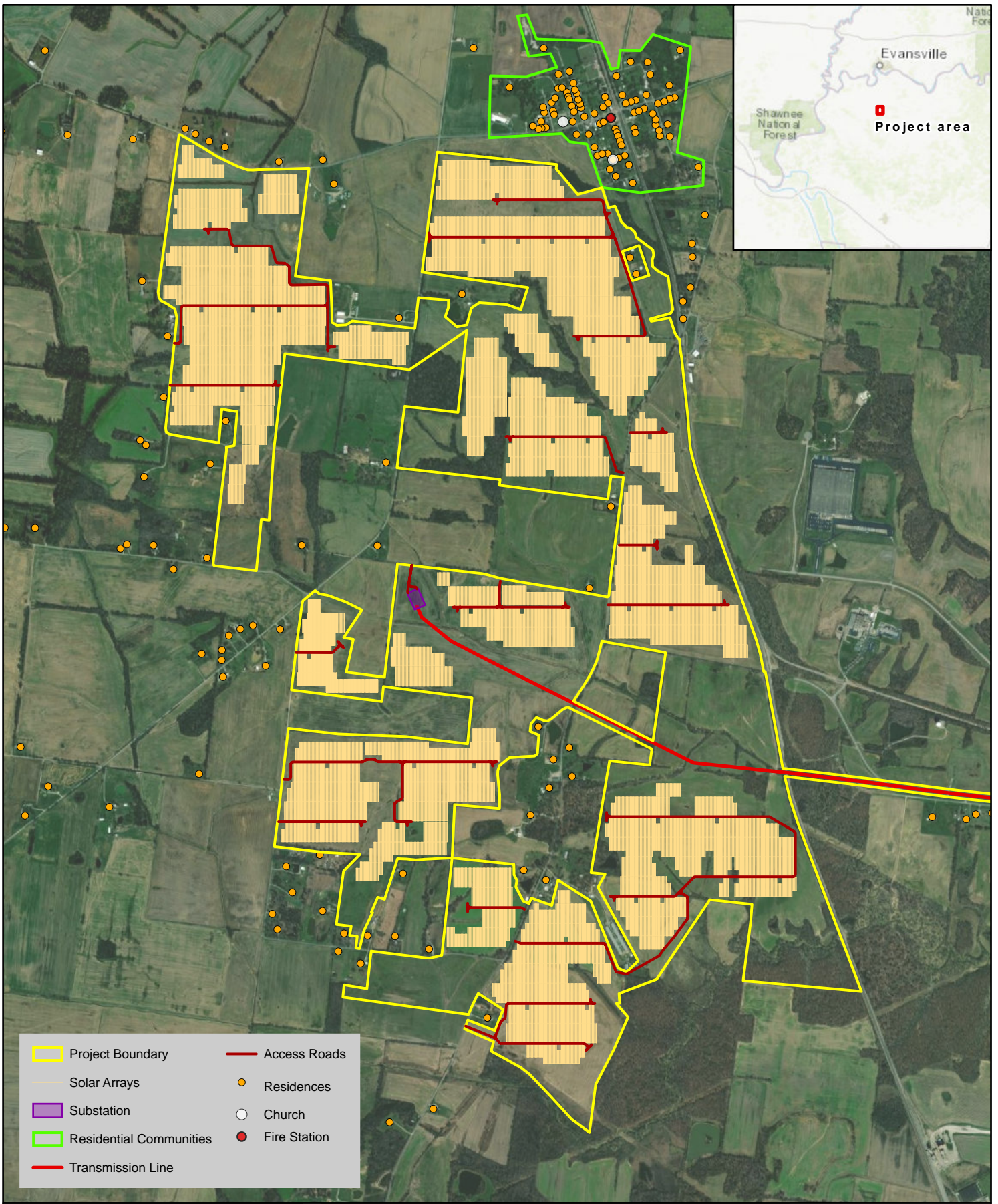
Development in, along, or across a stream requires a floodplain permit. One graveled access road is proposed within the boundaries of a floodplain. Unbridled will obtain a General Permit for Floodplain Development from Kentucky DOW, Webster County, and Henderson County prior to construction.

Kentucky State Board on  
Electric Generation and  
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ATTACHMENT

A

FIGURES

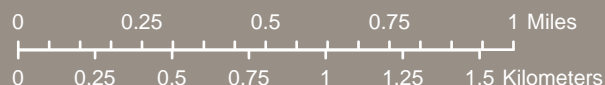


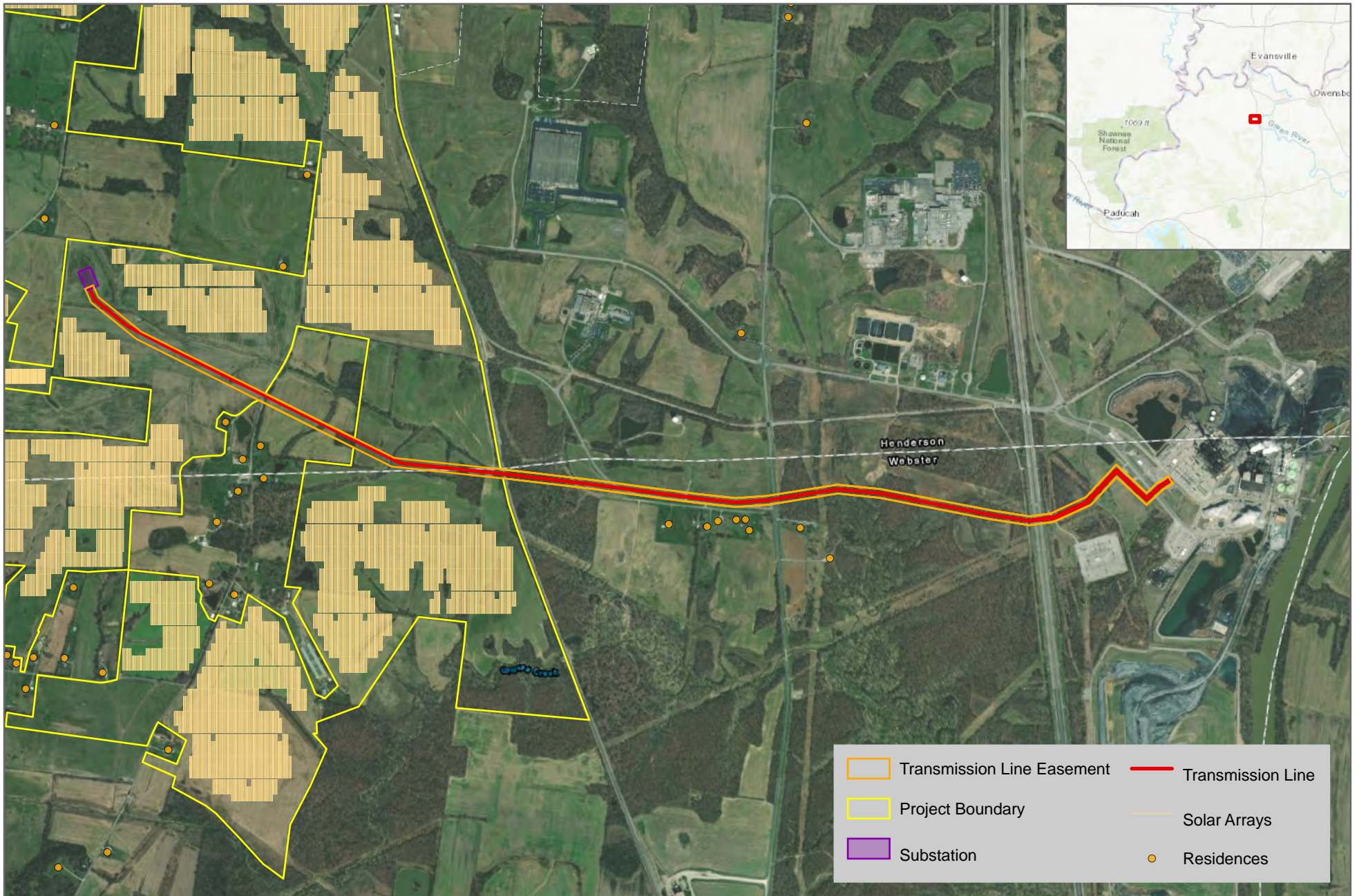
- Project Boundary
- Solar Arrays
- Substation
- Residential Communities
- Access Roads
- Residences
- Church
- Fire Station
- Transmission Line



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**Figure 1 Surrounding Communities Map**  
**Unbridled Solar Project**  
**Webster and Henderson Counties, Kentucky**





**Figure 2 Transmission Line Layout Map  
Unbridled Solar Project  
Webster and Henderson Counties, Kentucky**

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ATTACHMENT

B

NOISE AND TRAFFIC STUDY

# Unbridled Solar Facility Noise and Traffic Assessment

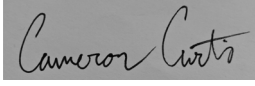
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Case No. 2020-00242



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Figure 1 Project Location Map

Figure 2 Land Cover Map

Figure 3 Aerial Imagery Map

Figure 4 Noise Receptors Map

## Acronyms

ADT	average daily traffic
Applicant	Unbridled Solar, LLC
dBA	A-weighted decibel scale
FHWA	Federal Highway Administration
Project	Unbridled Solar Facility
Unbridled	Unbridled Solar, LLC

# 1 Introduction

---

## 1.1 Project Description

The proposed Unbridled Solar Facility (Project) will be a 160-megawatt alternating current photovoltaic electricity generation facility with associated racking, inverters, and a substation. The Project will be located on approximately 1,680 combined acres of connected properties in Webster County (540 acres) and Henderson County (1,140 acres) near and within the 4 Star Industrial Park (Figure 1). No street address has been established at this time for the Project; however, the latitude and longitude are 37.650688° N and 87.550852° W. For interconnection, Unbridled Solar, LLC (Unbridled, or the Applicant), a wholly owned subsidiary of National Grid Renewables Development, LLC, also will construct a 161 kilovolt nonregulated transmission line from the Project substation in Henderson County to the Big Rivers Electric Corporation's Reid Substation approximately two miles east in Henderson County.

Vegetative buffers will consist of evergreen and/or deciduous trees and shrubs, subject to approval by the Henderson County Planning Commission in accordance with the County Zoning Ordinance, Article XXX, Section 30.02.D, Solar Energy Systems requirements.

## 1.2 Existing Land Use and Site Conditions

According to the National Land Cover Database, the existing land use in the Project area is predominantly cultivated crops, deciduous forest, developed open space, mixed forest (narrow wooded corridors along streams, fence rows, property boundaries), and pasture or hay (Figure 2). Narrow wooded corridors are located along streams, property boundaries, and fencerows (Figure 3). Farm buildings (stables, silos, barns, homes) are also present in lots near the Project area.

## 2 Noise Study

The Project will contribute sounds to the existing environment through the use of vehicles and equipment during construction, operation, and maintenance of the Project. Potential impacts could result from the proximity of Project sound sources to sensitive receptors, typical sound levels associated with equipment, the timing of sound-generating activities, and the duration that sensitive receptors will be affected. Sensitive receptors are locations that may be sensitive to sound, such as residences, businesses, places of worship, and schools.

Sounds in this study are quantified using the A-weighted decibel scale (dBA). This is a weighted scale for judging loudness that corresponds to the hearing threshold of the human ear. For reference, the following examples in **Table 1** show levels for common sounds measured in dBA at a typical distance from the source.

**Table 1 Typical Sound Levels Generated by Common Sources**

Sources (by distance)	Typical Sound Level by Distance (dBA)	Human Judgment Of Loudness
Ambulance Siren (100 feet) Gas Lawn Mower (3 feet)	100	Very Loud
Passenger Car, 65 mph (25 feet) Living Room Stereo (15 feet) Vacuum Cleaner (10 feet)	70	Loud
Air Conditioning Unit (100 feet)	60	1/2 as Loud
Light Traffic (100 feet)	50	1/4 as Loud
Bird Calls (distant)	40	Quiet (1/8 as loud)

Source: San Diego County (2008)

### 2.1 Existing Noise Conditions

#### 2.1.1 Receptor Sites near the Project

The nearest concentration of sensitive receptors will be in the town of Robards along 2<sup>nd</sup> Street and Hwy 416 near the northeastern section of the Project area. The nearest dwelling in Robards will be located more than 500 feet north of the Project area (Figure 4). The nearest public sensitive receptor will be the Robards Christian Church located over 800 feet east of the nearest proposed solar panels.

No receptors will be located within 100 feet of Project infrastructure which emits sound (i.e. tracking system, inverters, or substation).

#### 2.1.2 Existing Noise from Adjacent Properties

Adjacent properties to the Project are primarily agricultural and currently produce sounds similar to those that will be associated with the Project. In addition, existing traffic generates sound within the Project area. The Project is bounded by two-lane roadways that receive local traffic typical of a rural farming community (e.g., cars, trucks, tractors, and semi-trucks).

#### 2.1.3 Existing Project Area Noise

Transportation-related sound sources such as cars, trucks, and trains are the principal sources of baseline, ambient sounds in rural communities. Existing sound conditions across the Project consist of

typical sounds produced from farming and agriculture activities. Trucks, harvesters, tractors, and other farming equipment used during harvesting, baling operations, and transportation produce sound. Other baseline sounds more common in rural areas include livestock and wildlife (e.g., insects, birds, and frogs).

## 2.2 Proposed Construction Noise Conditions

### 2.2.1 Equipment and Machinery

Because the Project area is currently used for crop production, the need for extensive tree removal and earthmoving to prepare the site is anticipated to be relatively minor. Construction of the solar facility will use equipment typical for site development, such as dozers, graders, loaders, and trucks. The U.S. Department of Transportation, Federal Highway Administration (FHWA), publishes sound levels for typical construction equipment, which are shown in Table 2 below. No sound generated by typical construction equipment will violate Henderson and Webster County ordinances.

The amount of sound generated during construction will vary depending on the type of activities occurring on a given day. Grading equipment, bobcats, and other construction equipment typically emit sounds between 76 to 85 dBA at 50 feet (FHWA 2009). Sounds associated with these types of equipment will primarily occur during the initial site set up – grading and access road construction, which is expected to last approximately 4 weeks. It is anticipated that pile driving for rack support foundations will create the loudest sound (101 dBA at 50 feet, FHWA 2009). Installation of each rack support foundation takes between 30 seconds to 2 minutes, depending on soil conditions; it is anticipated this activity will take up to 8 weeks across the entire Project. Finally, installation of the solar panels on the tracking racks will emit sound levels similar to general construction (75 to 85 dBA at 50 feet). Typically, a forklift is used to place individual panels on the tracking rack system. The sounds from all construction activities will dissipate with distance and will be audible at varying levels, depending on the locations of the equipment and receptors. Note that construction activities will be sequenced; site preparation may occur at a portion of the site while pile driving occurs at a different location. These sound impacts will be temporary and limited to daytime hours.

**Table 2 Typical Noise Level by Equipment Type**

Equipment	Typical Noise Level (dBA) 50 Feet from Sources
Air Compressor	81
Backhoe	80
Dozer	85
Generator	81
Pickup Truck	55
Pile Driver (Impact)	101
Pneumatic Tool	85
Pump	76
Spike Driver	77
Tie Cutter	84
Tie Handler	80
Tie Inserter	85
Tractor	84
Truck	88
Welder/Torch	73

Note: FHWA Construction Noise Handbook (FHWA 2009). Table based on US Environmental Protection Agency report and measured data. Exact sound levels may vary depending on manufacturer and model.

**2.2.2 Roadway Noise during Construction**

Construction traffic will use the existing county roadway system to access the Project facilities and deliver construction materials and personnel. The increase in traffic is described in greater detail in Section 3. Based upon the sound levels published by FHWA, the sounds contributed by construction vehicles such as semi-trucks, light passenger cars, and trucks fall within acceptable ranges if the sounds do not occur between 11:00 p.m. and 6:00 a.m. Construction traffic sounds will be similar to common farm equipment and typical vehicles on local roadways.

**2.3 Proposed Operational Noise Conditions**

An operating solar facility emits sound from tracking motors that move solar panels, inverters that include fans and electrical equipment, and an electrical substation that contains high-voltage transformers. This equipment generates sound at levels that are at or below levels of common household appliances such as air conditioners and washing machines. Sound levels will decrease during nighttime hours because the solar facility will not be generating electricity at that time.

**2.3.1 Solar Array and Tracking System**

The solar array proposed for the Project includes tracking panels distributed across the entire Project. Tracking systems will be driven by small, brushless direct current motors to track the arc of the sun to maximize solar absorption. The sound typically produced by panel tracking motor over distance is included in Table 3.

**Table 3      Tracking System Sound Levels**

Model	dBA at 50 feet (measured)	dBA at 100 feet <sup>a</sup>	dBA at 200 feet <sup>a</sup>
NexTracker	54	48	42
ATI	30	24	18

<sup>a</sup> Data provided by Unbridled Solar, LLC, based on manufacture estimates.

**2.3.2 Inverters**

Inverters will be the main source of sound for the Project during operation. The solar facility will use approximately 42 to 46 inverters spread across the Project site. All inverters will be setback at least 200 feet from property lines, in accordance with Henderson County Zoning Ordinance, Article XXX, Section 30.02.D. The inverters used for the Project will include a separate voltage supply and cooling system. The sound emission produced by potential inverters used for the Project are listed in Table 4.

**Table 4 Inverter Sound Levels**

Model	dBA at measured distance	dBA at 50 feet <sup>a</sup>	dBA at 100 feet <sup>a</sup>	dBA at 200 feet <sup>a</sup>
Sunny Central UP	63dBA @ 10 meters	59	53	47
PE Leaflet HEM	79 dBA @ 1 meter	49	39	43
Solar Ware Ninja	80.5 dBA @ 1 meter	57	51	45
Sungrow 3150	78 dBA @ 1 meter	54	48	42

<sup>a</sup> Data provided by Unbridled Solar, LLC, based on manufacture estimates.

**2.3.3 Substation**

The Project substation will be a 34.5/161 kilovolt step-up substation with metering and switching gear required to connect to the transmission grid. The Project substation will be located in the central portion of the Project area and will have a footprint of 150 feet by 150 feet. The sound produced by an operating substation is emitted from electrical transformers, which generate a low hum or buzz. The vegetation buffer will aide in reducing the sounds heard by the nearest sensitive receptors, which are over 800 feet away from the substation. The sound typically produced from a substation is listed in Table 5.

**Table 5 Typical Substation Sound Levels**

Source	dBA at measured distance	dBA at 50 feet <sup>a</sup>	dBA at 100 feet <sup>a</sup>	dBA at 200 feet <sup>a</sup>	dBA at 800 feet <sup>a</sup>
GE Main Power Transformer	82 dBA @ 1 meter	58	52	46	34

<sup>a</sup> Data provided by Unbridled Solar, LLC, based on manufacture estimates.

**2.3.4 Project Operation and Maintenance**

Maintenance activities for the solar facilities will be grass mowing, completing minor repairs, washing solar panels, tracking systems, electrical wiring, or maintaining/inspecting the inverters. Maintenance will be performed using commercial trucks and pressure washers and is not expected to greatly impact sound during operation.

**2.4 Noise Summary and Conclusions**

Sound generated during construction is expected to only occur during daylight hours and will be generated by heavy equipment, passenger cars and trucks, and tool use during assembly of the Project. Sound will be present in the Project during construction; however, because of the size of the Project and the distance to the nearest receptors, construction will not contribute to a significant sound increase when compared to sound currently occurring onsite (i.e., the operation of farming equipment and crop harvesting) and baseline ambient sound levels.

Sound generated during Project operation will include the motors on the solar panel tracking system and the inverters. The estimated sound produced by the loudest tracking motor option is approximately 48 dBA at 100 feet and sound produced by the loudest inverter option is approximately 53 dBA at 100 feet

(Table 4). The nearest sensitive sound receptor is 112 feet from the nearest solar panel. At this distance, the sound from Project operation will be quieter than an air conditioning unit and close to sound created from light traffic (Table 1). The nearest sound receptor is also less than 100 feet from a public roadway.

The sound produced by the electrical transformers in the Project substation will be characterized as humming or buzzing. Estimated sound levels 200 feet from the substation will be 46 dBA (Table 5). Sound impacts from substation operation to the nearest sensitive receptor, over 800 feet away, will be quieter than light traffic at 100 feet (Table 1).

Maintenance activities during Project operation, such as mowing and panel cleaning, will take place during daylight hours and will not significantly contribute to sound. The sound associated with these activities is very similar to sounds currently generated onsite by farming activities and offsite by commercial and farm uses.

## 3 Traffic Study

### 3.1 Existing Road Network and Traffic Conditions

Two major roadways are present on the borders of the Project area vicinity: KY-283 and KY-416 (Figure 3). KY-416 runs east and west and is a two-lane road that is located on the northern border of the Project area. KY-283 is a two-lane road that runs north and south that runs through the western portion of the Project area. The average daily traffic (ADT) is the average number of vehicles traveling two-way past a specific point or monitoring station in a 24-hour period. Five ADT monitoring stations will be location in the Project vicinity—two along KY-416, two along KY-283, and one along Watkins School Road. The ADT information in the Project vicinity is summarized in Table 6 below.

**Table 6 Average Daily Traffic**

Station ID	Roadway	County	Milepoints	Distance from Project Area	Average Daily Traffic (average of vehicles / 24 hours)
051256	KY-416	Henderson	3.707–4.976	0 feet – Northern border	490
051263	KY-416	Henderson	4.976–7.363	0 feet – Northern border	800
051295	KY-283	Henderson	0–5.785	0 feet – Eastern portion of Project area	404
117018	KY-283	Webster	5.624–7.757	3,150 feet – East of Project area	261
117012	Watkins School Road	Webster	1.504–1.704	700 feet – Southwest of Project Area	145

### 3.2 Construction Traffic

Construction traffic will use exiting county roadway systems to access the Project facilities. During construction, a temporary increase in traffic volume associated with travel of construction laborers, delivery of construction equipment and materials, and delivery of solar panel components and equipment is anticipated. Traffic during construction is estimated to be approximately 75 to 100 pickup trucks, cars, or other types of employee vehicles onsite for the majority of construction. Approximately 10 to 20 semi-trucks per day will be used to deliver facility components. Semi-truck delivery will vary per day depending on time of construction and delivery timeline of equipment. Overweight or oversized loads are unlikely. This increased traffic may be perceptible to area residents, but the slight increase in volume is not expected to affect traffic function. Slow-moving construction vehicles may also cause delays on smaller roads. However, these delays should similar to the impact of farm equipment during planting or harvest and only occur during a relatively short construction delivery period.

#### 3.2.1 Impact on Road Infrastructure

Significant degradation to the existing roadways is not anticipated for the proposed Project. The increase in localized traffic and the continued entry and exit of heavy trucks or equipment has the potential to result in additional wear of the existing roadway or shoulder of the two prospective entrances to the Project site.



Access drives and internal roads will be constructed or improved as needed to accommodate appropriate vehicles and equipment to construct the proposed solar facility. Internal roads will be compacted gravel, which may result in an increase in airborne dust particles. During construction, water may be applied to internal road system to reduce dust generation.

### **3.3 Operational and Maintenance Traffic**

After construction is complete, traffic impacts during the operations phase of the Project will be negligible. A small maintenance crew will regularly drive through the area in pickup trucks to monitor and maintain the facilities as needed, but traffic function will not be impacted as a result.

### **3.4 Traffic Summary and Conclusions**

During construction, the traffic volume will temporarily increase because of the delivery of construction materials and personnel. Appropriate signage and traffic directing will occur as necessary to increase driver safety and reduce risk of collisions for approaching traffic. No damages to the existing roadway infrastructure are anticipated. For facility operation and maintenance, a small maintenance crew will regularly travel through the area in pickup trucks, but traffic function will not be impacted as a result.

## 4 Fugitive Dust Impacts

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Activities that disturb land during the construction of the Project may temporarily add airborne materials. To reduce the contribution of airborne materials, application of water and covering of spoils may occur. Vegetative buffer and revegetation measures along fencerows and property boundaries will help mitigate fugitive dust impacts to adjacent areas. Water used for dust control is authorized under the Kentucky Pollutant Discharge Elimination System as a non-stormwater discharge activity, required for the Project.

## 5 Impacts to Rail

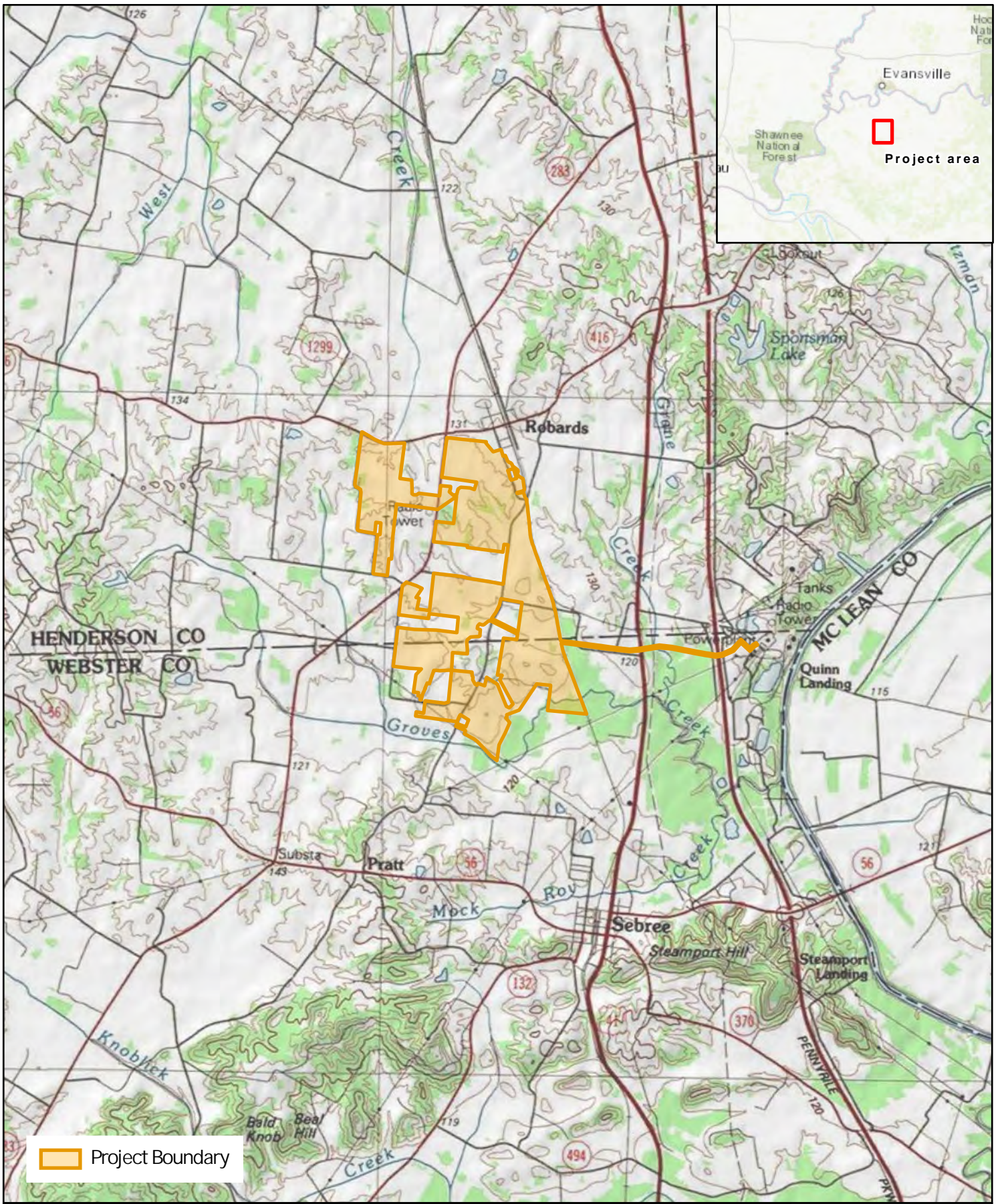
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The Louisville and Nashville railroad track extends nearly north to south on the eastern Project border. Construction traffic will use the existing county roadway system to access the Project facilities. The transmission line will cross the existing Class I railroad; however, no impacts are anticipated.

## 6 References

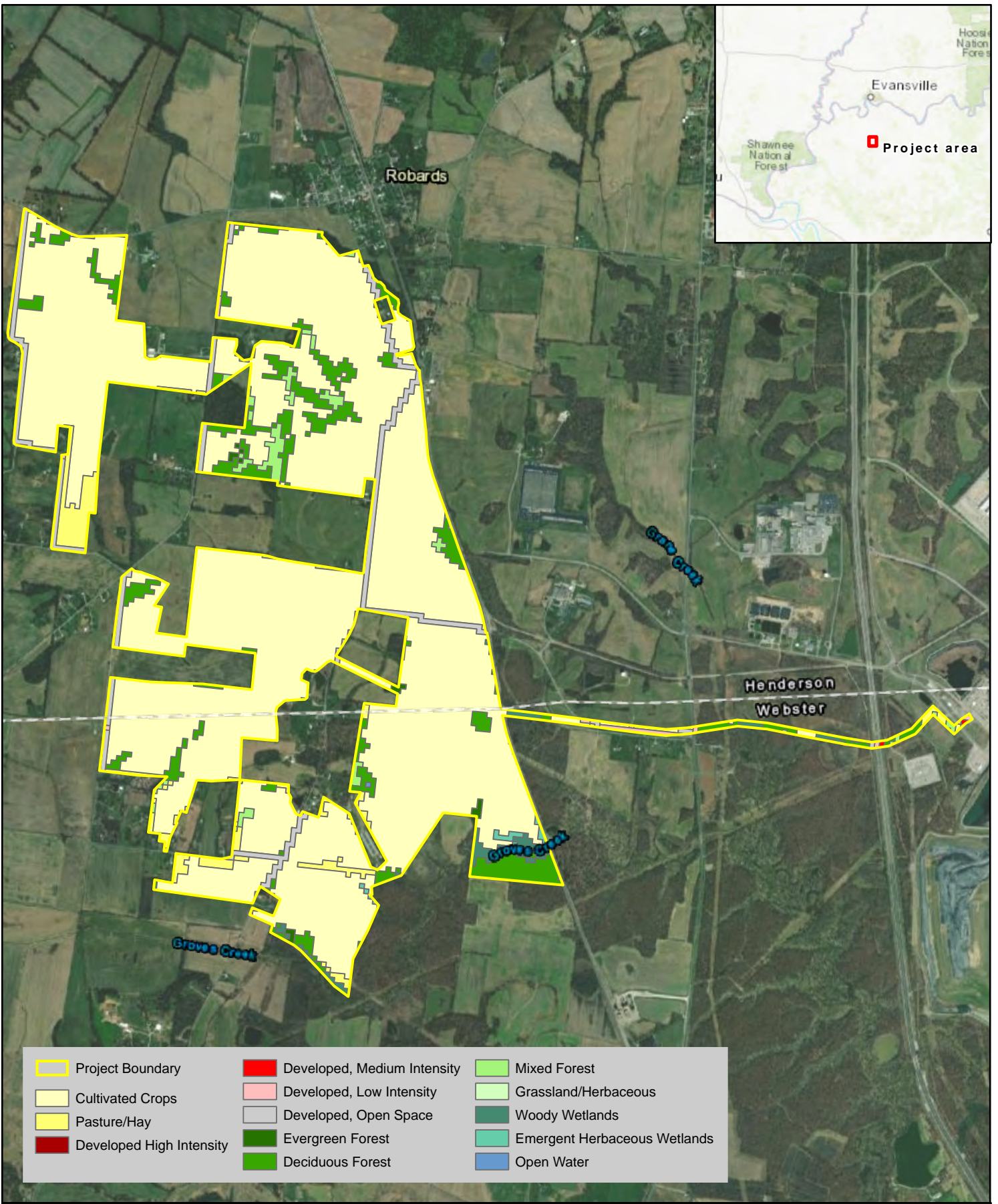
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San Diego County. 2008. Table 1 Sound Levels of Typical Noise Sources and Noise Environments.  
Available at: <https://www.sandiegocounty.gov/dplu/docs/081024/TM5499-NOISE-T.pdf>. Accessed  
November 23, 2020.

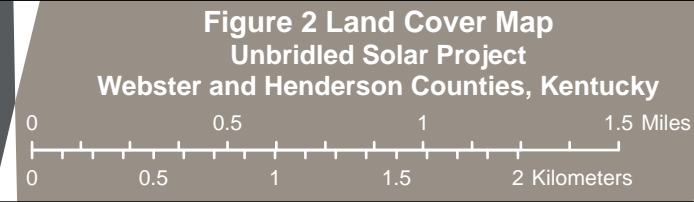


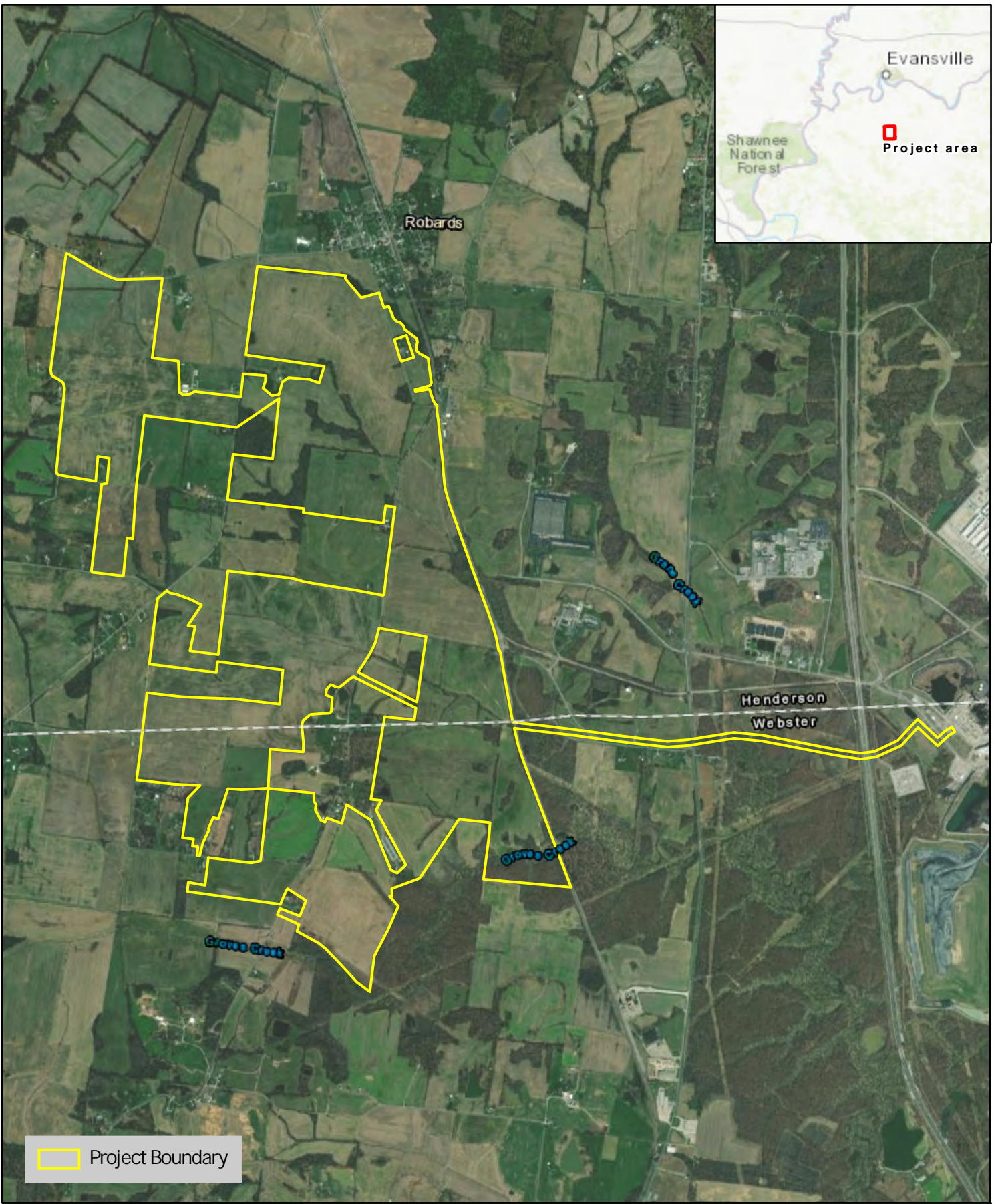
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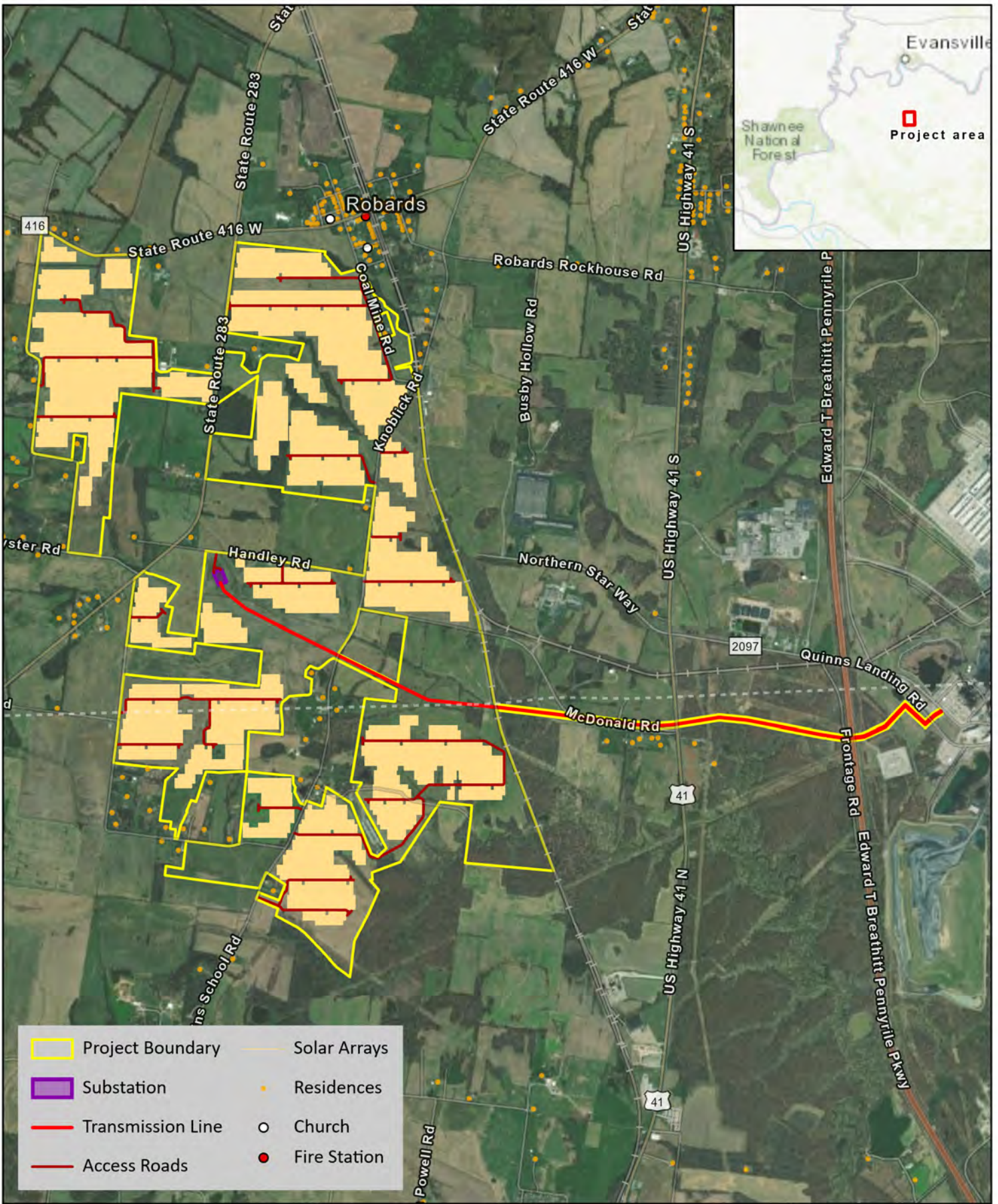
 Project Boundary











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**Figure 3 Aerial Imagery Map**  
**Unbridled Solar Project**  
**Webster and Henderson Counties, Kentucky**

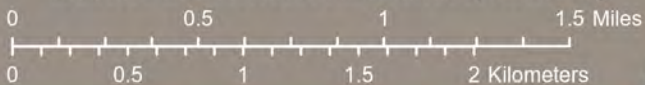




 Project Boundary	 Solar Arrays
 Substation	 Residences
 Transmission Line	 Church
 Access Roads	 Fire Station

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**Figure 4 Noise Receptors Map**  
**Unbridled Solar Project**  
**Webster and Henderson Counties, Kentucky**





## About Cardno

Cardno is an ASX-200 professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage, and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

## Cardno Zero Harm

*Cardno*  
**ZERO  
HARM**  
EVERY JOB. EVERY DAY.

At Cardno, our primary concern is to develop and maintain safe and healthy conditions for anyone involved at our project worksites. We require full compliance with our Health and Safety Policy Manual and established work procedures and expect the same protocol from our subcontractors. We are committed to achieving our Zero Harm goal by continually improving our safety systems, education, and vigilance at the workplace and in the field.

Safety is a Cardno core value and through strong leadership and active employee participation, we seek to implement and reinforce these leading actions on every job, every day.

Kentucky State Board on  
Electric Generation and  
Transmission Application

ATTACHMENT

C

GLARE REPORT

## HMMH

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Burlington, Massachusetts 01803  
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## MEMORANDUM

---

**To:** Unbridled Solar, LLC - c/o Courtney Pelissero  
**From:** Philip DeVita, HMMH  
**Date:** December 3, 2020  
**Subject:** Unbridled Solar, LLC Glare Analysis  
**Reference:** HMMH Job No.309700.021

---

### Introduction

Harris Miller Miller & Hanson Inc. (HMMH) completed a glare analysis on behalf of Unbridled Solar, LLC for the proposed solar project located just north of Sebree and southwest of Robards, Kentucky. The analysis evaluated potential glare from the proposed project on sensitive roadway observer locations on nearby Route 416 and Route 283. **Figure 1** shows the project location relative to Route 416 and 283.

HMMH used the latest version of the ForgeSolar GlareGauge solar glare tool, formerly known as the Solar Glare Hazard Analysis Tool (SGHAT) developed by Sandia National Laboratories to analyze potential glare at the roadway locations. GlareGauge is used to assess glare impacts at airport observation locations from solar photovoltaic (PV) projects and is currently the best tool available for analyzing solar glare impacts from PV projects and has the ability to simulate glare to observers along a continuous roadway segment. In lieu of specific county standards, model results were reviewed and compared relative to the Federal Aviation Administration's (FAA) Interim Policy of Solar Projects at Airports<sup>1</sup>, specifically standards for pilots on final approach.



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<sup>1</sup> <https://www.federalregister.gov/documents/2013/10/23/2013-24729/interim-policy-faa-review-of-solar-energy-system-projects-on-federally-obligated-airports>



Figure 1. Unbridled Solar, LLC Relative to Nearby Route 416 and 283

#### Design Parameters

In deploying the model, we selected the footprint of the solar project area of the Unbridled Solar, LLC solar array on the GlareGauge map interface and input the project design parameters provided by Geronimo Energy as shown in **Table 1**.

**Table 1. Unbridled Solar, LLC Proposed Project Design Parameters**

<i>Solar System</i>	<i>System</i>	<i>Orientation</i>	<i>Tilt Angle</i>	<i>Panel Height (AGL)</i>
<b>Unbridled Solar, LLC Array</b>	<b>Single Axis</b>	<b>180°</b>	<b>60°<sup>01</sup></b>	<b>15 feet</b>

The Project is proposing up to 160 MW single axis tracking system with a tracking orientation north to south and a maximum tracking angle of 60°. The project will be located on the ground, and a height of up to 15 feet above ground level was assessed for the modules.

**Background to FAA Airport Sensitive Receptors and Pilot Analysis**

To assess airport sensitive receptors, the FAA requires an evaluation of potential glare for pilots on final approach and at the air traffic control tower (ATCT). The FAA published an Interim Policy for Solar Projects at Airports on October 23, 2013. The policy clarifies the FAA’s jurisdiction in reviewing solar projects and the standards it uses to determine if a project will result in a negative glare impact to airspace safety.

The Policy also describes the standards for measuring ocular impact:

*To obtain FAA approval and a “no objection” to a Notice of Proposed Construction Form 7460-1, the airport sponsor will be required to demonstrate that the proposed solar energy system meets the following standards: (1) no potential for glint or glare in the existing or planned Air Traffic Control Tower cab, and (2) no potential for glare or “low potential for after-image” (shown in green) along the final approach path.*

**Table 2** presents the airport sensitive receptors that must be evaluated, the potential results presented by the Glaregauge model and whether the result complies with the FAA ocular hazard standard presented in the Policy.



**Table 2. Levels of Glare and Compliance with FAA Policy**

Airport Sensitive Receptor	Level of Glare	Color Result	Compliance with FAA Policy
ATCT Cab	No glare	None	Yes
	Low Potential for After-Image	Green	No
	Potential for After-Image	Yellow	No
	Potential for Permanent Eye Damage	Red	No
Aircraft along final approach path	No glare	None	Yes
	Low Potential for After-Image	Green	Yes
	Potential for After-Image	Yellow	No
	Potential for Permanent Eye Damage	Red	No

Any glare recorded on the ATCT is not compliant with FAA policy and will not receive a “no objection” determination from the FAA. Measurement of *low potential for after-image* or “Green” is acceptable for aircraft on final approach but greater levels (indicated in yellow and red) are not allowed.

