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March 16, 2022

Mr. Will Mayer, Director
Clark Coalition
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Dear Mr. Mayer:

As requested, I am submitting "A Summary of Solar Energy Generation Power Systems Damage Studies as of January 1, 2022." The original study was prepared for Clark Coalition, Winchester, KY on May 25, 2021 and the current update was prepared for Hardin County Citizens for Responsible Solar, Elizabethtown, KY on January 12, 2022. The study summarizes the current data as it relates to the potential diminution of property value as a result of proximity to Solar Energy Generation Power Systems (SEGPS), also known as utility or industrial scale solar farms.

This analysis includes peer viewed articles, case studies by professional real estate appraisers, solar developer's Neighbor Agreements and buyouts, in addition to four case studies prepared by this office.

These articles, case studies and agreements contradict the unanimous conclusion of solar developer's appraisers that utility scale solar farms are not detrimental conditions, nor do they adversely impact adjacent property values.

Though diminution in value varies, as the result of a detrimental condition's impact upon a property's utility, the evidence presented by these case studies of 100 MW or less solar farms, indicates that solar farms damages property values by **at least -6.0 percent to -30.0 percent.**

The preponderance of evidence based on these empirical studies indicates that **industrial scale solar farms do negatively impact adjacent properties** to the extent that their utility, as interpreted by the market, is affected. For, this reason, the **market considers solar powered electric generating facilities to be a detrimental condition.**

The following report is the basis of my conclusions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Mary McClinton Clay", written in a cursive style.

Mary McClinton Clay, MAI

**A SUMMARY OF
SOLAR ENERGY GENERATION POWER SYSTEMS
DAMAGE STUDIES
AS OF
JANUARY 1, 2022**

Prepared for

Mr. Will Mayer, Director
Clark Coalition
P.O. Box 596
Winchester, KY 40392

Prepared by

Mary McClinton Clay, MAI
218 Main Street
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CHARACTERISTICS OF UTILITY SCALE SOLAR GENERATING PLANTS

INTERMITTENT ENERGY SOURCE

According to Dr. Donald van der Vaart, former secretary of the North Carolina Department of Environmental Quality (DEQ), “It’s difficult at first to imagine what’s not to like about solar power. The energy used by the solar panels to produce electricity is free. The solar panels don’t emit any air pollution, and they don’t contribute to greenhouse gases that many believe play a role in global warming.”¹

However, solar power is not the panacea, that the solar developers claim. Numerous drawbacks are attributed to this source of energy, most notably the **intermittent nature of solar power**. “As Strata Solar disclosed in its application to build a solar farm on Gov. Roy Cooper’s Nash County (NC) property: ‘Solar is an intermittent energy source, and therefore the maximum dependable capacity is 0 MW.’”²

Despite the claim by developers that a solar farm’s generating capacity is X megawatts (MW) of electricity, a solar facility plant won’t generate X MW of energy 24 hours a day, seven days a week. Much of the time it won’t produce anything.³

Engineers who’ve worked with electric utilities say solar facilities generate no power most of the day, and seldom reach peak generation, yet they are marked by how many megawatts of electricity they can produce during the rare times they are at maximum output. The ratings are ambiguous at best, and deceptive at worst, raising significant public policy concerns, engineers say.⁴

It is important for county officials who approve permits for solar facilities to understand that the MW rating should not be interpreted as a constant flow of electricity. In

¹ Donald van der Vaart, “Are counties taking the lead in solar plant pushback?,” <https://carolinajournal.com/opinion-article/>, October 30, 2020.

² Jon Sanders, “Why Aren’t We Benefitting from Falling Costs of Solar,” *Economic & Environment, Energy & Environment*, December 17, 2019.

³ Dan Way, “Solar energy output ratings misleading if not deceptive, critics say,” <https://www.carolinajournal.com/news-article/>, May 20, 2019.

⁴ Ibid.

actuality, the rating is only potential—a maximum output that occurs for about one hour around noon on a sunny day. A solar plant generates less than the megawatt rating the other 23 hours, and no power at all the 14 hours of no sun light.⁵

As a result of the intermittent nature of solar plants, electric utilities must keep redundant fossil fuel-fired electric sources operating constantly to fill in immediately when solar power is disrupted by clouds, rain and nightfall. Compounding the cost of generating electricity, the federal Public Utility Regulating Policies Act requires utilities to buy all commercial solar power generated, even if it is more expensive than energy from other sources such as nuclear, natural gas or hydro power.⁶

The following chart from the North Carolina State Solar House represents the intermittent nature of solar energy generation. The plot lines indicate that on mostly cloudy or raining days the house produced less than 10 percent of its maximum rating capacity. A partly cloudy day recorded erratic fluctuations. **The variability of solar output would be the same regardless of a solar facility's size.**

For example, the 60 MW generating plant in Currituck County, North Carolina running at full capacity for the full 8,760 hours in a year would produce 525,600 MWh. However, the available usage is only 146,000 MWh or **27.7 percent of the full capacity** since it generates only when the sun is shining.