**Summary of Results for Nearby Roadway Observation Locations**

HMMH analyzed the potential for the Unbridled Solar, LLC Project to produce glare at nearby roadway observation locations using GlareGauge. As discussed, the GlareGauge model is currently the best tool available for analyzing solar glare impacts from PV projects and is able to simulate glare from proposed solar PV projects to observers along a continuous roadway segment.

**Methodology**

For the roadway analysis, the closest nearby main roadway of Route 416 which runs essentially east-west and Route 283 were analyzed which runs north south and then southwest to northeast as they traverse near the project boundary’s. **Figure 2** shows the Project arrays and roadway segment locations from the GlareGauge model selected for analysis. The roadway segments are depicted in light green in the figure.

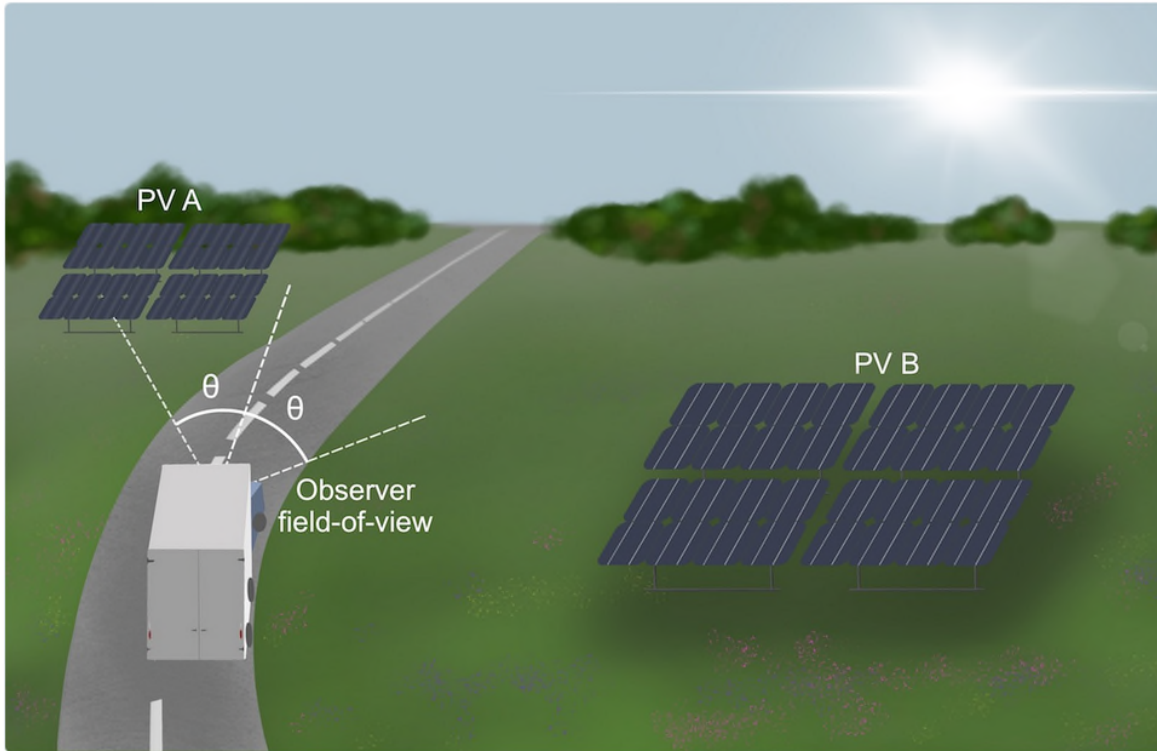


Source: GlareGauge

**Figure 2 Route 416 and Route 283 Roadway Segments Analyzed in GlareGauge**

HMMH input the same specifications of the project array design parameters as described above in **Table 1**. A smooth panel surface without any anti-reflective coating was assumed to provide maximum flexibility in module selection.

The model was run for a full calendar year to calculate information for every sun position scenario over a typical year and the model assessed potential for glare at one-minute intervals. A viewing height of 6 feet above ground level was chosen as the height of the roadway observer as well as assuming two-way viewing meaning the observers travel along the route in both directions. A viewer default angle of  $50^\circ$  was chosen as the field of view where the observer can see 50 degrees to the left and right for a total field of view of  $100^\circ$ . **Figure 3** shows a depiction of the route field of view in GlareGauge.



*Route receptor field-of-view is defined by view angle (theta) to left and right. Default FOV is 100° (i.e. 2 \* 50° view angle).*

Source: GlareGauge

**Figure 3. Route Receptor Field of View in GlareGauge**

A summary of the model output is presented in **Table 3** for the Route 416 and Route 283 Road observer segments. The modeling result output sheets for the roadway locations are provided as **Attachment A** and denoted as Route 416 and Route 283 in the model output. As shown in **Table 3**, no glare was detected by the model for all of the PV locations to the nearby roadway observer locations.

**Table 3 – GlareGauge Results (in minutes per year) for the Unbridled Solar, LLC Project for Portions of Route 416 and Route 283**

Site	Fixed/Tracker System	(orientation/tilt)	Route 416	Route 283	Comply with FAA Thresholds for Pilots
Unbridled Solar, LLC	Single Axis Tracker	180° (max tracker of 60°)	0	0	Yes

Notes:

**G (Green)** = Low Potential for Temporary After-Image

**Y (Yellow)** = Potential for Temporary After-Image

**R (Red)** = Potential for Permanent Eye-Damage

N/A = Not applicable, no analysis conducted.

As discussed above, measurement of no or Low Potential for After-Image or Green is acceptable for aircraft on final approach but greater levels (indicated in yellow and red) are not allowed.

Any potential solar glare to the vehicles traveling along the nearby roadways is very similar or representative to aircraft along final approach in the FAA standards. Therefore in lieu of county specific standards, the standards of acceptable ocular impact as contained in the FAA policy for aircraft on final approach were applied to the vehicles traveling along these sections of Route 416 and Route 283. It should be noted that the GlareGauge model does not consider potential obstacles associated with the landscape such as trees, buildings or hills which could block a direct view of the solar panels to the nearby observer locations.

Based on the design and layout of the Unbridled Solar, LLC Project, the GlareGauge modeling showed no glare detected at Route 416 and Route 283 observation points, accordingly, the proposed design for these arrays meets the FAA Standard for aircraft at each modeled observer location. *Therefore, there is no evidence based upon our modeling that glare from the Project will cause an adverse impact for drivers along analyzed portions of Route 416 and Route 283.*



## Conclusions

HMMH utilized the GlareGauge model developed by the Department of Energy's Sandia National Laboratories to evaluate potential glare from a proposed Unbridled Solar, LLC Project located just north of Sebree and southwest of Robards in KY. The analysis evaluated potential glare from the proposed project on sensitive roadway observer locations on nearby Route 416 and Route 283.

GlareGauge is used to assess glare impacts at airport observation locations from solar photovoltaic (PV) projects for comparison to FAA Solar Glare Standards, and is currently the best tool available for analyzing solar glare impacts from PV projects and has the ability to simulate glare to observers along a continuous roadway segment. In lieu of county standards, GlareGauge model results were compared to the FAA's ocular hazard standard for pilots to determine adverse impacts. **Attachment A** show the GlareGauge modeling results for the nearby roadway segments.

Based on the preferred design and layout of the Unbridled Solar, LLC Project, the GlareGauge modeling showed no glare detected at Route 416 and Route 283 observation points, accordingly, the proposed design for these arrays meets the FAA Standard for aircraft at each modeled observer location. *Therefore, there is no evidence based upon our modeling that glare from the Project will cause an adverse impact for drivers along analyzed portions of Route 416 and Route 283.*



**Attachment A**

GlareGauge Modeling Results – Unbridled Solar, LLC - Project Design





ForgeSolar

## Site Configuration: Unbridled Solar LLC Mit-3

Near Sebree, KY



Created **Oct. 21, 2020 6:41 a.m.**  
 Updated **Nov. 5, 2020 4:24 p.m.**  
 DNI **varies** and peaks at **1,000.0 W/m<sup>2</sup>**  
 Analyze every **1 minute(s)**  
**0.5** ocular transmission coefficient  
**0.002 m** pupil diameter  
**0.017 m** eye focal length  
**9.3 mrad** sun subtended angle  
 Timezone **UTC-5**  
 Site Configuration ID: 45391.8066

## Summary of Results No glare predicted!

PV Name	Tilt	Orientation	"Green" Glare	"Yellow" Glare	Energy Produced
	deg	deg	min	min	kWh
PV array 1A	SA tracking	SA tracking	0	0	-
PV array 1B	SA tracking	SA tracking	0	0	-
PV array 1C	SA tracking	SA tracking	0	0	-
PV array 1D	SA tracking	SA tracking	0	0	-
PV array 1E	SA tracking	SA tracking	0	0	-
PV array 2	SA tracking	SA tracking	0	0	-
PV array 3	SA tracking	SA tracking	0	0	-
PV array 4	SA tracking	SA tracking	0	0	-

## Component Data

PV Array(s)

**Note:** PV array encompasses a large surface area (greater than 25 acres). Accuracy of path receptor glare analysis may be affected by footprint size. Additional analyses of array sub-sections may provide more information on expected glare. ✕

**Name:** PV array 1A

**Axis tracking:** Single-axis rotation

**Tracking axis orientation:** 180.0 deg

**Tracking axis tilt:** 0.0 deg

**Tracking axis panel offset:** 0.0 deg

**Maximum tracking angle:** 60.0 deg

**Resting angle:** 60.0 deg

**Rated power:** -

**Panel material:** Smooth glass without AR coating

**Vary reflectivity with sun position?** Yes

**Correlate slope error with surface type?** Yes

**Slope error:** 6.55 mrad

**Approx. area:** 17,487,939 sq-ft



Vertex	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
1	37.672033	-87.556852	433.96	15.00	448.96
2	37.671489	-87.550672	418.63	15.00	433.63
3	37.670606	-87.547925	411.09	15.00	426.09
4	37.667889	-87.544964	414.53	15.00	429.53
5	37.665409	-87.544020	414.09	15.00	429.09
6	37.659531	-87.542861	413.46	15.00	428.46
7	37.656338	-87.541488	402.90	15.00	417.90
8	37.657425	-87.546252	405.01	15.00	420.01
9	37.658291	-87.558794	450.19	15.00	465.19
10	37.660806	-87.558493	428.75	15.00	443.75
11	37.660653	-87.555479	424.39	15.00	439.39
12	37.665493	-87.554985	448.42	15.00	463.43
13	37.665222	-87.552238	442.38	15.00	457.38
14	37.666377	-87.551895	437.67	15.00	452.67
15	37.666988	-87.557559	448.49	15.00	463.49

**Note:** PV array encompasses a large surface area (greater than 25 acres). Accuracy of path receptor glare analysis may be affected by footprint size. Additional analyses of array sub-sections may provide more information on expected glare.



**Name:** PV array 1B

**Axis tracking:** Single-axis rotation

**Tracking axis orientation:** 180.0 deg

**Tracking axis tilt:** 0.0 deg

**Tracking axis panel offset:** 0.0 deg

**Maximum tracking angle:** 60.0 deg

**Resting angle:** 60.0 deg

**Rated power:** -

**Panel material:** Smooth glass without AR coating

**Vary reflectivity with sun position?** Yes

**Correlate slope error with surface type?** Yes

**Slope error:** 6.55 mrad

**Approx. area:** 4,658,231 sq-ft

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
1	37.656253	-87.541466	401.57	15.00	416.57
2	37.653127	-87.539835	394.04	15.00	409.04
3	37.649695	-87.538591	394.24	15.00	409.24
4	37.650442	-87.544041	406.38	15.00	421.38
5	37.651020	-87.547474	391.50	15.00	406.50
6	37.657408	-87.546359	406.27	15.00	421.27



**Note:** PV array encompasses a large surface area (greater than 25 acres). Accuracy of path receptor glare analysis may be affected by footprint size. Additional analyses of array sub-sections may provide more information on expected glare. ✕

**Name:** PV array 1C  
**Axis tracking:** Single-axis rotation  
**Tracking axis orientation:** 180.0 deg  
**Tracking axis tilt:** 0.0 deg  
**Tracking axis panel offset:** 0.0 deg  
**Maximum tracking angle:** 60.0 deg  
**Resting angle:** 60.0 deg  
**Rated power:** -  
**Panel material:** Smooth glass without AR coating  
**Vary reflectivity with sun position?** Yes  
**Correlate slope error with surface type?** Yes  
**Slope error:** 6.55 mrad  
**Approx. area:** 13,072,141 sq-ft



Vertex	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
1	37.649637	-87.538528	393.65	15.00	408.65
2	37.645457	-87.537541	382.09	15.00	397.09
3	37.635840	-87.532949	396.46	15.00	411.46
4	37.636214	-87.539387	392.90	15.00	407.90
5	37.639408	-87.538915	395.41	15.00	410.42
6	37.639612	-87.541361	386.73	15.00	401.73
7	37.635942	-87.544150	397.17	15.00	412.17
8	37.636350	-87.545567	393.95	15.00	408.95
9	37.637539	-87.545674	393.36	15.00	408.36
10	37.640232	-87.547224	410.41	15.00	425.41
11	37.640598	-87.547079	413.77	15.00	428.78
12	37.640598	-87.547755	424.89	15.00	439.89
13	37.645559	-87.546854	417.20	15.00	432.20
14	37.645423	-87.544665	410.81	15.00	425.81
15	37.650282	-87.543979	404.74	15.00	419.74

**Note:** PV array encompasses a large surface area (greater than 25 acres). Accuracy of path receptor glare analysis may be affected by footprint size. Additional analyses of array sub-sections may provide more information on expected glare.

**Name:** PV array 1D

**Axis tracking:** Single-axis rotation

**Tracking axis orientation:** 180.0 deg

**Tracking axis tilt:** 0.0 deg

**Tracking axis panel offset:** 0.0 deg

**Maximum tracking angle:** 60.0 deg

**Resting angle:** 60.0 deg

**Rated power:** -

**Panel material:** Smooth glass without AR coating

**Vary reflectivity with sun position?** Yes

**Correlate slope error with surface type?** Yes

**Slope error:** 6.55 mrad

**Approx. area:** 7,948,017 sq-ft

Vertex	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
1	37.653884	-87.558757	416.72	15.00	431.72
2	37.652873	-87.547127	397.71	15.00	412.71
3	37.650894	-87.547513	391.59	15.00	406.59
4	37.649738	-87.547985	388.30	15.00	403.30
5	37.648141	-87.549187	396.28	15.00	411.28
6	37.647394	-87.550388	419.25	15.00	434.25
7	37.648345	-87.554594	402.54	15.00	417.54
8	37.649059	-87.564379	443.70	15.00	458.70
9	37.652270	-87.563971	415.65	15.00	430.65
10	37.652703	-87.563316	406.88	15.00	421.88
11	37.652087	-87.561101	403.72	15.00	418.72
12	37.651268	-87.559014	401.08	15.00	416.08



**Note:** PV array encompasses a large surface area (greater than 25 acres). Accuracy of path receptor glare analysis may be affected by footprint size. Additional analyses of array sub-sections may provide more information on expected glare.

**Name:** PV array 1E

**Axis tracking:** Single-axis rotation

**Tracking axis orientation:** 180.0 deg

**Tracking axis tilt:** 0.0 deg

**Tracking axis panel offset:** 0.0 deg

**Maximum tracking angle:** 60.0 deg

**Resting angle:** 60.0 deg

**Rated power:** -

**Panel material:** Smooth glass without AR coating

**Vary reflectivity with sun position?** Yes

**Correlate slope error with surface type?** Yes

**Slope error:** 6.55 mrad

**Approx. area:** 7,175,928 sq-ft



Vertex	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
1	37.647586	-87.551118	412.64	15.00	427.64
2	37.646839	-87.551547	414.45	15.00	429.45
3	37.645921	-87.551075	433.92	15.00	448.93
4	37.643543	-87.553049	465.97	15.00	480.97
5	37.643713	-87.555538	437.23	15.00	452.23
6	37.641334	-87.555656	426.59	15.00	441.59
7	37.641266	-87.558456	428.36	15.00	443.36
8	37.637936	-87.560473	416.92	15.00	431.92
9	37.638343	-87.561804	393.57	15.00	408.57
10	37.641368	-87.561589	407.91	15.00	422.91
11	37.641640	-87.565151	395.49	15.00	410.49
12	37.646601	-87.564464	416.06	15.00	431.06
13	37.646091	-87.554766	408.80	15.00	423.80
14	37.648334	-87.554551	402.15	15.00	417.16

**Note:** PV array encompasses a large surface area (greater than 25 acres). Accuracy of path receptor glare analysis may be affected by footprint size. Additional analyses of array sub-sections may provide more information on expected glare. ✕

**Name:** PV array 2

**Axis tracking:** Single-axis rotation

**Tracking axis orientation:** 180.0 deg

**Tracking axis tilt:** 0.0 deg

**Tracking axis panel offset:** 0.0 deg

**Maximum tracking angle:** 60.0 deg

**Resting angle:** 60.0 deg

**Rated power:** -

**Panel material:** Smooth glass without AR coating

**Vary reflectivity with sun position?** Yes

**Correlate slope error with surface type?** Yes

**Slope error:** 6.55 mrad

**Approx. area:** 10,976,550 sq-ft



Vertex	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
1	37.672505	-87.571280	445.49	15.00	460.49
2	37.671511	-87.568855	435.11	15.00	450.12
3	37.671120	-87.567578	420.49	15.00	435.49
4	37.671231	-87.564241	427.26	15.00	442.26
5	37.666594	-87.564885	442.17	15.00	457.17
6	37.666373	-87.562911	453.46	15.00	468.46
7	37.664563	-87.562874	453.97	15.00	468.97
8	37.664316	-87.558374	449.47	15.00	464.47
9	37.662749	-87.558577	450.07	15.00	465.08
10	37.663238	-87.565406	450.09	15.00	465.09
11	37.655951	-87.566064	421.58	15.00	436.58
12	37.655968	-87.566558	418.76	15.00	433.76
13	37.653826	-87.566705	428.52	15.00	443.52
14	37.653928	-87.568937	452.80	15.00	467.80
15	37.659005	-87.568247	434.10	15.00	449.10
16	37.659086	-87.567866	433.65	15.00	448.65
17	37.660698	-87.567705	443.60	15.00	458.60
18	37.660838	-87.568789	443.83	15.00	458.83
19	37.659360	-87.568555	441.26	15.00	456.26
20	37.659747	-87.571618	434.92	15.00	449.92
21	37.664700	-87.571146	438.72	15.00	453.73
22	37.665151	-87.571266	432.96	15.00	447.96
23	37.665661	-87.572218	432.19	15.00	447.19



**Note:** PV array encompasses a large surface area (greater than 25 acres). Accuracy of path receptor glare analysis may be affected by footprint size. Additional analyses of array sub-sections may provide more information on expected glare. ✕

**Name:** PV array 3

**Axis tracking:** Single-axis rotation

**Tracking axis orientation:** 180.0 deg

**Tracking axis tilt:** 0.0 deg

**Tracking axis panel offset:** 0.0 deg

**Maximum tracking angle:** 60.0 deg

**Resting angle:** 60.0 deg

**Rated power:** -

**Panel material:** Smooth glass without AR coating

**Vary reflectivity with sun position?** Yes

**Correlate slope error with surface type?** Yes

**Slope error:** 6.55 mrad

**Approx. area:** 8,445,436 sq-ft



Vertex	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
1	37.641138	-87.555423	428.98	15.00	443.98
2	37.640934	-87.552247	460.61	15.00	475.61
3	37.639393	-87.551627	443.27	15.00	458.27
4	37.639202	-87.551171	447.96	15.00	462.96
5	37.639427	-87.551042	450.61	15.00	465.61
6	37.639113	-87.549904	435.38	15.00	450.38
7	37.640217	-87.549572	450.84	15.00	465.84
8	37.639427	-87.547930	424.10	15.00	439.10
9	37.636087	-87.545906	397.04	15.00	412.05
10	37.635714	-87.544425	407.24	15.00	422.24
11	37.634393	-87.545747	387.75	15.00	402.75
12	37.631510	-87.547501	388.83	15.00	403.83
13	37.629448	-87.547724	382.85	15.00	397.85
14	37.633101	-87.552941	387.41	15.00	402.41
15	37.634851	-87.552222	396.47	15.00	411.47
16	37.635658	-87.554116	411.31	15.00	426.32
17	37.634154	-87.554808	389.06	15.00	404.06
18	37.634188	-87.554872	388.99	15.00	403.99
19	37.635189	-87.561246	383.91	15.00	398.91
20	37.635512	-87.561246	386.75	15.00	401.75
21	37.635333	-87.559991	385.46	15.00	400.46
22	37.636990	-87.559787	421.30	15.00	436.30
23	37.636760	-87.556751	394.44	15.00	409.44
24	37.636888	-87.555892	397.28	15.00	412.28

**Name:** PV array 4  
**Axis tracking:** Single-axis rotation  
**Tracking axis orientation:** 180.0 deg  
**Tracking axis tilt:** 0.0 deg  
**Tracking axis panel offset:** 0.0 deg  
**Maximum tracking angle:** 60.0 deg  
**Resting angle:** 60.0 deg  
**Rated power:** -  
**Panel material:** Smooth glass without AR coating  
**Vary reflectivity with sun position?** Yes  
**Correlate slope error with surface type?** Yes  
**Slope error:** 6.55 mrad  
**Approx. area:** 451,340 sq-ft

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
1	37.665667	-87.557873	459.95	15.00	474.95
2	37.665608	-87.556440	452.59	15.00	467.59
3	37.665374	-87.556451	453.20	15.00	468.20
4	37.664932	-87.556617	449.44	15.00	464.44
5	37.664321	-87.555437	452.35	15.00	467.35
6	37.662724	-87.558296	451.00	15.00	466.00



### Route Receptor(s)

**Name:** Route 283  
**Route type:** One-way  
**View angle:** 50.0 deg

Vertex	Latitude	Longitude	Ground elevation	Height above ground	Total elevation
	deg	deg	ft	ft	ft
1	37.675090	-87.556728	421.41	6.00	427.41
2	37.664904	-87.558131	456.46	6.00	462.46
3	37.659124	-87.558914	444.32	6.00	450.32
4	37.657992	-87.559064	446.00	6.00	452.00
5	37.656877	-87.559214	427.46	6.00	433.46
6	37.656245	-87.559391	421.11	6.00	427.11
7	37.655714	-87.559692	422.70	6.00	428.70
8	37.655242	-87.560083	431.93	6.00	437.93
9	37.654856	-87.560556	430.06	6.00	436.06
10	37.651755	-87.565072	429.38	6.00	435.38
11	37.648688	-87.569611	426.55	6.00	432.55
12	37.641421	-87.580389	404.44	6.00	410.44
13	37.640504	-87.581161	393.80	6.00	399.80
14	37.639009	-87.581419	391.02	6.00	397.02
15	37.631158	-87.582320	400.91	6.00	406.91



**Name:** Route 416  
**Route type:** One-way  
**View angle:** 50.0 deg



Vertex	Latitude deg	Longitude deg	Ground elevation ft	Height above ground ft	Total elevation ft
1	37.673578	-87.574102	464.73	6.00	470.73
2	37.673200	-87.572755	449.71	6.00	455.71
3	37.672801	-87.571345	443.53	6.00	449.53
4	37.672124	-87.569853	437.08	6.00	443.08
5	37.671498	-87.568330	429.55	6.00	435.55
6	37.671273	-87.567536	420.58	6.00	426.58
7	37.671392	-87.564113	423.91	6.00	429.91
8	37.671485	-87.563083	429.48	6.00	435.48
9	37.672776	-87.558170	422.38	6.00	428.38
10	37.673150	-87.550767	429.97	6.00	435.97
11	37.674882	-87.544286	467.21	6.00	473.21

## PV Array Results

### Summary of PV Glare Analysis PV configuration and predicted glare

PV Name	Tilt deg	Orientation deg	"Green" Glare min	"Yellow" Glare min	Energy Produced kWh	Data File ?
PV array 1A	SA tracking	SA tracking	0	0	-	-
PV array 1B	SA tracking	SA tracking	0	0	-	-
PV array 1C	SA tracking	SA tracking	0	0	-	-
PV array 1D	SA tracking	SA tracking	0	0	-	-
PV array 1E	SA tracking	SA tracking	0	0	-	-
PV array 2	SA tracking	SA tracking	0	0	-	-
PV array 3	SA tracking	SA tracking	0	0	-	-
PV array 4	SA tracking	SA tracking	0	0	-	-

*Click the name of the PV array to scroll to its results*

### PV & Receptor Analysis Results detailed results for each PV array and receptor

#### PV array 1A no glare found



Component	Green glare (min)	Yellow glare (min)
Route: Route 283	0	0
Route: Route 416	0	0

*No glare found*

#### PV array 1B no glare found



Component	Green glare (min)	Yellow glare (min)
Route: Route 283	0	0
Route: Route 416	0	0

No glare found

### PV array 1C no glare found



Component	Green glare (min)	Yellow glare (min)
Route: Route 283	0	0
Route: Route 416	0	0

No glare found

### PV array 1D no glare found



Component	Green glare (min)	Yellow glare (min)
Route: Route 283	0	0
Route: Route 416	0	0

No glare found

### PV array 1E no glare found



Component	Green glare (min)	Yellow glare (min)
Route: Route 283	0	0
Route: Route 416	0	0

No glare found

### PV array 2 no glare found



Component	Green glare (min)	Yellow glare (min)
Route: Route 283	0	0
Route: Route 416	0	0

No glare found

---

### PV array 3 no glare found



Component	Green glare (min)	Yellow glare (min)
Route: Route 283	0	0
Route: Route 416	0	0

No glare found

---

### PV array 4 no glare found



Component	Green glare (min)	Yellow glare (min)
Route: Route 283	0	0
Route: Route 416	0	0

No glare found

---

## Assumptions

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- Times associated with glare are denoted in Standard time. For Daylight Savings, add one hour.
- Glare analyses do not account for physical obstructions between reflectors and receptors. This includes buildings, tree cover and geographic obstructions.
- Detailed system geometry is not rigorously simulated.
- The glare hazard determination relies on several approximations including observer eye characteristics, angle of view, and typical blink response time. Actual values and results may vary.
- The system output calculation is a DNI-based approximation that assumes clear, sunny skies year-round. It should not be used in place of more rigorous modeling methods.
- Several calculations utilize the PV array centroid, rather than the actual glare spot location, due to algorithm limitations. This may affect results for large PV footprints. Additional analyses of array sub-sections can provide additional information on expected glare.
- The subtended source angle (glare spot size) is constrained by the PV array footprint size. Partitioning large arrays into smaller sections will reduce the maximum potential subtended angle, potentially impacting results if actual glare spots are larger than the sub-array size. Additional analyses of the combined area of adjacent sub-arrays can provide more information on potential glare hazards. (See previous point on related limitations.)
- Hazard zone boundaries shown in the Glare Hazard plot are an approximation and visual aid. Actual ocular impact outcomes encompass a continuous, not discrete, spectrum.
- Glare locations displayed on receptor plots are approximate. Actual glare-spot locations may differ.
- Glare vector plots are simplified representations of analysis data. Actual glare emanations and results may differ.
- Glare analysis methods used: OP V1, FP V1, Route V1
- Refer to the **Help page** for assumptions and limitations not listed here.

Kentucky State Board on  
Electric Generation and  
Transmission Application

ATTACHMENT

D

PROPERTY VALUE  
IMPACT REPORT





## **IMPACT STUDY OF PROPERTY VALUES ADJACENT TO SOLAR A STUDY OF TEN EXISTING SOLAR FACILITIES**

Located in Dougherty County, Georgia; Marion County, Indiana; Chisago County, Minnesota  
Miami-Dade County, Florida; Brevard County, Florida; Bladen and Cumberland Counties,  
North Carolina; Rutherford County, North Carolina; Wilson County, North Carolina; Isle of  
Wight County, Virginia, and Lapeer County, Michigan

**PREPARED FOR:**

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**November 23, 2020**

Andrew R. Lines, MAI  
Patricia L. McGarr, MAI, CRE, FRICS

## EXECUTIVE SUMMARY

National Grid Renewables is seeking approvals for proposed solar farms to be located in various locations throughout the State of Kentucky

CohnReznick has been engaged to complete a property value impact study to determine whether existing solar farms have had any measurable impact on the value of adjacent properties. This report summarizes the findings of that study.

The purpose of the assignment is to determine whether proximity to an existing solar farm resulted in any significant measurable and consistent impact on adjacent property values, given the existing uses and zoning of nearby property at the time of development; address potential local concerns regarding any proposed solar farm having a perceived impact on surrounding property values; and, provide a consulting report that can address the required criteria for obtaining approvals for future National Grid Renewables projects.

We have included ten established solar farms in our study, focusing on rural and suburban areas with neighboring residential homes, that are comparable to the proposed solar farm locations in Kentucky. Solar farms with a variety of output capacities have been studied because of their proximity to residential properties. We have studied the sales of property located adjacent to the solar farms in order to see if proximity to this use results in any consistent and measurable impact on property values.

Since 1984, we have studied the impacts on adjacent land values of schools, landfills, waste transfer stations, stone quarries, cellular towers, electrical power transmission lines, “Big Box” retail facilities, levies, properties with restrictive covenants, landmark districts, environmental contamination, airports, material defects in construction, stigma, and loss of view amenity for residential high rises. Over the past three years, we have studied more than 25 existing solar farms across the United States of varying sizes to determine whether there has been any measurable impact on adjacent property values.

## METHODOLOGY

The basic premise of this comparative analysis is that if there is any impact on the value of adjacent properties, by virtue of their proximity to a solar farm, it would be reflected by such factors as the range of sale prices, differences in unit sale prices, conditions of sale, and overall marketability. When comparing these factors for properties near the solar farm (“Test Area Sales”) to properties locationally removed from the solar farm (“Control Area Sales”), we would expect to see some emerging and consistent pattern of substantial difference in these comparative elements – if, in fact, there was an effect.

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## STUDY FEATURES

Our study includes research and analyses of existing solar farms in the Midwest Southeast, and East, (collectively, the “Existing Solar Farms”), as well as the property value trends of the adjacent land uses, including agricultural, single family and residential properties; a review of published studies, and discussions with market participants. Adjoining properties physically adjacent to the Existing Solar Farms that sold in an arm’s length transaction after the completion of the Existing Solar Farms were categorized as Test Area Sales that qualified for further analysis in a paired sale analysis to determine if a difference in price exists.

- Solar Farm 1 (North Star Solar Farm) is located near the City of North Branch, in unincorporated Chisago County, Minnesota. This is a 100 MW AC solar farm that is situated on approximately 1,000 acres of land and is surrounded by agricultural land uses and some residential uses. We found four adjoining properties that qualified for a paired sales analysis.
- Solar Farm 2 (Dominion Indy Solar Farm III) is located in a suburban, yet rural area outside of Indianapolis, in Marion County, Indiana, on a parcel totaling 134 acres. The solar farm has a capacity of 8.6 MW AC of power and the surrounding uses consist of agricultural land to the east, west and south, and a single-family subdivision to the north. We found ten adjoining properties that qualified for a paired sales analysis, two of which have resold for a total of twelve sales.
- Solar Farm 3 (Dougherty Solar) is located in a rural area outside of the nearest city, Albany, in Dougherty County, Georgia, on three parcels totaling over 1,000 acres. The solar farm has a capacity of 120 MW AC of power and the surrounding uses consist of agricultural land to the east, west and north, and a single-family homes to the south and the northeast. We found one adjoining property that qualified for a paired sales analysis.
- Solar Farm 4 (Miami-Dade Solar Energy Center) is located in unincorporated Miami-Dade County, Florida on 465 acres. The solar farm has a capacity of 74.5 MW AC and the surrounding uses consists of agricultural land, single family homes, and federally owned government land. We found three adjoining properties that qualify for a paired sales analysis.
- Solar Farm 5 (Barefoot Bay Solar Energy Center) is located near the city of Sebastian, in unincorporated Brevard County, Florida on 504.75 acres. The solar farm has a capacity of 74.5 MW AC and the surrounding uses consists of some industrial, agricultural land, single family homes, and municipal land. We found seven adjoining properties that qualify for a paired sales analysis.
- Solar Farm 6 (Innovative Solar 42) is located near the City of Fayetteville in Bladen and Cumberland Counties, North Carolina on 414 acres. The solar farm has a capacity of 71 MW AC of power and the surrounding uses consist of agricultural land, forests, and single family homes. We found one adjoining property that qualified for a paired sales analysis.

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- Solar Farm 7 (Rutherford Solar Farm) is located near the city of Forest City in Rutherford County, North Carolina in a primarily rural area, on a 489-acre parcel of land. The solar farm has a capacity of 61 MW AC of power and the surrounding uses consist of agricultural land, vacant land, and single family homes. We found two adjoining properties that qualified for a paired sales analysis.
- Solar Farm 8 (Elm City Solar Facility) is located in the City of Elm City in Wilson County, North Carolina, in a primarily rural area, on 354 acres. The solar farm has a capacity of 40 MW AC of power and the surrounding uses consist of forest, industrial, vacant, and single family homes. We found one adjoining property that qualified for a paired sales analysis.
- Solar Farm 9 (Woodland Solar Farm) is located near the City of Windsor in unincorporated Isle of Wight County, Virginia, in a primarily rural area, on 204 acres. The solar farm has a capacity of 19 MW AC of power and the surrounding uses consist of agricultural land, forest land, and single family homes. We found one adjoining property that qualified for a paired sales analysis.
- Solar Farm 10 (DTE's Lapeer Michigan Solar Projects) is a two-farm project, the Demille Solar Farm and the Turrill Solar Farm, located in the City of Lapeer, Michigan. Demille is a 28.56 MW AC solar farm that is situated on approximately 170 acres of land and is surrounded by agricultural land uses and residential uses. Turrill is a 19.72 MW AC solar farm situated on approximately 200 acres. We found four adjoining properties that qualified for a paired sales analysis.

**We analyzed 36 adjoining property sales in Test Areas and 222 comparable sales in Control Areas, collectively, for these identified solar facilities, over the past five years.**

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## RESULTS

With regard to their impact on nearby property values, our studies of facilities of various sizes demonstrate that there is no measurable and consistent difference in property values for properties adjacent to solar farms when compared to similar properties locationally removed from their influence. This is supported by our interviews with local real estate brokers who have stated that there is no difference in price, marketing periods or demand for the homes directly adjacent to the solar farm facilities.

We have also interviewed market participants, including County and Township Assessors (with solar facilities in their districts), to give us additional insight as to how the market evaluates farmland and single-family homes located adjacent to solar farms. Local assessors we have spoken with directly have noted that there is no evidence of negative property value impacts due to proximity to a solar farm, and local brokers interviewed have noted that there has been no effect on pricing, marketing time, nor conditions of sale.

We performed three Before and After Analyses, in which we compared sales that occurred prior to the announcement and subsequent development of the solar farm project with sales that occurred after completion of the solar farm project for one solar farm in Florida, one solar farm in Indiana, and one in Minnesota, for both adjoining and non-adjoining properties. No measurable impact on property values was demonstrated in these analyses.

We have also reviewed studies prepared by other real estate valuation experts that specifically analyzed the impact of solar facilities on nearby property values. These studies found little to no measurable or consistent difference in value between the Test Area Sales and the Control Area Sales attributed to the proximity to solar farms.

Considering all of this information, we can conclude that since the property values of the Adjoining Property Sales (Test Area Sales) for the existing solar farms analyzed were not adversely affected by their proximity to solar farms, that properties surrounding other solar farms operating in compliance with all regulatory standards will similarly not be adversely affected, in either the short- or long-term.

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## LETTER OF TRANSMITTAL

November 23, 2020

Ms. Courtney Pelissero  
 Permitting Associate  
 National Grid Renewables  
 8400 Normandale Lake Blvd Suite 1200  
 Bloomington, MN 55437

SUBJECT: Property Value Impact Study  
 Real Estate Adjacent to Solar Farms

Dear Ms. Pelissero:

CohnReznick is pleased to submit the accompanying adjacent property values impact study regarding proposed solar energy uses.

In developing this report, we have researched the identified existing solar farms listed below, researched articles and other published studies, and interviewed real estate professionals and Township/County Assessors active in the market where solar farms are located, to gain an understanding of market perceptions.

### CohnReznick - Existing Solar Farms Studied

#	Solar Farm	County	State	MW AC	Acreage
1	North Star Solar	Chisago	MN	100.00	±1,000
2	Indy Solar III	Marion	IN	8.60	129.04
3	Dougherty Solar	Dougherty	GA	120.00	1,037.42
4	Miami-Dade Solar Energy Center	Miami-Dade	FL	74.50	465.61
5	Barefoot Bay Solar Energy Center	Brevard	FL	74.50	504.75
6	Innovative Solar 42	Bladen & Cumberland	NC	71.00	413.99
7	Rutherford Farm	Rutherford	NC	61.00	488.84
8	Elm City Solar	Wilson	NC	40.00	354.00
9	Woodland Solar	Isle of Wight	VA	19.00	211.12
10	DTE Lapeer Solar	LaPeer	MI	48.28	365.68

The purpose of the assignment is to determine whether the proximity of the proposed renewable energy facility use (solar farm) will result in any significant measurable and consistent impact on adjacent property values, given the existing uses and zoning of nearby property at the time of development. The intended use of our opinions and conclusions is to assist the client in addressing local concerns regarding a solar farm's potential impact on surrounding property values, in addition to addressing the required criteria for obtaining approvals for National Grid Renewable's proposed solar energy projects, such as minimizing the impact on adjacent property values. We have not been asked to value any specific property, and we have not done so.

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The client and intended user for the assignment is National Grid Renewables. Additional intended users of our findings may include various county officials in the state of Kentucky and the Kentucky State Electric Generation and Transmission Siting Board. The report may be used only for the aforementioned purpose and may not be distributed without the written consent of CohnReznick LLP (“CohnReznick”).

The assignment is intended to conform to the Uniform Standards of Professional Appraisal Practice (USPAP), the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute as well as applicable state appraisal regulations. Based on the analysis in the accompanying report, and subject to the definitions, assumptions, and limiting conditions expressed in the report, our findings follow below.

## CONCLUSIONS

We analyzed 36 adjoining property sales and over 222 comparable sales, collectively, for the identified ten solar farms, over the past five years. We note that proximity to the solar farms has not deterred sales of nearby agricultural land and residential single-family homes nor has it deterred the development of new single-family homes on adjacent land.

No empirical evidence evolved that indicated a more favorable real estate impact on the Control Area Sales as compared to the adjoining, Test Area Sales with regard to such market elements as:

1. Range of sale prices
2. Differences in unit sale prices
3. Conditions of sale
4. Overall marketability
5. New Development
6. Rate of Appreciation

We have also reviewed studies prepared by other real estate valuation experts that specifically analyzed the impact of solar facilities on nearby property values. These studies found little to no measurable and consistent difference in value attributed to the proximity to solar farms between unit prices for Test Area Sales and Control Area Sales and noted that solar energy uses are generally considered a compatible use. We have also interviewed market participants, including County and Township Assessors, to give us additional insight as to how the market evaluates farmland and single-family homes with views of the solar farm.

Considering all of this information, we can conclude that since the Adjoining Property Sales (Test Area Sales) for the existing solar farms analyzed were not adversely affected by their proximity to solar farms, that properties surrounding other solar farms operating in compliance with all regulatory standards will similarly not be adversely affected, in either the short- or long-term periods.

If you have any questions or comments, please contact the undersigned. Thank you for the opportunity to be of service.

Very truly yours,

**CohnReznick LLP**



Andrew R. Lines, MAI  
Principal- Valuation Advisory Services  
Certified General Real Estate Appraiser

Florida License No. RZ3899  
Expires 11/30/2020  
Indiana License No. CG41500037  
Expires 6/30/2022  
Kentucky License 5663  
Expires 6/30/2021  
Georgia License No. 360939  
Expires 10/31/2021



Patricia L. McGarr, MAI, CRE, FRICS  
National Director - Valuation Advisory Services  
Certified General Real Estate Appraiser

Indiana License No. CG49600131  
Expires 6/30/2022  
North Carolina License No. A8131  
Expires 6/30/2021  
Virginia License No. 4001016998  
Expires 3/31/2022  
Michigan License No. 1201072979  
Expires 7/31/2022

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## SCOPE OF WORK

### CLIENT

The client for this assignment is National Grid Renewables.

### INTENDED USERS

National Grid Renewables; other intended users may include the client's legal, accounting, and site development professionals, various county officials in the state of Kentucky and the Kentucky State Electric Generation and Transmission Siting Board. Additional intended users of our findings include all relevant permitting authorities for proposed solar energy use sites in Kentucky.

### INTENDED USE

The intended use of our findings and conclusions is to address certain criteria required for the granting of approvals for proposed solar energy uses in various location in the state of Kentucky, including the minimization of impact on nearby or adjacent property values. The report may be used only for the aforementioned purpose and may not be distributed without the written consent of CohnReznick LLP ("CohnReznick").

### PURPOSE

The purpose of the assignment is to determine whether the proximity of the studied facilities (solar farms) resulted in any significant measurable and consistent impact on adjacent property values, given the existing uses and zoning of nearby property at the time of development; address local concerns regarding a solar farm use having a perceived impact on surrounding property values; and, provide a consulting report that can address criteria for obtaining approvals for National Grid Renewable's future proposed solar projects.

### EFFECTIVE DATE

November 23, 2020

### DATE OF REPORT

November 23, 2020

### PRIOR SERVICES

USPAP requires appraisers to disclose to the client any services they have provided in connection with the subject property in the prior three years, including valuation, consulting, property management, brokerage, or any other services.

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This report is a compilation of the Solar Farms which we have studied over the past three years, and is not evaluating a specific subject site. In this instance, there is no “subject property” to disclose.

## INSPECTION

Patricia L. McGarr, MAI and Andrew R. Lines, MAI have viewed the exterior of all comparable data referenced in this report in person, via photographs, or aerial imagery.

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

### METHODOLOGY

According to Randall Bell, PhD, MAI, author of text *Real Estate Damages*, published by the Appraisal Institute in 2016, the paired sales analysis is an effective method of determining if there is a detrimental impact on surrounding properties.

*“This type of analysis may compare the subject property or similarly impacted properties called **Test Areas** (at Points B, C, D, E, or F) with unimpaired properties called **Control Areas** (Point A). A comparison may also be made between the unimpaired value of the subject property before and after the discovery of a detrimental condition. If a legitimate detrimental condition exists, there will likely be a **measurable and consistent difference** between the two sets of market data; if not, there will likely be no significant difference between the two sets of data. This process involves the study of a group of sales with a detrimental condition, which are then compared to a group of otherwise similar sales without the detrimental condition.”<sup>1</sup>*

As an approved method, paired sales analysis can be utilized to extract the effect of a single characteristic on value. By definition, paired data analysis is “a quantitative technique used to identify and measure adjustments to the sale prices or rents of comparable properties; to apply this technique, sales or rental data on nearly identical properties is analyzed to isolate a single characteristic’s effect on value or rent.”<sup>2</sup> The text further describes that this method is theoretically sound when an abundance of market data is available for analysis. It may be impractical for those property types that do not frequently sell, such as commercial properties. *The Appraisal of Real Estate* states that the lack of data can reduce the strength of the analysis, and that “an adjustment derived from a single pair of sales is not necessarily indicative” of the value of the single difference (i.e. proximity to an external factor).

Our methodology does not rely on multiple subjective adjustments that are typical in many appraisals and single-paired sales analyses. Rather, our methodology remains objective and the only adjustments required are for market conditions; this is reasonable as this is an explainable trend tracked by credible agencies. We applied a Trend Analysis to adjust the Control Sales for market conditions (the time between sales), as this is a variable that affects all properties similarly and can be adjusted for in an objective manner. The constant valuation date was determined to be the date of the Test Area sale. According to the *Dictionary of Real Estate Appraisal, 6th edition*, a Trend Analysis is defined as:

*“A quantitative technique used to identify and measure trends in the sale prices of comparable properties; useful when sales data on highly comparable properties is lacking but a broad*

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<sup>1</sup> Bell, Randall, PhD, MAI. *Real Estate Damages*. Third ed. Chicago, IL: Appraisal Institute, 2016.

<sup>2</sup> *The Appraisal of Real Estate 14<sup>th</sup> Edition*. Chicago, IL: Appraisal Institute, 2013.

*database on properties with less similar characteristics is available. Market sensitivity is investigated by testing various factors that influence sale prices.”*

We extracted a monthly appreciation rate for each set of Control Sales and applied that to each respective grouping to normalize the sales to a common valuation date.

## PUBLISHED STUDIES

We have also considered various studies that consider the impact of solar farms on surrounding property values. The studies range from survey-based formal research to less formal analyses.

The studies show that over the past decade, the solar industry has experienced unprecedented growth. Among the factors contributing to its growth were government incentives, significant capacity additions from existing and new entrants and continual innovation. The incentives made the solar photovoltaic (PV) industry economically attractive for many consumers and as a result, set the conditions for the boom. A significant amount of farmland trades have been to solar developers; transaction prices for these deals were reported to be between 30 to 50 percent above normal agricultural land prices in 2016.

*Clean Energy Trends*, a publication developed by Clean Edge, reported in 2013 that investments in new capacity of solar farms increased from approximately \$3 billion USD in 2000 to approximately \$91 billion USD in 2013, just short of the record of \$92 billion USD in 2011. Solar PV installations increased from 31 Gigawatts (GW) in 2012 to a record of approximately 37 GW in 2013. As a result, annual solar PV installations exceeded annual wind installations for the first time. Before 2011, annual wind installations were double annual solar PV installations.

Solar farms offer a wide array of economic and environmental benefits to surrounding properties. Unlike other energy sources, solar energy does not produce emissions that may cause negative health effects or environmental damage. Solar farms produce a lower electromagnetic field exposure than most household appliances, such as TV and refrigerators, and studies have confirmed there are no health issues related to solar farms.<sup>3</sup> The Solar Foundation measured that the solar industry increased employment by 22 percent from 2013 to 2015. Solar farm construction in rural areas has also dramatically increased the tax value of the land on which they are built, which has provided a financial boost to some counties. According to Duke University’s Center on Globalization, Governance, and Competitiveness (“DUCGCC”), a study of solar projects in North Carolina indicated despite the 80% tax abatement, the taxable value of a parcel with a solar farm is significantly larger than the taxable value of that same land under agricultural zoning.

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<sup>3</sup> “Electromagnetic Field and Public Health.” Media Centre (2013): 1-4. World Health Organization.

Beyond creating jobs, solar farms are also benefiting the overall long-term agricultural health of the community. As explained by ReThink Energy, a conservation foundation, a typical solar farm has more than two-thirds of the field left open and uncovered by solar panels. This unused land, and also all the land beneath the solar panels, will be left to repair naturally. In the long run this is a better use of land since the soil is allowed to recuperate instead of being ploughed and fertilized year in and year out.

A solar farm can greatly increase the value of land, offering some financial security for the property owner over 20 to 25 years. Once solar panel racking systems are removed, the land can revert to its original use.<sup>4</sup>

Studies have also noted that the installation of utility-scale solar on a property has no negative impact on adjoining property's value. According to a report titled "Mapleton Solar Impact Study" from Kirkland Appraisals, LLC, conducted in Murfreesboro, North Carolina in September 2017, the study found that the proposed solar farm had no impact to adjacent vacant residential, agricultural land, or residential homes. The adjoining land for the paired data sales analysis in the report was primarily low density residential and agricultural uses, although there was one case where the solar farm adjoined to two dense subdivisions of homes.

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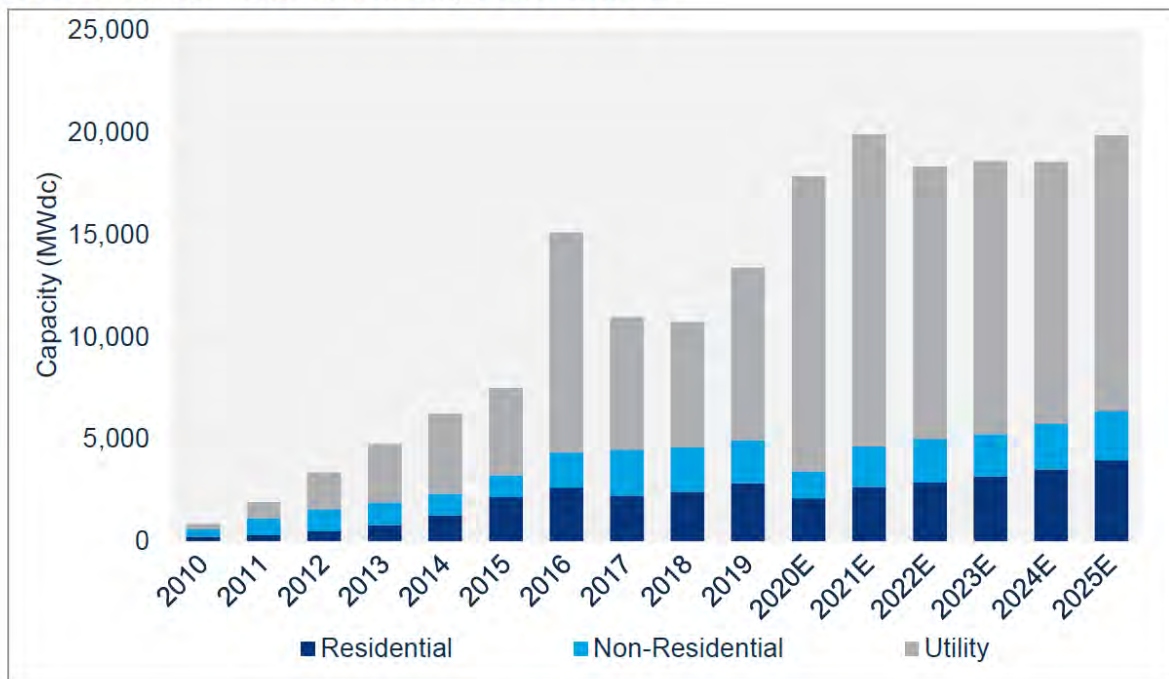
<sup>4</sup> NC State Extension. (May 2016). Landowner Solar Leasing: Contract Terms Explained. Retrieved from: <https://content.ces.ncsu.edu/landowner-solar-leasing-contract-terms-explained>

## ADJACENT PROPERTY VALUES IMPACT STUDY

### OVERVIEW OF SOLAR DEVELOPMENT IN THE UNITED STATES

Solar development increased almost exponentially over the past ten years in the United States as technology and the economic incentives (Solar Investment Tax Credits or ITC) made the installation of solar farms economically reasonable. The cost to install solar panels has dropped nationally by 70 percent since 2010, which has been one factor that led to the increase in installations. A majority of these solar farm installations are attributed to larger-scale solar farm developments for utility purposes. The chart below portrays the historical increase on an annual basis of solar installations in the US as a whole, courtesy of research by Solar Energy Industries Association (SEIA) and Wood Mackenzie, and projects solar photovoltaic (PV) deployment for the next five years, through 2025, with the largest percentage of installations attributed to utility-scale projects.

U.S. PV installation forecast, 2010-2025E



Source: Wood Mackenzie

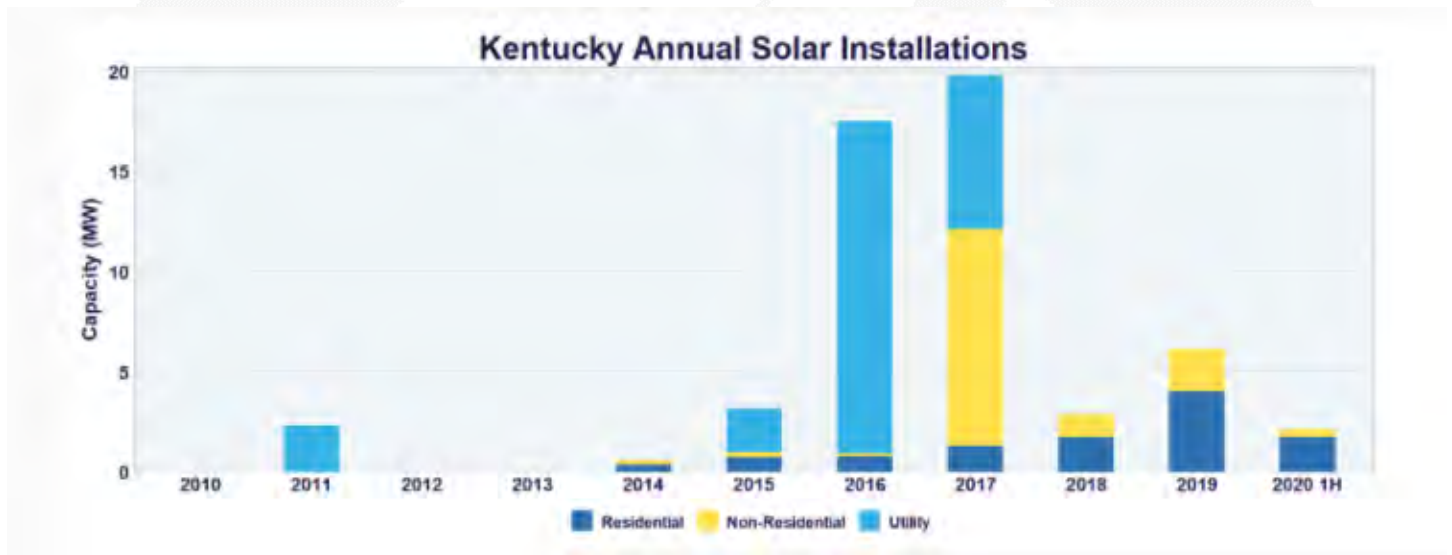
The United States installed 13.3 Gigawatts (GW) DC of solar photovoltaic capacity for both residential and utility-scale solar projects installed in 2019, representing an increase of 23 percent year-over-year. The first quarter of 2020 was largely unaffected by the Coronavirus Pandemic, and saw 3.6 Gigawatts (GW) DC installed, the largest first quarter on record by over 1 Gigawatt. However, the Solar Industry is not immune from the pandemic. Second quarter is seeing some impact, most acutely in distributed solar, which is expected to see 31 percent fewer installations as compared to last year, as installers face work stoppages and consumer demand reacts to an impending recession. The pipeline for utility-scale PV, as of June 2020, includes capacity of 51 GW combined

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from contracted projects (including those under construction) as well as announced but pre-contract sources.<sup>5</sup> With the increase of utility-scale solar installations across the country, solar projects have become a common and understood feature of the landscape and will continue to proliferate with the projected additional capacity to come online in the coming years despite the downside risks caused by the coronavirus pandemic.

## SOLAR DEVELOPMENT IN KENTUCKY

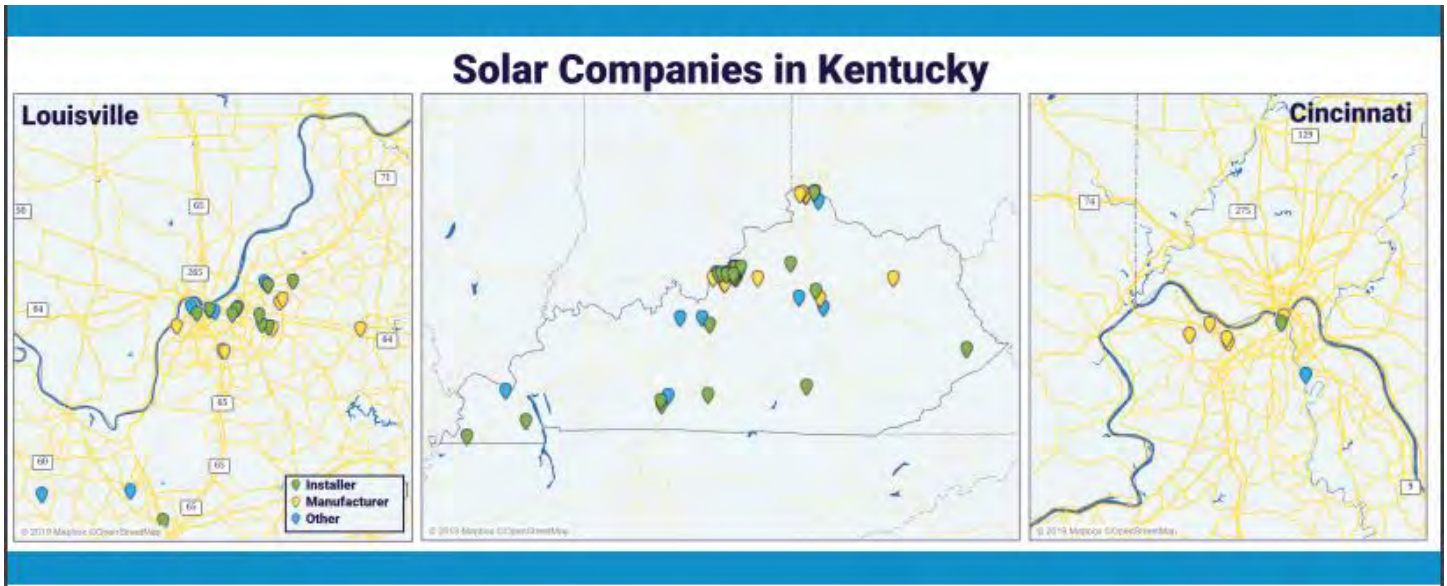
As of the end of the first half of 2020, Kentucky has 54.5 MW of solar installed, ranking only 47<sup>th</sup> in the US for the capacity of solar installed. There has been significantly more utility investments in clean energy with continued growth on the horizon, with 590.04 MW of solar to be installed over the next five years.



Kentucky only has a few solar installations, and most of them are less than 10 MW of power. The largest solar site in Kentucky is the Cooperative Solar One project, located in Lexington, Kentucky. This site has a capacity to generate 8.5 MW of electricity, enough to power over 841 homes. Kentucky is home to 1,362 solar related jobs, and 55 solar related companies, which includes 15 manufacturers, and 22 installers/developers. We have presented a map for these companies on the following page, courtesy of the SEIA.

<sup>5</sup> Solar Energy Industries Association, Solar Market Insight Report 2020 Q2, released June 2, 2020.

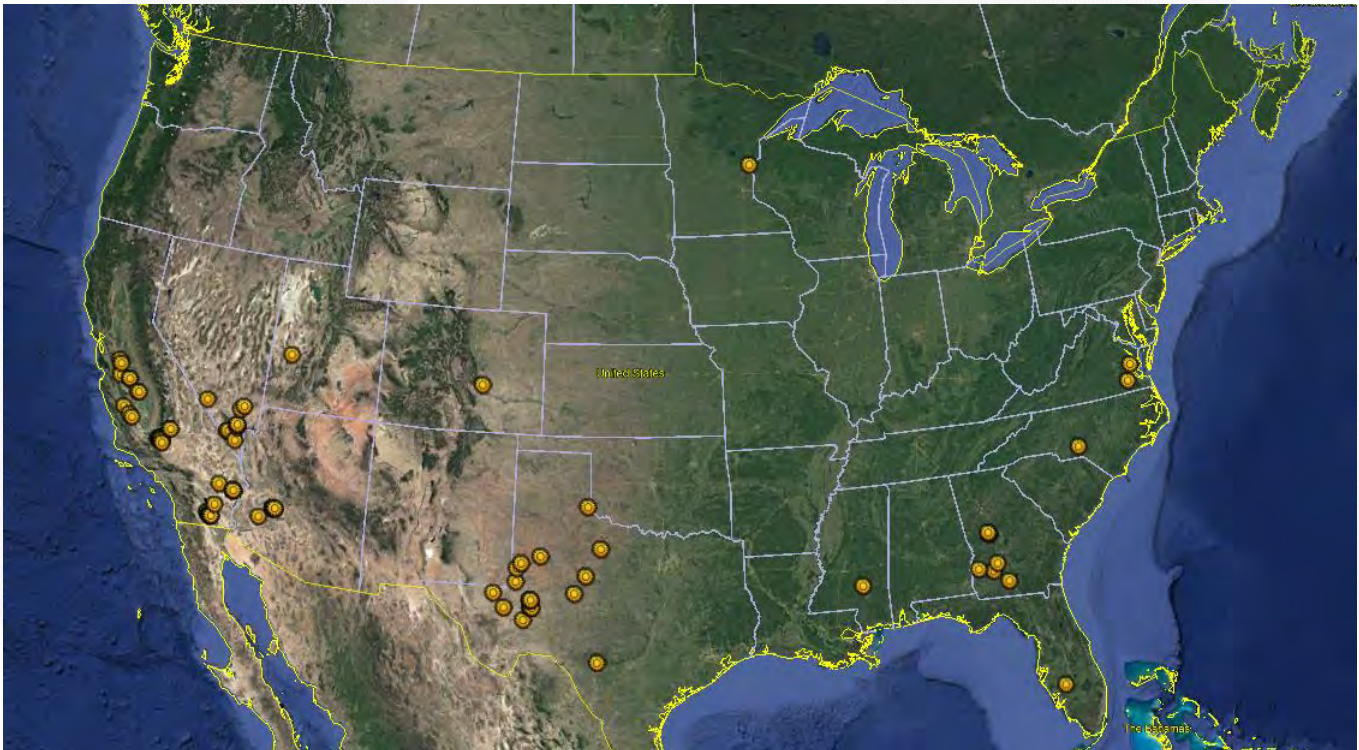




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## LARGE-SCALE SOLAR IN THE UNITED STATES

According to the U.S. Energy Information Administration (EIA) through June 2020, there were  $\pm 230$  solar facilities in operation that generate more than 50 MW AC of power, and  $\pm 84$  solar facilities in operation that generate more than 100 MW AC of power. A map illustrating existing solar farms with capacities greater than 100 MW is presented below (indicated by yellow suns), using data retrieved from the Energy Information Administration (EIA). There are currently no operating solar farms in Kentucky with capacities greater than 25 MW, although new large, utility scale projects have been approved in the surrounding states within the last 2 years or are under construction.



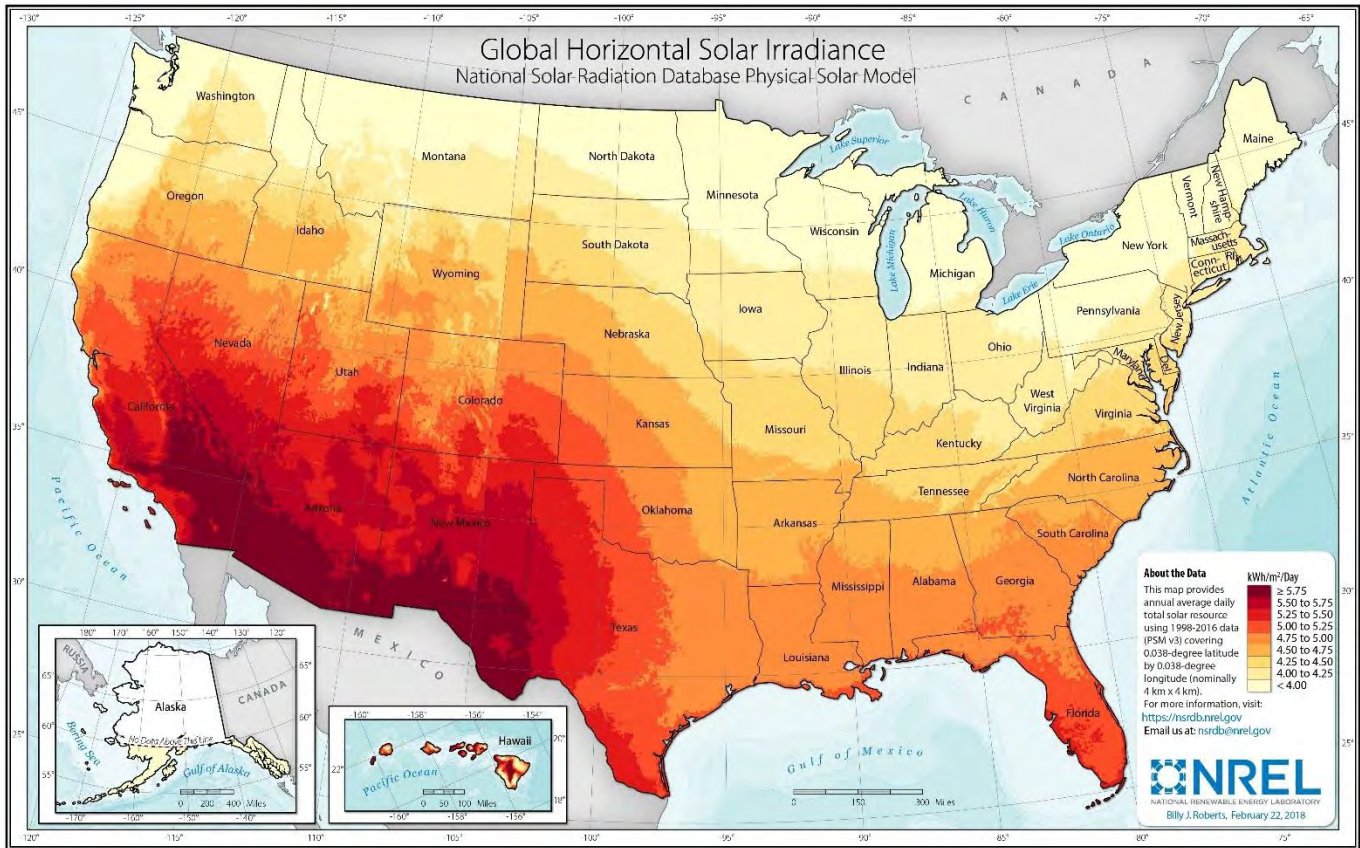
To meet zoning and planning requirements, and/or to take advantage of certain incentive programs, several solar farms are built by the same developer around the same location, de facto functioning as one larger solar farm. Many of these solar facilities are located in California, with several located in Florida, Texas, Nevada, North Carolina, Arizona, Georgia and Utah. Additionally, these installations are typically located in outlying areas where site costs are lowest, and residential development and sales activity is minimal in these areas. While we have reviewed each for surrounding uses, the majority are not good candidates for a paired sales analysis since they were either recently constructed or surrounding development/sales activity was minimal.

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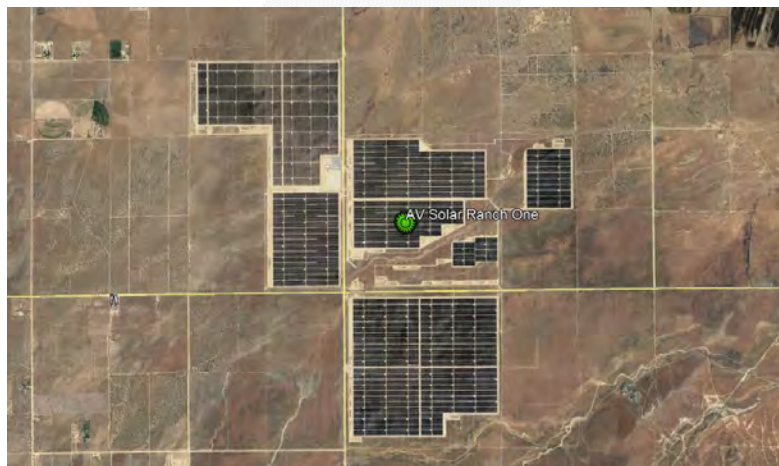
In the United States there are ±27 operating solar farms with generating capacities above 200 MW AC, presented below (indicated by green suns). All of the existing solar farms in operation as of June 2020 that have a generating capacity of greater than 200 MW AC are located in the southwestern United States. This is due to economies of scale for reducing development costs by maximizing size in areas where there is maximum sunlight, and can be correlated between the below aerial image and the map presented on the following page developed by the National Renewable Energy Laboratory (NREL).



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The vast majority of them are locationally removed from development. For example, the 253 MW AC solar farm known as Antelope Valley Solar Ranch One, as shown below, is located in the Mojave Desert on non-crop producing land, approximately 50 miles north of the City of Los Angeles and feeds into the Pacific Gas and Electric’s power grid.



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The largest operating solar farm in the United States and one of the largest in the world is the Topaz Solar Farm, located in California Valley in eastern San Luis Obispo County, in the northern portion of the Carrizo Plains. The Topaz Solar Farm has a total nameplate capacity of 585.9 MW AC, and was constructed over time between 2013 and 2014 on 4,700 acres of private land, consisting of five individual permitted installations ranging in size from 90 MW to 151 MW. Pacific Gas and Electric purchased the electricity generated under a 25-year power purchase agreement. The power generated is enough to power nearly 160,000 average California homes, and at the time of development economic benefits were an estimated \$417 million, including property and sales tax revenue for the county, wages from employment, and supply chain spending.



We also spoke with the San Luis Obispo Real Property Appraiser Ross Felthousen who indicated that this is an environmentally sensitive area, and it is the least desirable for nearly any type of development. The Carrizo Plain is a large-enclosed grassland containing the Carrizo Plain National Monument, the largest single native grassland remaining in California and national historic landmark. Additionally, the San Andreas Fault is located along the eastern edge of the Carrizo Plains. The area is remote in nature, as it is at least an hour in either direction to reach major cities; although, for solar development it has a high amount of “sun” days, two existing high capacity power lines, and little fog days due to its location in the California Valley.

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As part of the development process, the developer purchased the underlying land and also had to purchase land for mitigation since there are endangered plant and animal species in this area (aside from also meeting “100” conditions of approval). Screening and fencing were required to be compatible with the endangered species’ native habitat. According to the owner’s project description, the developer worked with the county, state, and federal resource agencies, and national and local environmental groups, to avoid, minimize and mitigate environmental impact, including the following:

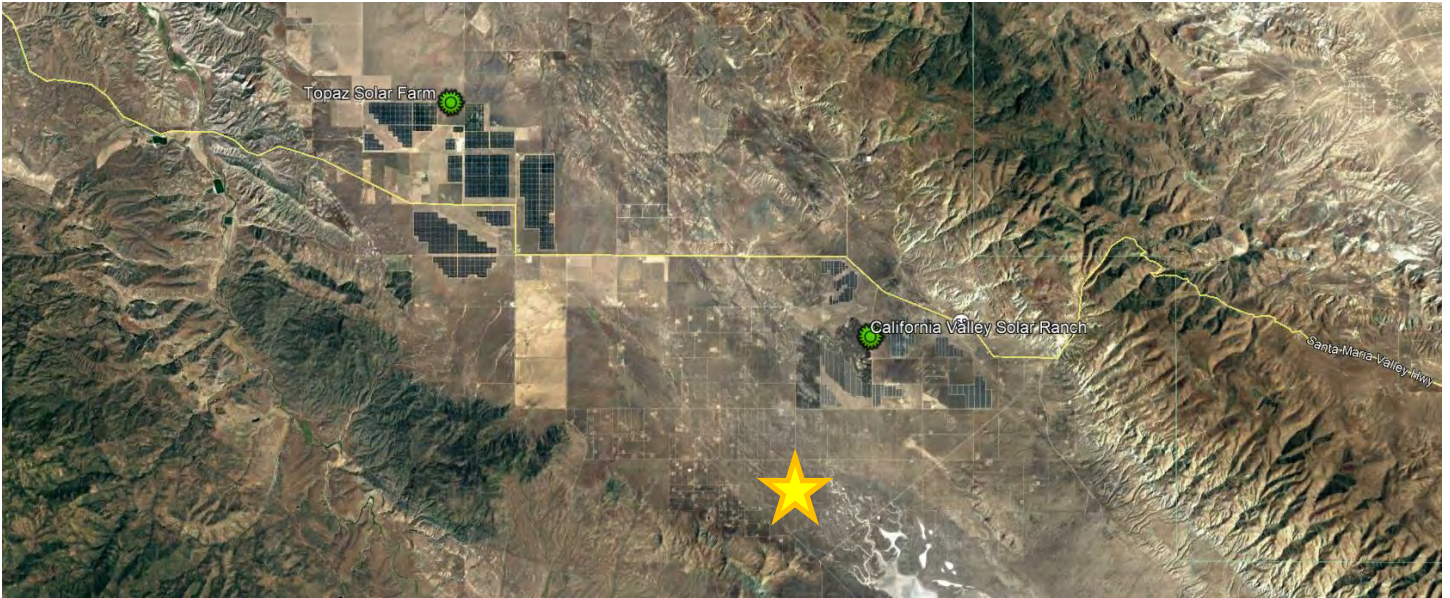
- “Productive grassland habitat for native plants and animals while passively farming the sun’s energy.
- No panel washing is required. Annual rainfall in the [Carrizo] Plains is sufficient to clean the panels.
- Year-round vegetation monitoring provides dust control and habitat for native species. Annually, a variety of grazing methods are used throughout the project footprint for vegetation management.
- Between 2015 and 2020, monitoring efforts of the San Joaquin kit fox – a federally listed endangered species – will be done throughout the project footprint and the surrounding mitigation lands.
- Situated on nonprime agricultural land, animals can graze throughout the project footprint within wildlife movement corridors. The movement corridors support Pronghorn Antelope and Tule Elk.”<sup>6</sup>

While it was undergoing development, the construction of this and the neighboring California Valley Solar Ranch spurred hundreds of new jobs, requiring on-site housing due to its remote location. As a result, there was a flurry of activity in the area, which included reopening a vacant motel for the construction workers. Fewer than 500 people live in this area, most of which are retirees, ranchers, or those working on protecting the Carrizo Plains. The area has seen limited development activity since water is sparse, and the quality of the groundwater is also questionable in areas.

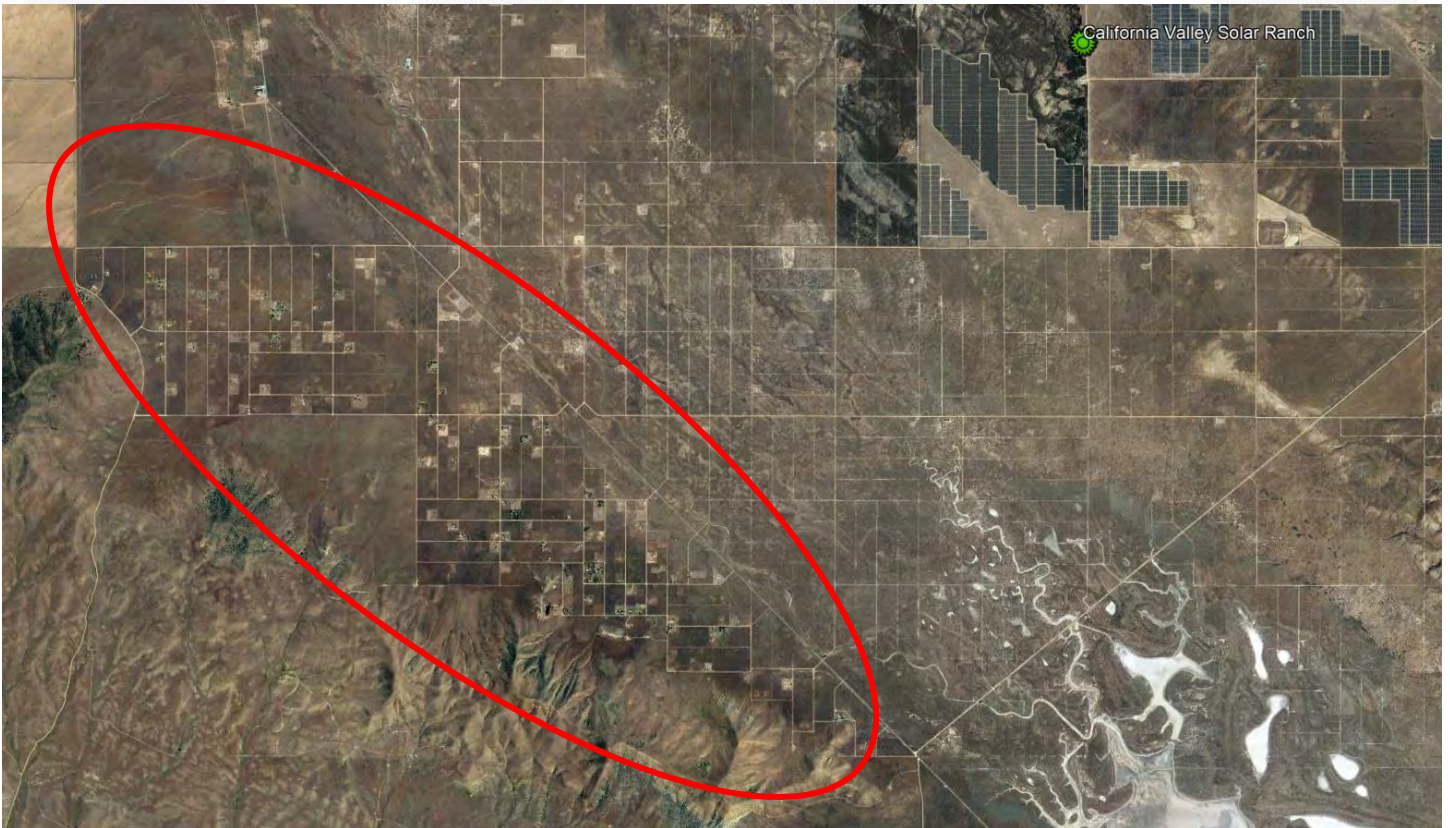
In the 1960s, an antiquated subdivision known as California Valley was platted, which includes more than 7,000-2.5 acre lots. Success of the subdivision largely relied on municipal water supply, but it never came to fruition due to several issues. Since then, approximately 100-200 of the lots have been developed, limited to areas where private wells have the quantity and quality of water for residential use. Public services are limited in this area given the low population. According to Felthousen, the 2.5-acre lots in California Valley are estimated at \$3,000 to \$10,000 per acre depending on the availability of water, and there is very minimal demand given the prior comments on the area. The image on the next page illustrates the location of the subdivision.

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<sup>6</sup> [https://www.bherenewables.com/include/pdf/fact\\_sheet\\_topaz.pdf](https://www.bherenewables.com/include/pdf/fact_sheet_topaz.pdf)



California Valley Subdivision Location (indicated by orange star)



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As encircled by the red oval on the prior page, most of the development in the subdivision is limited to this area as it is the most prevalent with water for private wells.

After reviewing local environmental barriers and the lack of public infrastructure, these two solar farms in California Valley did not qualify for further analysis as the local area is not comparable to the Project Area and the presence of several external factors reduces the credibility of an analysis. San Luis Obispo Real Property Appraiser Ross Felthousen indicated that neither solar farms affected property values in the local area, and in fact increased local activity.

The remainder of the existing solar farms in operation over 200 MW AC are located in areas where there is no adjacent development to study and these did not qualify for further analysis. The next section details the selected Existing Solar Farms in the adjacent property value impact study.

## SELECTION OF SITES AND ANALYSES

Because of the lack of large existing utility-scale solar installations in Kentucky, we expanded our analysis and reviewed other large solar farms in other states. We reviewed additional solar farms located in Kentucky; however, they were not candidates for a paired sale analysis due to external factors or lack of adjoining sales.

Based on our previous assessment of solar development, we have studied established solar farms in the Midwest/South (one in Georgia, two in Florida, one in Indiana, one in Minnesota, and one in Michigan) and the East (three in North Carolina and one in Virginia) because of their size and the way that soil conditions, climate, and topography contribute to property values and their potential for impact on property values in addition to the adjacent uses and development trends.

The selected solar sites in this analysis were considered based on their similarities in surrounding areas, size, and availability of arm's length adjoining property transaction data that were available for analysis. Of significance is the North Star Solar Farm located in Chisago County, Minnesota. This is a utility scale solar farm is located in a rural area surrounded by single family residences and agricultural land, similar to the proposed projects.

In total, we identified ten solar farms to study with comparable sales where generally the only difference was the attribute under study: proximity to a solar farm.

Ownership and sales history for each adjoining property to an existing solar farm through the effective date of this report is maintained within our workfile. Adjoining properties with no sales data or that sold prior to the announcement of the solar farm were excluded from further analysis. Adjoining properties that sold in a non-arm's length transaction (such as a transaction between related parties, bank-owned transaction, or between adjacent owners) were excluded from analysis as these are not considered to be reflective of market price levels. The adjoining properties that remained after exclusions were considered for a paired sale analysis.



The difference in price is considered to be the impact of the proximity to the solar farm. Two types of paired sales analyses were considered based on the availability of data:

- Comparing sales of adjoining properties prior to the announcement of the solar farm to sales of adjoining properties after announcement and subsequent development of the solar farm (a “Before and After Analysis”).
- Comparing sales of adjoining properties after the announcement and subsequent development of the solar farm to sales of comparable properties that are locationally removed from their influence.

We have considered both types of paired sales analyses in this study. We performed three “Before and After Analyses,” as defined above, for one solar farm in Indiana, one in Minnesota, and one in Florida. The remaining existing solar farms studied did not qualify for this Before and After Analysis due to lack of quantity of homogenous sale data. All ten solar farms qualified for the second type of paired sales analysis, which was comparing sales of properties locationally removed from the solar farm (Control Area) to sales of adjoining properties that occurred after the announcement and subsequent development of the solar farm project (Test Area).

We have found Control Area sales data through the local Multiple Listing Service (MLS) and other real estate broker databases and verified these sales through county records, conversations with brokers, the individual county’s GIS services, and the county assessor’s office. It is important to note that these Control Area Sales are not adjoining to any solar farm, nor do they have a view of a solar farm from the property. Therefore, neither the announcement nor the completion of the solar farm use could have impacted the sale price of these properties.

To make direct comparisons, the sale price of the Control Area Sales will need to be adjusted for market conditions to a common date. In this analysis, the common date is the date of the Adjoining Property Sale after the completion of the solar farm. After adjustment, any measurable difference between the sale prices would be indicative of a possible price impact by the solar farm, if any.

For the ten existing solar farms studied, a summary of the analysis completed for each solar farm studied is presented on the following pages. Details of these analyses are retained within our workfile, and will be provided to the client for their review (or to a party of the hearing), after execution of a specific Non-Disclosure Agreement relating to our research and interviews.

We also noted that our impact study data and methodology have been previously reviewed by our peer in the filed – Kirkland Appraisals, LLC – as well as by the Solar Energy Industries Association (SEIA).

**SOLAR FARM 1: NORTH STAR SOLAR FARM, CHISAGO COUNTY, MN****Coordinates:** Latitude 45.486756, Longitude -92.884206**PINs:** Multiple**Total Land Size:** ±1,000 Acres**Date Project Announced:** 2014**Date Project Completed:** October 2016**Output:** 100 MW AC**Overview and Surrounding Area:**

The North Star Solar Farm is located approximately four miles southeast of the City of North Branch in unincorporated Chisago County, near the intersection of Route 69 and Route 72. The solar farm was developed by Community Energy Solar in 2016 and is the largest solar farm in the Midwest. The solar farm features 440,000 solar panels and a power output capacity of 100 MW AC, which is enough to power 20,000 homes. The owner, North Star, LLC, has a 25-year purchase contract for the power produced by the project with Xcel Energy.

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Chisago County lies on Minnesota's eastern border, abutting the western border of Wisconsin, across the Saint Croix River. The North Star Solar Farm is approximately 16 miles west of the border with Wisconsin, and is just over one mile west of the Kost Dam public park and reservoir, a 28-acre park on the south branch of the Sunrise River.

### **The Immediate Area:**

The North Star Solar Farm is surrounded by agricultural land to the north and west. To the south and east of the project there are several residential properties, some of which are nestled within the actual solar farm.

All of the adjacent land parcels to the solar farm are used for agricultural or residential purposes.

The solar farm has agricultural and deer fencing around parts of the project. Additionally, native vegetation and trees previously existed as a buffer along the frontage roads.

**Prior Use:** Agricultural use

### **Real Estate Tax Information:**

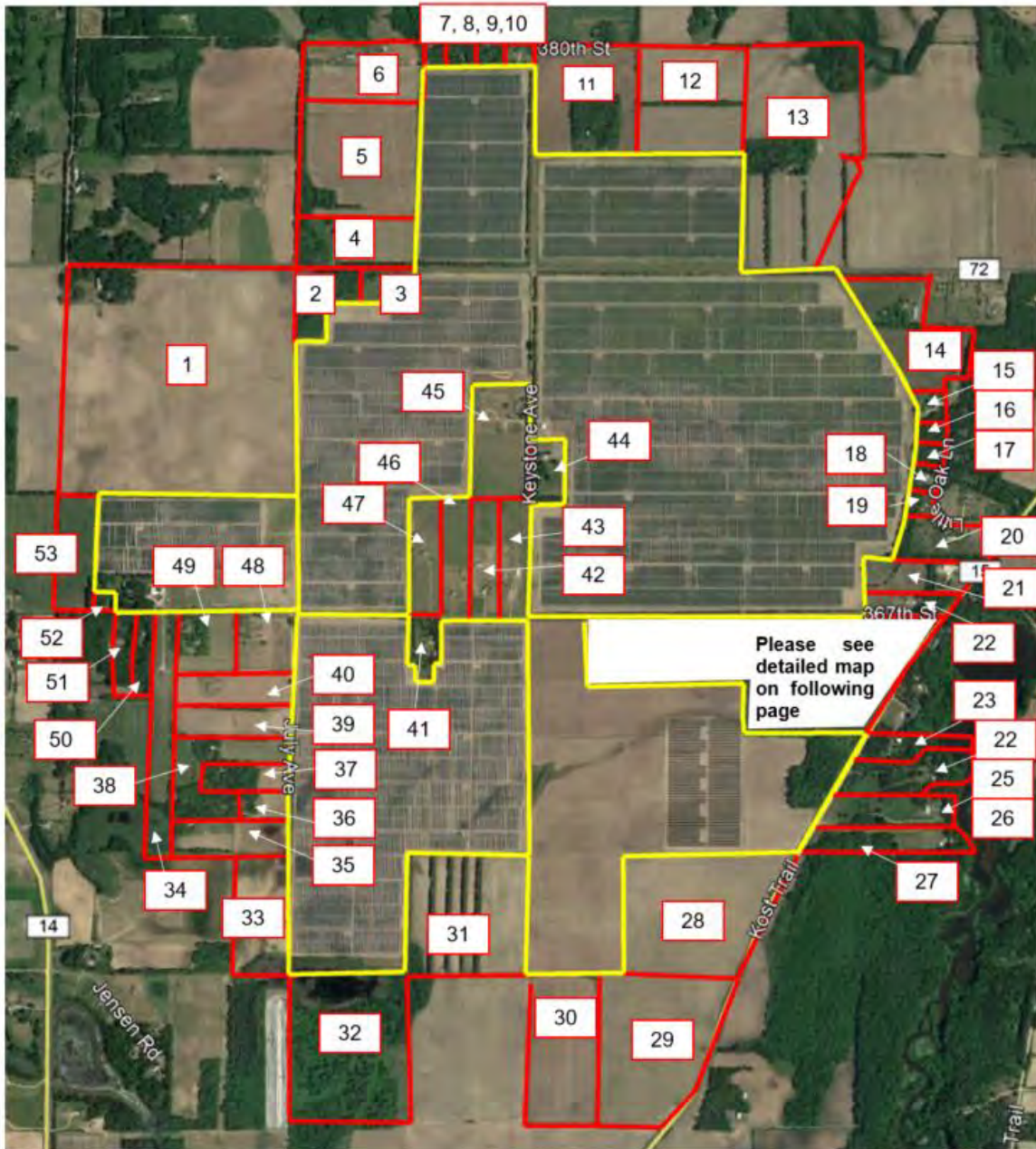
Prior to development of the solar farm, in 2015, this ±1,000-acre site paid real estate taxes of \$37,250, annually. After the solar farm development, in 2017, real estate taxes increased to \$112,856, a 203 percent increase in tax revenue for the site.

PIN	Acres	2015 Taxes Paid	2017 Taxes Paid	Tax Increase	2015 Assessed Value	2017 Assessed Value	Value Increase
<b>Chisago County, MN</b>							
09.00348.00	74.91	\$ 2,806	\$ 8,546	205%	\$ 198,800	\$ 233,900	18%
09.00349.00	74.30	\$ 2,818	\$ 8,578	204%	\$ 199,600	\$ 234,800	18%
09.00350.10	16.95	\$ 644	\$ 2,752	327%	\$ 45,600	\$ 75,300	65%
09.00351.10	68.01	\$ 3,260	\$ 9,806	201%	\$ 230,900	\$ 268,400	16%
09.00353.00	81.87	\$ 3,114	\$ 8,678	179%	\$ 220,500	\$ 237,500	8%
09.00354.00	121.84	\$ 4,578	\$ 13,324	191%	\$ 324,200	\$ 364,700	12%
11.00517.00	72.07	\$ 3,382	\$ 7,440	120%	\$ 194,400	\$ 224,100	15%
11.00528.00	66.42	\$ 1,460	\$ 6,836	368%	\$ 180,000	\$ 210,000	17%
11.00529.00	60.26	\$ 1,506	\$ 7,284	384%	\$ 168,700	\$ 168,800	0%
11.00726.00	40.55	\$ 1,010	\$ 3,968	293%	\$ 110,700	\$ 140,700	27%
11.00730.00	68.32	\$ 3,426	\$ 7,638	123%	\$ 315,700	\$ 338,200	7%
11.00731.00	160.83	\$ 3,598	\$ 17,924	398%	\$ 422,500	\$ 469,100	11%
11.00732.00	30.52	\$ 788	\$ 4,748	503%	\$ 84,900	\$ 109,500	29%
11.00732.10	10.00	\$ 4,860	\$ 5,334	10%	\$ 257,700	\$ 290,100	13%
<b>TOTAL</b>	<b>946.85</b>	<b>\$ 37,250</b>	<b>\$ 112,856</b>	<b>203%</b>	<b>\$ 2,954,200</b>	<b>\$ 3,365,100</b>	<b>14%</b>

### **Paired Sale Analysis:**

The maps on the following pages display the parcels that contain the solar farm (outlined in yellow). Properties adjoining this site (outlined in red) are numbered for subsequent analysis.

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North Star Solar Farm - Adjoining Properties

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North Star Solar Farm - Adjoining Properties

In reviewing Adjoining Properties to study in a Paired Sale Analysis, several properties and sales were considered but eliminated from further consideration as discussed below.

While assembling the solar development site, the developer of the solar farm acquired five homes along 367<sup>th</sup> Street, Adjoining Properties 41, 42, 43, 46, and 47, which are surrounded by the solar arrays. According to conversations with the developer, they purchased the homes prior to development to provide interim housing for employees as the solar farm was under construction or for potential use for the project area (which ultimately was not necessary). The developer purchased the houses at a premium above the appraised values. After construction, they sold all five homes after development to new buyers at market levels. The exception being Adjoining Property 47, which was purchased by the original owner. This indicates that the development of the North Star Solar Farm did not deter transactions nor affect sale prices in the surrounding area.