COST OF SOLAR ENERGY PRODUCTION INCLUDES BACKUP GENERATION

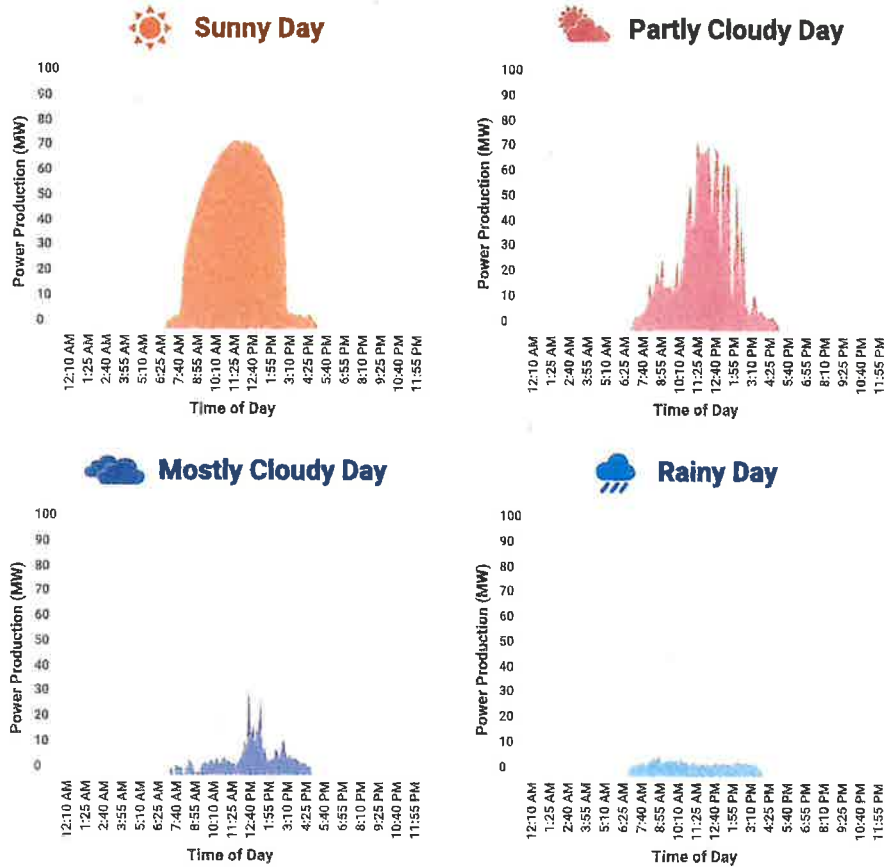
Properly accounting for the cost of solar energy means including the cost of the backup generation that is required to accompany it. Including these backup costs, the **levelized cost of new solar plants is far more expensive than the levelized cost of existing power plants and nearly three times more expensive than the most efficient—zero-emissions nuclear power plants.**

⁵Ibid.

⁶Ibid.

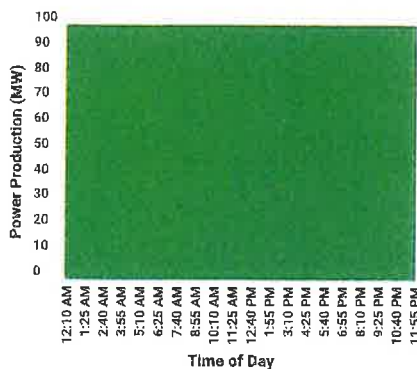
100 MW Solar Farm Production

Engineers who have worked in the electric utility industry say rating solar power plants by the maximum number of megawatts they can produce in peak operating conditions is a deceptive system because they seldom reach that level of output. Solar facilities only generate power six to eight hours a day, and it's far lower than their rating labels. That misleading rating approach leads to wrong assumptions and bad public policy. These plotlines illustrate the difference between rating capacity and actual power production during variable weather conditions. They are based on data captured from the N.C. State University Solar House.



100 MW Conventional Power Plant Production

Coal, Natural Gas, and Nuclear



The conventional power plant illustration shows electricity is generated at full capacity without wild fluctuations throughout the day.

Source: Herb Eckerlin, N.C. State University emeritus professor

Tags: solar (<https://lockerroom.johnlocke.org/tag/solar/>), wind (<https://lockerroom.johnlocke.org/tag/wind/>)

<https://lockerroom.johnlocke.org/2019/05/20/solar-and-wind-the-most-power-you-can-rely-on-getting-is-nothing/>

An example of **increased pollution** due to solar power generation comes from a 2019 Duke Energy permit application.