Clifford Sheppeck of Keller Williams Classic was hired by Renewable Energy Asset Co, LLC to market and sell the remaining four properties. We discussed these transactions with Mr. Sheppeck who indicated they all sold within two months, which was in line with the market.

In addition to the four homes sold by Mr. Sheppeck, we identified four other properties: Adjoining Properties 17, 37, 44 and 48, all which sold since the construction of the solar farm. This sums to be a total of six identified Adjoining Properties that sold.

Adjoining Property 41 is subject to an existing 30-year lease for the south 6.24 acres. Due to the additional rental income from the land, this sale was excluded from further analysis.

One of the sales, Adjoining Property 43, is an above-grade, two-story home with an atypical floor design. Most the homes in the area, while having similar gross living areas, are one-story, single-family homes with basements. We conducted a search in the area for comparable above-grade, two-story homes, but did not find sufficient data. Mr. Sheppeck was the listing broker for this property and confirmed its atypical nature. He indicated that it sold at a price that was in-line with the market even though two-story homes are considered to be rare. Due to limited sales in the area, Adjoining Property 43 was excluded from further analysis.

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Another sale, Adjoining Property 37 was a home designed specifically as a passive solar home, taking advantage of the same renewable energy potential of the North Star solar farm. The property is set back behind five acres of agricultural land and is secluded behind trees and operates as a mixed-use “hobby farm.” This is a highly atypical use with no comparable sales. For these reasons, Adjoining Property 37 was excluded from further analysis.

Another sale, Adjoining Property 44, is a ranch-style home with an inferior quality of construction and an inferior basement; sale listing materials indicated deferred maintenance. Most comparable sales either have finished or walk-out basements and average to above-average construction and condition quality. Due to limited comparable sales for this type of property, Adjoining Property 44 was excluded from further analysis.

Adjoining Properties 17, 42, 46, and 48 were considered for a paired sales analysis, and we analyzed these properties as single-family home uses. The improvements on these properties are located between 335 to 630 feet to the nearest solar panel.

Test Area Sales - Group 1									
Adj. Property #	Address	Median Sale Price	Median Site Size (AC)	Median Beds	Median Baths	Median Year Built	Median GLA (SF)	Median Sale Date	Median Price PSF
17, 42, 46, 48	37096 LITTLE OAK LN, 10505 367TH ST, 10200 367TH ST, 10132 367TH ST	\$309,500	10.74	4	2.0	2001	2,229	Jul-17	\$139.13

We analyzed 11 Control Area Sales, single family homes with similar location, construction, square footages, lot sizes, and ages that sold within a reasonable time frame from the median sale date of the Test Area Sales.

We identified and analyzed 11 Control Area Sales that were comparable in location, size, and use that were not located in close proximity to the solar farm. The Control Area Sales for Group 1 are split-level homes with between 3 and 4 bedrooms and 1.5 to 4 bathrooms. We excluded sales that were bank-owned, and those between related parties.

The Control Area Sales were adjusted for market conditions using a regression to identify the appropriate monthly market conditions adjustment. The results of our analysis for the North Star Solar Farm are presented below.

CohnReznick Paired Sale Analysis North Star Solar Group 1		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Test Area Sales (4)	Adjoining solar farm	\$139.13
Control Area Sales (11)	No: Not adjoining solar farm	\$138.54
Difference between Unit Price of Test Area Sales and Adjusted Median Unit Price of Control Area Sales		0.43%

**Noting no significant marketing time differential**, the Test Area Sales sold between 21 and 57 days on market (1-2 months) and a median of 32 days on market, while the Control Area Sales sold between 3 and 190 days on market (0-7 months) and a median of 30 days on market.

**Noting no negative price differential**, with the Test Area Sales having a slightly higher unit sale price than the Control Area Sales, it does not appear that North Star solar project had any negative impact on adjacent property values.

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**A Repeat Sales Study (Before and After Construction of the Solar Farm Analysis):**

In a 2017 study conducted by Chisago County Assessor John Keefe, Keefe analyzed the numbers for 15 parcels alongside or near the North Star Solar Farm that sold between January 2016 and October 2017. Based on trends exhibited by 750+ sales throughout the county, Keefe concluded that the homes, located on 375<sup>th</sup>, 367<sup>th</sup>, Keystone, Little Oak, Lincoln Trail, and Kost Trail were all “in excess of assessed” and reported that “valuation hasn’t suffered.”<sup>7</sup>

Considering Keefe’s 2017 study, we conducted a supplemental analysis in which we compared the sale prices of three recently sold parcels that are adjacent to the North Star Solar Farm (Test Area Group) to the previous sale price of the home, commonly known as a “Repeat Sales Analysis” utilizing a sale and resale of the same property. These sales reflect the average site size, home type, and home size of properties in the surrounding area. In our comparison for each property analyzed, we calculated the total appreciation between each sale, the number of months that elapsed between each sale, and determined the monthly appreciation rate for the property. We then compared the extracted monthly appreciation rates to the change in the Federal Housing Finance Agency (FHFA) Home Price Index in Minnesota’s 55056 zip code (where the studied homes are located) over the same period. The index for zip codes is only measured on a yearly basis and is presented to the right.

We conducted the same analysis for eight single-family properties that are not within proximity to the North Star Solar Farm (Control Area Group), but are within the North Branch, MN market. The tables on the following page present this study.

In the Test Group, there was one sale with a negative appreciation rates that originally sold in 2006 (37096 Little Oak Drive). In the Control Group, there were also two sales with negative appreciation rates that originally sold in 2005 and 2007 (40956 Greystone Avenue and 5183 366th Street, respectively). During the calendar years of 2005 to 2007, Housing Index Prices in the United States were reaching their peaks. Considering the rapid growth in housing prices that occurred during these years prior to the market crash, from which the local market has not yet recovered, the negative appreciation rate exhibited by these sales is explainable by economic conditions, as demonstrated in the red boxes to the right.

55056 Zip Code - Housing Index Change (Year Over Year) Seasonally Adjusted			
Year	January 1 Index	Annual Change (%)	Compounded Monthly Change (%)
1991	100.00		
1992	100.79	0.79%	0.07%
1993	105.04	4.22%	0.34%
1994	109.85	4.58%	0.37%
1995	121.61	10.71%	0.85%
1996	126.82	4.28%	0.35%
1997	133.89	5.57%	0.45%
1998	140.46	4.91%	0.40%
1999	150.11	6.87%	0.56%
2000	168.93	12.54%	0.99%
2001	187.35	10.90%	0.87%
2002	200.52	7.03%	0.57%
2003	212.90	6.17%	0.50%
2004	227.02	6.63%	0.54%
2005	246.19	8.44%	0.68%
2006	252.09	2.40%	0.20%
2007	242.87	-3.66%	-0.31%
2008	222.73	-8.29%	-0.72%
2009	196.67	-11.70%	-1.03%
2010	178.91	-9.03%	-0.79%
2011	162.98	-8.90%	-0.77%
2012	155.47	-4.61%	-0.39%
2013	164.16	5.59%	0.45%
2014	175.11	6.67%	0.54%
2015	186.01	6.22%	0.50%
2016	203.39	9.34%	0.75%
2017	218.69	7.52%	0.61%
2018	232.70	6.41%	0.52%
2019			

<sup>7</sup> <https://www.cleanenergyresourceteams.org/chisago-county-boards-real-estate-update-shows-solar-has-no-impact-property-values>



Test Area Group												55056 Zip Code - FHFA Housing Index Change			
Address	Land Area (Acres)	Total Finished Living Area	Most Recent Sale Date	Most Recent Sale Price	Most Recent Sale Unit Price	Prior Sale Date	Prior Sale Price	Prior Sale Unit Price	Total Appreciation	Months Elapsed between Sales	Monthly Appreciation Rate	Most Recent Sale Index Level	Prior Sale Index Level	Total Appreciation	Monthly Appreciation Rate
10009 375th Street	5.10	1,040	3/30/2016	\$219,900	\$211.44	3/4/2005	\$163,000	\$156.73	34.91%	133	0.23%	203.39	246.19	-17.38%	-0.14%
10505 367th Avenue	5.00	1,890	8/19/2016	\$260,500	\$137.83	4/30/1999	\$123,294	\$65.23	111.28%	208	0.36%	203.39	150.11	35.49%	0.15%
37096 Little Oak Drive	2.10	2,412	4/11/2017	\$289,000	\$119.82	1/27/2006	\$308,000	\$127.69	-6.17%	134	-0.05%	218.69	252.09	-13.25%	-0.11%
<i>Median - All Test Area</i>	<i>5.00</i>	<i>1,890</i>			<i>\$137.83</i>			<i>\$127.69</i>			<i>0.23%</i>				<i>-0.11%</i>

Control Area Group												55056 Zip Code - FHFA Housing Index Change			
Address	Land Area (Acres)	Total Finished Living Area	Most Recent Sale Date	Most Recent Sale Price	Most Recent Sale Unit Price	Prior Sale Date	Prior Sale Price	Prior Sale Unit Price	Total Appreciation	Months Elapsed between Sales	Monthly Appreciation Rate	Most Recent Sale Index Level	Prior Sale Index Level	Total Appreciation	Monthly Appreciation Rate
10589 Wilcox Road	5.00	2,050	7/6/2016	\$262,500	\$128.05	9/26/2007	\$223,700	\$109.12	17.34%	105	0.15%	203.39	242.87	-16.26%	-0.17%
5183 366th Street	2.29	1,530	7/28/2016	\$201,000	\$131.37	4/13/2007	\$207,000	\$135.29	-2.90%	112	-0.03%	203.39	242.87	-16.26%	-0.16%
40956 Greystone Avenue	2.03	2,571	8/26/2016	\$267,776	\$104.15	8/18/2005	\$285,900	\$111.20	-6.34%	132	-0.05%	203.39	246.19	-17.38%	-0.14%
4359 Elk Court	2.50	1,970	1/10/2017	\$263,000	\$133.50	11/25/1998	\$175,365	\$89.02	49.97%	218	0.19%	218.69	105.04	108.20%	0.34%
39088 More Ferry Road	5.00	1,838	1/27/2017	\$229,000	\$124.59	9/29/2005	\$185,000	\$100.65	23.78%	136	0.16%	218.69	246.19	-11.17%	-0.09%
4737 377th Street	2.50	2,002	6/28/2017	\$230,000	\$114.89	7/20/1999	\$138,400	\$69.13	66.18%	215	0.24%	218.69	150.11	45.69%	0.17%
6417 360th Street	5.00	2,196	7/7/2017	\$325,010	\$148.00	5/16/2008	\$270,000	\$122.95	20.37%	110	0.17%	218.69	222.73	-1.81%	-0.02%
8628 380th Street	5.00	1,842	7/10/2017	\$275,000	\$149.29	4/23/2010	\$203,000	\$110.21	35.47%	87	0.35%	218.69	178.91	22.23%	0.23%
<i>Median - All Control Area</i>	<i>3.75</i>	<i>1,986</i>			<i>\$129.71</i>			<i>\$109.66</i>			<i>0.16%</i>				<i>-0.05%</i>

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Most home sites outside of a subdivision in this area are within the 2.00- to 5.00-acre range, as depicted in the Control Area Group chart on the prior page. The median gross living area for each group differs by less than 100 square feet of living area. The analysis described in this section, however, does not require us to make adjustments to the sales as we are only evaluating the difference in appreciation rates between a sale and resale of the same property.

As mentioned earlier in the report, the developer of the solar farm purchased 10505 367<sup>th</sup> Avenue at an above-market rate due to the assemblage of the solar farm site. This sale took place in between the April 1999 and August 2016 transactions displayed in the chart on the previous page. Given these circumstances, we excluded the non-market assemblage sale in this analysis and only considered market-oriented transactions.

The Test Area Group's and the Control Area Group's median monthly appreciation rate are nearly identical. When compared to the FHFA home price index for the zip code, both groups outperformed the average for the zip code as depicted in the far right column in the charts on the prior page. As such, we concur with Keefe's conclusion that there does not appear to be a consistent detrimental impact that has occurred to adjacent property to the North Star Solar Farm.

**SOLAR FARM 2: DOMINION INDY SOLAR III, MARION COUNTY, IN**

**Coordinates:** Latitude 39°39'14.16"N, Longitude 86°15'35.06"W

**PIN:** 49-13-13-113-001.000-200

**Total Land Size:** 129.04 acres

**Date Project Announced:** August 2012

**Date Project Completed:** December 2013

**Output:** 8.6 MW AC (11.9 MW DC)



*Aerial imagery retrieved from Google Earth*

**Overview and Surrounding Area:**

The Dominion Indy III Solar Farm was developed by Dominion Renewable Energy and became operable in December 2013. This solar farm has ground-mounted solar panels and has the capacity for 8.6 Megawatts (MW) AC of power. The panels are mounted in a fixed tilt fashion with 12 inverters.

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The Dominion Indy III solar farm is located in Decatur Township, in the southwest portion of Marion County, Indiana. The solar farm is approximately 10 miles southeast of the Indianapolis International Airport and approximately eight and a half miles from the center of Indianapolis.

### **The Immediate Area:**

The solar installation is on the southern side of West Southport Road. Adjoining parcels to the west, south, and east are agricultural in nature, actively farmed primarily with row crops and large areas of mature trees. There is one single family home on 4.78 acres of land at the northwest corner of the solar site, with frontage on West Southport Road, identified in our analysis as Adjoining Property 9.

To the north, across West Southport Road from the solar site, is the single-family residential subdivision known as Crossfield. Originally developed with over 81 acres of land by the Key Life Insurance Company, the one- and two-story homes in the subdivision were built between approximately 1998 and 2011.

All of the adjacent land parcels to the solar farm are used for agricultural or residential purposes.

The solar farm is surrounded by a chain link fence that contains all the solar panels. Additionally, there are some natural shrubs and deciduous trees on all sides of the property; this vegetation was in place before the solar farm was developed.

**Prior Use:** Agricultural use

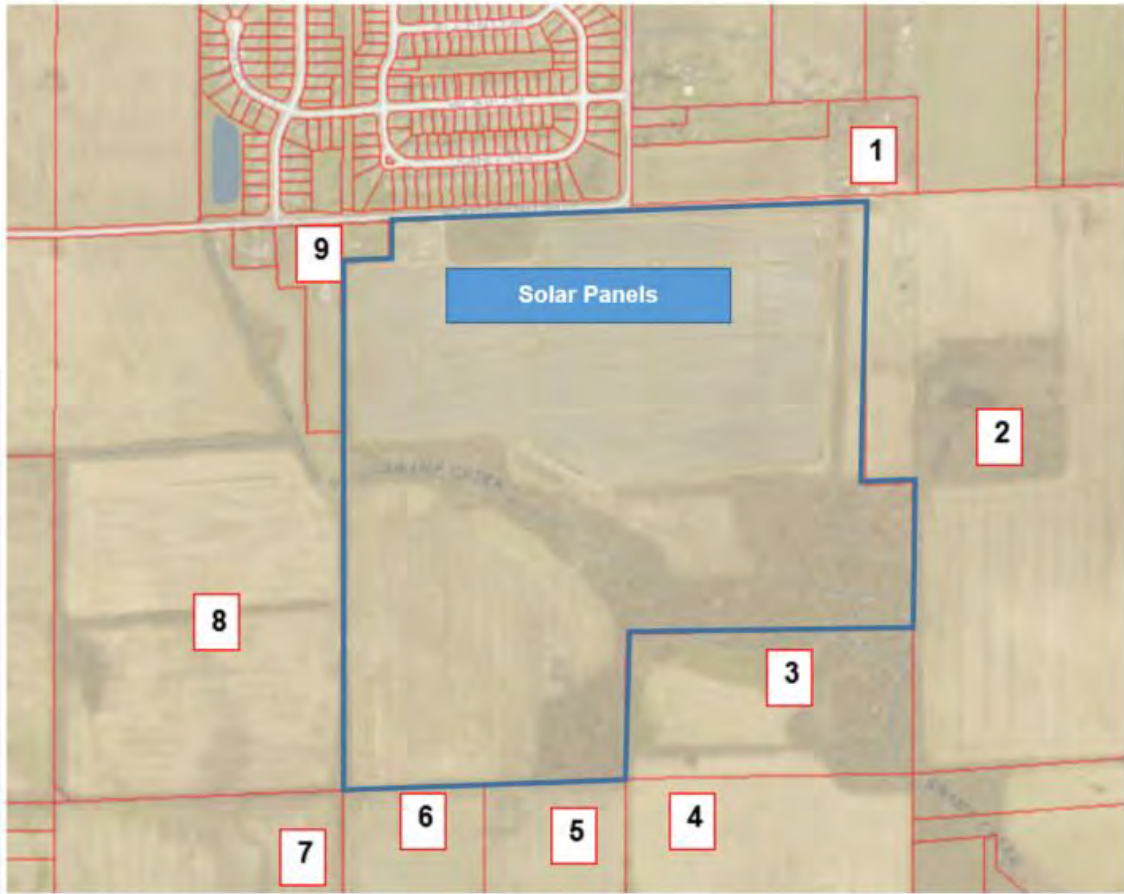
**Real Estate Tax Information:** Prior to development of the solar farm, in 2013, the owner of this 129-acre site paid real estate taxes of \$1,788 annually. After development of the solar farm development, in 2015, real estate taxes increased to approximately \$16,405, an 818 percent increase in tax revenue for the site.

PIN	Acres	2013 Taxes Paid	2015 Taxes Paid	Tax Increase	2013 Assessed Value	2015 Assessed Value	Value Increase
Marion County, IN 49-13-13-113-001.000-200	129.04	\$ 1,788	\$ 16,405	818%	\$ 89,400	\$ 109,900	23%
<b>TOTAL</b>	<b>129.04</b>	<b>\$ 1,788</b>	<b>\$ 16,405</b>	<b>818%</b>	<b>\$ 89,400</b>	<b>\$ 109,900</b>	<b>23%</b>

### **Paired Sale Analysis:**

The maps on the following pages display the parcels within the solar farm is located (outlined in blue). Properties adjoining this site are numbered for subsequent analysis.

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Dominion Indy III - Adjoining Properties

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Dominion Indy III - Adjoining Properties

We have considered two types of paired sales analysis with regards to the Dominion Indy III Solar Farm. The first compares sales of Adjoining Properties to the solar farm after the completion of the solar farm site (Test Area Sales) to similar properties not proximate to the solar farm (Control Area Sales). We utilized this type of paired sale analysis for all three Groups of Adjoining Properties under study.

The second type of paired sale analysis is known as a Before and After analysis which compares sales of Adjoining Properties that occurred prior to the announcement of the solar farm with the sales of the same Adjoining Properties after the completion of the solar farm development. We were able to use home sale data from the Crossfield subdivision that is located to the north of the solar site, across West Southport Road.

### Group 1 – Agricultural Land

Adjoining Property 2 is a vacant 86.96-acre agricultural parcel located to the east of the solar site. Adjoining Property 2 sold in October 2017 and was considered for a paired sale analysis, known as a Test Area Sale, in Group 1.

The property line of this unimproved parcel is approximately 166 feet from the closest solar panel. The following table outlines the other important characteristics of Adjoining Property 12.

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Test Area Sale								
Group 1 - Agricultural Land								
Adjoining Property #	Address	Sale Price	Site Size (AC)	NCCPI Index	Wetlands	Floodplain	Sale Price/AC	Sale Date
Adjoining Property 2	5755 W Southport Rd, Indianapolis, IN	\$738,584	89.96	63.4	1%	Zone X	\$8,210	Oct-17

Crop yields have been the basis for establishing a soil productivity index, and are used by county assessors, farmers, and market participants in assessing agricultural land. While crop yields are an integral part in assessing soil qualities, it is not an appropriate metric to rely on because “yields fluctuate from year to year, and absolute yields mean little when comparing different crops. Productivity indices provide a single scale on which soils may be rated according to their suitability for several major crops under specified levels of management such as an average level.” The productivity index, therefore, not crop yields, is best suited for applications in land appraisal and land-use planning.

The United States Department of Agriculture’s (USDA) National Resources Conservation Services (NRCS) developed and utilizes the National Commodity Crop Productivity Index (NCCPI) as a national soil interpreter and is used in the National Soil Information System (NASIS), but it is not intended to replace other crop production models developed by individual states.<sup>8</sup> The focus of the model is on identifying the best soils for the growth of commodity crops, as the best soils for the growth of these crops are generally the best soils for the growth of other crops.<sup>9</sup> The NCCPI model describes relative productivity ranking over a period of years and not for a single year where external influences such as extreme weather or change in management practices may have affected production. At the moment, the index only describes non-irrigated crops, and will later be expanded to include irrigated crops, rangeland, and forestland productivity.<sup>10</sup>

Yields are influenced by a variety of different factors including environmental traits and management inputs. Tracked climate and soil qualities have been proven by researchers to directly explain fluctuations in crop yields, especially those qualities that relate to moisture-holding capacity. Some states such as Illinois have developed a soil productivity model that considers these factors to describe “optimal” productivity of farmed land. Except for these factors, “inherent soil quality or inherent soil productivity varies little over time or from place to place for a specific soil (map unit component) identified by the National Cooperative Soil Survey (NCSS).”<sup>11</sup> The NRCS Web

<sup>8</sup> Agricultural land rental payments are typically tied to crop production of the leased agricultural land and is one of the primary reasons the NCCPI was developed, especially since the model needed to be consistent across political boundaries.

<sup>9</sup> Per the User Guide for the National Commodity Crop Productivity Index, the NCCPI uses natural relationships of soil, landscape and climate factors to model the response of commodity crops in soil map units. The present use of the land is not considered in the ratings.

<sup>10</sup> AgriData Inc. Docs: [http://support.agridatainc.com/NationalCommodityCropProductivityIndex\(NCCPI\).ashx](http://support.agridatainc.com/NationalCommodityCropProductivityIndex(NCCPI).ashx)

<sup>11</sup> USDA NRCS’s User Guide National Commodity Crop Productivity Index (NCCPI)

Soil Survey website has additional information on how the ratings are determined. The **State of Indiana** does not have its own crop production model and utilizes the NCCPI.

In analyzing agricultural land sales for Control Area Sales with similar characteristics to Adjoining Property 12, we have excluded any parcels with NCCPI soil indices less than 50.0 and greater than 85.0.

We identified and analyzed four Control Area Sales that were comparable in location, size, and use that were not located in close proximity to the solar farm. The Control Area Sales for Adjoining Property 2 are land tracts that were larger than 20 acres and utilized specifically as farmland. We excluded sales that were bank-owned, those between related parties, split transactions, and land with significant improvements.

The Control Area Sales were adjusted for market conditions using a regression and trend analysis to identify the appropriate monthly market condition adjustment. Using the agricultural land sale data published in the *Land Sales Bulletin*,<sup>12</sup> from January 2016 through December 2017, which includes reliable and credible data for analysis, we extracted a monthly rate of change of 0.50 percent.

The results of our analysis for Adjoining Property 2, in Group 1 is presented below.

CohnReznick Paired Sale Analysis Dominion Indy III Solar Group 1 - Agricultural Land		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per Acre
Test Area Sale (Adjoining Property 2)	Yes: Solar Farm was completed by the sale date	\$8,210
Control Area Sales (4)	No: Not adjoining solar farm	\$8,091
Difference between Unit Price of Test Area Sale and Adjusted Median Unit Price of Control Area Sales		1.47%

It is noted that we have kept this analysis within our study despite it being the sole land-only analysis. While we have not tabulated the difference in our reconciled average of variance (from study to study), this is important because it shows that agricultural land adjacent to solar but also lying in the future path of development does not show any degradation of value.

**Noting the relatively low price differential**, in which the Test Area Sale was higher than the median for the Control Areas Sales, it does not appear that the Dominion Indy III solar farm had any negative impact on the adjoining agricultural property values.

<sup>12</sup> <https://www.landsalesbulletin.com/>



We identified a total of nine Adjoining Properties that sold after the development of the solar farm as single-family home uses. Adjoining Properties 11, 13, 14, 15, 18, 20, 22, 24 and 26 were analyzed in two paired sales analyses (Group 2 and Group 3). These nine properties were analyzed as single-family homes and they are located in the Crossfield subdivision, across West Southport Road from the solar site, as seen in the prior aerials.

It should be noted that Adjoining Properties 11 and 24 have sold more than once since the solar farm was constructed, and each sale is included in the analysis. Adjoining Property 11 sold first in December 2015 and later in July 2018, approximately two and a half years later. Adjoining Property 24 sold first in February 2014 and later in April 2019, approximately five years later. Our research indicated that these were arm's-length sales between typically motivated buyers and sellers.

The nine Adjoining Properties that were included in our paired sales analysis were divided into two groups, based on the sale dates of the Test Area Sales.

## Group 2

For Group 2 (sales in 2014 – 2016), we analyzed four Control Area Sales with similar location, square footages, lot sizes, and ages that sold within a reasonable time frame from the median sale date of the Group 2 Test Area Sales described below.

Dominion Indy III Solar Test Area Sales Group 2									
Adj. Property #	Address	Median Sale Price	Median Site Size (AC)	Median Beds	Median Baths	Median Year Built	Median Square Feet	Median Sale Date	Median Price PSF
11, 20, 22, 24	5933 Sable Dr, 5829 Sable Dr, 5813 Sable Dr, 5737 Sable Dr	\$129,375	0.23	4	2.0	2008	2,163	Jul-15	\$59.10

The Test Area Sales in Group 2 are located between 230 feet and 404 feet from the house to the solar panels. The Control Area Sales for Group 2 are located beyond this area in other areas of the Crossfield subdivision and in other nearby subdivisions. The Control Area Sales did not have a view of the solar farm.

## Group 3

For Group 3 (sales in 2017 - 2019), we analyzed a set of seven Control Area Sales with similar locations, square footages, lot sizes, and ages that sold within a reasonable time frame from the median sale date of the Group 3 Test Area Sales described on the next page.

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Test Area Sales Group 3									
Adj. Property #	Address	Median Sale Price	Median Site Size (AC)	Median Beds	Median Baths	Median Year Built	Median Square Feet	Median Sale Date	Median Price PSF
11, 13, 14, 15, 18, 24, 26	5933 Sable Dr, 5921 Sable Dr, 5921 Sable Dr, 5915 Sable Dr, 5909 Sable Dr, 5841 Sable Dr, 5737 Sable Dr, 5731 Sable Dr	\$169,900	0.23	3	2.5	2006	2,412	Jul-18	\$72.15

The Test Area Sales in Group 3 are located between 227 feet and 419 feet from the house to the solar panels. The Control Area Sales are located beyond this area, in other areas of the Crossfield Subdivision, and in other nearby subdivisions. The Control Area Sales did not have a view of the solar farm.

Control Area Sales in Groups 2 and 3 were adjusted for market conditions using a regression analysis to identify the appropriate monthly market condition adjustment. The results of our study are presented below.

CohnReznick Paired Sale Analysis Dominion Indy III Solar Group 2		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Test Area Sales (4)	Adjoining solar farm	\$59.10
Control Area Sales (8)	No: Not adjoining solar farm	\$57.84
Difference between Unit Price of Test Area Sales and Adjusted Median Unit Price of Control Area Sales		2.18%

CohnReznick Paired Sale Analysis Dominion Indy III Solar Group 3		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Test Area Sales (7)	Adjoining solar farm	\$72.15
Control Area Sales (11)	No: Not adjoining solar farm	\$71.69
Difference between Unit Price of Test Area Sales and Adjusted Median Unit Price of Control Area Sales		0.65%

The Test Area Sales for Group 2 sold with a median of 33 days on market, while the Control Area Sales for Group 2 sold with a median of 31 days on market. The Test Area Sales for Group 3 sold with a median of 17

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days on market, while the Control Area Sales for Group 3 sold with a median of 25 days on market. There is no **significant negative marketing time differential**.

**Noting the relatively low price differentials**, it does not appear that the Dominion Indy III solar farm had any negative impact on adjoining residential property values.

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### **Before Announcement and After Construction of the Solar Farm Analysis:**

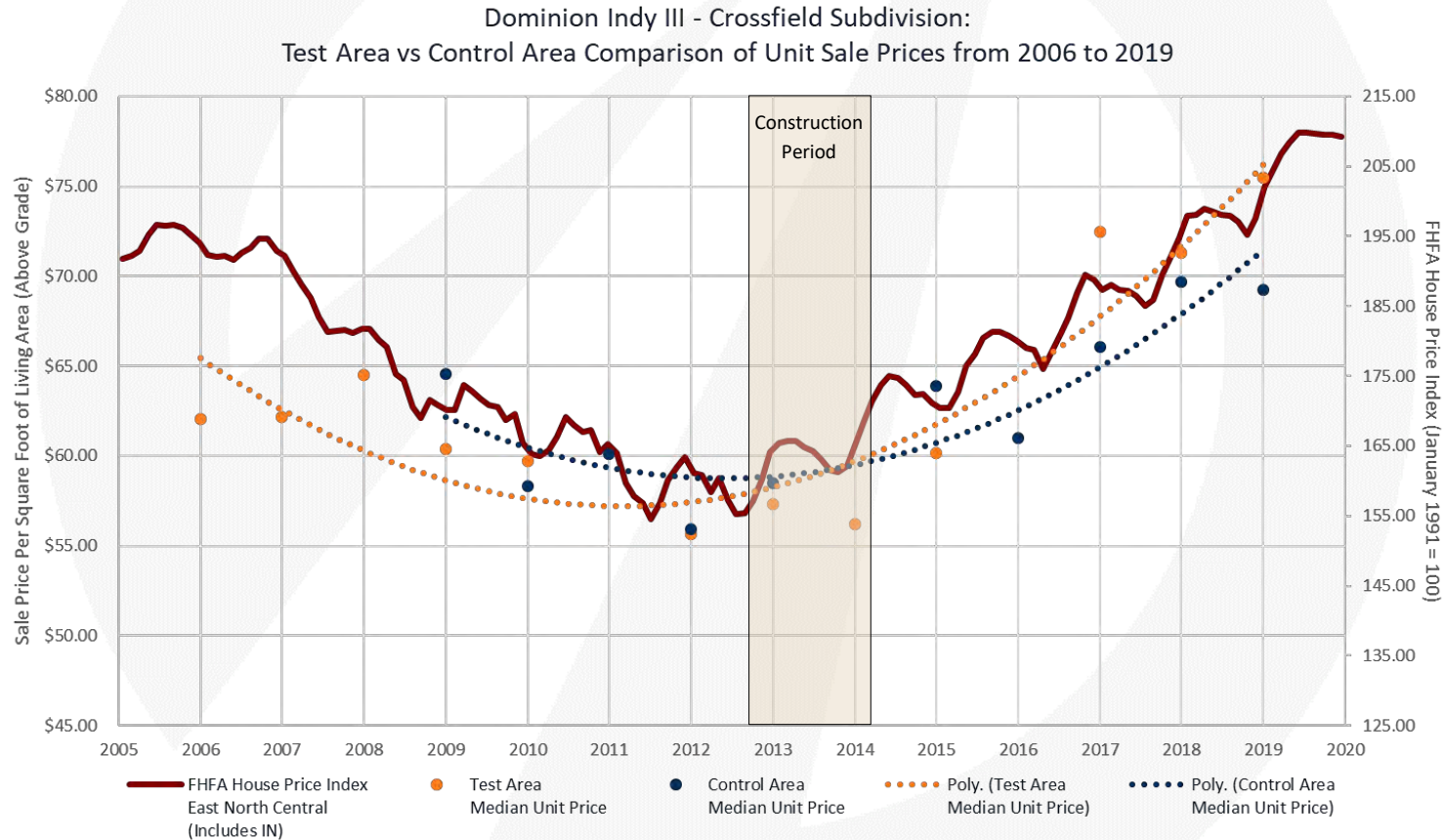
Due to the number of sales over time in the Crossfield subdivision, we were able to conduct an analysis on the unit prices of single-family homes before the solar farm announcement date in comparison to the prices of single-family homes after the construction of the Dominion Indy III solar farm. We have provided our conclusions from the data below and the following page contains a chart with the data.

- 25 Test Area Sales were sold from 2006 to 2019 and 46 Control Area Sales sold from 2008 to 2019.
  - The Test Area Sales are homes located adjoining the Dominion Indy III Solar Farm in the Crossfield subdivision.
  - The Control Area Sales are homes located in the remainder of the Crossfield subdivision, not adjoining the solar farm.
- In both the Test Area Sales (ORANGE) and Control Area Sales (BLUE) plotted on the chart on the following page, new construction homes sold through 2011, prior to announcement of the solar farm.
- The dotted lines are polynomial trend lines plotted by Microsoft Excel in order to illustrate and approximate the “average” trend of each set of data.
- The economic climate improved in the period from 2013 to 2019 as shown by the Red line representing the Federal Housing Finance Agency’s House Price Index for the East North Central region that includes Indiana. After construction of the solar farm, in parallel with the improving economic climate, it appears that unit prices for both the Test Area Sales and the Control Area Sales appreciated at a similar rate over the period from 2013 to 2019.

A difference in appreciation rates does not appear to exist between Test Area Sale homes versus the Control Area Sale homes.

Sale prices of single-family homes after the construction of the solar farm exhibit a similar appreciation trend as sales prior to the solar farm announcement. Overall, our findings indicate that there *is not a consistent and measurable difference* in prices that exists in association with homes proximate to the Dominion Indy III solar farm.

**Before Announcement and After Construction of the Solar Farm Analysis:**



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**SOLAR FARM 3: DOUGHERTY SOLAR, DOUGHERTY COUNTY, GEORGIA**

**Coordinates:** Latitude 31.305614, Longitude 84.022637

**PIN:** 00144/00001/03D, 00120/00001/007,00146/00001/01B

**Total Land Size:** ±1,037.42 Acres

**Date Project Announced:** August 2018

**Date Project Completed:** November 2019

**Output:** 120 MW AC



*Aerial imagery retrieved from Google Earth*

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The 120 MW AC capacity, Dougherty Solar project was developed by NextEra in 2019. This solar site is expected to generate \$10 million in tax revenue over its lifetime. The project sits on a  $\pm 1,037.42$ -acre site which was a former agricultural land site. Georgia Power signed a 30-year Power Purchase Agreement with NextEra Energy to buy the solar generated power and NextEra Energy owns and maintains the installation. The solar facility consists of 5,232 rows of support beams for 440,535 solar panels.

**The Surrounding Area:** The Dougherty County Solar project is located in unincorporated Dougherty County, with a city of Albany mailing address, Georgia. Georgia Route 3 (Liberty Expressway) is approximately 4.5 mile west of the solar site, and connects the surrounding area to downtown Albany, which is approximately 8 miles northwest of the solar site. We note the nearest interstate, Interstate 75, is approximately 31 miles east of the solar site. The surrounding area is rural in nature with agricultural and low density residential uses surrounding the property.

**The Immediate Area:** Within a one-mile radius of the solar farm, surrounding uses mainly consist of agricultural land, with some single-family homes to the south and the northwest. Adjacent land parcels to the solar farm are mainly residential, with some agricultural uses. Additional surrounding land uses are an industrial use to the southeast of the southern-most panels. The majority of the residential housing is located to the south of the solar site, along Spring Flats Road, with some homes located along Gaisert Road to the northeast.

The solar site is built on a large, mostly flat agricultural site. The site is bounded by Spring Flats Road and Moultrie Road to the south with single family homes along these roads, agricultural land to the west, vacant land to the east, and agricultural land and more single family homes to the north. The adjoining homes sites are all buffered from the solar site by mature trees, bushes, and other shrubbery.

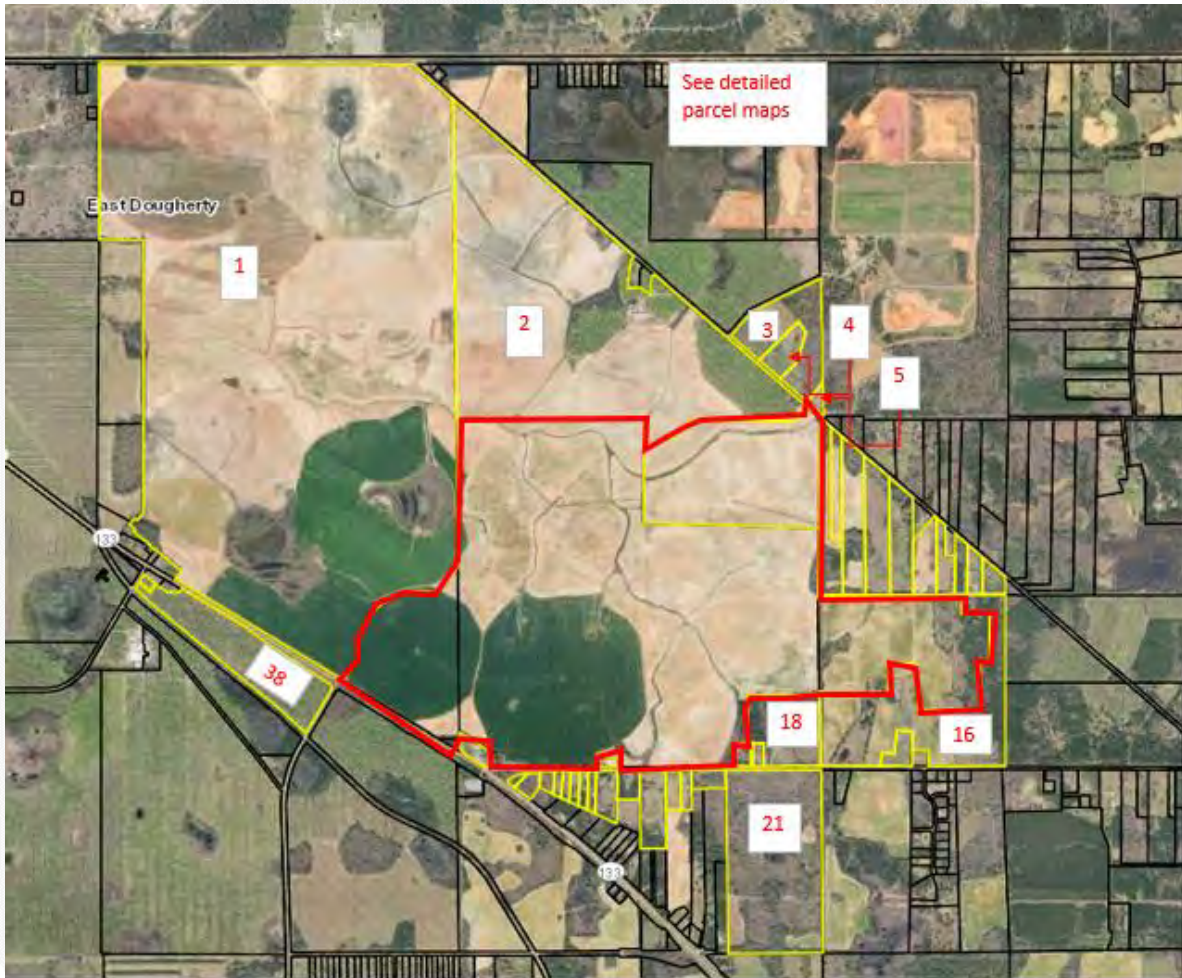
**Prior Use:** Agricultural use

**Real Estate Tax Information:** The assessed value in Dougherty County has not changed for the solar parcel since decreased slightly from 2018, prior to the development of the solar farm, to 2020, after the development of the solar farm. We note \$61,000 of this decrease is due to the demolition of existing improvements (Parcel 00120/00001/007). Removing the improvements from the 2018 assessed value only accounts for a decrease of 0.32% from this parcel, although given the solar farm's recent construction it is possible the site would be reassessed during the next cycle. Historical real estate taxes are not available from Dougherty County public records.

Parcel IDs	Acres	2018 Assessed Value	2020 Assessed Value	Value Increase
<b>Dougherty County</b>				
00144/00001/03D	143.75	\$546,300.00	\$546,300.00	0.00%
00120/00001/007	792.98	\$2,253,000.00	\$2,185,100.00	-3.11%
00146/00001/01B	100.69	\$398,600.00	\$398,600.00	0.00%
<b>Total</b>	<b>1,037.42</b>	<b>\$3,197,900.00</b>	<b>\$3,130,000.00</b>	<b>-2.17%</b>

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The maps below and following display the solar project (parcels outlined in red). Properties adjoining the solar site are outlined in yellow and numbered for subsequent analysis. We note the Dougherty County GIS has not updated its aerial imagery to include the solar panels on the solar site.



Dougherty Solar - Adjoining Properties

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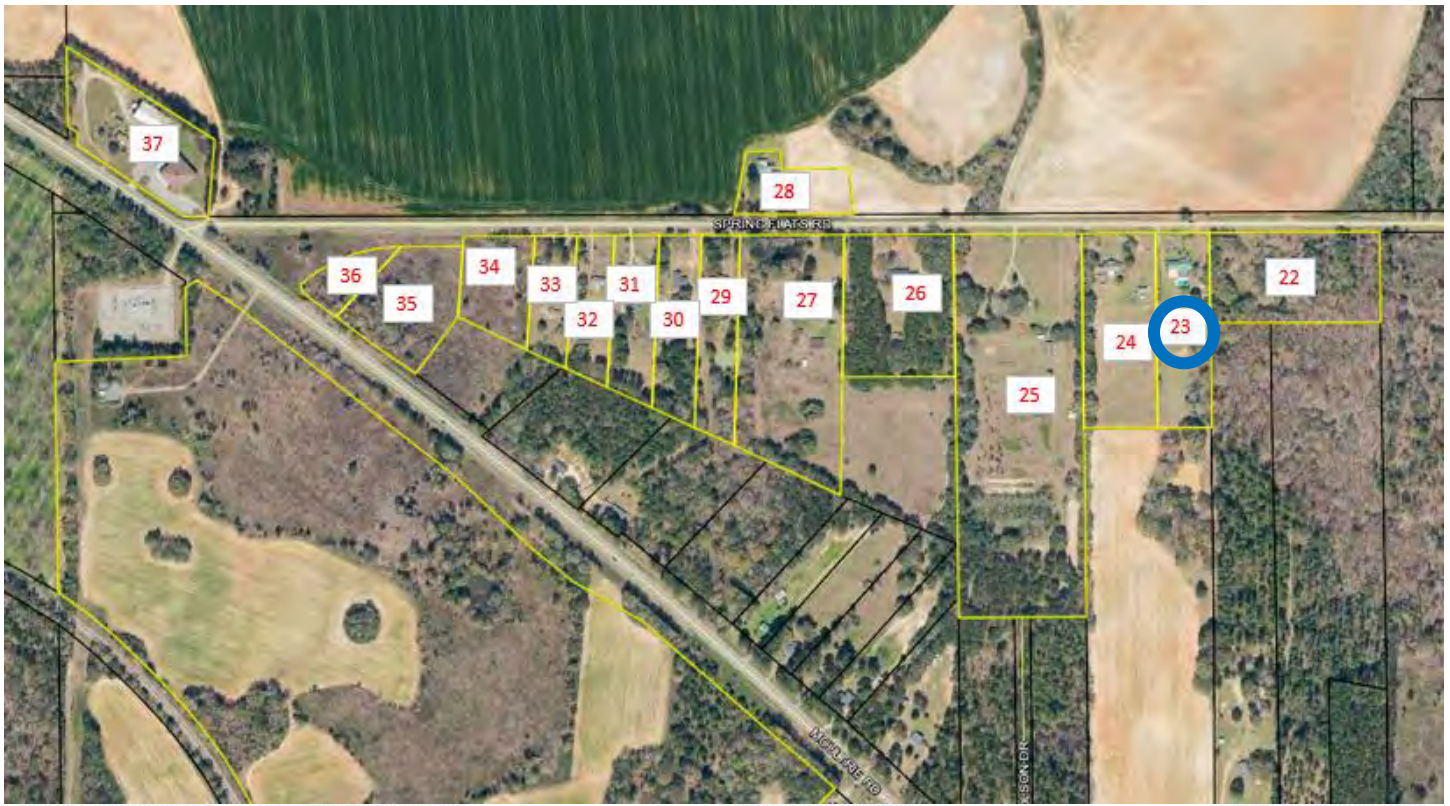
Dougherty Solar - Adjoining Properties

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Dougherty Solar - Adjoining Properties

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Dougherty Solar - Adjoining Properties

Adjoining Properties 1-18, 20, 21, 24-31, 33-38 all sold between August 1973 and September 2019, prior to the date of completion of the subject solar site. These properties have been excluded from further analysis.

We do note Adjoining Property 27 was sold in July 2019, during the construction period of the solar farm. Since it was sold during the construction period, we have excluded it from being considered as a Test Area Sale since we cannot extract the external influence of construction on the sale price. We spoke to the selling broker for this transaction, Christy Wingate, with Parker Real Estate Group. She noted the future presence of the solar farm did not impact the sales price at all. Additionally, she noted in her experience, the presence of a solar farm is neither an attraction nor a deterrant for nearby home buyers. She noted a similar case with a new solar farm in Leesburg, Georgia, which is much smaller than the solar farm under analysis, within a predominately residential area.

Adjoining Property 32 sold in December 2019 and we analyzed it for potential inclusion as a Test Area Sale; however, since the sale was a gift sale with no allocated sales price, we have not analyzed it further since the transaction was not a market transaction.

Adjoining Property 19 was sold in February 2020, however this sale was also a gift sale between family members with no allocated sales price. Therefore we did not analyze it.

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Adjoining Property 22 sold in August 2020 for \$19,500, although according to public records does not note this sale was a “Fair Market Sale.” Additionally, the county GIS marked this sale as unqualified for a market transactions. Therefore, we did not analyze this sale further.

### Paired Sales Analysis:

We have considered only one type of paired sales analysis, which compares sales of properties proximate to the solar farm (Control Area) to the sales of adjoining properties after the completion of the solar farm project (Test Area).

We found one adjoining property that qualified for a paired sales analysis. Adjoining Property 23 (Test Area Sale), circled in blue on the previous page, was considered for a paired sales analysis, and sold in June 2020, after the completion of the solar farm. This property was analyzed as single-family home use.

Adjoining Property 23 (Test Area Sale) was considered for a paired sales analysis, and we analyzed this property as a single-family home use, which is a 2,750 square foot home located on a 3.44- acre parcel that sold in June 2020. The property line of this parcel is approximately 202 feet from the closest solar panel, and the improvements are approximately 312 feet from the closest solar panel. The following table outlines the other important characteristics of Adjoining Property 23.

Adjoining Property 23												
Status	Address	City	County	Sale Price	Site Size (AC)	Beds	Baths	Year Built	Square Feet	Improvements	Sale Price/SF	Sale Date
Sold	2916 SPRING FLATS RD	Albany	Dougherty	\$205,000	3.44	4	2.5	1980	2,750	1-Story SFR	\$74.55	Jun-20

We note that Adjoining Property 23 has an in-ground pool. We have found Control Area Sale data through Zillow and verified these sales through county records, conversations with brokers, and the County Assessor’s Office. We excluded sales that were not arm’s length, such as REO sales or those transactions between related parties. We have included only sales with a similar number of bedrooms, bathrooms, and living area, as well as land area. Additionally, we only selected Control Area Sales of single family homes also had an in-ground pool.

It is important to note that these Control Area Sales are not adjoining to any solar farm, nor do they have a view of one from the property at the time of their sales. Therefore, the announcement nor the completion of the solar farm use could not have impacted the sales price of these properties. It is informative to note that the average and median marketing time (from list date to off market date) for Control Area Sales was 83 days and 119 days, respectively. The Test Area sale had a marketing time of 99 days. This is an indication that the marketability of the Test Area sale was not negatively influenced by proximity to the Dougherty Solar project. The Control Area Sales are comparable in most physical characteristics and bracket Adjoining Property 23 reasonably.

Control Area sales were adjusted for market conditions using the Federal Housing Finance Agency's House Price Index (HPI), a weighted, repeat-sales index measuring average price changes in repeat sales or refinancing of the same properties. The results of the paired sales analysis for the Dougherty Solar project are presented below.

CohnReznick Paired Sales Analysis Dougherty County Solar Facility Adjoining Property 23		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Test Area Sale (1)	Yes: Adjoining solar farm	\$74.55
Control Area Sales (5)	No: Not adjoining solar farm	\$76.23
Difference between Unit Price of Test Area Sale and Adjusted Median Unit Price of Control Area Sales		-2.21%

The difference between the unit price of the Test Area Sale and the Adjusted Median Unit Price of the Control Area Sales is considered within the range for a typical market area. One of the Control Area Sales was 20 years newer than the Test Area Sale. A secondary analysis excluding this sale indicated an adjusted median unit sale price of \$74.47 per square foot, which is in line with the Test Area Sale unit price of \$74.55 per square foot.

**Noting no significant price differential**, it does not appear that the Dougherty Solar project impacted the sales price of the Test Sale, Adjoining Property 23.

**SOLAR FARM 4: MIAMI-DADE SOLAR ENERGY CENTER, MIAMI DADE COUNTY, FL**

**Coordinates:** Latitude 25°38'34.5"N, 80°29'16.5"W

**PIN:** 30-5813-000-0020

**Recorded Owner:** Florida Power & Light Company

**Total Land Size:** 465 acres

**Date Project Announced:** October 2017

**Date Project Completed:** January 2019

**Output:** 74.5 MW AC



2020 Aerial imagery retrieved from Google Earth

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**Overview and Surrounding Area:**

The Miami Dade Solar Energy Center is situated in unincorporated Miami-Dade County, just west of Florida State Road 997. The site comprises approximately 300,000 solar panels on a fixed-tilt system, generating enough energy to power around 15,000 homes.

It is surrounded to the north, west, and south by rural residences and agricultural uses. The Kendall Tamiami Executive Airport is located due east, along the flight path for one of the airport's runways. A canal runs along the west side of the property, and beyond that is 306 acres of federal government land and four agricultural use lots. The predominant lot size in the surrounding area is approximately five acres and uses vary from palm tree farms, equestrian centers, citrus groves, to rural residences. These lots are zoned GU – Interim District, which categorizes land not otherwise specified in the unincorporated areas of Miami Dade County. This designation allows for uses consistent with the surrounding character, or a density of one residence for every 5 acres.<sup>13</sup> As such, development is limited to rural residences or agricultural uses

**Prior Use:** Agricultural use

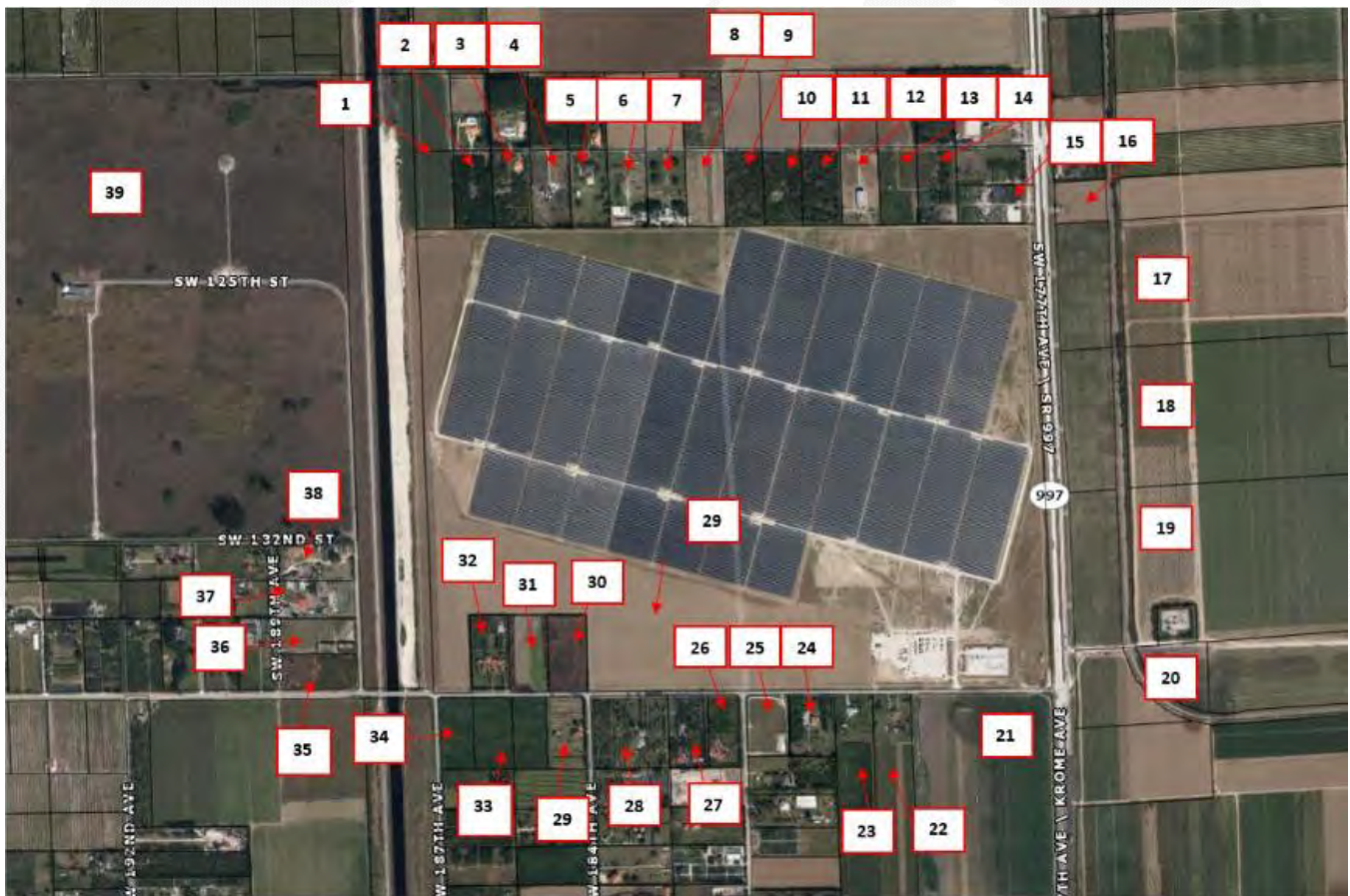
**Real Estate Tax Info:** The chart below shows the increase from 2018 (before construction) to 2019 (after construction) in the assessed value of the parcels and the total real estate taxes.

PIN	Acres	2018 Taxes Paid	2019 Taxes Paid	Tax Increase	2018 Assessed Value	2019 Assessed Value	Value Increase
<b>Miami-Dade County</b> 30-5813-000-0020	465.61	\$ 40,777	\$ 179,761	341%	\$ 2,460,316	\$ 10,575,924	330%
<b>TOTAL</b>	<b>465.61</b>	<b>\$ 40,777</b>	<b>\$ 179,761</b>	<b>341%</b>	<b>\$ 2,460,316</b>	<b>\$ 10,575,924</b>	<b>330%</b>

<sup>13</sup> <http://www.miamidade.gov/zoning/districts.asp>

**Paired Sale Analysis – Residential Land:**

The following map numbers the adjoining parcels for subsequent analysis. The 39 adjoining parcels are a mix of single family residences, agricultural land, and government land. We have identified five parcels that have transferred since the solar farm was completed, adjoining parcels 3, 13, 31, 33, and 35. Adjoining properties 3 and 33 transferred as deed corrections between related parties and are not considered market sales. Adjoining Property 35 was bought by the owner of the adjoining parcel for assemblage purposes and was also removed from the study. The remaining three parcels, adjoining properties 13, 31, and 33 were considered for a paired sales analysis. These three parcels have an interim agricultural use with residential development allowed under the GU zoning.



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We identified six Control Area sales with similar location, square footages, lot sizes, and ages that sold from a reasonable sale time from the median sales date of the test sales. Control Area sales were adjusted for market conditions using the Federal Housing Finance Agency's House Price Index (HPI), a weighted, repeat-sales index measuring average price changes in repeat sales or refinancing of the same properties. The result of our study is presented below.

<b>CohnReznick Paired Sale Analysis - Miami Dade Solar</b>		
	<b>Potentially Impacted by Solar Farm</b>	<b>Adjusted Median Price Per Acre</b>
Control Area Sales (6)	No: Not adjoining solar farm	\$81,866
Test Area Sales (3)	Adjoining solar farm	\$82,491
<b>Difference</b>		<b>0.76%</b>

Noting no negative price differential, it does not appear that the Miami Dade Solar Energy Center impacted the sales price of adjoining properties 13, 31, and 33.

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**SOLAR FARM 5: BAREFOOT BAY SOLAR ENERGY CENTER, BREVARD COUNTY, FL**

**Coordinates:** Latitude 27°52'15.5"N, Longitude 80°31'38.3"W

**PINs:** Several

**Recorded Owner:** Florida Power & Light Company

**Total Land Size:** 505 acres

**Date Project Announced:** January 2017

**Date Project Completed:** May 2018

**Output:** 74.5 MW AC



2020 Aerial imagery retrieved from Google Earth

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### **Overview and Surrounding Area:**

The Barefoot Bay Solar Energy Center is located north of Sebastian, in the unincorporated community of Micco, in coastal Brevard County, Florida. The solar installation sits on a 462-acre site, on land that was formerly an orange grove. Florida Power & Light held an open house for the area residents in January of 2017. The construction started in June of 2017 and was completed in May of 2018. The solar energy center has a capacity of approximately 74.5 MW AC. The site comprises approximately 300,000 solar panels on a fixed-tilt system, generating enough energy to power around 15,000 homes.

The solar site is approximately 450 feet south of Micco Road, an east-west arterial, approximately 1.5 miles west of U.S. 1, which runs along the shores of the Indian River. The solar installation is surrounded by trees and vegetation, and is adjoined by residential development to the north and east. Along Micco Road, to the northwest of the solar farm are several mixed-use lots, with agricultural, rural residential, and industrial uses.

The solar site is surrounded to the north and northeast primarily by the Barefoot Bay manufactured home community. Barefoot Bay is the largest manufactured home community in Florida where homes are permanently built, bought, and sold as real property. The community has three pools, a bar and restaurant, a golf course and other recreational and entertainment activities.

The population is estimated to be over 12,000 persons and approximately 80 percent of residents are over 55 years old, however, there is no age restriction in the community. The entire community sits on approximately 1,000 acres originally purchased and developed starting in 1968, with almost total absorption of lots by 1996. A total of 5,000 lots were platted and lots sizes currently range from 50 feet wide by 80 feet deep (4,000 square feet) to 75 feet wide by 100 feet deep (7,500 square feet). Homes are close together and with the standard setbacks homes can be 15 feet apart from one another.

A longtime local real estate agent and community resident at Barefoot Bay Realty said that the homes that border the solar site to the northeast, along Papaya Circle, are considered perimeter lots and are more desirable due to the lack of backyard neighbors. There is a swale (a broad and shallow ditch with water) that separates the lots from the solar site and the agent noted that many people in the community are unaware that the solar site is even there. The prices and marketing times of homes adjoining the solar farm on Papaya Circle in Barefoot Bay are not impacted by their proximity to the installation, and in fact may benefit from the increased privacy provided by the solar site.

The Barefoot Bay agent reported that small homes on small lots may sell for \$70,000 and larger homes on larger and better located lots can sell for over \$200,000. In the experience of Barefoot Bay Realty agents, there are typically 80 to 100 homes on the market at any one time and the average marketing time is considered to be 60 days.

To the east of the solar farm are rural residential lots with extended driveways. Several of these parcels are flag lots with secluded residences set back. At the southeast corner of the solar site, are approximately 441 acres of land zoned agricultural-residential by Brevard County owned by a cattle ranch operation.

To the south of the solar site lies the Wheeler Stormwater Park which is a 300-acre stormwater management area. The site includes 163 acres of park land with dynamic walking and nature trails, which was opened to the public in 2017.

On the western boundary of the solar site is the Sottile Canal, a canal that flows into the north prong of the St. Sebastian River, a major tributary of the Indian River Lagoon. South of Micco Road west of the Canal is the new residential subdivision known as the Lakes at St. Sebastian Preserve, on land platted as Paladin Estates. The Lakes at St. Sebastian Preserve is located approximately 2.3 miles west of the Indian River. The single-family home community features new homes being built by two national homebuilders. The homes will have city water and septic but the subdivision is outside the city limits of Sebastian in Brevard County. Several homes have been built in the community as of July 2020 but the street with lots that back onto the Sottile Canal (Lago Vista Drive) will be built in a later phase. Real estate sales people for both builders noted that the view of the solar installation is primarily obstructed from the lots that will back to the Canal and there has been no impact on home sales or interest in the development due to its location proximate to the solar installation.

To the west of the solar site, south of Lakes at St. Sebastian Preserve, is state-owned land utilized for flood control.

**Prior Use:** Agricultural use

**Real Estate Tax Info:** The chart below shows the increase from 2016 (before construction) to 2018 (after construction) in the assessed value of the parcels and the total real estate taxes.

PIN	Acres	2016 Taxes Paid	2018 Taxes Paid	Tax Increase	2016 Assessed Value	2018 Assessed Value	Value Increase
<b>Brevard County</b>							
3006694	56.20	\$ 1,038	\$ 9,426	808%	\$ 67,440	\$ 618,200	817%
3007862	48.51	\$ 896	\$ 10,859	1112%	\$ 58,210	\$ 727,650	1150%
3008628	320.14	\$ 6,077	\$ 60,433	895%	\$ 384,170	\$ 4,001,750	942%
3008630	1.00	\$ 23	\$ 22	-4%	\$ 600	\$ 600	0%
3008632	9.00	\$ 162	\$ 1,888	1069%	\$ 10,500	\$ 126,000	1100%
3010467	69.90	\$ 1,291	\$ 13,685	960%	\$ 83,880	\$ 908,700	983%
<b>TOTAL</b>	<b>504.75</b>	<b>\$ 9,485</b>	<b>\$ 96,313</b>	<b>915%</b>	<b>\$ 604,800</b>	<b>\$ 6,382,900</b>	<b>955%</b>

### **Paired Sale Analysis:**

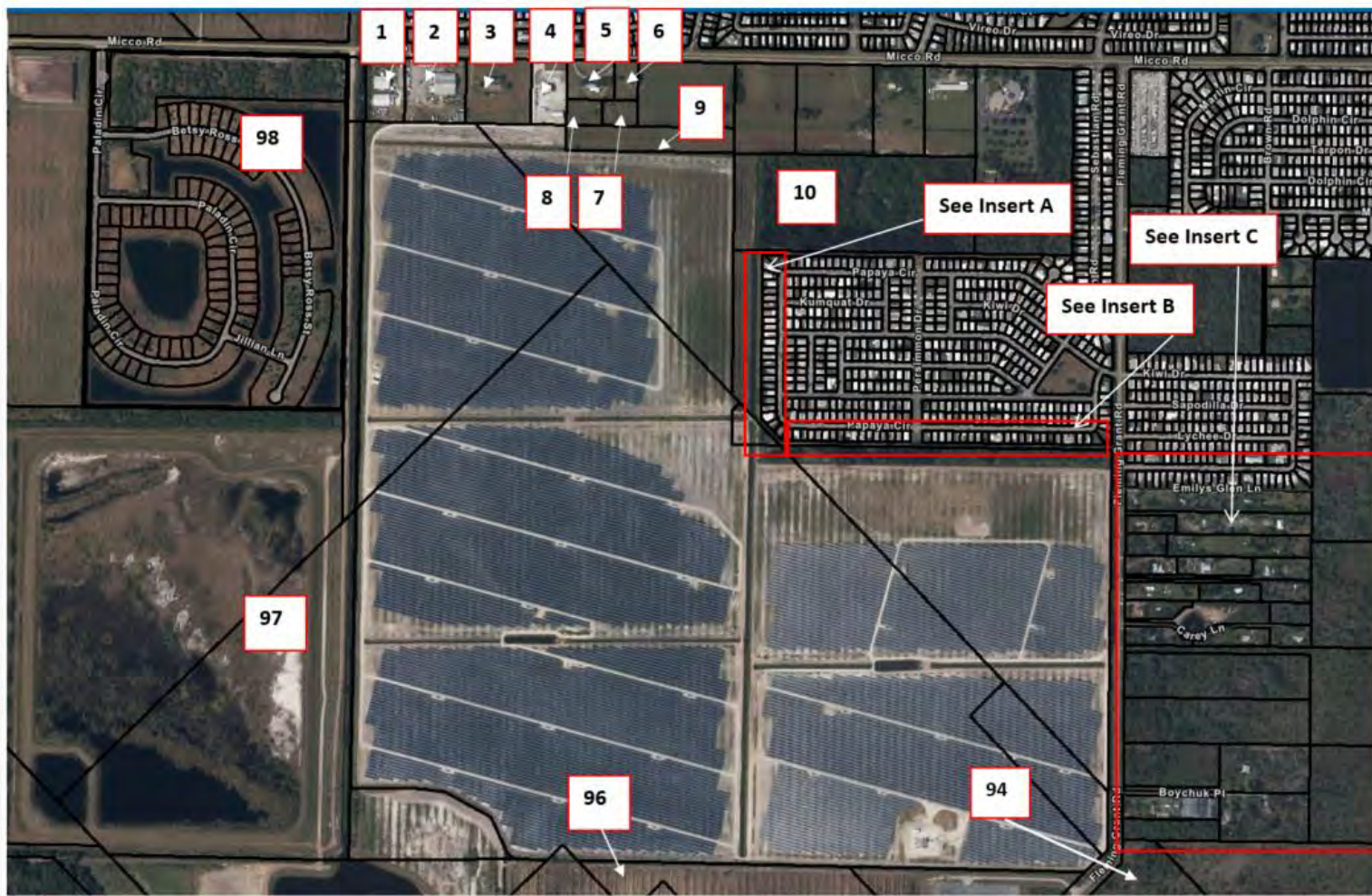
The maps on the following pages number the adjacent parcels for subsequent analysis. We have identified thirteen sales that have transferred since the solar farm construction, adjacent parcels 6, 7, 13, 14, 18, 30, 37, 40, 47, 50, 51, 76, and 86. Adjoining property 14 was a liquidation sale and removed from consideration. Adjoining properties 37 and 50 transferred off the multiple listing service and are non-owner occupied. Adjoining property 30 has a large converted patio and is atypical for Barefoot Bay: this sale was considered an outlier and removed from analysis. While adjoining properties 76 and 86 are technically adjacent, they are atypical flag lots with driveways that operate as de facto roads. The residence for property 76 is buffered from the solar farm by

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two other residences. Adjoining property 86 is atypically larger than other sales in the market area and is approximately forty percent wetland. Properties 76 and 86 were considered outliers and removed from the study.

The remaining seven parcels, adjoining properties 6, 7, 13, 18, 40, 47, and 51 were considered for a paired sales analysis. We have divided these properties into two groups as discussed further on the following pages.

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Barefoot Bay Farm Adjoining Properties

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Barefoot Bay Farm Adjoining Properties - Insert A



Barefoot Bay Farm Adjoining Properties - Insert B



Barefoot Bay Farm Adjoining Properties - Insert C

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Adjoining properties 6 and 7 are residential lots. They were purchased by the same buyer from two different sellers on different sale dates. We identified seven Control Area Sales with similar location and lot sizes that sold from a reasonable sale time from the median sales date of the test sales. The test sales had a median marketing time of two to three months, as did the control sales. Control Area sales were adjusted for market conditions using the Federal Housing Finance Agency's House Price Index (HPI), a weighted, repeat-sales index measuring average price changes in repeat sales or refinancing of the same properties. The result of our study is presented below.

<b>CohnReznick Paired Sale Analysis - Barefoot Bay (Group 1)</b>		
	<b>Potentially Impacted by Solar Farm</b>	<b>Adjusted Median Price Per Acre</b>
Control Area Sales (7)	No: Not adjoining solar farm	\$51,000
Test Area Sales (2)	Adjoining solar farm	\$54,500
<b>Difference</b>		<b>6.86%</b>

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Adjoining properties 13, 18, 40, 47, and 51 are improved residential dwellings. Since Barefoot Bay is a homogenous subdivision with a large number of residences, we were able to identify 126 control sales located in the Barefoot Bay manufactured home community, all manufactured homes on residential lots, with gross living areas of 1,100 SF to 1,800 SF, that sold from a reasonable sale time from the median sales date of the test sales, excluding outliers and non-arm's length transactions. Barefoot Bay has typical marketing times of two months. The test sales had a median marketing time of approximately a month and a half. Control Area sales were adjusted for market conditions using a regression analysis to identify the appropriate monthly market condition adjustment. The result of our study is presented below.

CohnReznick Paired Sale Analysis - Barefoot Bay (Group 2)		
	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Control Area Sales (126)	No: Not adjoining solar farm	\$93.95
Test Area Sales (5)	Adjoining solar farm	\$95.90
<b>Difference</b>		<b>2.07%</b>

**Noting the relatively low price differential,** in which the Test Area Sales were higher than the median for the Control Areas Sales, it does not appear that the Barefoot Bay Solar Energy Center had any negative impact on adjoining property values or marketing times.

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**Summary of Before and After Construction of the Solar Farm Analysis:**

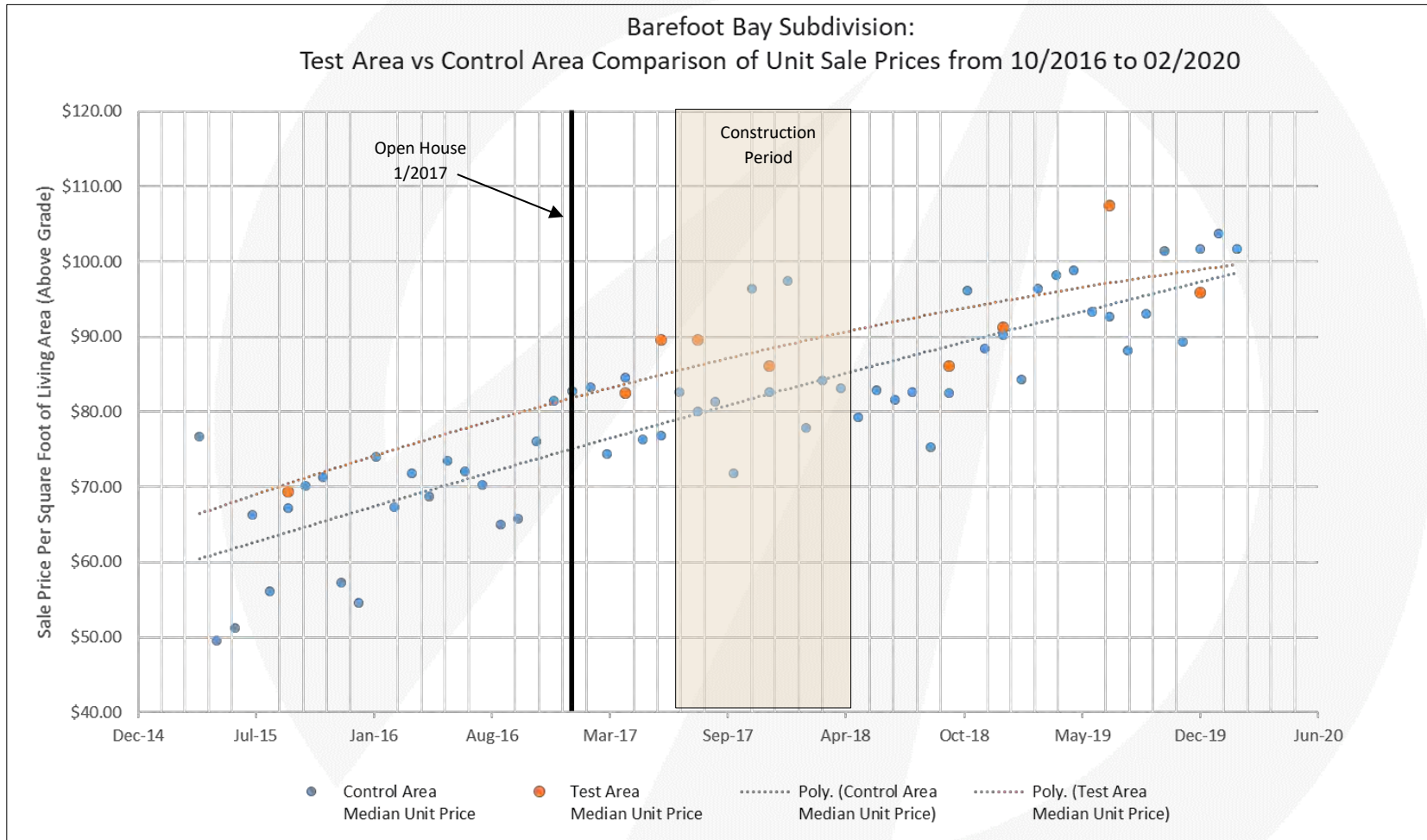
Due to the frequency of sales in the Barefoot Bay subdivision, we were able to conduct an analysis on the prices of manufactured homes before the solar farm announcement date in comparison to the prices of manufactured homes after the construction of the solar farm. We have provided our conclusions from the data below and the following page contains a chart with the data.

Nine Test Area sales and 903 Control Area Sales were identified from Q2 2015 to Q1 2020.

- The Test area sales (ORANGE) are located adjoining to the Barefoot Bay Solar Energy Center.
- The Control area sales (BLUE) are located in the remainder of the Barefoot Bay subdivision.

The dotted lines are polynomial trend lines plotted by Microsoft Excel in order to illustrate and approximate the “average” trend of each set of data. After construction of the solar farm, in parallel with the improving economic climate, it appears that unit prices for both the test and control areas appreciated at a similar rate over the period from Q2 2015 to Q1 2020. A difference in appreciation rates does not appear to exist between homes in the Test Area versus homes in the Control Area.

Sale prices of manufactured homes after the construction of the solar farm exhibit a similar appreciation trend as sales prior to the solar farm announcement. Overall, our findings indicate that there is not a consistent and measurable difference that exists in association with proximity to a solar farm.



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**SOLAR FARM 6: INNOVATIVE SOLAR 42, BLADEN AND CUMBERLAND COUNTIES, NC**

**Coordinates:** Latitude 34.847627, Longitude -78.877360

**Cumberland County PIN:** 0339-67-3814

**Bladen County PINs:** 033900553698, 033900751483, 033900658763

**Total Land Size:** 414 acres

**Date Project Announced:** May 2014

**Date Project Completed:** September 2017

**Output:** 71 MW AC



*Aerial imagery retrieved from Google Earth*

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**Overview and Surrounding Area:**

Innovative Solar Farm 42 was developed by Innovative Solar Systems and became operational in September 2017. There are over 271,000 solar arrays on the farm that can generate power for approximately 12,000 homes.

Innovative Solar Farm 42 is located in unincorporated Bladen and Cumberland Counties, in North Carolina, approximately 17 miles south of Fayette, North Carolina and 21 miles north of Elizabethtown, North Carolina. The county line bisects the solar farm, with Cumberland County on the north side and Bladen County on the south side. Innovative Solar Farm is located just south of County Line Road in Cumberland County and approximately one mile west of North Carolina Highway 87.

**The Immediate Area:** The solar farm is surrounded by residential land to the north, residential and forest land to the west, and agricultural and forest land to the south and east.

**Landscaping:** The solar farm is buffered from the residences along County Line Road with a chain link fence, and tree plantings. The solar farm is clearly visible.

**Prior Use:** Agricultural use

**Real Estate Tax Info:** The chart below shows the increase from 2017 (before construction) to 2018 (after construction) in the assessed value of the parcels and the total real estate taxes.

PIN	Acres	2017 Taxes Paid	2018 Taxes Paid	Tax Increase	2017 Assessed Value	2018 Assessed Value	Value Increase
<b>Cumberland County, NC</b> 0339-67-3814	261.39	\$ 5,263	\$ 37,699	616%	\$ 541,500	\$ 3,920,850	624%
<b>Bladen County, NC</b> 33900553698	82.48	\$ 920	\$ 947	2.96%	\$ 108,870	\$ 108,870	0.00%
33900751483	17.92	\$ 234	\$ 241	2.96%	\$ 27,690	\$ 27,690	0.00%
033900658763	52.20	\$ 622	\$ 640	2.96%	\$ 73,600	\$ 73,600	0.00%
<b>TOTAL</b>	<b>413.99</b>	<b>\$ 7,039</b>	<b>\$ 39,527</b>	<b>462%</b>	<b>\$ 751,660</b>	<b>\$ 4,131,010</b>	<b>450%</b>

**Paired Sale Analysis:**

We found two Adjoining Properties that qualified for a paired sales analysis: Adjoining Property 11 and Adjoining Property 2. Adjoining Property 2 was a speculative construction home built after the completion of the solar farm (see further discussion in the Solar Farm Factors in Harmony of Use section). The map on the following page displays the parcels adjoining to the solar farm panels (outlined in red), these parcels are numbered for subsequent analysis. Note, that the GIS map views do not have updated aerial imagery that display the solar panels in the image on the following page.

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### Cumberland County Map



Innovative Solar 42 - Adjoining Properties

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Bladen County Map



Innovative Solar 42 - Adjoining Properties

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**Group 1**

Adjoining Property 11 was considered for a paired sales analysis, and sold during the construction period of the solar farm. The property was analyzed as a single-family home use.

The Control Area Sales were 1-story homes, with three bedrooms and two or three bathrooms with comparable sizes that sold within a reasonable time frame. We excluded sales that were bank-owned, and those between related parties.

The Control Area Sales were adjusted for market conditions using a regression analysis to identify the appropriate monthly market conditions adjustment. The result of our analysis for Innovative Solar 42 – Group 1e are presented below.

CohnReznick Paired Sale Analysis Innovative Solar 42 Group 1		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Test Area Sales (1)	Adjoining solar farm	\$107.09
Control Area Sales (7)	No: Not adjoining solar farm	\$100.18
<b>Difference between Unit Price of Test Area Sales and Adjusted Median Unit Price of Control Area Sales</b>		<b>6.91%</b>

The Test Area Sale sold after 71 days on market (2-3 months), while the Control Area Sales ranged from 1 day on market to 175 days on market (0-6 months), with a median of 116 days on market. We note **no negative marketing time differential.**

**Noting no negative price differential,** with the Test Area Sale having a higher unit sale price than the median adjusted unit sale price of the Control Area Sales, it does not appear that the Innovative Solar 42 energy use had any negative impact on adjacent property values.

## Group 2

Adjoining Property 2 was considered for a paired sales analysis, and sold after completion of the solar farm. We discussed this sale with the listing broker, Kevin Grullon, who said the solar farm did not impact the sales price nor the marketing time.

The Control Area Sales were 2-story homes, with three and four bedrooms and two to four bathrooms with comparable sizes that sold within a reasonable time frame. We excluded sales that were bank-owned, and those between related parties. For Adjoining Property 2, we analyzed seven Control Area Sales.

Control Area Sales were adjusted for market conditions using regression analysis to identify the appropriate monthly market conditions adjustment. The result of our analysis for Innovative Solar 42 – Group 2 are presented below.

CohnReznick Paired Sale Analysis Innovative Solar Group 2		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Test Area Sales (1)	Adjoining solar farm	\$111.77
Control Area Sales (7)	No: Not adjoining solar farm	\$105.34
<b>Difference between Unit Price of Test Area Sales and Adjusted Median Unit Price of Control Area Sales</b>		<b>6.10%</b>

The Control Area Sales ranged from 13 days on market to 225 days on market (0-8 months), with a median of 46 days on market. The Test Area Sale sold after 153 days on market (3-4 months) and it was listed during construction, which explains the above average time on market since closing can only occur after the home had been completed.

**Noting no negative price differential**, with the Test Area Sale having a higher unit sale price than the median adjusted unit sale price of the Control Area Sales, it does not appear that the Innovative Solar 42 energy use had any negative impact on adjacent property values.

**SOLAR FARM 7: RUTHERFORD FARM, RUTHERFORD COUNTY, NC****Coordinates:** Latitude 35.257778, Longitude -81.830560**PIN:** 1556-31-0185**Total Land Size:** 489 acres**Date Project Announced:** November 24, 2015**Date Project Completed:** December 2016**Output:** 61 MW AC

*Aerial imagery retrieved from Google Earth*

**Overview and Surrounding Area:**

The Rutherford Farm Solar use is located in unincorporated Rutherford County, North Carolina. The solar farm was developed by Cypress Creek Renewables and became operational in December 2016. Southern Power and Turner Renewable Energy purchased the solar facility on July 8, 2016. The solar farm has over 289,000 solar modules that can generate power for approximately 12,000 homes.

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The Rutherford Farm solar use is approximately 7 miles southeast of Forest City, in Rutherford County, in southwestern North Carolina. The solar facility is situated approximately 3 miles northeast of the intersection of Chase High Road and US 221, a major thoroughfare that traverses the county.

### **The Immediate Area:**

Surrounding land uses consists of residential and forest land to the north, forest and commercial to the east, vacant and forest land to the south. All of the adjacent land parcels to the solar farm are used for agricultural or residential purposes.

The solar farm has a hedge buffer along portions of the farms where the residential development is closest. Along all solar panels areas adjacent to residential, a row of trees buffer the view of the panels.

**Prior Use:** Wooded

### **Real Estate Tax Information:**

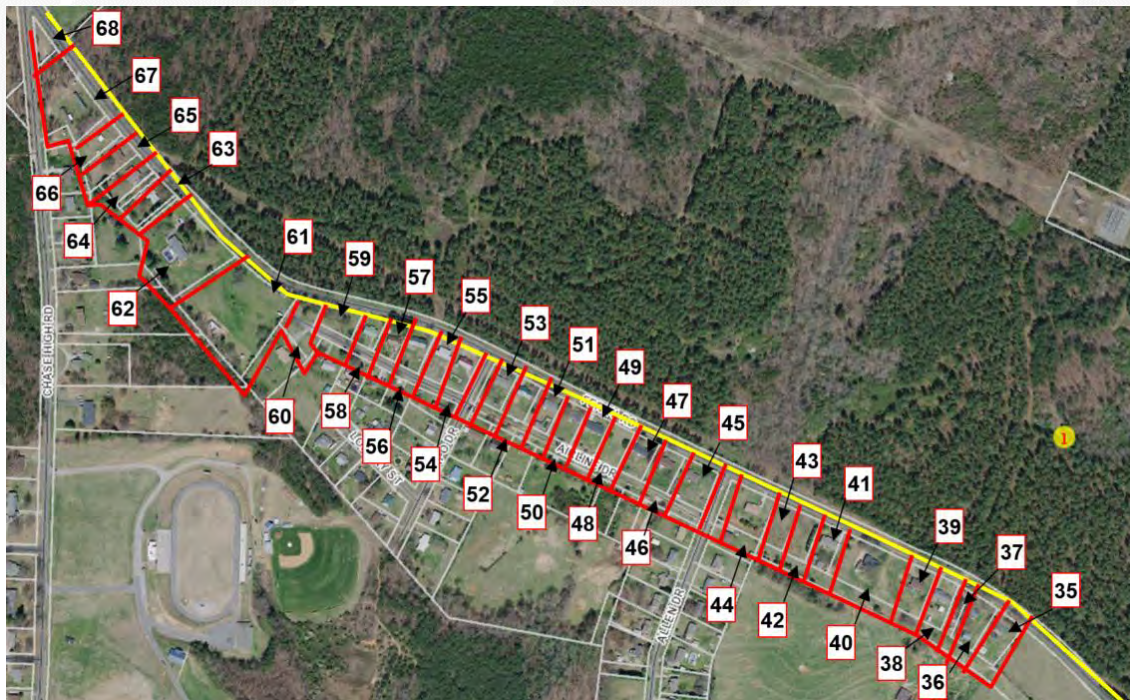
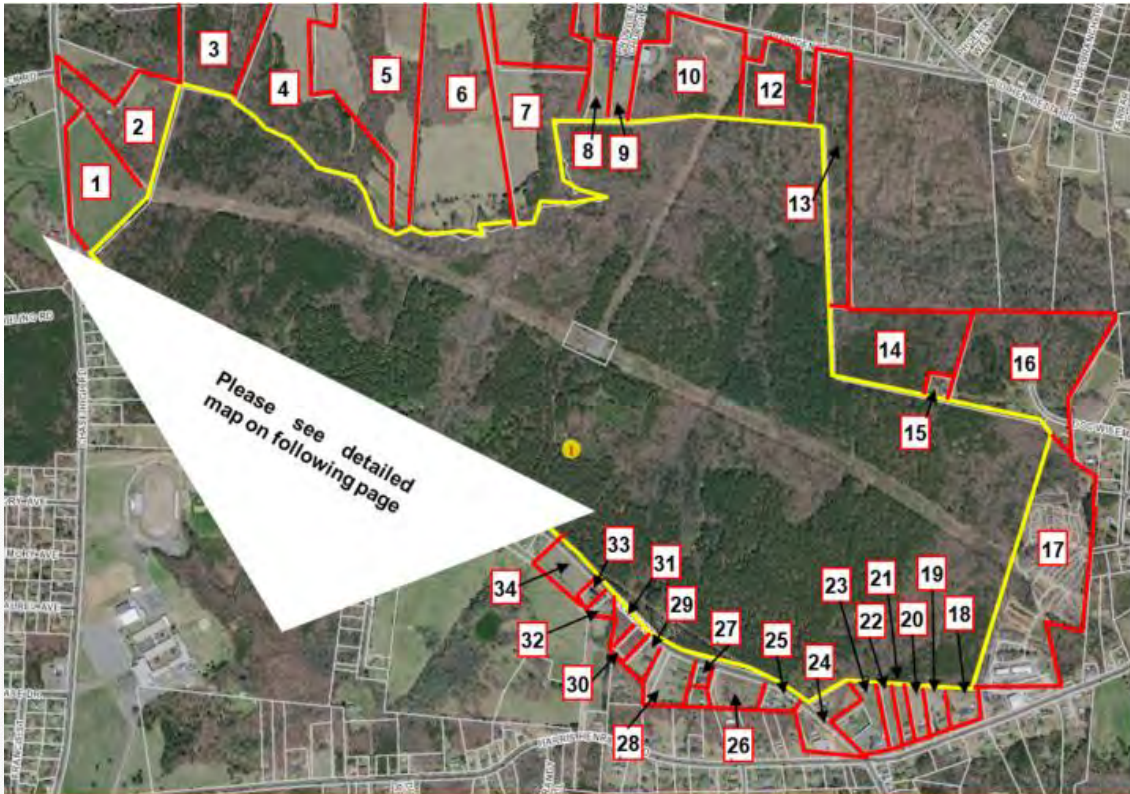
Prior to development of the solar farm, the assessed value of the property was \$466,200 and ownership paid \$3,156 in taxes. In 2018, after the completion of the solar farm, the assessed value of the solar farm property increased to \$1,075,800 and taxes increased to \$7,391, a 131 percent increase in tax revenue.

PIN	Acres	2016 Taxes Paid	2018 Taxes Paid	Tax Increase	2016 Assessed Value	2018 Assessed Value	Value Increase
Rutherford County 1556-31-0185	488.84	\$ 3,203	\$ 7,391	131%	\$ 466,200	\$ 1,075,800	131%
<b>TOTAL</b>	<b>488.84</b>	<b>\$ 3,203</b>	<b>\$ 7,391</b>	<b>131%</b>	<b>\$ 466,200</b>	<b>\$ 1,075,800</b>	<b>131%</b>

### **Paired Sale Analysis:**

In reviewing adjoining properties to study in a Paired Sale Analysis, seven properties and sales were considered in total but six were eliminated from further consideration as discussed below.

The map on the following page displays the Adjoining Properties (outlined in red) to the solar farm parcel (outlined in yellow). Properties adjoining this parcel are numbered for subsequent analysis.



Rutherford Farm Solar - Adjoining Properties

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Five Adjoining Properties (21, 22, 36, 56, and 57) were eliminated from further consideration because they were sales with no recorded sales value or property transfers in off-market transactions. Adjoining Property 2 was a transfer between related parties. Adjoining Property 55 sold in October 2020; however, this property is a duplex with one two-bedroom unit rented. We were not able to locate sales of other duplex properties in the surrounding area that are comparable to the property. As additional duplex sales occur, we will monitor and generate a paired sale analysis for this property at a later date.

We found one Adjoining Property that qualified for a Paired Sale analysis. Adjoining Property 46, the Test Area Sale, was considered for a paired sales analysis. The property was analyzed as a single-family home use. It should be noted that this sale occurred after announcement but prior to construction of the solar farm. We spoke with the selling broker for this property, Brent Washburn, who confirmed that the solar farm had not been constructed at the time of sale, and said the announcement had no impact on the sale.

Adjoining Property 46 was considered for a paired sales analysis, and we analyzed this properties as single-family home use. The improvements on this property are located 139 feet to the nearest solar panel.

Test Area Sale Rutherford Farm Solar									
Adj. Property #	Address	Median Sale Price	Median Site Size (AC)	Median Beds	Median Baths	Median Year Built	Median Square Feet	Median Sale Date	Median Price PSF
46	434 Ferry Rd	\$85,000	0.41	3	2.0	1977	1,590	Jan-16	\$53.46

We analyzed six Control Area Sales, single family homes with similar location, construction, square footages, lot sizes, and ages, use that were not located in close proximity to the solar farm, that also sold within a reasonable time frame from the median sale date of the Test Area Sale. The Control Area Sales are one-story homes with 3 bedrooms and one to two bathrooms. We excluded sales that were bank-owned, and those between related parties.

The Control Area Sales were adjusted for market conditions using a regression to identify the appropriate monthly market conditions adjustment. The results of our analysis for the Rutherford Farm solar facility are presented on the next page.

CohnReznick Paired Sale Analysis Rutherford Farm Solar		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Test Area Sales (1)	Adjoining solar farm	\$53.46
Control Area Sales (6)	No: Not adjoining solar farm	\$52.49
<b>Difference between Unit Price of Test Area Sales and Adjusted Median Unit Price of Control Area Sales</b>		<b>1.85%</b>

**Noting no significant price differential**, with the Control Area Sales having a slightly higher median unit sale price than the unit sale price of the Test Area Sale, it does not appear that the Rutherford Farm Solar energy use had any negative impact on adjacent property values. It should be noted that the mean, or average, unit sale price for the Control Area Sales is \$53.47 per square foot, effectively equal to the Test Area Sale adjacent to the Rutherford Farm Solar use.

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**SOLAR FARM 8: ELM CITY SOLAR FACILITY, WILSON COUNTY, NC**

**Coordinates:** Latitude 35.781111, Longitude -77.846940

**PINs:** 3744-33-6758.01, 3744-11-9000.000

**Total Land Size:** 354 acres

**Date Project Announced:** September 2014

**Date Project Completed:** July 2012

**Output:** 40 MW AC



*Aerial imagery retrieved from Google Earth*

**Overview and Surrounding Area:**

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The Elm City Solar use is located in Elm City, North Carolina. Duke Energy owns the solar facility and selected HelioSage Energy to develop it. The solar farm went into operation in March 2016 and can generate power for approximately 7,000 homes. Nearly a half million solar panels comprise the farm.