Under its current permits in the heavily regulated market, Duke must completely shut down the backup combustion turbines when solar peaks under full sun, then restart them when the sun recedes.

Duke wants the N.C. Division of Environmental Quality to issue new permits allowing combustion turbines to throttle up and down from a “low load” idling operation instead of switching completely off and on as solar waxes and wanes. In its permit applications, Duke said that would lower pollutant emissions and reduce stress on machines.

Without any solar power in the mix, ‘a typical combined cycle combustion turbine emits NO_x at approximately 9-11 lb./hr., assuming 24 hours of ‘normal’ operation. That is equivalent to 264 pounds of NO_x emissions daily. When those same plants are operated to supplement solar power facilities, daily emissions more than double to 624 pound a day, based on a table in Duke’s application.

If DEQ agrees to Duke’s alternate operating scenario, a combustion turbine would emit 381 pounds of NO_x daily—still **44% more pollution than operating without any solar power on the grid.**⁷

Compounding the additional cost of backup energy generation is the fact that **a solar farm requires 75 times more land than a conventional plant of the same capacity.**⁸ These factors result in solar energy being an **inefficient** form of electrical generation.

SOLAR ENERGY GENERATION IS FEASIBLE DUE TO INCENTIVES

Solar power is thriving due primarily to the **billions of dollars United States taxpayers and electricity customers have given the industry.**

Federal and state incentives include the requirement that utilities buy all the green power generated by solar farms, whether they need it or not; utilities must meet renewable energy purchase targets; legislatures have **exempt property taxes up to 80 percent** of the

⁷ Jon Sanders, op. cit.

⁸ Dr. Donald R. van der Vaart, “Gov. Cooper’s ‘Clean Energy Plan,’ Part 3: Raising Prices and Polluting Moore?” *Energy and Environment*, September 22, 2020.

appraised value of non-residential solar energy electric systems; and solar developers and investors receive **30 to 35 percent tax credits**.

ENVIRONMENTAL IMPACTS ARE LONG TERM

Despite the claims by the solar developer's and their appraisers that solar farms are not sources of contaminants, California classifies spent **solar panels as hazardous waste**, and research has shown that **heavy metals are leaching out of the solar panels** into surrounding groundwater. Groundwater is often relied upon for drinking water in rural counties.⁹

Used solar panels have many chemical waste components, including such things as gallium arsenide, tellurium, crystalline silicon, lead cadmium and heavy earth minerals. The U.S. Environmental Protection Agency (EPA) confirmed in 2018 that **GenX** and related compounds are **used to produce solar panels**.¹⁰

Among the environmental concerns of industrial scale solar farms is the **lack of state regulations governing the decommissioning** of the facilities and the safe disposal of the solar panels after they wear out. Only five states require a decommissioning plan and that does not include rules—only a plan. In addition, decommissioning bonds are not required by most states.

Solar developers claim much of the material in solar facilities can be recycled to recoup cleanup costs or safely disposed of in landfills. According to Steve Goreham, a climate change and energy expert, “there’s a fair amount of value in recycling solar materials, but it doesn’t come close to cleanup costs. For example, he said, a 3-megawatt project in Sacramento County, Calif., cost owners \$220,000 to clean up even after they got

⁹ Donald van der Vaart, “Are counties taking the lead in solar plant pushback?,” <https://www.carolinajournal.com/opinion-article/>, October 30, 2020.

¹⁰ John Sanders, “Waste problems from wind and solar are why we need proper decommissioning,” <https://www.carolinajournal.com/opinion-article/>, February 18, 2020.

\$375,000 for recycled materials. A 20 MW solar project in Maryland cost \$2.1 million to remove *after* recycling revenue.”¹¹

Because of the steep costs, Goreham recommends **landowners get a decommissioning plan in writing** from solar companies stating they will be responsible for all removal and land reclamation.

NC State Rep. Chris Mills, R-Pender, lead sponsor of NC House Bill 319 requiring proper decommissioning, acknowledged that some solar companies have negotiated 15-year property leases with landowners, after which they transfer ownership of the facilities to the landowner. The companies sometimes claim solar panels will last 40 years, and they don’t warn about costs to dispose of the tons of aging materials after they degrade below profitability.

According to Goreham, a solar panel’s useful life is 20 to 25 years, when it has degraded to about 80 percent of its productivity.