Wilson County is located in central North Carolina. The county is primary rural in nature, with the city of Wilson being the county seat. Elm City is actually a town with a population of less than 1,200. The Elm City Solar Farm is located to the southeast of Elm City, approximately a third of a mile to the east of State Highway 301. Surrounding land uses consist of residential and forest land to the north; forest and agricultural land to the east; vacant, forest, and residential land to the south; and residential, industrial, vacant, and forest land to the west.

### **The Immediate Area:**

All of the adjacent land parcels to the solar farm are used for agricultural, residential, and/or industrial purposes.

**Landscaping:** The Elm City Solar Farm is buffered from the adjoining residential lots with a fence and tree plantings.

**Prior Use:** Agricultural use

**Real Estate Tax Info:** In 2016, prior to the property being assessed as a solar farm, the assessed value of the property was \$206,220 and ownership paid \$2,805 in real estate taxes. In 2017, the assessed value increased to \$1,779,830 and the real estate tax increased to \$24,206.

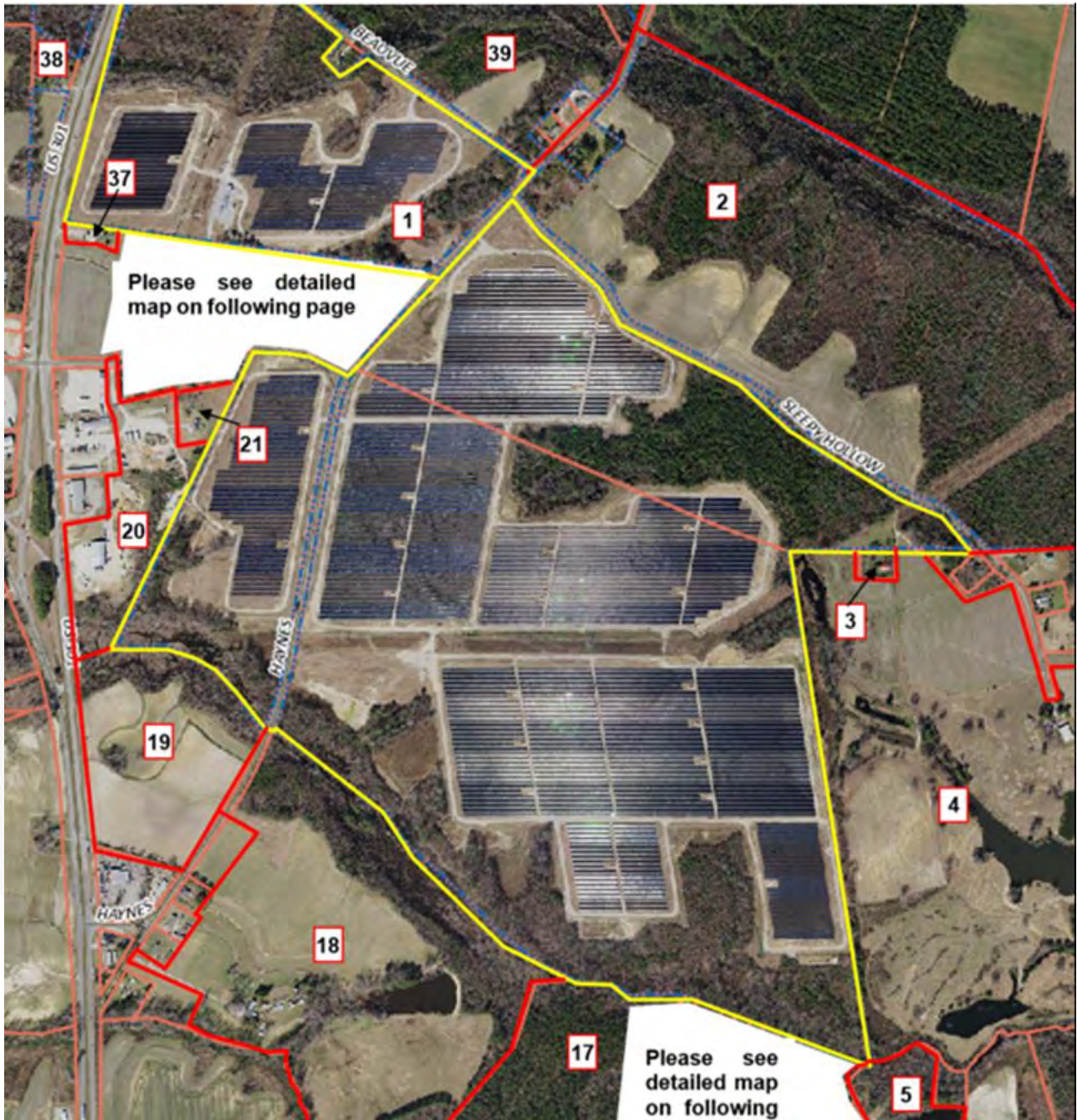
PIN	Acres	2016 Taxes Paid	2017 Taxes Paid	Tax Increase	2016 Assessed Value	2017 Assessed Value	Value Increase
<b>Wilson County</b>							
3744119000.000	249.00	\$ 2,805	\$ 14,624	421%	\$ 206,220	\$ 1,075,330	421%
3744336758.01*	105.00	\$ 1,494	\$ 9,581	541%	\$ 117,881	\$ 704,500	498%
<b>TOTAL</b>	<b>354.00</b>	<b>\$ 4,298</b>	<b>\$ 24,206</b>	<b>463%</b>	<b>\$ 324,101</b>	<b>\$ 1,779,830</b>	<b>449%</b>

\* This parcel was split from its parent prior to construction. The 2016 Assessed Value is based on the pro-rata amount for the entire 471.53 acre parent parcel.

### **Paired Sale Analysis:**

The map on the following page displays the parcels adjoining the solar farm (outlined in red). Properties adjoining the solar parcels are numbered for subsequent analysis.

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Elm City Solar - Adjoining Properties

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Elm City Solar - Adjoining Properties



Elm City Solar - Adjoining Properties

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Adjoining Property 23 (Test Area Sale) was considered for a paired sales analysis, which sold after development of the solar farm. The property was analyzed as a single-family home use. We discussed this sale with Selby Brewer with First Wilson Properties, Inc who sold the property. He said the buyers “did not even mention” the solar farm, and he saw **no market difference.**

For Adjoining Property 23, we analyzed eight Control Area Sales that sold within a reasonable time frame from the sale date of Adjoining Property 23. The Control Area Sales are ranch homes with three bedrooms and one and two bathrooms. We excluded sales that were bank-owned, and those between related parties.

The Control Area Sales were adjusted for market conditions using a regression analysis to identify the appropriate monthly market conditions adjustment. The result of our analysis for Elm City Solar is presented below.

CohnReznick Paired Sale Analysis Elm City Solar		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Test Area Sales (1)	Adjoining solar farm	\$56.60
Control Area Sales (8)	No: Not adjoining solar farm	\$55.57
<b>Difference between Unit Price of Test Area Sales and Adjusted Median Unit Price of Control Area Sales</b>		<b>1.85%</b>

**Noting no negative marketing time differential,** the days on market for the Test Area Sale was 38 days (0-1 month), while the Control Area Sales ranged from five to 204 days on market (0-8 months).

**Noting no negative price differential,** it does not appear that the Elm City Solar impacted the sales price of the Test Sale, Adjoining Property 23. This was confirmed by the real estate agent who marketed and sold this home.

**SOLAR FARM 9: WOODLAND SOLAR FARM, ISLE OF WIGHT COUNTY, VA**

**Coordinates:** Latitude 36.890000, Longitude -76.611000

**PINs:** 41-02-004, 41-02-001, 41-02-001A, 41-02-005

**Total Land Size:** 211.12 acres

**Date Project Announced:** August 4, 2015

**Date Project Completed:** December 2016

**Output:** 19.0 MW AC



*Aerial imagery retrieved from Google Earth*

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**Overview and Surrounding Area:**

The Woodland Solar Farm is located in unincorporated Isle of Wight County, Virginia, and was developed by Dominion Virginia Power in 2016. This solar farm has a capacity of 19.0 Megawatts (MW) AC of power, which is enough to power 4,700 homes. The solar farm sits on 204 acres, part of Oliver Farms, a 1,000-acre site that was chosen for its flat land and proximity to power lines. The land under the solar arrays was previously farmed and used to grow broccoli, collards, peas, strawberries and butter beans. The solar installation includes 79,648 solar panels and was one of the largest of its kind at the time of construction.

Isle of Wight County is in the southeast part of Virginia and has shoreline along the James River on its eastern border. The county is predominantly rural and has two incorporated towns, Smithfield and Windsor. The Woodland Solar facility is approximately 27 miles northwest of Norfolk, Virginia, across the Elizabeth River and the Nansemond River. The solar site is also approximately 21 miles southwest of Newport News, Virginia. The town of Smithfield is approximately nine miles northeast of the solar facility and the town of Windsor is approximately 12 miles southwest. The solar facility is near the intersection of State Route 600 (Oliver Drive) and State Route 602 (Longview Drive).

**The Immediate Area:**

Land uses surrounding the Woodland Solar facility include forests and agricultural land to the north, west, and south, and residential and farm land to the east.

Landscaping around the solar site consists of the naturally occurring vegetation and forests. It should be noted that the land owner that leases the land to the developer has agricultural buildings and other structures along Longview Drive and the nearest solar panels are approximately 220 feet from the property line.

**Prior Use:** Agricultural use

**Real Estate Tax Info:** In 2015, prior to the property being assessed as a solar farm, the assessed value of the property was approximately \$542,200 and ownership paid \$4,609 in real estate taxes (see below). In 2016, the assessed value increased to \$3,021,600 and the real estate tax increased to \$27,844.

PIN	Acres	2015 Taxes Paid	2016 Taxes Paid	Tax Increase	2015 Assessed Value	2016 Assessed Value	Value Increase
<b>Isle of Wight County, VA</b>							
41-02-004	107.32	\$ 2,250	\$ 15,985	610%	\$ 264,700	\$ 1,728,100	553%
41-02-001	62.66	\$ 1,369	\$ 8,601	529%	\$ 161,000	\$ 939,900	484%
41-02-001A	8.08	\$ 230	\$ 1,193	420%	\$ 27,000	\$ 110,700	310%
41-02-005	33.06	\$ 761	\$ 2,065	171%	\$ 89,500	\$ 242,900	171%
<b>TOTAL</b>	<b>211.12</b>	<b>\$ 4,609</b>	<b>\$ 27,844</b>	<b>504%</b>	<b>\$ 542,200</b>	<b>\$ 3,021,600</b>	<b>457%</b>

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**Paired Sale Analysis:**

The map below displays the Adjoining Properties to the solar farm (outlined in red). Properties adjoining the solar farm parcels are numbered for subsequent analysis.



Woodland Solar - Adjoining Properties

In reviewing Adjoining Properties to study in a Paired Sale Analysis, several properties and sales were considered but eliminated from further consideration as discussed below.

We identified three Adjoining Properties that sold since the solar farm started operations in December 2016: Adjoining Property 3, and two parcels included in Adjoining Property 5. The two properties that were considered part of Adjoining Property 5, sold between related parties, and were sales between family members of the land lessor for the solar site. These two sales were excluded from further analysis.

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Adjoining Property 3 was considered for a paired sales analysis, and we analyzed this property as single-family home use. The improvements on this property is located approximately 600 feet to the nearest solar panel.

Test Area Sale - Adjoining Property 3									
Adj. Property #	Address	Median Sale Price	Median Site Size (AC)	Median Beds	Median Baths	Median Year Built	Median GLA (SF)	Median Sale Date	Median Price PSF
3	18146 Longview Drive	\$175,000	1.00	3	1	1978	1,210	Jun-16	\$144.63

We analyzed five Control Area Sales of single-family homes with similar construction and use that were not located in close proximity to the solar farm, that sold within a reasonable time frame from the median sale date of the Test Area Sale. The Control Area Sales one-story homes with three bedrooms and one and two bathrooms. We excluded sales that were bank-owned, and those between related parties.

The Control Area Sales were adjusted for market conditions using a regression analysis to identify the appropriate monthly market conditions adjustment. The result of our analysis for Woodland Solar Farm is presented below.

CohnReznick Paired Sales Analysis Woodland Solar Farm Adjoining Property 3		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Test Area Sale (1)	Yes: Adjoining solar farm	\$144.63
Control Area Sales (5)	No: Not adjoining solar farm	\$137.76
Difference between Unit Price of Test Area Sale and Adjusted Median Unit Price of Control Area Sales		4.99%

The difference between the unit price of the Test Area Sale and the Adjusted Median Unit Price of the Control Area Sales is considered within the range for a typical market area.

**Noting no negative marketing time differential**, the Test Area Sale sold in 33 days (1-2 months), while the Control Area Sales sold between 17 and 37 days (0-2 months), with a median time on market of 28 days.

**Noting no negative price differential**, with the Test Area Sale having a higher unit sale price than the Control Area sales, it does not appear that the Woodland Solar Farm had any negative impact on adjacent property values.

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**SOLAR FARM 10: DTE'S LAPEER SOLAR PROJECT, LAPEER, MICHIGAN**

**Coordinates:** Latitude 43.0368219316, Longitude -83.3369986251

**PINs:** L20-95-705-050-00, L20-98-008-003-00

**Owner of Record:** DTE Electric Company & City of Lapeer

**Total Land Size:** ±365 Acres

**Date Project Announced:** 2016

**Date Project Completed:** May 2017

**Output:** 48.28 MW AC



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### Overview and Surrounding Area:

The DTE Lapeer solar farm is located just south of the City of Lapeer, in Lapeer County, Michigan and is a joint project between the City of Lapeer and DTE Electric Company. The solar farm was developed with Inovateus Solar MI, LLC to meet Michigan renewable energy standards. The solar farm features over 200,000 panels, a power output of 48.28 MW AC, and produces enough energy to power 14,000 homes. The Lapeer solar project was developed in two phases: the Demille Solar installation and the Turrill Solar installation. For purposes of our study, taken together, both installations are considered one solar farm.



DTE's Lapeer Solar Projects Demille and Turrill solar installations

Lapeer is considered to be in the Tri-Cities area of central Michigan and is approximately 21 miles east of the City of Flint. Interstate-69 serves Lapeer and runs east-west just south of the solar farm. The two phases of the solar installation are on the east and west sides of Michigan State Route 24 from each other.

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**The Immediate Area:**

Land uses surrounding the Demille installation include a correctional facility and industrial uses to the west, buffered by a mature stand of trees, a retail center to the northeast, other commercial uses to the east along MI-24/South Lapeer Road, and residential homes to the southeast. Interstate-69 runs south of the Demille solar installation.

The Turrill installation is surrounded to the north by a residential subdivision, to the north and east by industrial uses, to the south by vacant land and residential homes, and to the west by light commercial and professional uses along MI-24/South Lapeer Road. Hunter's Creek divides two sets of solar arrays in the Turrill installation.

The Demille installation is surrounded on the west by a large grove of mature trees. A small part of the solar farm extends southward and adjoins Interstate-69 while more mature trees and shrubbery buffer the rest of the southern exposure of the south side of the solar panels. To the southeast, buffering the subdivision homes are mature trees and some shrubbery. The eastern border of the solar installation is primarily existing mature trees, and some vacant land. To the northeast corner of the solar panels is a senior living facility, Stonegate Health Campus, developed before the solar facility that is buffered by shrubbery and mature trees. According to employees at Stonegate the solar panels are not visible from the building.

The Turrill installation is separated from Tower Road on the west by trees and shrubbery. To the south, existing mature trees and shrubbery buffers the solar panels from Turrill Road. The solar panels are bisected by Hunters Creek, which runs roughly north-south. Mature trees buffer the industrial uses on the eastern side and the northeastern corner of the solar panels. The northern border of the solar panels is separated from the Hunters Creek subdivision by mature trees as well.

**Prior Use:** Agricultural use

**Real Estate Tax Information:**

Prior to the development of the solar farm, the land under the Demille and Turrill solar installations were municipal-owned and were not subject to property tax. After development, in 2017, the land became taxable and taxes were \$82,889 total, as shown below.

PIN	Acres	2016 Taxes Paid	2017 Taxes Paid	Tax Increase	2016 Assessed Value	2017 Assessed Value	Value Increase
<b>Lapeer County, MI</b>							
L20-98-008-003-00*	110.84	\$ -	\$ 34,294	N/A	\$ -	\$ 726,700	N/A
L20-95-705-050-00*	254.84	\$ -	\$ 48,595	N/A	\$ -	\$ 1,029,750	N/A
<b>TOTAL</b>	<b>365.68</b>	<b>\$ -</b>	<b>\$ 82,889</b>	<b>N/A</b>	<b>\$ -</b>	<b>\$ 1,756,450</b>	<b>N/A</b>

\* Prior to development as a solar farm, the parcels were municipal property without a taxable value.

**Paired Sale Analysis:**

The maps, below, and on the following pages display properties adjoining the solar sites that are numbered in red for subsequent analysis.

**Demille Solar Farm**



DTE's Lapeer Solar Projects - Demille Adjoining Properties

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DTE's Lapeer Solar Projects - Demille Adjoining Properties

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### Turrill Solar Farm



DTE's Lapeer Solar Projects - Turrill Adjoining Properties



DTE's Lapeer Solar Projects - Turrill Adjoining Properties

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In reviewing Adjoining Properties to study in a Paired Sale Analysis, several properties and sales were considered but eliminated from further consideration as discussed below.

We identified seven Adjoining Properties that sold since the solar farm started operations in May of 2017: Adjoining Properties 3, 4, 7, 9, and 16 for the Demille Solar Farm, and Adjoining Properties 3 and 4 for the Turrill Solar Farm. Of these properties, three were considered atypical for the area.

Adjoining Property 7 adjacent to the Demille Solar farm is a split-level home with a finished walk out basement with a pool. The typical home in the area has a traditional basement and pools are atypical. The unusual nature of this sale was confirmed with the selling broker, Renee Voss (see comments below).

Adjoining Property 16 just south of the Demille Solar Farm is a 10.1-acre lot that is buffered by trees. The home is atypical for the area, as most homes are situated on lots between 1-acre and 1.5-acres in size and were built before 1980; this home was built in 2008. We interviewed the broker Josh Holbrook (see comments below) who confirmed the atypical nature of this property.

Adjoining Property 3, just west of the Turrill Solar Farm, was a ranch home with 1,348 square feet on a lot that was just over one acre. Comparables for homes of this size, type, and lot size were not available in the immediate market area. It should be noted that the price per square foot for this home (\$108.01) is significantly higher than median price per square foot of either data set we studied.

As a part of our research, we interviewed three local real estate brokers that sold homes adjacent to the Lapeer Solar farm. According the brokers, there was no impact on the home prices or marketability due to the homes' proximity to the solar arrays.

*Renee Voss of Coldwell Banker*, selling broker of the raised ranch at 1138 Don Wayne Drive (Adjoining Property 7), which is adjacent to the Demille solar farm at the southeast corner, noted that there was no impact on this sale from the solar farm located to the rear. The home, which has a pool in the backyard, sold quickly with multiple offers, Voss stated.

*Josh Holbrook*, the selling broker of 1408 Turrill Road (known as Adjoining Property 16), located just south of the Demille Solar Farm, said the solar farm had no impact on the sale and that the community takes pride in the solar farm.

*Anne Pence of National Realty Centers*, the selling broker for 1126 Don Wayne Drive, a single-family home adjacent to the Demille solar farm (known as Test Area Sale 9), reported that "the solar farm did not have any effect on the sale of this home. The buyers did not care one bit about the solar field in the back yard. The fact is that you know no one is going to be behind you when they develop a solar farm in your back yard. And there they put up trees to block the view. My in-laws also actually live at end of that street, even though they haven't sold or put their house on market, they don't mind the solar panels either. It's not an eyesore. And another house sold on that block, a raised ranch home, and it sold with no problems."



**Group 1 – Demille:**

Adjoining Properties 3, 4, and 9 to the Demille Solar Farm were considered for a paired sales analysis, and we analyzed these properties as single-family home uses in Group 1. The improvements on these properties are located between 210 to 255 feet to the nearest solar panel.

Test Area Sales Group 1 - Demille Solar									
Adj. Property #	Address	Median Sale Price	Median Site Size (AC)	Median Beds	Median Baths	Median Year Built	Median Square Feet	Median Sale Date	Median Price PSF
3, 4, 9	1174 Alice Dr, 1168 Alice Dr, 1126 Don Wayne Drive	\$160,000	0.50	3	2.0	1973	1,672	May-18	\$86.12

We analyzed seven Control Area Sales of single-family homes with similar construction and use that were not located in close proximity to the solar farm, that sold within a reasonable time frame from the median sale date of the Test Area Sales in Group 1. The Control Area Sales for Group 1 are ranch homes with three bedrooms and one and two bathrooms. We excluded sales that were bank-owned, and those between related parties.

The Control Area Sales were adjusted for market conditions using a regression analysis to identify the appropriate monthly market conditions adjustment. The result of our analysis for DTE's Lapeer Solar Project - Group 1 is presented below.

DTE Lapeer Solar Group 1 - Demille Solar		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Test Area Sales (3)	Adjoining solar farm	\$86.12
Control Area Sales (7)	No: Not adjoining solar farm	\$85.92
Difference between Unit Price of Test Area Sales and Adjusted Median Unit Price of Control Area Sales		0.24%

The days on market for the three Test Area Sales had a median of 28 days on market (ranging from 5 to 48 days), while the median days on market for the Control Area sales was 72 days (ranging from 14 to 224 days), **and we note no negative marketing time differential.**

**Group 2 – Turrill:**

Adjoining Property 4 to the Turrill Solar Farm was analyzed separately since it is a two-story home on a larger lot as Group 2. The home on Adjoining Property 4 is 165 feet from the property line to the nearest solar panel.

Test Area Sale Group 2 - Turrill Solar									
Adj. Property #	Address	Median Sale Price	Median Site Size (AC)	Median Beds	Median Baths	Median Year Built	Median Square Feet	Median Sale Date	Median Price PSF
4	1060 Cliff Drive	\$200,500	1.30	4	2.5	1970	2,114	Sep-18	\$94.84

We analyzed four Control Area single-family homes sales with similar construction that were not located in close proximity to the solar farm, that sold within a reasonable time frame from the sale date of Adjoining Property 4.

The Control Area Sales for Group 2 are 2-story homes with between two and four bedrooms and 2.5 to 3.0 bathrooms. We excluded sales that were bank-owned, and those between related parties.

We adjusted the Control Area Sales for market conditions using a regression analysis to identify the appropriate monthly market conditions adjustment. The result of our analysis for DTE's Lapeer Solar Project – Group 2 is presented below.

CohnReznick Paired Sale Analysis DTE Lapeer Solar Group 2 - Turrill Solar		
No. of Sales	Potentially Impacted by Solar Farm	Adjusted Median Price Per SF
Test Area Sale (1)	Adjoining solar farm	\$94.84
Control Area Sales (4)	No: Not adjoining solar farm	\$91.80
Difference between Unit Price of Test Area Sale and Adjusted Median Unit Price of Control Area Sales		3.31%

The days on market for the Test Area Sale was 2 days, while the median days on market for the Control Area sales was 35 days (ranging from 11 to 177 days), **and we note no negative marketing time differential.**

**Noting no negative price differential,** with the Test Area Groups having a higher unit sale price than the Control Area sales, in either Group, it does not appear that the DTE's Lapeer Solar had any negative impact on adjacent property values.

## SUMMARY OF ADJOINING USES

The table below summarizes each subject solar farm's adjoining uses.

Solar Farm #	Solar Farm	Composition of Surrounding Uses (% of Surrounding Acreage)					Avg. Distance from Panels to Improvements (Feet)
		Acreage % of Surrounding Agricultural Uses	Acreage % of Surrounding Residential Uses	Acreage % of Surrounding Industrial Uses	Acreage % of Surrounding Office Uses	Acreage % of Surrounding Other Uses	
1	North Star	75.00%	15.00%	0.00%	0.00%	10.00%	350
2	Dominion Indy Solar III	97.70%	2.30%	0.00%	0.00%	0.00%	474
3	Dougherty Solar	76.42%	22.46%	1.12%	0.00%	0.00%	350
4	Miami-Dade Solar Energy Center	56.10%	10.00%	0.00%	0.00%	34.00%	915
5	Barefoot Bay Solar Energy Center	0.00%	9.71%	88.08%	0.00%	2.20%	734
6	Innovative Solar 42	20.00%	25.00%	0.00%	0.00%	55.00%	405
7	Woodland Solar	25.00%	5.00%	0.00%	0.00%	60.00%	615
8	Rutherford Farm	10.00%	40.00%	10.00%	0.00%	40.00%	180
9	Elm City Solar	20.00%	15.00%	10.00%	0.00%	50.00%	295
10	Lapeer Solar	60.00%	35.00%	0.00%	0.00%	5.00%	260

Overall, the majority of the surrounding acreage for each comparable solar farm is made up of agricultural land, some of which have homesteads. There are also smaller single-family home sites that adjoin the solar farms we have studied. We have found that these solar farms are sound comparables in terms of adjoining uses, location, and size.

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## MARKET COMMENTARY

Additionally, we have contacted market participants such as appraisers, brokers, and developers familiar with property values around solar farms. Commentary from our conversations with these market participants is recorded below.

A Grant County, Kentucky Assessor stated that they have not seen a reduction in assessed property values or market values for adjacency to Solar Farms.

A McNairy County, Tennessee Assessor stated that they have not applied reductions to assessed value for adjacency to Solar Farms.

Christy Wingate, a real estate broker with Parker Real Estate Group, noted in her experience, the presence of a solar farm is neither an attraction nor a deterrent for nearby home buyers.

A Miami Dade County, Florida Assessor stated that they do not reduce assessed property values for adjacency to Solar Farms.

A Putnam County, Florida Assessor stated that they have not seen a reduction in assessed value for adjacency to Solar Farms.

A Grant County, Kentucky Assessor stated that they have not seen a reduction in assessed property values or market values for adjacency to Solar Farms.

A McNairy County, Tennessee Assessor stated that they have not applied reductions to assessed value for adjacency to Solar Farms.

Renee Davis, Tax Administrator for Bladen County, North Carolina, stated that she has not seen any effect on property values due to proximity to a solar farm.

We spoke with Jim Brown, an appraiser for Scotland County, North Carolina, who stated that he has seen no effect on property values due to proximity to a solar farm.

We spoke with Gary Rose, a tax assessor for Duplin County, North Carolina, who stated that he has seen no effect on property values in regards to proximity to a solar farm.

Kathy Renn, a property Valuation Manager for Vance County, North Carolina, stated that she has not noticed any effect on property values due to proximity to a solar farm.

Larry Newton, a Tax Assessor for Anson County, North Carolina, stated that there are six solar farms in the county ranging from 20 to 40 acres and he has not seen any evidence that solar farms have had any effect on property values due to proximity to a solar farm.

We spoke with Patrice Stewart, a Tax Administrator for Pasquotank County, North Carolina, and she has seen no effect on land or residential property values due to proximity to the solar farms in Pasquotank County.

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We spoke with the selling broker of the Adjoining Property for Elm City Solar, in North Carolina, Selby Brewer, who said the solar farm did not impact the buyer's motivation.

We spoke with Amy Carr, Commissioner of Revenue in Southampton County, Virginia, who stated that most of the solar farms are in rural areas but she has not seen any effect or made any adjustments on property values. They have evaluated the solar farm land considering a more intense use, which increased the assessed value.

The Interim Assessor for the town of Whitestown in Oneida County, New York, Frank Donato, stated that he has seen no impact on property values of properties nearby solar farms.

Steve Lehr at the Department of Assessment for Tompkins County, New York, mentioned that the appraisal staff has made no adjustments regarding assessed values of properties surrounding solar farms. Marketing times for properties have also stayed consistent. Lehr noted that a few of the solar farms in Tompkins County are on land owned by colleges and universities and a few are in rural areas.

At this point in time, Al Fiorille, Senior Valuation Specialist in the Tompkins County Assessment department in New York, reported that he cannot measure any negativity from the solar farms and arrays that have been installed within the county.

Mason Hass, the Riverhead Assessor in Suffolk County, on Long Island, New York stated that the solar farms in his town are in industrial zoned areas and he has not seen any impact on adjacent properties.

The Assessor for the town of Smithtown in Suffolk County, New York, Irene Rice, has not seen any impact on property values as a result of their location near the newly built solar farms in her town.

In the Assessor's office in the town of Seneca, Ontario County, New York, Shana Jo Hamilton stated that she has seen no impact on property values of properties adjacent to solar farms.

Michael Zazzara, Assessor of the City of Rochester in Monroe County, New York commented that the City has a couple of solar farms, and they have seen no impact on nearby property values and have received no complaints from property owners.

While there are one or two homes nearby to existing solar farms in the town of Lisbon in St. Lawrence County, New York, Assessor Stephen Teele has not seen any impact on property values in his town. The solar farms in the area are in rural or agricultural areas in and around Lisbon.

The Assessor for the Village of Whitehall in Washington County, New York, Bruce Caza, noted that there are solar farms located in both rural and residential areas in the village and he has seen no impact on adjacent properties, including any concerns related to glare from solar panels.

Laurie Lambertson, the Town Assessor for Bethlehem, in Albany County, New York noted that the solar farms in her area are tucked away in rural or industrial areas. Lambertson has seen no impact on property values in properties adjacent to solar farms.

We spoke with Ken Surface, a Senior Vice President of Nexus Group. Nexus Group is a large valuation group in Indiana and has been hired by 20 counties in Indiana regarding property assessments. Mr. Surface is familiar with the solar farm sites in Harrison County (Lanesville Solar Farm) and Monroe County (Ellettsville Solar Farm) and stated he has noticed no impact on property values from proximity to these sites.

We interviewed Missy Tetrick, a Commercial Valuation Analyst for the Marion County Indiana Assessor. She mentioned the Indy Solar III sites and stated that she saw no impact on land or property prices from proximity to this solar farm.

We spoke with Dorene Greiwe, Decatur County Indiana Assessor, and she stated that solar farms have only been in the county a couple of years, but she has seen no impact on land or property prices due to proximity to this solar farm.

Connie Gardner, First Deputy Assessor for Madison County Indiana, stated that there are three solar farms in her county, and she has seen no impact on land or property prices due to proximity to these solar farms.

We spoke with Tara Shaver, Director of Administration for Marion County, Indiana Assessor/Certified Assessor, and she stated that she has seen no impact on land or property prices due to proximity to solar farms.

Candace Rindahl of ReMax Results, a real estate broker with 16 years of experience in the North Branch, Minnesota area, said that she has been in most of the homes surrounding the North Star Solar Farm and personally sold two of them. She reported that the neighboring homes sold at market rates comparable to other homes in the area not influenced by the solar farm, and they sold within 45 days of offering, at the end of 2017, which was in line with the market.

Dan Squires, Chisago County Tax Assessor, confirmed that the Chisago County Assessor's Office completed their own study on property values adjacent to and in close vicinity to the solar farm from January 2016 to October 2017. From the study, the assessor determined the residential homes adjacent to the North Star Solar Farm were in-line with the market and were appreciating at the same rate as the market.<sup>14</sup>

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14 Chisago County Press: County Board Real Estate Update Shows No "Solar Effects" (11/03/2017)

## SOLAR FARM FACTORS ON HARMONY OF USE

The data from the solar farms included in this Property Value Impact Study, clearly indicates that solar farms are generally a compatible use with agricultural and residential uses.

The following section analyzes specific physical characteristics of solar farms and is based on research and our solar farm site visits.

**Appearance:** Most solar panels have a similar appearance to a greenhouse or single-story residence can range from 8 to 20 feet, but are usually not more than 15 feet high. As previously mentioned, developers generally surround a solar farm with a fence and often leave existing perimeter foliage, which minimizes the visibility of the solar farm. The physical characteristics of solar farms are compatible with adjoining agricultural and residential uses.

**Sound:** Solar panels in general are effectively silent and sound levels are minimal, like ambient sound. There are limited sound-emitting pieces of equipment on-site, which only produce a quiet hum (e.g. substation). However, these sources are not typically heard outside the solar farm perimeter fence.

**Odor:** Solar panels do not produce any byproduct or odor.

**Greenhouse Gas (GHG) Emissions:** Much of the GHG produced in the United States is linked to the combustion of fossil fuels, such as coal, natural gas, and petroleum, for energy use. Generating renewable energy from operating solar panels for energy use does not have significant GHG emissions, promoting cleaner air and reducing carbon dioxide (CO<sub>2</sub>) emissions to fight climate change.

**Traffic:** The solar farm requires minimal daily onsite monitoring by operational employees and thus minimal operational traffic.

**Hazardous Material:** Modern solar panel arrays are constructed to U.S. government standards. Testing shows that modern solar modules are both safe to dispose of in landfills, and are also safe in worst case conditions of abandonment or damage in a disaster.<sup>15</sup> Reuse or recycling of materials would be prioritized over disposal. Recycling is an area of significant focus in the solar industry, and programs for both batteries and solar panels are advancing every year. While the exact method of recycling may not be known yet as it is dependent on specific design and manufacturer protocol, the equipment is designed with recyclability of its components in mind, and it is likely that solar panel and battery energy storage recycling and reuse programs will only improve in 25 years' time.

Examples of homes built adjoining to solar farms are presented on the following pages.

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<sup>15</sup> Virginia Solar Initiative - Weldon Cooper Center for Public Service – University of Virginia  
(<https://solar.coopercenter.org/taxonomy/term/5311>)



**Innovative Solar 42 (2017)**  
Cumberland County, NC

Single Family Home Development (1)

- End-user built
- 2,933 SF
- Completed on 3/1/2019
- Cost estimate: \$170,300

Single Family Home Development (2)

- Developer built
- 4 Bedroom
- 3 Bathroom
- 2,401 SF
- Sold 6/18/19 for \$265,900 (\$110.75/sf)

**Innovative Solar 42 (2019)**  
Cumberland County, NC

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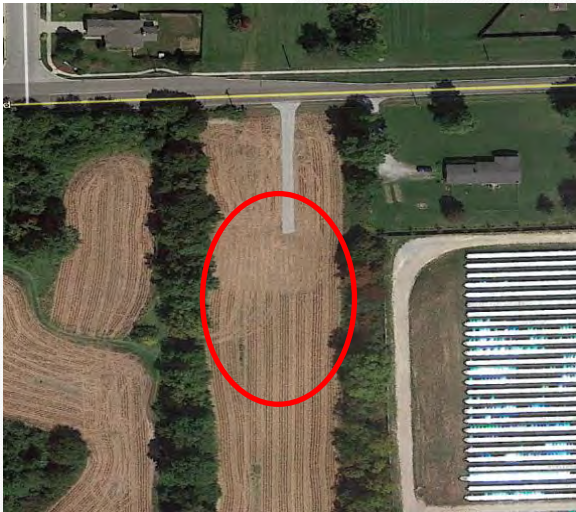
**Developer Built Home**

Sold 6/18/19 for \$265,900 (\$110.75/sf)

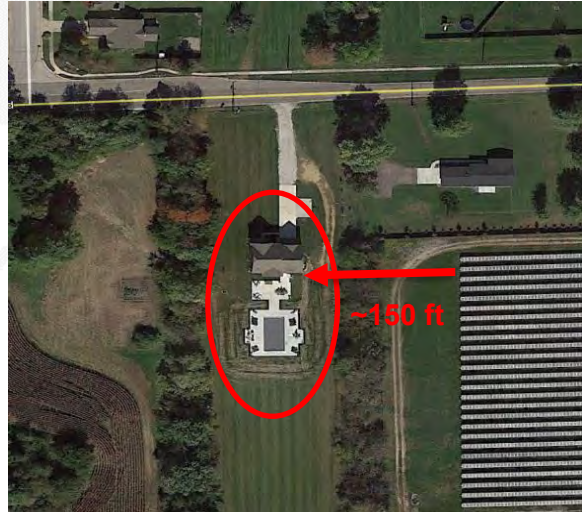
Cumberland County, NC (adjacent to Innovative 42 solar farm)

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For the solar farm Dominion Indy III, the adjacent land to the west was acquired and subsequently developed with a large estate home – after the solar panels had been in operation for years.



*Dominion Indy III Solar Farm  
September 2014*



*Dominion Indy III Solar Farm  
October 2016*



*Estate home adjacent to Dominion Indy III Solar Farm  
On-site pool and attached garage (home cost estimated at \$450,000 - October 2015)*

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## SUMMARY AND FINAL CONCLUSIONS

We have reviewed published methodology for measuring impact on property values as well as published studies that analyzed the impact of solar farms on property values. We have also interviewed market participants to give us additional insight as to how the market evaluates farmland and single-family homes with views of the solar farm. These studies found little to no measurable and consistent difference between the Test Area Sales and the Control Area Sales attributed to the solar farms. We then can conclude that since the Adjoining Property Sales (Test Area Sales) were not adversely affected by their proximity to the solar farm, that properties surrounding other proposed solar farms operating in compliance with all regulatory standards will similarly not be adversely affected, in either the short or long term periods.

The purpose of this property value impact study is to determine whether the presence of a solar farm has caused a measurable and consistent difference in values between the Test Area Sales and the Control Area Sales. A summary of our findings for the paired sales analyses is presented below, which analyzes all of the improved homes, and then an additional analysis summarizing the impact on adjacent residential lots and farmland.

CohnReznick Solar Analysis Conclusions									
#	Solar Farm	Number of Test Area Sales	Number of Control Area Sales	Median Adjoining Property Sale (Test Area) Price per Unit	Control Area Sales Median Price per Unit	Difference (%)	Avg. Feet from Panel to Lot	Avg. Feet from Panel to House	Impact Found
<b>Single-Family Residential</b>									
1	North Star Solar	4	11	\$139.13	\$138.54	+0.43%	140	425	No Impact
2	Indy Solar III Group 2	4	8	\$59.10	\$57.84	+2.18%	240	350	No Impact
	Indy Solar III Group 3	7	11	\$72.15	\$71.69	+0.65%	165	300	No Impact
3	Dougherty Solar	1	5	\$74.55	\$76.23	-2.21%	202	312	No Impact
5	Barefoot Bay Solar Energy Center Group 2	5	126	\$95.90	\$93.95	+2.07%	675	750	No Impact
6	Innovative Solar 42 Group 1	1	7	\$107.09	\$100.18	+6.91%	215	405	No Impact
	Innovative Solar 42 Group 2	1	7	\$111.71	\$105.34	+6.10%	240	300	No Impact
7	Rutherford Farm	1	6	\$53.46	\$52.49	+1.85%	135	180	No Impact
8	Elm City Solar	1	8	\$56.60	\$55.57	+1.85%	255	295	No Impact
9	Woodland Solar	1	5	\$144.63	\$137.76	+4.99%	420	615	No Impact
10	DTE Lapeer Solar Group 1	3	7	\$86.12	\$85.92	+0.24%	220	260	No Impact
	DTE Lapeer Solar Group 1	1	4	\$94.84	\$91.80	+3.31%	165	250	No Impact
<b>Average Variance in Sale Prices for Test to Control Areas</b>						<b>+2.36%</b>			
<b>Land (Agricultural/Single Family Lots)</b>									
2	Indy Solar III Group 1	1	4	\$8,210	\$8,091	+1.47%	280	-	No Impact
4	Miami-Dade Solar Energy Center	3	6	\$82,491	\$80,686	+0.76%	766	-	No Impact
5	Barefoot Bay Solar Energy Center Group 1	2	7	\$54,500	\$51,000	+6.86%	475	-	No Impact
<b>Average Variance in Sale Prices for Test to Control Areas</b>						<b>+3.03%</b>			

36 Adjoining Test Sales studied and compared to 222 Control Sales

Most of the solar farms under study reflected sales of property adjoining an existing solar farm in which the unit sale prices were effectively the same or higher, except for two, than the comparable Control Area sales that were not near a solar farm. The conclusions support that there is no negative impact for improved residential homes adjacent to solar, nor for residential development lots or agricultural acreage.

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Based upon our examination, research, and analyses of the existing solar farm uses, the surrounding areas, and an extensive market database, we have concluded that **no consistent negative impact has occurred to adjacent property that could be attributed to proximity to the adjacent solar farm**, with regard to unit sale prices or other influential market indicators. Additionally, in our workfile we have retained analyses of additional test subjects, each with their own set of matched control sales, which had consistent results, indicating no consistent and measurable impact on adjacent property values. This conclusion has been confirmed by numerous county assessors who have also investigated this use's potential impact on property values.

If you have any questions or comments, please contact the undersigned. Thank you for the opportunity to be of service.

Respectfully submitted,

CohnReznick LLP



Andrew R. Lines, MAI  
Principal- Valuation Advisory Services  
Certified General Real Estate Appraiser

Florida License No. RZ3899  
Expires 11/30/2020  
Indiana License No. CG41500037  
Expires 6/30/2022  
Kentucky License 5663  
Expires 6/30/2021  
Georgia License No. 360939  
Expires 10/31/2021



Patricia L. McGarr, MAI, CRE, FRICS  
National Director - Valuation Advisory Services  
Certified General Real Estate Appraiser

Indiana License No. CG49600131  
Expires 6/30/2022  
North Carolina License No. A8131  
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## CERTIFICATION

We certify that, to the best of our knowledge and belief:

1. The statements of fact and data reported are true and correct.
2. The reported analyses, findings, and conclusions in this consulting report are limited only by the reported assumptions and limiting conditions, and are our personal, impartial, and unbiased professional analyses, findings, and conclusions.
3. We have no present or prospective interest in the property that is the subject of this report and no personal interest with respect to the parties involved.
4. We have performed no services, as an appraiser or in any other capacity, regarding the property that is the subject of this report within the three-year period immediately preceding acceptance of this assignment.
5. We have no bias with respect to the property that is the subject of this report or the parties involved with this assignment.
6. Our engagement in this assignment was not contingent upon developing or reporting predetermined results.
7. Our compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value finding, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this report.
8. Our analyses, findings, and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute, which includes the Uniform Standards of Professional Appraisal Practice (USPAP).
9. The use of this report is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives.
10. Patricia L. McGarr, MAI, CRE, FRICS and Andrew R. Lines, MAI have viewed the exterior of all comparable data referenced in this report in person, via photographs, or aerial imagery.
11. We have not relied on unsupported conclusions relating to characteristics such as race, color, religion, national origin, gender, marital status, familial status, age, and receipt of public assistance income, handicap, or an unsupported conclusion that homogeneity of such characteristics is necessary to maximize value.
12. Sonia K. Singh, MAI, Michael F. Antypas, Amanda G. Edwards, TJ Schemmel, Connor H. Martin and Malaika Martin. provided consulting assistance to the persons signing this certification, including data verification, research, and administrative work all under the appropriate supervision.
13. We have experience in reviewing properties similar to the subject and are in compliance with the Competency Rule of USPAP.
14. As of the date of this report, Patricia L. McGarr, MAI, CRE, FRICS, Andrew R. Lines, MAI, and Sonia K. Singh, MAI have completed the continuing education program for Designated Members of the Appraisal Institute.

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If you have any questions or comments, please contact the undersigned. Thank you for the opportunity to be of service.

Respectfully submitted,

**CohnReznick LLP**



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Expires 6/30/2022  
Kentucky License 5663  
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Georgia License No. 360939  
Expires 10/31/2021



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## ASSUMPTIONS AND LIMITING CONDITIONS

*The fact witness services will be subject to the following assumptions and limiting conditions:*

1. No responsibility is assumed for the legal description provided or for matter pertaining to legal or title considerations. Title to the property is assumed to be good and marketable unless otherwise stated. The legal description used in this report is assumed to be correct.
2. The property is evaluated free and clear of any or all liens or encumbrances unless otherwise stated.
3. Responsible ownership and competent management are assumed.
4. Information furnished by others is believed to be true, correct and reliable, but no warranty is given for its accuracy.
5. All engineering studies are assumed to be correct. The plot plans and illustrative material in this report are included only to help the reader visualize the property.
6. It is assumed that there are no hidden or unapparent conditions of the property, subsoil, or structures that render it more or less valuable. No responsibility is assumed for such conditions or for obtaining the engineering studies that may be required to discover them.
7. It is assumed that the property is in full compliance with all applicable federal, state, and local and environmental regulations and laws unless the lack of compliance is stated, described, and considered in the evaluation report.
8. It is assumed that the property conforms to all applicable zoning and use regulations and restrictions unless nonconformity has been identified, described and considered in the evaluation report.
9. It is assumed that all required licenses, certificates of occupancy, consents, and other legislative or administrative authority from any local, state, or national government or private entity or organization have been or can be obtained or renewed for any use on which the value estimate contained in this report is based.
10. It is assumed that the use of the land and improvements is confined within the boundaries or property lines of the property described and that there is no encroachment or trespass unless noted in this report.
11. The date of value to which the findings are expressed in this report apply is set forth in the letter of transmittal. The appraisers assume no responsibility for economic or physical factors occurring at some later date which may affect the opinions herein stated.
12. Unless otherwise stated in this report, the existence of hazardous materials, which may or may not be present on the property, was not observed by the appraisers. The appraisers have no knowledge of the existence of such substances on or in the property. The appraisers, however, are not qualified to detect such substances. The presence of substances such as asbestos, urea-formaldehyde foam insulation, radon gas, lead or lead-based products, toxic waste contaminants, and other potentially hazardous materials may affect the value of the property. The value estimate is predicated on the

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assumption that there is no such material on or in the property that would cause a loss in value. No responsibility is assumed for such conditions or for any expertise or engineering knowledge required to discover them. The client is urged to retain an expert in this field, if desired.

13. The forecasts, projections, or operating estimates included in this report were utilized to assist in the evaluation process and are based on reasonable estimates of market conditions, anticipated supply and demand, and the state of the economy. Therefore, the projections are subject to changes in future conditions that cannot be accurately predicated by the appraisers and which could affect the future income or value projections.
14. Fundamental to the appraisal analysis is the assumption that no change in zoning is either proposed or imminent, unless otherwise stipulated. Should a change in zoning status occur from the property's present classification, the appraisers reserve the right to alter or amend the value accordingly.
15. It is assumed that the property does not contain within its confined any unmarked burial grounds which would prevent or hamper the development process.
16. The Americans with Disabilities Act (ADA) became effective on January 26, 1992. We have not made a specific compliance survey and analysis of the property to determine if it is in conformance with the various detailed requirements of the ADA. It is possible that a compliance survey of the property, together with a detailed analysis of the requirements of the ADA, could reveal that the property is not in compliance with one or more of the requirements of the Act. If so, this fact could have a negative effect on the value of the property. Unless otherwise noted in this report, we have not been provided with a compliance survey of the property. Any information regarding compliance surveys or estimates of costs to conform to the requirements of the ADA are provided for information purposes. No responsibility is assumed for the accuracy or completeness of the compliance survey cited in this report, or for the eventual cost to comply with the requirements of the ADA.
17. Any value estimates provided in this report apply to the entire property, and any proration or division of the total into fractional interests will invalidate the value estimate, unless such proration or division of interests has been set forth in this report.
18. Any proposed improvements are assumed to have been completed unless otherwise stipulated; any construction is assumed to conform with the building plans referenced in this report.
19. Unless otherwise noted in the body of this report, this evaluation assumes that the subject does not fall within the areas where mandatory flood insurance is effective.
20. Unless otherwise noted in the body of this report, we have not completed nor are we contracted to have completed an investigation to identify and/or quantify the presence of non-tidal wetland conditions on the subject property.
21. This report should not be used as a basis to determine the structural adequacy/inadequacy of the property described herein, but for evaluation purposes only.
22. It is assumed that the subject structure meets the applicable building codes for its respective jurisdiction. We assume no responsibility/liability for the inclusion/exclusion of any structural

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component item which may have an impact on value. It is further assumed that the subject property will meet code requirements as they relate to proper soil compaction, grading, and drainage.

23. The appraisers are not engineers, and any references to physical property characteristics in terms of quality, condition, cost, suitability, soil conditions, flood risk, obsolescence, etc., are strictly related to their economic impact on the property. No liability is assumed for any engineering-related issues.

*The evaluation services will be subject to the following limiting conditions:*

1. The findings reported herein are only applicable to the properties studied in conjunction with the Purpose of the Evaluation and the Function of the Evaluation as herein set forth; the evaluation is not to be used for any other purposes or functions.
2. Any allocation of the total value estimated in this report between the land and the improvements applies only to the stated program of utilization. The separate values allocated to the land and buildings must not be used in conjunction with any other appraisal and are not valid if so used.
3. No opinion is expressed as to the value of subsurface oil, gas or mineral rights, if any, and we have assumed that the property is not subject to surface entry for the exploration or removal of such materials, unless otherwise noted in the evaluation.
4. This report has been prepared by CohnReznick under the terms and conditions outlined by the enclosed engagement letter. Therefore, the contents of this report and the use of this report are governed by the client confidentiality rules of the Appraisal Institute. Specifically, this report is not for use by a third party and CohnReznick is not responsible or liable, legally or otherwise, to other parties using this report unless agreed to in writing, in advance, by both CohnReznick and/or the client or third party.
5. Disclosure of the contents of this evaluation report is governed by the by-laws and Regulations of the Appraisal Institute has been prepared to conform with the reporting standards of any concerned government agencies.
6. The forecasts, projections, and/or operating estimates contained herein are based on current market conditions, anticipated short-term supply and demand factors, and a continued stable economy. These forecasts are, therefore, subject to changes with future conditions. This evaluation is based on the condition of local and national economies, purchasing power of money, and financing rates prevailing at the effective date of value.
7. This evaluation shall be considered only in its entirety, and no part of this evaluation shall be utilized separately or out of context. Any separation of the signature pages from the balance of the evaluation report invalidates the conclusions established herein.
8. **Possession of this report, or a copy thereof, does not carry with it the right of publication, nor may it be used for any purposes by anyone other than the client without the prior written consent of the appraisers, and in any event, only with property qualification.**

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9. The appraisers, by reason of this study, are not required to give further consultation or testimony or to be in attendance in court with reference to the property in question unless arrangements have been previously made.
10. Neither all nor any part of the contents of this report shall be conveyed to any person or entity, other than the appraiser's client, through advertising, solicitation materials, public relations, news, sales or other media, without the written consent and approval of the authors, particularly as to evaluation conclusions, the identity of the appraisers or CohnReznick, LLC, or any reference to the Appraisal Institute, or the MAI designation. Further, the appraisers and CohnReznick, LLC assume no obligation, liability, or accountability to any third party. If this report is placed in the hands of anyone but the client, client shall make such party aware of all the assumptions and limiting conditions of the assignment.
11. This evaluation is not intended to be used, and may not be used, on behalf of or in connection with a real estate syndicate or syndicates. A real estate syndicate means a general or limited partnership, joint venture, unincorporated association or similar organization formed for the purpose of, and engaged in, an investment or gain from an interest in real property, including, but not limited to a sale or exchange, trade or development of such real property, on behalf of others, or which is required to be registered with the United States Securities and Exchange commissions or any state regulatory agency which regulates investments made as a public offering. It is agreed that any user of this evaluation who uses it contrary to the prohibitions in this section indemnifies the appraisers and the appraisers' firm and holds them harmless from all claims, including attorney fees, arising from said use.



**ADDENDUM A:  
APPRAISER QUALIFICATIONS**

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Patricia L. McGarr, MAI, CRE, FRICS, CRA, is a principal and National Director of CohnReznick Advisory Group's Valuation Advisory Services practice who is based in Chicago. Pat's experience includes market value appraisals of varied property types for acquisition, condemnation, mortgage, estate, ad valorem tax, litigation, zoning, and other purposes. Pat has been involved in the real estate business since 1980. From June 1980 to January 1984, she was involved with the sales and brokerage of residential and commercial properties. Her responsibilities during this time included the formation, management, and training of sales staff in addition to her sales, marketing, and analytical functions. Of special note was her development of a commercial division for a major Chicago-area brokerage firm.

Since January 1984, Pat has been exclusively involved in the valuation of real estate. Her experience includes the valuation of a wide variety of property types including residential, commercial, industrial, and special purpose properties including such diverse subjects as quarries, marinas, riverboat gaming sites, shopping centers, manufacturing plants, and office buildings. She is also experienced in the valuation of leasehold and leased fee interests. Pat has performed appraisal assignments throughout Illinois and the Chicago Metropolitan area as well as Wisconsin, Indiana, Michigan, New York, New Jersey, California, Nevada, Florida, Utah, Texas, and Ohio. Pat has gained substantial experience in the study and analysis of the establishment and expansion of sanitary landfills in various metropolitan areas including the preparation of real estate impact studies to address criteria required by Senate Bill 172. She has also developed an accepted format for allocating value of a landfill operation between real property, landfill improvements, and franchise (permits) value.

Over the past several years, Pat has developed a valuation group that specializes in serving utility companies establish new utility corridors for electric power transmission and pipelines. This includes determining acquisition budgets, easement acquisitions, and litigation support. Pat has considerable experience in performing valuation impact studies on potential detrimental conditions and has studied properties adjoining landfills, waste transfer stations, stone quarries, cellular towers, schools, electrical power transmission lines, "Big Box" retail facilities, levies, properties with restrictive covenants, landmark districts, environmental contamination, airports, material defects in construction, stigma, and loss of view amenity for residential high rises.

Pat has qualified as an expert valuation witness in numerous local, state and federal courts.

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Pat has participated in specialized real estate appraisal education and has completed more than 50 courses and seminars offered by the Appraisal Institute totaling more than 600 classroom hours, including real estate transaction courses as a prerequisite to obtaining a State of Illinois Real Estate Salesman License.

Pat has earned the professional designations of Counselors of Real Estate (CRE), Member of the Appraisal Institute (MAI), Fellow of Royal Institution of Chartered Surveyors (FRICS) and Certified Review Appraiser (CRA). She is also a certified general real estate appraiser with active licenses in numerous states.

### Education

- North Park University: Bachelor of Science, General Studies

### Professional Affiliations

- National Association of Realtors
- CREW Commercial Real Estate Executive Women
- IRWA International Right of Way Association

### Appointments

**Appointed by the Governor in 2017 to the State of Illinois' Department of Financial & Professional Regulation's Real Estate Appraisal Board; Vice-Chairman - 2018**

### Licenses and Accreditations

- Member of the Appraisal Institute (MAI)
- Counselors of Real Estate, designated CRE
- Fellow of Royal Institution of Chartered Surveyors (FRICS)
- Certified Review Appraiser (CRA)
- Alabama State Certified General Real Estate Appraiser
- California State Certified General Real Estate Appraiser
- Connecticut State Certified General Real Estate Appraiser
- District of Columbia State Certified General Real Estate Appraiser
- Illinois State Certified General Real Estate Appraiser
- Indiana State Certified General Real Estate Appraiser
- Louisiana State Certified General Real Estate Appraiser
- Maryland State Certified General Real Estate Appraiser
- Massachusetts State Certified General Real Estate Appraiser
- Michigan State Certified General Real Estate Appraiser
- Nevada State Certified General Real Estate Appraiser
- New Jersey State Certified General Real Estate Appraiser
- New York State Certified General Real Estate Appraiser
- North Carolina State Certified General Real Estate Appraiser
- Indiana State Certified General Real Estate Appraiser
- South Carolina State Certified General Real Estate Appraiser
- Tennessee State Certified General Real Estate Appraiser

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- Texas State Certified General Real Estate Appraiser
- Virginia State Certified General Real Estate Appraiser
- Wisconsin State Certified General Real Estate Appraiser

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## Andrew R. Lines, MAI

### Principal – Real Estate Valuation, Valuation Advisory Services

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Andrew R. Lines, MAI, is a principal for CohnReznick Advisory Group's Valuation Advisory practice who is based in the Chicago office and has been a CohnReznick employee for over six years. Andrew has been involved in the real estate business for more than 15 years and has performed valuations on a wide variety of real property types including single- and multi-unit residential (including LIHTC), student housing, office, retail, industrial, mixed-use and special purpose properties including landfills, waste transfer stations, marinas, hospitals, universities, telecommunications facilities, data centers, self-storage facilities, racetracks, CCRCs, and railroad corridors. He is also experienced in the valuation of leasehold, leased fee, and partial interests, as well as purchase price allocations (GAAP, IFRS and IRC 1060) for financial reporting.

Valuations have been completed nationwide for a variety of assignments including mortgage financing, litigation, tax appeal, estate gifts, asset management, workouts, and restructuring, as well as valuation for financial reporting including purchase price allocations (ASC 805), impairment studies, and appraisals for investment company guidelines and REIS standards. Andrew has qualified as an expert witness, providing testimony for eminent domain cases in the states of IL and MD. Andrew has also performed appraisal review assignments for accounting purposes (audit support), asset management, litigation and as an evaluator for a large Midwest regional bank.

Andrew has earned the professional designation of Member of the Appraisal Institute (MAI). He has also qualified for certified general commercial real estate appraiser licenses in Arizona, California, Maryland, Florida, Wisconsin, Georgia, Illinois, Indiana, New Jersey and New York. Temporary licenses have been granted in Connecticut, Colorado, Ohio, Indiana, Idaho, Kansas, Minnesota and South Carolina.

#### Education

- Syracuse University: Bachelor of Fine Arts

#### Professional Affiliations

- Chicago Chapter of the Appraisal Institute - Alternate Regional Representative (2016 – 2018)
- International Real Estate Management (IREM)
- National Council of Real Estate Investment Fiduciaries (NCREIF)

#### Community Involvement

- Fellows Alumni Network - World Business Chicago, Founding member
- Syracuse University Regional Council – Active Member

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## Sonia K. Singh, MAI

### Senior Manager – Real Estate Valuation

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Sonia K. Singh, MAI is a senior manager in CohnReznick Advisory Group's Valuation Advisory practice and based in the Bethesda office. For the past eight years, she has engaged in real estate valuation and other real estate consulting services and valued over \$5 billion in real property.

Sonia is adept at valuing a variety of commercial real estate across the United States, including the following complex property types: athletic clubs; full-service hotels and beach resorts; marinas; historic redevelopment projects; recycling facilities; single-family rental home portfolios; master planned communities; and for-sale residential units or subdivisions. She has also performed real estate appraisals involving leasehold interests, air rights ownership, and right-of-way fee simple and easement acquisitions for utility corridors. She has performed these and other appraisals others for purposes including financial reporting, estate planning, gift and estate tax, bond and conventional financing, litigation (eminent domain), and asset management, with the ability to handle appraisals of large portfolios in expedited timeframes. With significant experience in the appraisal of senior living facilities including continuing care retirement communities, skilled nursing facilities, assisted living and memory care facilities, as well as age-restricted housing, Ms. Singh has elevated the firm's modelling of complex healthcare property ownership structures to help illuminate debt/income and lease coverage ratios for federal courts, resulting in millions of dollars in recovered credits for clients.

Additionally, Sonia is experienced in purchase price allocations (GAAP, IFRS, and IRC 1060) for financial reporting, including the early adoption of ASU 2017-01. She has also provided valuation services related to highest and best use analysis, market feasibility studies, and useful life analysis. She has prepared impact studies measuring the possible detrimental impact of economic and environmental influences on property values, including those related to high-voltage transmission lines, distribution warehouses, and solar farms. She has provided expert witness testimony at local county zoning hearings for proposed solar energy uses and their potential detrimental impacts on adjacent property values.

#### Education

- University of Illinois: Bachelor of Science, Actuarial Science

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**Professional Affiliation, Licenses, and Exams**

- MAI - Appraisal Institute, Designated Member
- Urban Land Institute, Associate Member
- Certified General Real Estate Appraiser with Active Licenses in DC and the States of MD, MO, and VA
- Successful completion of the following actuarial exams: Probability (1/P), Financial Mathematics (2/FM), and Models for Financial Economics (3/MFE)

**Awards and Recognitions**

- 2019 National Association of Certified Valuers and Analysts (NACVA) and the Consultants Training Institute (CTI) 40 Under Forty Honoree

# Michael F. Antypas

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Michael Antypas is a senior consultant in CohnReznick Advisory Group's Valuation Advisory Services practice and is based in the Bethesda office. He has assisted other associates and appraisers in the valuation of a variety of retail shopping centers, hotels, market rate and restricted rental apartment properties, Class A office complexes with GSA tenants, mixed-use properties, developable land, and **single-family** rental home portfolios owned by REITs. He has also completed solar farm impact studies, appraisals for eminent domain disputes, as well as purchase price allocations on various senior living facilities, medical office buildings, and retail centers. In addition, Michael is certified in working with Argus Enterprise valuation software. He is a practicing affiliate in the Appraisal Institute and is working towards becoming a Certified General Real Estate Appraiser.

He graduated from the Villanova School of Business in May of 2016. Some of his other experience working in Real Estate originated through interning with commercial brokers. Throughout his senior year in college, Michael interned with Newmark Grubb Knight Frank as a Capital Markets intern. There he helped create and revise many marketing packages for the firm's senior managing directors. He also assisted in developing underwriting models and projections for offering memorandums. He also worked with a boutique restaurant broker in Washington D.C., Papadopoulos Properties where he compiled market research for his client's use and surveyed prospective restaurants to gauge their interest in expanding to the Washington D.C. market.

## Education

- Villanova University: Bachelor of Business Administration, Finance and Real Estate, Minor in Business Analytics

## Certifications

- Argus Enterprise Certified

## Professional Affiliations

- Appraisal Institute, Practicing Affiliate

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TJ Schemmel is a senior consultant in CohnReznick Advisory Group's Valuation Advisory Services practice and is based in the Chicago office. His scope of experience includes assisting other appraisers in performing solar farm impact studies and various special use appraisals. He is currently working towards obtaining his Associate Real Estate Trainee Appraisal License.

Prior to joining CohnReznick, TJ was a financial analyst at Avison Young, specializing in office tenant representation and land development. Over the five years in this position, he participated in office lease negotiations and real estate transactions for companies ranging in size from small start-ups to large multinational corporations. His diverse skill set allowed him to help numerous teams at Avison Young close more than \$150 million of lease transactions. He also supported the land development team on numerous multifamily and office projects for Chicago based investors.

### Education

- University of Cincinnati: Bachelor of Business Administration

### Other Affiliations

- Routes to Success, Incorporated (HOBY Ohio West) – Board President
- Chicago Tutoring - Associate Board Member

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Malaika Martin is a senior consultant in CohnReznick Advisory Group's Valuation Advisory Services practice and is based in the New York office. Malaika's scope of experience includes assisting other appraisers in performing appraisals of office, retail, multifamily and industrial properties as well as intangible assets and special use properties. She is currently working towards obtaining her Certified General Appraisal License.

Prior to joining CohnReznick, Malaika was a Senior Consultant at Altus Group, performing quarterly appraisals and review of external appraisals of institutional-grade property for MetLife. She also has broader experience as a financial analyst for owner-investors in Brooklyn, independent consulting for clients such as Avison Young and Real Capital Analytics, as well as local New York appraisal experience.

### Education

- Bar-Ilan University, International Master of Business Administration
- Tufts University, Bachelor of Arts, History

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Amanda Edwards is a consultant in CohnReznick's Valuation Advisory Services practice group and is based in Chicago. Amanda has assisted other appraisers in the valuation of a variety of industrial properties, medical offices, hotels, multifamily properties, condominium developments, retail and mixed-use properties, developable and open space land, and single-family subdivisions. She has also assisted with appraisals and continuing consulting for eminent domain litigation. Additionally, Amanda has provided audit support for Assurance clients of the firm. Amanda is a licensed Associate Real Estate Trainee Appraiser in Illinois, working toward becoming a Certified General Real Estate Appraiser.

Before joining CohnReznick, Amanda worked at the Inland Group of companies valuing properties and underwriting, as well as assisting in the closing of, commercial mortgage loans, nationwide. Property types included industrial, office, multi-family, retail, and hotel, with an emphasis on value-add properties and new construction projects. Amanda has also worked as a commercial lender for builder-developer housing at Fifth Third Bank, specializing in the Chicago metro area. She has also worked valuing senior housing properties and associated business models for acquisition purposes at a senior housing developer/operator.

Amanda has spent considerable time in the consulting environment, developing and conducting in-depth interviews for primary research in a variety of industries such as technology, financial institutions, and industrial manufacturing for private equity clients.

### Education

- Bryn Mawr College, Bachelor of Arts

### Other Affiliations

- Practicing Affiliate – Appraisal Institute
- Chicago Real Estate Council - Member

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Connor Martin is a consultant in CohnReznick's Valuation Advisory Services practice group and is based in Chicago, IL. Connor has assisted other appraisers in the valuation of a variety of properties, including but not limited to, office, retail, condominium developments and mixed-use developments. Additionally, Connor has aided with eminent domain and solar farm litigation. Connor is a licensed Associate Real Estate Trainee Appraiser in Illinois, working toward becoming a Certified General Real Estate Appraiser.

Before joining CohnReznick, Connor worked on the Valuation and Advisory Services group at Jones Lang LaSalle's Chicago headquarters, specializing in net lease portfolios in the Midwest for private equity firms, large financial institutions, and private investors.

During his time at Ohio State's Fisher College of Business, Connor completed both the Real Estate and Urban Planning specialization and the Marketing specialization. During his senior year, he worked as an Intern on Colliers International's Brokerage team, operating as an active broker and assisting with the incubation of the Healthcare Department. Connor also worked on Kaufman Development's Finance Analysis team, where he developed underwriting models and site selection analyses.

### Education

- The Ohio State University – Fisher College of Business, Bachelor of Science

### Professional Designations

- Associate Real Estate Trainee Appraiser in Illinois

### Other Affiliations

- Practicing Affiliate – Appraisal Institute

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## IMPACT STUDY OF PROPERTY VALUES ADJACENT TO SOLAR

Site Specific Analysis Addendum Report:  
For the Proposed 160 MW Unbridled Solar Project to be Located in Henderson and Webster  
Counties, KY

**PREPARED FOR:**

Ms. Courtney Pelissero  
Permitting Associate  
National Grid Renewables  
8400 Normandale Lake Blvd Suite 1200  
Bloomington, MN 55437

**SUBMITTED BY:**

CohnReznick LLP  
*Valuation Advisory Services*  
200 S. Wacker Drive, Suite 2600  
Chicago, Illinois 60606  
(312) 508-5900

**December 3, 2020**

Andrew R. Lines, MAI  
Patricia L. McGarr, MAI, CRE, FRICS

## LETTER OF TRANSMITTAL

December 3, 2020

Ms. Courtney Pelissero  
Permitting Associate  
National Grid Renewables  
8400 Normandale Lake Blvd Suite 1200  
Bloomington, MN 55437

SUBJECT: Addendum - Property Value Impact Study  
Proposed 160 MW Unbridled Solar Project  
Unincorporated Henderson and Webster Counties, Kentucky

Dear Ms. Pelissero:

**This letter and associated report are considered an Addendum to the previously prepared property value impact study report with an effective date of November 23, 2020 (“Primary Report”). All facts and circumstances surrounding the property value impact study that analyzes existing solar farm and any effect on adjacent property values are contained within the cited Primary Report. This Addendum cannot be properly understood without the cited Primary Report and should be reviewed in unison.**

Per the client’s request, we have researched the proposed solar farm on land located in unincorporated Henderson and Webster Counties, Kentucky. The proposed solar use called Unbridled Solar will have a capacity of 160 MW AC (megawatts alternating current).

The purpose of the assignment is to determine whether the proximity of the proposed renewable energy center use (solar farm) will result in any significant measurable and consistent impact on adjacent property values, given the existing uses and zoning of nearby property at the time of development.

The intended use of our opinions and conclusions is to assist the client in addressing local concerns regarding the proposed solar farm’s potential impact on surrounding property values, in addition to addressing the required criteria for obtaining approvals for the proposed solar farm, such as minimizing the impact on adjacent property values. We have not been asked to value any specific property, and we have not done so.

The client and intended user for the assignment is Unbridled Solar, LLC and National Grid Renewables. Additional intended users of our findings include Henderson and Webster Counties, KY planning and zoning department officials as well as the Kentucky State Electric Generation and Transmission Siting Board. The report may be used only for the aforementioned purpose and may not be distributed without the written consent of CohnReznick LLP (“CohnReznick”).

*Disclaimer: This report is limited to the intended use, intended users (Unbridled Solar, LLC, National Grid Renewables, Henderson and Webster Counties, KY planning and zoning department officials, and the Kentucky State Electric Generation and Transmission Siting Board as it relates to the evaluation of the Project), and purpose stated within. No part of this report may otherwise be reproduced or modified in any form, or by any means, without the prior written permission of CohnReznick LLP.*



The assignment is intended to conform to the Uniform Standards of Professional Appraisal Practice (USPAP), the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute as well as applicable state appraisal regulations.

Based on the analysis in the accompanying report, and subject to the definitions, assumptions, and limiting conditions expressed in the report, our findings follow below.

## CONCLUSIONS

We analyzed 36 adjoining property sales and over 222 comparable sales, collectively, for the identified eleven solar farms (detailed in the Primary Report), over the past five years. We note that proximity to the solar farms has not deterred sales of nearby agricultural land and residential single-family homes nor has it deterred the development of new single-family homes on adjacent land.

No empirical evidence evolved that indicated a more favorable real estate impact on the Control Area Sales as compared to the adjoining, Test Area Sales with regard to such market elements as:

1. Range of sale prices
2. Differences in unit sale prices
3. Conditions of sale
4. Overall marketability
5. New Development
6. Rate of Appreciation

We have also reviewed studies prepared by other real estate valuation experts that specifically analyzed the impact of solar facilities on nearby property values. These studies found little to no measurable and consistent difference in value attributed to the proximity to solar farms between unit prices for Test Area Sales and Control Area Sales and noted that solar energy uses are generally considered a compatible use.

We have also interviewed market participants, including County and Township Assessors, to give us additional insight as to how the market evaluates farmland and single-family homes with views of the solar farm. These local real estate assessors who have at least one solar farm in their jurisdiction have determined that property adjacent to solar farms have not affected adjacent property values, specifically:

- A Grant County, Kentucky Assessor stated that they have not seen a reduction in assessed property values or market values for adjacency to Solar Farms.
- A McNairy County, Tennessee Assessor stated that they have not applied reductions to assessed value for adjacency to Solar Farms.

Considering all of this information, we can conclude that since the Adjoining Property Sales (Test Area Sales) for the existing solar farms analyzed were not adversely affected by their proximity to solar farms, that properties surrounding other solar farms operating in compliance with all regulatory standards will similarly not be adversely affected, in either the short- or long-term periods.

If you have any questions or comments, please contact the undersigned. Thank you for the opportunity to be of service.

Very truly yours,

**CohnReznick LLP**



Andrew R. Lines, MAI  
Principal- Valuation Advisory Services  
Certified General Real Estate Appraiser

Florida License No. RZ3899  
Expires 11/30/2020  
Indiana License No. CG41500037  
Expires 6/30/2022  
Kentucky License 5663  
Expires 6/30/2021  
Georgia License No. 360939  
Expires 10/31/2021



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Expires 3/31/2022  
Michigan License No. 1201072979  
Expires 7/31/2022

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## SCOPE OF WORK

### CLIENT

The client for this assignment is Unbridled Solar, LLC and National Grid Renewables.

### INTENDED USERS

Unbridled Solar, LLC and National Grid Renewables, Henderson and Webster Counties, KY planning and zoning department officials, and Kentucky State Electric Generation and Transmission Siting Board; other intended users may include the client's legal and site development professionals.

### INTENDED USE

The intended use of our findings and conclusions is to address certain criteria required for the granting of approvals for the proposed solar energy center use in Henderson and Webster Counties, Kentucky, including the minimization of impact on nearby or adjacent property values. The report may be used only for the aforementioned purpose and may not be distributed without the written consent of CohnReznick LLP ("CohnReznick").

### PURPOSE

The purpose of the assignment is to determine whether the proximity of the studied facilities (solar farms) resulted in any significant measurable and consistent impact on adjacent property values, given the existing uses and zoning of nearby property at the time of development; address local concerns regarding a solar farm use having a perceived impact on surrounding property values; and, provide a consulting report that can address criteria for obtaining approvals for National Grid Renewable's proposed solar energy center use.

### EFFECTIVE DATE

December 3, 2020

### DATE OF REPORT

December 3, 2020

### PRIOR SERVICES

USPAP requires appraisers to disclose to the client any services they have provided in connection with the subject property in the prior three years, including valuation, consulting, property management, brokerage, or any other services.

We have not previously evaluated the Project site.

### INSPECTION

Patricia L. McGarr, MAI and Andrew R. Lines, MAI have viewed the exterior of the Project and all comparable data referenced in the study in person, via photographs, or aerial imagery.

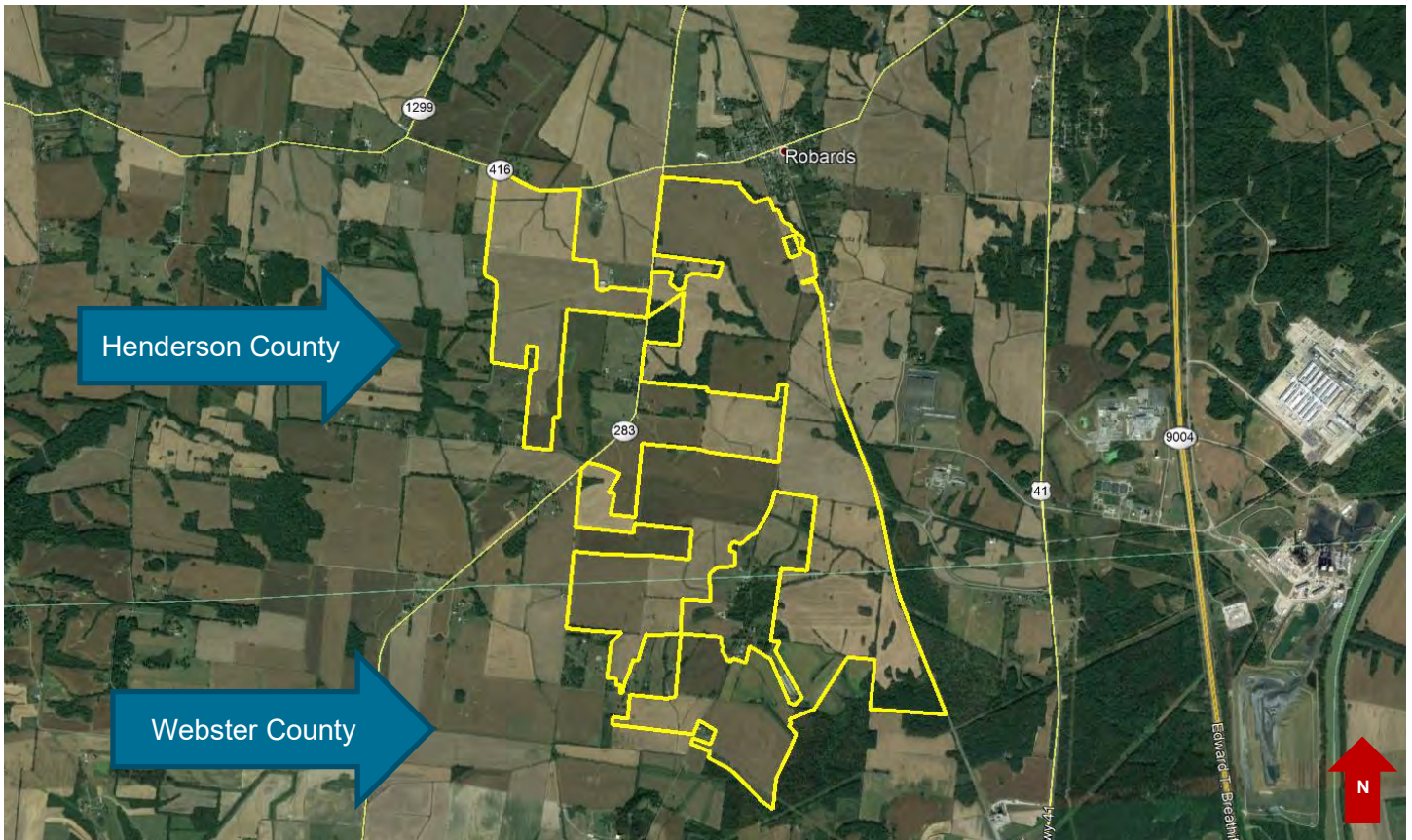
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## IDENTIFICATION AND DESCRIPTION OF THE PROPOSED PROJECT

The Unbridled Solar Project (“Unbridled Solar” or “the Project”) is to be located on land to the south of Kentucky Route 416 and west of Kentucky Highway 41 in unincorporated Henderson County to the north and Webster County to the south, northwest of Sebree, Kentucky and southwest of Robards, Kentucky. Based on development plans for a typical solar farm, the proposed 160-megawatt solar energy center project would generally consist of solar photovoltaic arrays, electrical inverters, underground and aboveground collection lines, security fencing, safety lighting, and other axillary infrastructure. The Project is estimated to generate the amount of power equal to powering approximately 29,516 homes, annually. It will take approximately 12 to 18 months to construct and vegetation will be maintained approximately twice a year.

The Project will be located on approximately 1,680 combined acres of connected properties in Webster County (540 acres) and Henderson County (1,140 acres). The Project is located in a rural and industrial environment. Solar energy systems are an allowable use in Henderson County under a site plan approval. Webster County does not have a zoning and planning department. The electric generation facility will be surrounded by seven-foot fences with barbed and/or smooth wire for security, which meets the National Electrical Code (NEC) Article 100 requirements, as well as the Henderson County Zoning Ordinance.

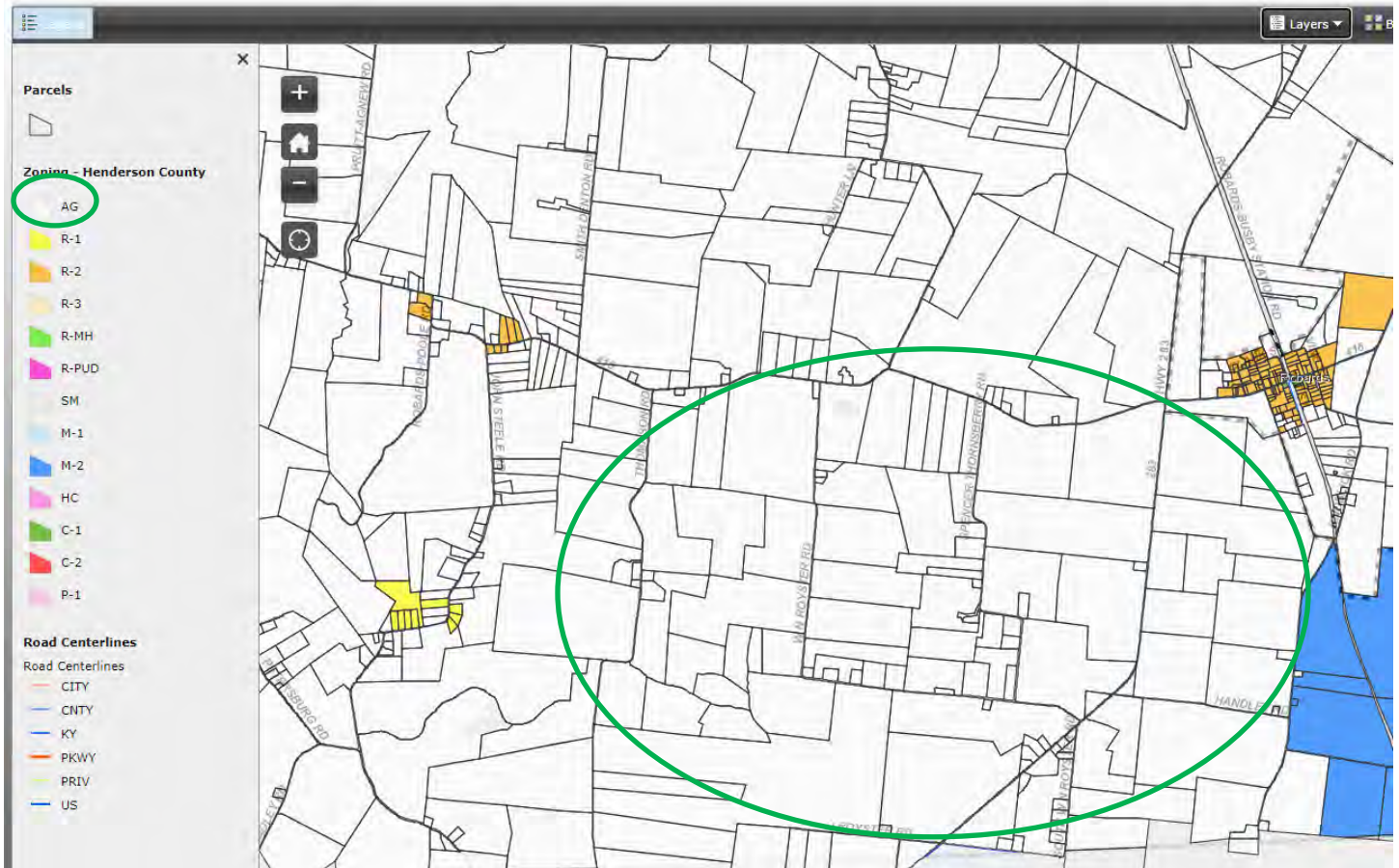
The Project will be situated on land parcels utilized for agricultural purposes and is illustrated on the following page by the outlined polygons. A utility corridor bifurcates the Project through the middle and the panels are proposed to be designed around it. The Project parcels are bordered by agricultural farmland and rural homesteads.



Proposed Unbridled Solar Project parcel area outline in yellow above as provided by National Grid Renewables

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EXCERPT OF ZONING MAP FROM HENDERSON COUNTY GIS VIEWER



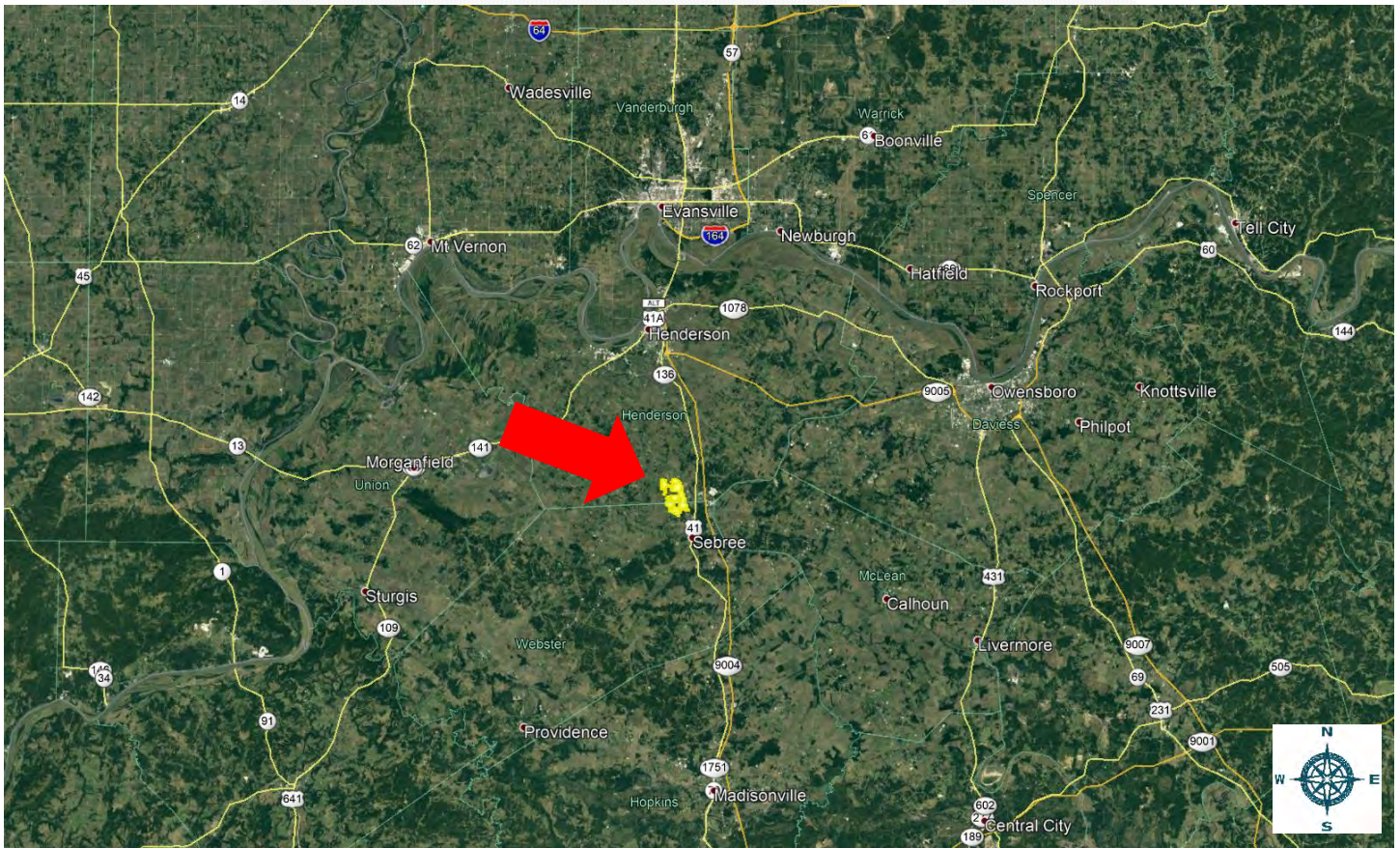
Approximate location of site area outlined in green

According to information provided by National Grid Renewables, the Project panels shall be no closer than 100 feet from adjacent residential structures. Other setbacks include 25 foot setbacks from adjacent agricultural land parcel lines, as well as 25 foot setbacks from roadways across from agricultural land parcels. The security fence will be consistent with federal and state code regulations. Landscape buffers will be 15 feet wide and will consist of shrubbery and trees to be determined.

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## OVERVIEW OF THE SURROUNDING AREA OF THE PROJECT

The Project consists of a utility-scale, solar energy use in unincorporated Henderson and Webster Counties, Kentucky known as the 160 MW Unbridled Solar Project. A surrounding area map indicating the location of the Project (outlined in yellow) is presented below.



Aerial imagery of site area provided by Google Earth, dated October 2019.  
Parcel boundaries provided by National Grid Renewables



**TRAFFIC PATTERNS AND CONNECTIVITY**

The Project is located west of Kentucky Routes 41 and 9004 (Edward T. Breathitt Pennyrile Parkway/Interstate-69), major arterials in this area connect north to the city of Henderson and south to through the state of Kentucky, into Tennessee. The nearest major cities to the Project are Evanston, OH, approximately 23 miles north of the Subject, Louisville, KY approximately 103 miles northeast of the site, and Nashville TN approximately 113 miles south of the Project.

**DEMOGRAPHIC FACTORS**

Demographic data is presented below, as compiled by ESRI, which indicates a slightly declining population in the area surrounding the Project, the Counties, and the State, as well as a predominantly owner-occupied area. Median household income is higher at the local and State levels than the Counties levels. These features indicate a stable economic base.

<b>DEMOGRAPHIC PROFILE</b>				
	<b>3 Mile Radius</b>	<b>Henderson County</b>	<b>Webster County</b>	<b>Kentucky</b>
<b>Population</b>				
2025 Projection	1,313	44,715	13,394	4,703,976
2020 Estimate	1,340	45,393	13,609	4,596,869
2010 Census	1,384	46,250	13,621	4,339,367
Growth 2020 - 2025	-2.01%	-1.49%	-1.58%	2.33%
Growth 2010 - 2020	-3.18%	-1.85%	-0.09%	5.93%
<b>Households</b>				
2025 Projection	498	18,203	5,176	1,861,840
2020 Estimate	508	18,454	5,263	1,819,399
2010 Census	523	18,705	5,272	1,719,965
Growth 2020 - 2025	-1.97%	-1.36%	-1.65%	2.33%
Growth 2010 - 2020	-2.87%	-1.34%	-0.17%	5.78%
2020 Owner Occupied (%)	74.41%	59.44%	70.19%	68.26%
2020 Renter Occupied (%)	25.59%	40.56%	29.81%	31.74%
2020 Med. Household Income	\$54,103	\$47,979	\$42,110	\$50,617
2020 Avg. Household Income	\$66,588	\$65,908	\$56,660	\$70,264

**CONCLUSION**

Land uses in the area surrounding the Project can be categorized as predominantly farmland and residential homesteads. The factors presented previously indicate that the proposed Project would not be incompatible with surrounding uses and would not negatively impact surrounding properties.

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## KENTUCKY SOIL PRODUCTIVITY AND VALUE TRENDS

### NCCPI PRODUCTIVITY INDEX

Crop yields have been the basis for establishing a soil productivity index, and are used by county assessors, farmers, and market participants in assessing agricultural land. While crop yields are an integral part in assessing soil qualities, it is not an appropriate metric to rely on because “yields fluctuate from year to year, and absolute yields mean little when comparing different crops. Productivity indices provide a single scale on which soils may be rated according to their suitability for several major crops under specified levels of management, such as an optimum level.”<sup>1</sup> The productivity index, therefore, not crop yields, is best suited for applications in land appraisal and land-use planning.

The United States Department of Agriculture’s (USDA) National Resources Conservation Services (NRCS) developed and utilizes the National Commodity Crop Productivity Index (NCCPI) as a national soil interpreter and is used in the National Soil Information System (NASIS), but it is not intended to replace other crop production models developed by individual states.<sup>2</sup> The focus of the model is on identifying the best soils for the growth of commodity crops, as the best soils for the growth of these crops are generally the best soils for the growth of other crops.<sup>3</sup> The NCCPI model describes relative productivity ranking over a period of years and not for a single year where external influences such as extreme weather or change in management practices may have affected production. At the moment the index only describes non-irrigated crops, and will later be expanded to include irrigated crops, rangeland, and forestland productivity.<sup>4</sup>

Yields are influenced by a variety of different factors including environmental traits and management inputs. Tracked climate and soil qualities have been proven by researchers to directly explain fluctuations in crop yields, especially those qualities that relate to moisture-holding capacity. Some states such as Illinois have developed a soil productivity model that considers these factors to describe “optimal” productivity of farmed land. Except for these factors, “inherent soil quality or inherent soil productivity varies little over time or from place to place for a specific soil (map unit component) identified by the National Cooperative Soil Survey (NCSS).”<sup>5</sup> The NRCS Web Soil Survey website has additional information on how the ratings are determined. The **State of Kentucky** does not have its own crop production model and utilizes the NCCPI.

The proposed solar farm will be located in unincorporated Henderson and Webster counties, in the western portion of the state. An excerpt of a soil productivity map is presented on the following page as retrieved from the USDA Web Soil Survey, which provides an illustration of the variation in soil productivity across the local

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1 Bulletin 811: Optimum Crop Productivity of Illinois Soils. University of Illinois, College of Agricultural, Consumer and Environmental Sciences, Office of Research. August 200.

2 Agricultural land rental payments are typically tied to crop production of the leased agricultural land and is one of the primary reasons the NCCPI was developed, especially since the model needed to be consistent across political boundaries.

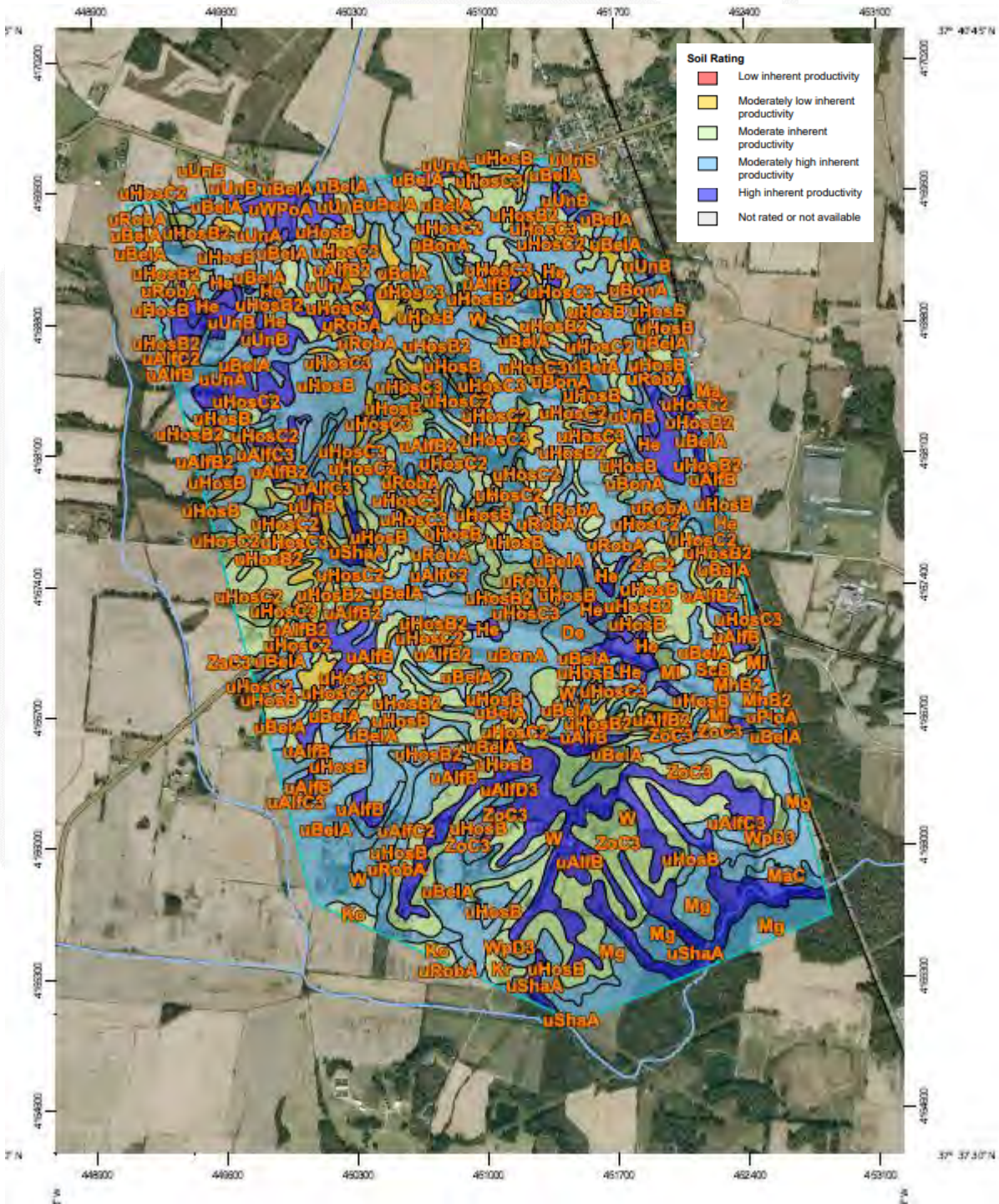
3 Per the User Guide for the National Commodity Crop Productivity Index, the NCCPI uses natural relationships of soil, landscape and climate factors to model the response of commodity crops in soil map units. The present use of the land is not considered in the ratings.

4 AgriData Inc. Docs: [http://support.agridatainc.com/NationalCommodityCropProductivityIndex\(NCCPI\).ashx](http://support.agridatainc.com/NationalCommodityCropProductivityIndex(NCCPI).ashx)

5 USDA NRCS’s User Guide National Commodity Crop Productivity Index (NCCPI)

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area that is based on the NCCPI. The approximate site area for the Project is within boundary delineated below. Note, numerical labels correspond to soil type, not productivity index.



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Per the NCCPI, soil productivity is measured on both a numerical scale from 0 to 100, with 0 being the worst and 100 being the best,<sup>6</sup> and by qualitative ratings. The qualitative rating classifications below are determined by the USDA NRCS and provide general comments on the productivity of the soil.

**High inherent productivity** indicates that the soil, site, and climate have features that are very favorable for crop production. High yields and low risk of crop failure can be expected if a high level of management is employed.

**Moderately high inherent productivity** indicates that the soil has features that are generally quite favorable for crop production. Good yields and moderately low risk of crop failure can be expected.

**Moderate inherent productivity** indicates that the soil has features that are generally favorable for crop production. Good yields and moderate risk of crop failure can be expected.

**Moderately low inherent productivity** indicates that the soil has features that are generally not favorable for crop production. Low yields and moderately high risk of crop failure can be expected.

**Low inherent productivity** indicates that the soil has one or more features that are unfavorable for crop production. Low yields and high risk of crop failure can be expected.

The weighted average soil productivity for the general area was determined to be approximately 62.34. A numerical scale that corresponds to the indicated qualitative ratings above was not available for the NCCPI; however, the soil productivity for this area is on the near the middle of the range, aligning with the “moderate inherent productivity” and “moderately high inherent productivity” categories. According to the qualitative scale above, land with the moderate inherent productivity classification is generally favorable for crop production.

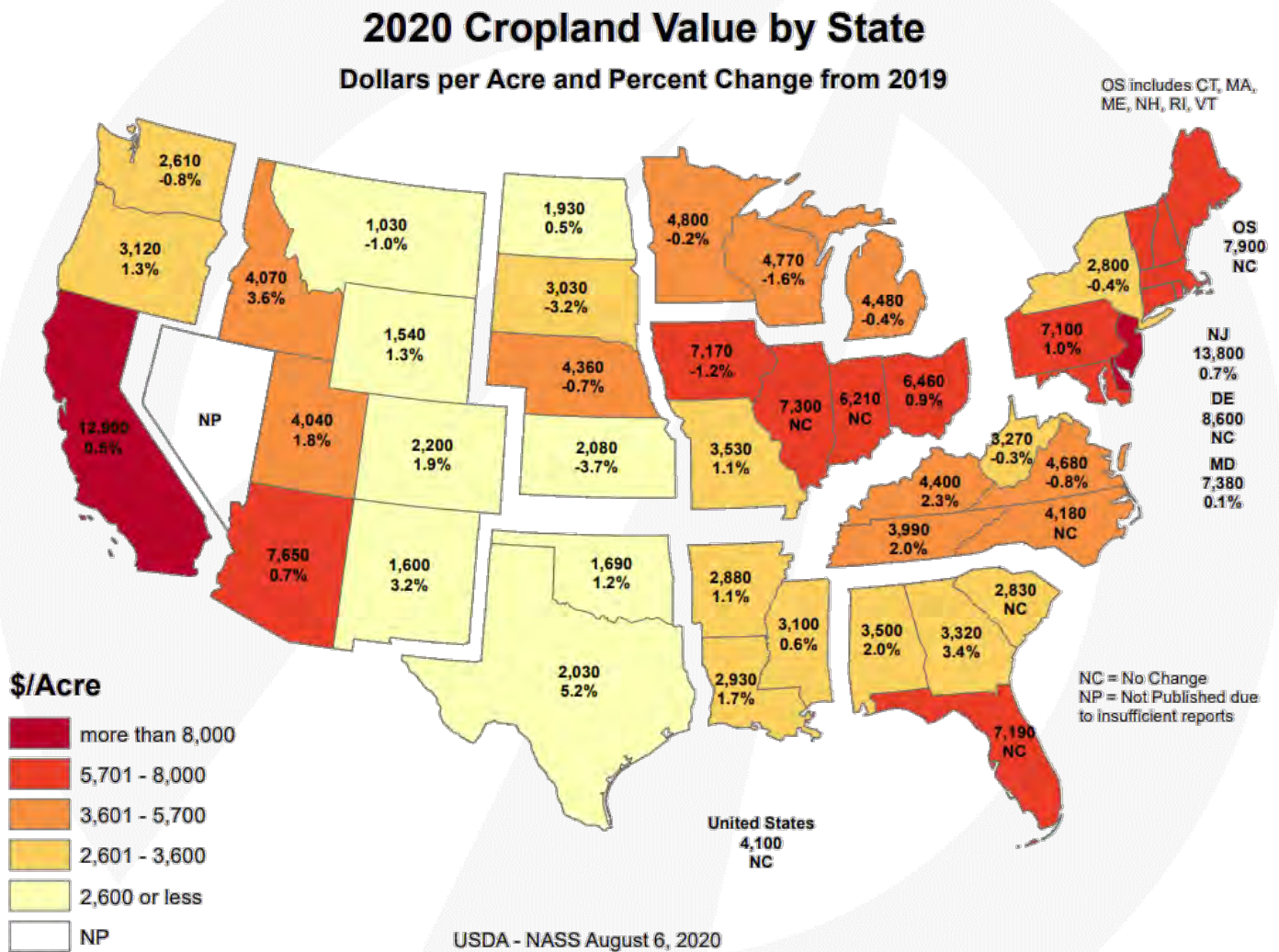
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<sup>6</sup> Quantitative ratings are also show in ranges of 0.00 to 1.00. AgriData Inc. presents the NCCPI index rating multiplied by 100 in a range of 0.00 to 100.00 to show up to four significant figures.

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AREA VALUE TRENDS - CROPLAND

Agricultural land values are heavily influenced by relative crop production yields. The following exhibit compiled by the USDA National Agricultural Statistics Service (NASS) provides an illustration of how regional conditions such as weather conditions, geographies, and soil conditions can affect farm real estate values.



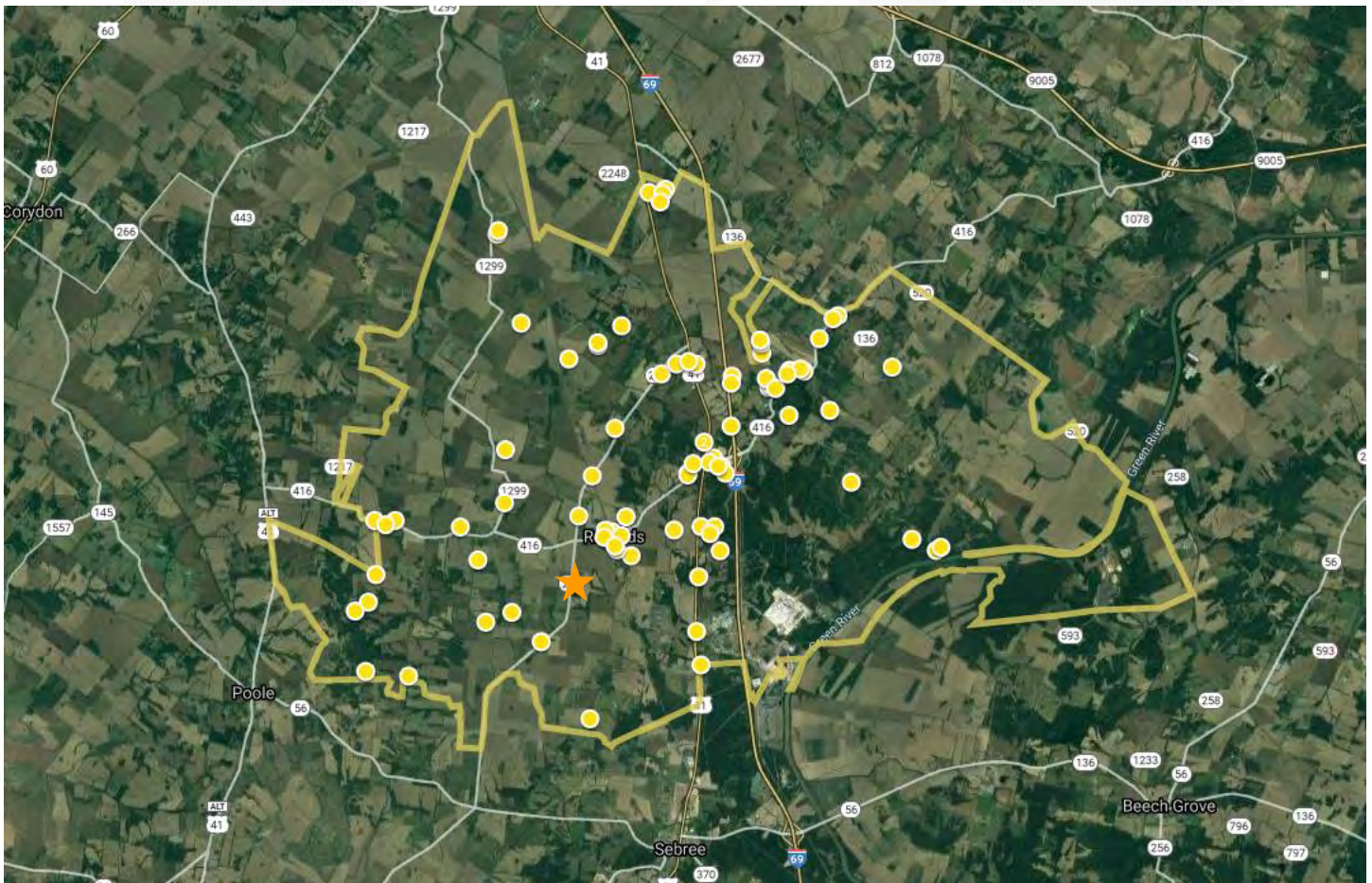
Per the NASS report, the average value of cropland in Kentucky for 2020 is \$4,400 per acre, which is an increase of 2.3 percent from 2019. In addition, the report indicated that the average annual growth rate for farmland values in Kentucky from 2016 to 2020 was 2.59 percent.<sup>7</sup>

<sup>7</sup> [https://www.nass.usda.gov/Publications/Todays\\_Reports/reports/land0820.pdf](https://www.nass.usda.gov/Publications/Todays_Reports/reports/land0820.pdf)

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## AREA VALUE TRENDS – RESIDENTIAL HOMES

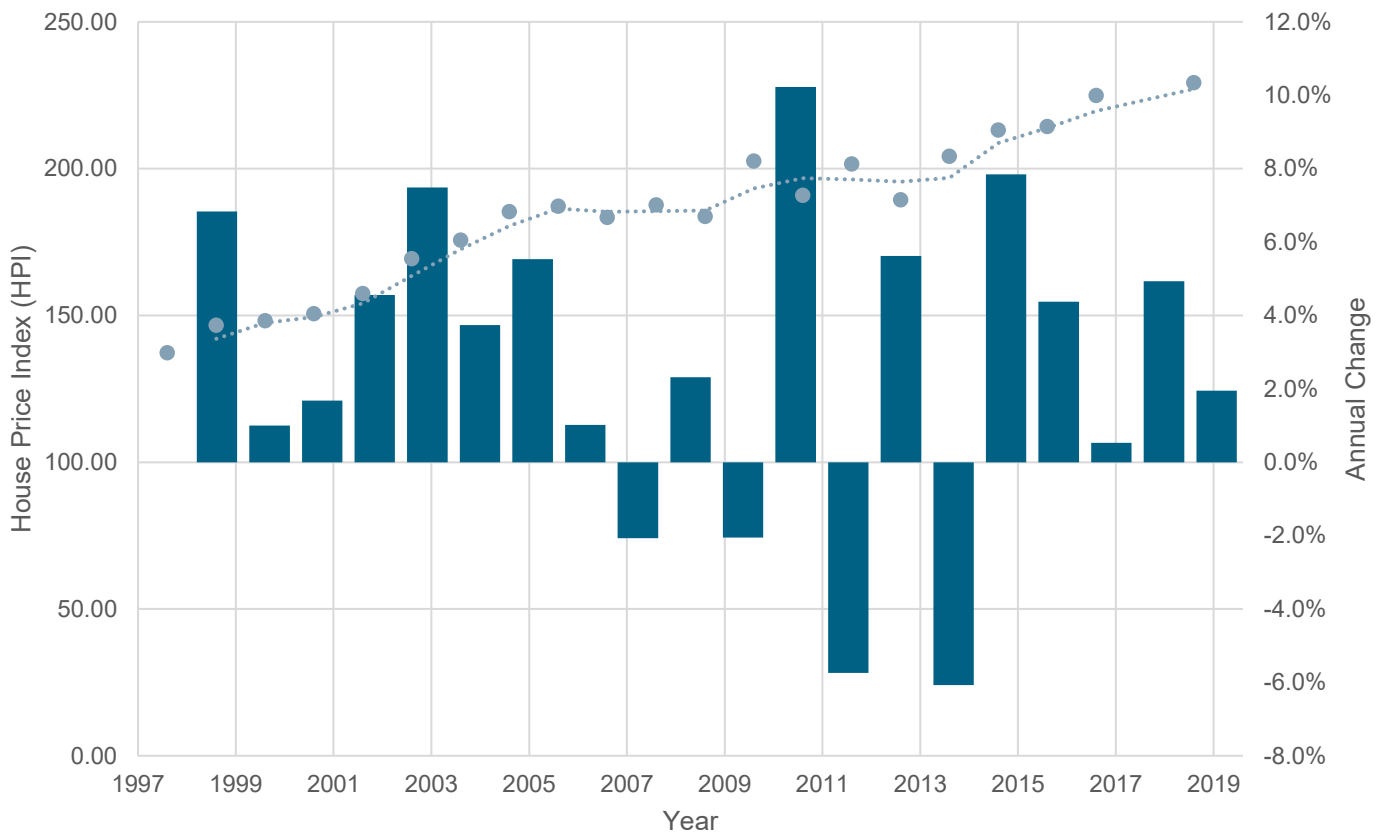
Although the Project is in unincorporated Henderson and Webster County, Kentucky, the Project has a Robards mailing address and a 42452 zip code, which extends from Robards at the center, through northern Webster County in the south to Anthoston to the north as outlined in the aerial image below. Majority of the single family homes in this area are ranch-style or are manufactured homes. Homes in the area surrounding the Project (identified with the orange star) are generally located on one to five acre homes sites and a few recent sales indicate a unit price range of \$60 to \$110 per square foot of gross living area. Although, more robust sale activity and higher unit prices are exhibited closer to Interstate 69.



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In a three to five mile radius of the Project there has not been much sale activity given the rural nature of the local area; however, the chart below illustrates residential home value trends for the Project’s 42452 zip code. The source is the Federal Housing Finance Agency’s (FHFA) House Price Index (HPI), which is a weighted, repeat-sales index measuring changes in single-family house prices. There is not published index for 2018 since there was not enough transactional data, therefore, we have omitted 2018 from our below graph.

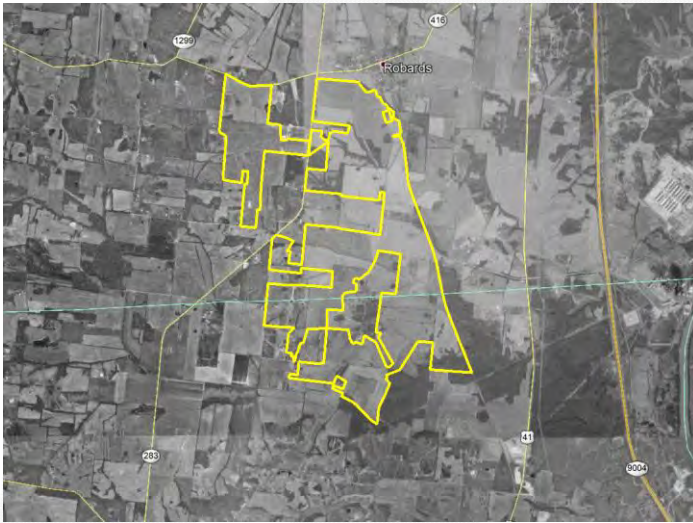
Federal Housing Financy Agency (FHFA) House Price Index (HPI)  
Zip Code 42452



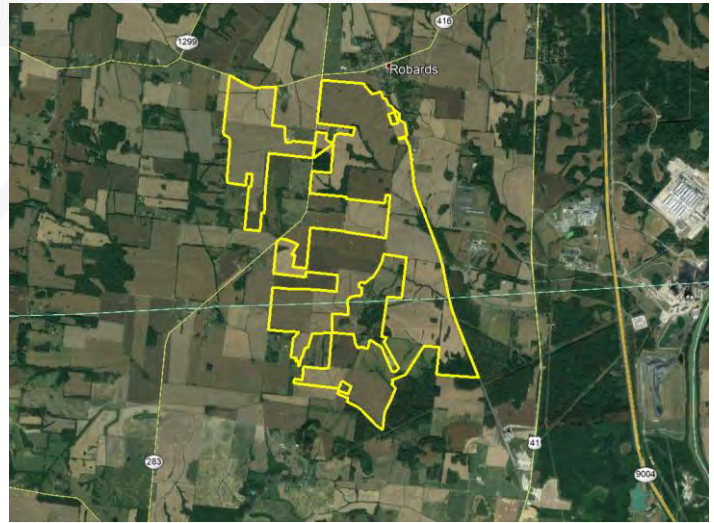
Based on the above, residential home values in the local area have increased since 2013 during the economic recovery from the 2008 recession, and have begun to stabilize into 2019.

## LOCAL LAND DEVELOPMENT TRENDS

Land values can be driven by a site's proximity to the path of development. The closer a property is to the path of development, and without natural barriers to development, the more value a property may have in the future; however, according to the Henderson County, KY comprehensive plan<sup>8</sup>, the Project has a future land use identical to the zoning categories of General Agriculture zone as currently designated.



*Aerial Imagery dated April 1998*



*Aerial Imagery dated October 2019*

According to the images above, there has not been much development in the local area over the past twenty years. Generally, any undeveloped agricultural land is considered to be an interim use as the intensity of uses grows in step with macroeconomic factors; however, the Project and the land surrounding have future designated land uses for agricultural uses.

<sup>8</sup> <https://hendersonky.us/DocumentCenter/View/261/Final-Henderson-City-County-Comprehensive-Plan-PDF?bidId=>



## SUMMARY AND FINAL CONCLUSIONS

The Project is located in a stable area that is predominantly agricultural in nature with some residential homesteads. Local development has not been robust over the past twenty years, and the immediate land parcels have a future land use designation of agricultural. Based on our analysis of real estate taxes in the Primary Report, solar farm uses incur anywhere from 131% to ±1,000% increase in real estate tax revenue for the local area, feeding back into essential services and schools. Local land and residential home prices have remained stable over the past five years and are anticipated to align in the future with macroeconomic changes. Overall, the proposed Project is considered a locally compatible use.

We have reviewed published methodology for measuring impact on property values as well as published studies that analyzed the impact of solar farms on property values. These studies found little to no measurable and consistent difference between the Test Area Sales and the Control Area Sales attributed to the solar farms. Specifically, in a 2017 study conducted by Chisago County Assessor John Keefe, Keefe analyzed the numbers for 15 parcels alongside or near the North Star Solar Farm that sold between January 2016 and October 2017. Based on trends exhibited by 750+ sales throughout the county, Keefe concluded that the homes, located on 375<sup>th</sup>, 367<sup>th</sup>, Keystone, Little Oak, Lincoln Trail, and Kost Trail were all “in excess of assessed” and reported that “valuation hasn’t suffered.”<sup>9</sup>

We have also interviewed market participants, including County and Township Assessors, to give us additional insight as to how the market evaluates farmland and single-family homes with views of the solar farm. These local real estate assessors who have at least one solar farm in their jurisdiction have determined that property adjacent to solar farms have not affected adjacent property values, specifically:

- A Grant County, Kentucky Assessor stated that they have not seen a reduction in assessed property values or market values for adjacency to Solar Farms.
- A McNairy County, Tennessee Assessor stated that they have not applied reductions to assessed value for adjacency to Solar Farms.

Based upon our examination, research, and analyses of the existing solar farm uses, the surrounding areas, and an extensive market database, we have concluded that **no consistent negative impact has occurred to adjacent property that could be attributed to proximity to the adjacent solar farm**, with regard to unit sale prices or other influential market indicators. Additionally, in our workfile we have retained analyses of additional Test Area subjects, each with their own set of matched Control Area sales, which had consistent results, indicating no consistent and measurable impact on adjacent property values. This conclusion has been confirmed by numerous county assessors who have also investigated this use’s potential impact on property values.

We then can conclude that since the Adjoining Property Sales (Test Area Sales) were not adversely affected by their proximity to the solar farm, that properties surrounding the proposed solar farm Project operating in

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<sup>9</sup> <https://www.cleanenergyresourceteams.org/chisago-county-boards-real-estate-update-shows-solar-has-no-impact-property-values>

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compliance with all regulatory standards will similarly not be adversely affected, in either the short or long term periods.

If you have any questions or comments, please contact the undersigned. Thank you for the opportunity to be of service.

Respectfully submitted,

**CohnReznick LLP**



Andrew R. Lines, MAI  
Principal- Valuation Advisory Services  
Certified General Real Estate Appraiser

Florida License No. RZ3899  
Expires 11/30/2020  
Indiana License No. CG41500037  
Expires 6/30/2022  
Kentucky License 5663  
Expires 6/30/2021  
Georgia License No. 360939  
Expires 10/31/2021



Patricia L. McGarr, MAI, CRE, FRICS  
National Director - Valuation Advisory Services  
Certified General Real Estate Appraiser

Indiana License No. CG49600131  
Expires 6/30/2022  
North Carolina License No. A8131  
Expires 6/30/2021  
Virginia License No. 4001016998  
Expires 3/31/2022  
Michigan License No. 1201072979  
Expires 7/31/2022

## CERTIFICATION

We certify that, to the best of our knowledge and belief:

1. The statements of fact and data reported are true and correct.
2. The reported analyses, findings, and conclusions in this consulting report are limited only by the reported assumptions and limiting conditions, and are our personal, impartial, and unbiased professional analyses, findings, and conclusions.
3. We have no present or prospective interest in the property that is the subject of this report and no personal interest with respect to the parties involved.
4. We have performed no services, as an appraiser or in any other capacity, regarding the property that is the subject of this report within the three-year period immediately preceding acceptance of this assignment.
5. We have no bias with respect to the property that is the subject of this report or the parties involved with this assignment.
6. Our engagement in this assignment was not contingent upon developing or reporting predetermined results.
7. Our compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value finding, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of this report.
8. Our analyses, findings, and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute, which includes the Uniform Standards of Professional Appraisal Practice (USPAP).
9. The use of this report is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives.
10. Patricia L. McGarr, MAI, CRE, FRICS and Andrew R. Lines, MAI have viewed the exterior of the Project and of all comparable data referenced in this report in person, via photographs, or aerial imagery.
11. We have not relied on unsupported conclusions relating to characteristics such as race, color, religion, national origin, gender, marital status, familial status, age, and receipt of public assistance income, handicap, or an unsupported conclusion that homogeneity of such characteristics is necessary to maximize value.
12. Sonia K. Singh, MAI, Michael F. Antypas, Amanda G. Edwards, TJ Schemmel, Connor H. Martin and Malaika Martin provided consulting assistance to the persons signing this certification, including data verification, research, and administrative work all under the appropriate supervision.
13. We have experience in reviewing properties similar to the subject and are in compliance with the Competency Rule of USPAP.
14. As of the date of this report, Patricia L. McGarr, MAI, CRE, FRICS, Andrew R. Lines, MAI, and Sonia K. Singh, MAI have completed the continuing education program for Designated Members of the Appraisal Institute.

If you have any questions or comments, please contact the undersigned. Thank you for the opportunity to be of service.

Respectfully submitted,

**CohnReznick LLP**



Andrew R. Lines, MAI  
Principal- Valuation Advisory Services  
Certified General Real Estate Appraiser

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Expires 10/31/2021



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North Carolina License No. A8131  
Expires 6/30/2021  
Virginia License No. 4001016998  
Expires 3/31/2022  
Michigan License No. 1201072979  
Expires 7/31/2022

## ASSUMPTIONS AND LIMITING CONDITIONS

*The fact witness services will be subject to the following assumptions and limiting conditions:*

1. No responsibility is assumed for the legal description provided or for matter pertaining to legal or title considerations. Title to the property is assumed to be good and marketable unless otherwise stated. The legal description used in this report is assumed to be correct.
2. The property is evaluated free and clear of any or all liens or encumbrances unless otherwise stated.
3. Responsible ownership and competent management are assumed.
4. Information furnished by others is believed to be true, correct and reliable, but no warranty is given for its accuracy.
5. All engineering studies are assumed to be correct. The plot plans and illustrative material in this report are included only to help the reader visualize the property.
6. It is assumed that there are no hidden or unapparent conditions of the property, subsoil, or structures that render it more or less valuable. No responsibility is assumed for such conditions or for obtaining the engineering studies that may be required to discover them.
7. It is assumed that the property is in full compliance with all applicable federal, state, and local and environmental regulations and laws unless the lack of compliance is stated, described, and considered in the evaluation report.
8. It is assumed that the property conforms to all applicable zoning and use regulations and restrictions unless nonconformity has been identified, described and considered in the evaluation report.
9. It is assumed that all required licenses, certificates of occupancy, consents, and other legislative or administrative authority from any local, state, or national government or private entity or organization have been or can be obtained or renewed for any use on which the value estimate contained in this report is based.
10. It is assumed that the use of the land and improvements is confined within the boundaries or property lines of the property described and that there is no encroachment or trespass unless noted in this report.
11. The date of value to which the findings are expressed in this report apply is set forth in the letter of transmittal. The appraisers assume no responsibility for economic or physical factors occurring at some later date which may affect the opinions herein stated.
12. Unless otherwise stated in this report, the existence of hazardous materials, which may or may not be present on the property, was not observed by the appraisers. The appraisers have no knowledge of the existence of such substances on or in the property. The appraisers, however, are not qualified to detect such substances. The presence of substances such as asbestos, urea-formaldehyde foam insulation, radon gas, lead or lead-based products, toxic waste contaminants, and other potentially hazardous materials may affect the value of the property. The value estimate is predicated on the assumption that there is no such material on or in the property that would cause a loss in value. No

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responsibility is assumed for such conditions or for any expertise or engineering knowledge required to discover them. The client is urged to retain an expert in this field, if desired.

13. The forecasts, projections, or operating estimates included in this report were utilized to assist in the evaluation process and are based on reasonable estimates of market conditions, anticipated supply and demand, and the state of the economy. Therefore, the projections are subject to changes in future conditions that cannot be accurately predicated by the appraisers and which could affect the future income or value projections.
14. Fundamental to the appraisal analysis is the assumption that no change in zoning is either proposed or imminent, unless otherwise stipulated. Should a change in zoning status occur from the property's present classification, the appraisers reserve the right to alter or amend the value accordingly.
15. It is assumed that the property does not contain within its confined any unmarked burial grounds which would prevent or hamper the development process.
16. The Americans with Disabilities Act (ADA) became effective on January 26, 1992. We have not made a specific compliance survey and analysis of the property to determine if it is in conformance with the various detailed requirements of the ADA. It is possible that a compliance survey of the property, together with a detailed analysis of the requirements of the ADA, could reveal that the property is not in compliance with one or more of the requirements of the Act. If so, this fact could have a negative effect on the value of the property. Unless otherwise noted in this report, we have not been provided with a compliance survey of the property. Any information regarding compliance surveys or estimates of costs to conform to the requirements of the ADA are provided for information purposes. No responsibility is assumed for the accuracy or completeness of the compliance survey cited in this report, or for the eventual cost to comply with the requirements of the ADA.
17. Any value estimates provided in this report apply to the entire property, and any proration or division of the total into fractional interests will invalidate the value estimate, unless such proration or division of interests has been set forth in this report.
18. Any proposed improvements are assumed to have been completed unless otherwise stipulated; any construction is assumed to conform with the building plans referenced in this report.
19. Unless otherwise noted in the body of this report, this evaluation assumes that the subject does not fall within the areas where mandatory flood insurance is effective.
20. Unless otherwise noted in the body of this report, we have not completed nor are we contracted to have completed an investigation to identify and/or quantify the presence of non-tidal wetland conditions on the subject property.
21. This report should not be used as a basis to determine the structural adequacy/inadequacy of the property described herein, but for evaluation purposes only.
22. It is assumed that the subject structure meets the applicable building codes for its respective jurisdiction. We assume no responsibility/liability for the inclusion/exclusion of any structural component item which may have an impact on value. It is further assumed that the subject property will meet code requirements as they relate to proper soil compaction, grading, and drainage.

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23. The appraisers are not engineers, and any references to physical property characteristics in terms of quality, condition, cost, suitability, soil conditions, flood risk, obsolescence, etc., are strictly related to their economic impact on the property. No liability is assumed for any engineering-related issues.

*The evaluation services will be subject to the following limiting conditions:*

1. The findings reported herein are only applicable to the properties studied in conjunction with the Purpose of the Evaluation and the Function of the Evaluation as herein set forth; the evaluation is not to be used for any other purposes or functions.
2. Any allocation of the total value estimated in this report between the land and the improvements applies only to the stated program of utilization. The separate values allocated to the land and buildings must not be used in conjunction with any other appraisal and are not valid if so used.
3. No opinion is expressed as to the value of subsurface oil, gas or mineral rights, if any, and we have assumed that the property is not subject to surface entry for the exploration or removal of such materials, unless otherwise noted in the evaluation.
4. This report has been prepared by CohnReznick under the terms and conditions outlined by the enclosed engagement letter. Therefore, the contents of this report and the use of this report are governed by the client confidentiality rules of the Appraisal Institute. Specifically, this report is not for use by a third party and CohnReznick is not responsible or liable, legally or otherwise, to other parties using this report unless agreed to in writing, in advance, by both CohnReznick and/or the client or third party.
5. Disclosure of the contents of this evaluation report is governed by the by-laws and Regulations of the Appraisal Institute has been prepared to conform with the reporting standards of any concerned government agencies.
6. The forecasts, projections, and/or operating estimates contained herein are based on current market conditions, anticipated short-term supply and demand factors, and a continued stable economy. These forecasts are, therefore, subject to changes with future conditions. This evaluation is based on the condition of local and national economies, purchasing power of money, and financing rates prevailing at the effective date of value.
7. This evaluation shall be considered only in its entirety, and no part of this evaluation shall be utilized separately or out of context. Any separation of the signature pages from the balance of the evaluation report invalidates the conclusions established herein.
8. **Possession of this report, or a copy thereof, does not carry with it the right of publication, nor may it be used for any purposes by anyone other than the client without the prior written consent of the appraisers, and in any event, only with property qualification.**
9. The appraisers, by reason of this study, are not required to give further consultation or testimony or to be in attendance in court with reference to the property in question unless arrangements have been previously made.
10. Neither all nor any part of the contents of this report shall be conveyed to any person or entity, other

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relations, news, sales or other media, without the written consent and approval of the authors, particularly as to evaluation conclusions, the identity of the appraisers or CohnReznick, LLC, or any reference to the Appraisal Institute, or the MAI designation. Further, the appraisers and CohnReznick, LLC assume no obligation, liability, or accountability to any third party. If this report is placed in the hands of anyone but the client, client shall make such party aware of all the assumptions and limiting conditions of the assignment.

11. This evaluation is not intended to be used, and may not be used, on behalf of or in connection with a real estate syndicate or syndicates. A real estate syndicate means a general or limited partnership, joint venture, unincorporated association or similar organization formed for the purpose of, and engaged in, an investment or gain from an interest in real property, including, but not limited to a sale or exchange, trade or development of such real property, on behalf of others, or which is required to be registered with the United States Securities and Exchange commissions or any state regulatory agency which regulates investments made as a public offering. It is agreed that any user of this evaluation who uses it contrary to the prohibitions in this section indemnifies the appraisers and the appraisers' firm and holds them harmless from all claims, including attorney fees, arising from said use.



**ADDENDUM A:  
APPRAISER QUALIFICATIONS**

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**Patricia L. McGarr, MAI, CRE, FRICS, CRA**  
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Patricia L. McGarr, MAI, CRE, FRICS, CRA, is a principal and National Director of CohnReznick Advisory Group's Valuation Advisory Services practice who is based in Chicago. Pat's experience includes market value appraisals of varied property types for acquisition, condemnation, mortgage, estate, ad valorem tax, litigation, zoning, and other purposes. Pat has been involved in the real estate business since 1980. From June 1980 to January 1984, she was involved with the sales and brokerage of residential and commercial properties. Her responsibilities during this time included the formation, management, and training of sales staff in addition to her sales, marketing, and analytical functions. Of special note was her development of a commercial division for a major Chicago-area brokerage firm.

Since January 1984, Pat has been exclusively involved in the valuation of real estate. Her experience includes the valuation of a wide variety of property types including residential, commercial, industrial, and special purpose properties including such diverse subjects as quarries, marinas, riverboat gaming sites, shopping centers, manufacturing plants, and office buildings. She is also experienced in the valuation of leasehold and leased fee interests. Pat has performed appraisal assignments throughout Illinois and the Chicago Metropolitan area as well as Wisconsin, Indiana, Michigan, New York, New Jersey, California, Nevada, Florida, Utah, Texas, and Ohio. Pat has gained substantial experience in the study and analysis of the establishment and expansion of sanitary landfills in various metropolitan areas including the preparation of real estate impact studies to address criteria required by Senate Bill 172. She has also developed an accepted format for allocating value of a landfill operation between real property, landfill improvements, and franchise (permits) value.

Over the past several years, Pat has developed a valuation group that specializes in serving utility companies establish new utility corridors for electric power transmission and pipelines. This includes determining acquisition budgets, easement acquisitions, and litigation support. Pat has considerable experience in performing valuation impact studies on potential detrimental conditions and has studied properties adjoining landfills, waste transfer stations, stone quarries, cellular towers, schools, electrical power transmission lines, "Big Box" retail facilities, levies, properties with restrictive covenants, landmark districts, environmental contamination, airports, material defects in construction, stigma, and loss of view amenity for residential high rises.

Pat has qualified as an expert valuation witness in numerous local, state and federal courts.

Pat has participated in specialized real estate appraisal education and has completed more than 50 courses and seminars offered by the Appraisal Institute totaling more than 600 classroom hours, including real estate transaction courses as a prerequisite to obtaining a State of Illinois Real Estate Salesman License.

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Pat has earned the professional designations of Counselors of Real Estate (CRE), Member of the Appraisal Institute (MAI), Fellow of Royal Institution of Chartered Surveyors (FRICS) and Certified Review Appraiser (CRA). She is also a certified general real estate appraiser with active licenses in numerous states.

### Education

- North Park University: Bachelor of Science, General Studies

### Professional Affiliations

- National Association of Realtors
- CREW Commercial Real Estate Executive Women
- IRWA International Right of Way Association

### Appointments

**Appointed by the Governor in 2017 to the State of Illinois' Department of Financial & Professional Regulation's Real Estate Appraisal Board; Vice-Chairman - 2018**

### Licenses and Accreditations

- Member of the Appraisal Institute (MAI)
- Counselors of Real Estate, designated CRE
- Fellow of Royal Institution of Chartered Surveyors (FRICS)
- Certified Review Appraiser (CRA)
- Alabama State Certified General Real Estate Appraiser
- California State Certified General Real Estate Appraiser
- Connecticut State Certified General Real Estate Appraiser
- District of Columbia State Certified General Real Estate Appraiser
- Illinois State Certified General Real Estate Appraiser
- Indiana State Certified General Real Estate Appraiser
- Louisiana State Certified General Real Estate Appraiser
- Maryland State Certified General Real Estate Appraiser
- Massachusetts State Certified General Real Estate Appraiser
- Michigan State Certified General Real Estate Appraiser
- Nevada State Certified General Real Estate Appraiser
- New Jersey State Certified General Real Estate Appraiser
- New York State Certified General Real Estate Appraiser
- North Carolina State Certified General Real Estate Appraiser
- Indiana State Certified General Real Estate Appraiser
- South Carolina State Certified General Real Estate Appraiser
- Tennessee State Certified General Real Estate Appraiser
- Texas State Certified General Real Estate Appraiser
- Virginia State Certified General Real Estate Appraiser
- Wisconsin State Certified General Real Estate Appraiser



## Andrew R. Lines, MAI

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Andrew R. Lines, MAI, is a principal for CohnReznick Advisory Group's Valuation Advisory practice who is based in the Chicago office and has been a CohnReznick employee for over six years. Andrew has been involved in the real estate business for more than 15 years and has performed valuations on a wide variety of real property types including single- and multi-unit residential (including LIHTC), student housing, office, retail, industrial, mixed-use and special purpose properties including landfills, waste transfer stations, marinas, hospitals, universities, telecommunications facilities, data centers, self-storage facilities, racetracks, CCRCs, and railroad corridors. He is also experienced in the valuation of leasehold, leased fee, and partial interests, as well as purchase price allocations (GAAP, IFRS and IRC 1060) for financial reporting.

Valuations have been completed nationwide for a variety of assignments including mortgage financing, litigation, tax appeal, estate gifts, asset management, workouts, and restructuring, as well as valuation for financial reporting including purchase price allocations (ASC 805), impairment studies, and appraisals for investment company guidelines and REIS standards. Andrew has qualified as an expert witness, providing testimony for eminent domain cases in the states of IL and MD. Andrew has also performed appraisal review assignments for accounting purposes (audit support), asset management, litigation and as an evaluator for a large Midwest regional bank.

Andrew has earned the professional designation of Member of the Appraisal Institute (MAI). He has also qualified for certified general commercial real estate appraiser licenses in Arizona, California, Maryland, Florida, Wisconsin, Georgia, Illinois, Indiana, New Jersey and New York. Temporary licenses have been granted in Connecticut, Colorado, Ohio, Indiana, Idaho, Kansas, Minnesota and South Carolina.

### Education

- Syracuse University: Bachelor of Fine Arts

### Professional Affiliations

- Chicago Chapter of the Appraisal Institute - Alternate Regional Representative (2016 – 2018)
- International Real Estate Management (IREM)
- National Council of Real Estate Investment Fiduciaries (NCREIF)

### Community Involvement

- Fellows Alumni Network - World Business Chicago, Founding member
- Syracuse University Regional Council – Active Member

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## Sonia K. Singh, MAI

### Senior Manager – Real Estate Valuation

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Sonia K. Singh, MAI is a senior manager in CohnReznick Advisory Group's Valuation Advisory practice and based in the Bethesda office. For the past eight years, she has engaged in real estate valuation and other real estate consulting services and valued over \$5 billion in real property.

Sonia is adept at valuing a variety of commercial real estate across the United States, including the following complex property types: athletic clubs; full-service hotels and beach resorts; marinas; historic redevelopment projects; recycling facilities; single-family rental home portfolios; master planned communities; and for-sale residential units or subdivisions. She has also performed real estate appraisals involving leasehold interests, air rights ownership, and right-of-way fee simple and easement acquisitions for utility corridors. She has performed these and other appraisals others for purposes including financial reporting, estate planning, gift and estate tax, bond and conventional financing, litigation (eminent domain), and asset management, with the ability to handle appraisals of large portfolios in expedited timeframes. With significant experience in the appraisal of senior living facilities including continuing care retirement communities, skilled nursing facilities, assisted living and memory care facilities, as well as age-restricted housing, Ms. Singh has elevated the firm's modelling of complex healthcare property ownership structures to help illuminate debt/income and lease coverage ratios for federal courts, resulting in millions of dollars in recovered credits for clients.

Additionally, Sonia is experienced in purchase price allocations (GAAP, IFRS, and IRC 1060) for financial reporting, including the early adoption of ASU 2017-01. She has also provided valuation services related to highest and best use analysis, market feasibility studies, and useful life analysis. She has prepared impact studies measuring the possible detrimental impact of economic and environmental influences on property values, including those related to high-voltage transmission lines, distribution warehouses, and solar farms. She has provided expert witness testimony at local county zoning hearings for proposed solar energy uses and their potential detrimental impacts on adjacent property values.

#### Education

- University of Illinois: Bachelor of Science, Actuarial Science

**Professional Affiliation, Licenses, and Exams**

- MAI - Appraisal Institute, Designated Member
- Urban Land Institute, Associate Member
- Certified General Real Estate Appraiser with Active Licenses in DC and the States of MD, MO, and VA
- Successful completion of the following actuarial exams: Probability (1/P), Financial Mathematics (2/FM), and Models for Financial Economics (3/MFE)

**Awards and Recognitions**

- 2019 National Association of Certified Valuators and Analysts (NACVA) and the Consultants Training Institute (CTI) 40 Under Forty Honoree

## About Cardno

Cardno is an ASX-200 professional infrastructure and environmental services company, with expertise in the development and improvement of physical and social infrastructure for communities around the world. Cardno's team includes leading professionals who plan, design, manage, and deliver sustainable projects and community programs. Cardno is an international company listed on the Australian Securities Exchange [ASX:CDD].

## Cardno Zero Harm

*Cardno*  
**ZERO  
HARM**  
EVERY JOB. EVERY DAY.

At Cardno, our primary concern is to develop and maintain safe and healthy conditions for anyone involved at our project worksites. We require full compliance with our Health and Safety Policy Manual and established work procedures and expect the same protocol from our subcontractors. We are committed to achieving our Zero Harm goal by continually improving our safety systems, education, and vigilance at the workplace and in the field.

Safety is a Cardno core value and through strong leadership and active employee participation, we seek to implement and reinforce these leading actions on every job, every day.

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