Without a required decommissioning and a bond to secure it, huge swaths of land could become riddled with dead solar panels, according to Mills. The fear is that this may become the **next Superfund site for the taxpayers**.¹²

INDUSTRIAL SCALE SOLAR HAS POTENTIAL TO DISRUPT AGRICULTURAL ECONOMY

Utility-scale solar energy facilities are increasing the pressure on farming by taking land out of production needed to maintain a delicate economy of scale, viability and profitability. Many county commissioners lack enough knowledge about the complex interplay of solar installations on the economic, ecological, environmental and cultural dynamics of a community as solar companies woo them for siting approvals with promises of jobs and revenue.¹³

¹¹ Dan Way, “Moore County residents worry about solar’s long-term environmental impacts,” <https://www.carolinajournal.com/news-article/environmental-hazard/> May 30, 2017.

¹² Ibid.

¹³ Dan Way, “Big solar farms maybe stressing agricultural ecosystem,” <https://www.carolinajournal.com/news-article/>, May 25, 2017.

LOCAL AND STATE REACTION TO THE PROLIFERATION OF INDUSTRIAL SCALE SOLAR PLANTS

NORTH CAROLINA APPROVES HOUSE BILL 329

Until 2019, the renewable lobby had been successful in keeping decommissioning and reclamation for solar and wind facilities out of state law. However, North Carolina passed House Bill 329 that required the Environmental Management Commission to establish rules for the decommissioning of solar and wind plants by January 1, 2022.¹⁴

INDIANA HOUSE BILL 1381 DEFEATED

Recently, the Indiana Legislature proposed House Bill 1381 which attempted to shift local control over the siting of wind and solar farms to the state. For all practical purposes, it stripped local governments of the ability to specify the type of land they want to see as solar farms in their communities. The first version attempted to overrule county ordinances. The bill was defeated by significant citizen objection.

STANLY COUNTY, NC REGULATIONS INTERNALIZES COSTS OF SOLAR FARMS

To internalize the costs of solar power to those who create them, the developers of solar farms, Stanley County's ordinance attempts to reverse the externalization of these costs from the citizens. "Reducing property values of others, causing more air pollution and contaminating ground water are all 'external' costs of solar power; that is the solar companies aren't paying for them—others external to the companies are. Environmental management seeks to 'internalize' those costs, meaning to have the polluting company pay for them."¹⁵

Stanly County's ordinances include the following:

1. To protect landowners, as well as solar companies, baseline groundwater measurements must be taken to determine whether any changes to metal concentrations measured in the future are attributable to the solar plant.

¹⁴ Jon Sanders, op. cit.

¹⁵ Donald van der Vaart, op. cit.

2. To follow up on those pre-construction measurements, the solar plant must monitor groundwater during operation and after the plant is shut down.
3. Solar panels used by the plant are not allowed to contain perfluoroalkyl substances (PFAS), which include GenX.
4. Due to the risk and unusual nature of battery fires, enough resources must be made available to the fire department, including training.
5. Setbacks are required to protect the viewshed of neighboring landowners.
6. A pre-approval study of unique ecological features of the land proposed for the plant can be required at the solar developer's expense.
7. Given that solar developers often form multiple companies that end up undercapitalized and hence unable to pay for the future costs associated with decommissioning of these massive sites, and to ensure resources are available for final disposal after the plant is shut down, a financial assurance is required equal to the greater of \$106,000/installed megawatt (MW) or 150% of the estimated cost of removal.¹⁶

KENTUCKY PROPOSES SENATE BILL 266

During the 2021 session of the Kentucky legislature, Bourbon County Senator Steve West introduced a bill that would amend KRS 100.203 to allow cities and counties to prohibit the construction of photovoltaic power stations on agricultural lands.¹⁷

KENTUCKY LEGISLATURE CREATES SITING BOARD

The Kentucky State Board on Electric Generation and Transmission Siting (the Siting Board) was created in 2002 by an act of the Kentucky General Assembly. Its purpose is to review application and, as appropriate, grant certificates for the construction of electric generating facilities and transmission line that are not regulated by the Kentucky Public Service Commission.

Siting Board review focuses on three areas:

- Environmental matters not covered by permits issued by the Kentucky Department for Environmental Protection. The Siting Board review covers matters such as noise, visual impacts and **property values**.

¹⁶ Ibid.

¹⁷ <https://apps.legislature.ky.gov/record/21rs/SB266.html>

- Economic impacts.
- Impact of the proposed facility on Kentucky's electric transmission grid.

DAMAGE STUDY THEORY AND METHODOLOGY

DAMAGE STUDY THEORY

Real estate values are estimated by the application of three approaches to value—the market comparison, cost and income approaches. When real estate is damaged or impaired, an additional analysis is required which changes an appraisal to a damage study.

The term *unimpaired* value refers to the value of the property as if no detrimental condition exists, while the term *impaired* value reflects the value of the property with the detrimental condition. The difference between these two values is the amount of damage.

Solar Energy Generation Power Systems (SEGPS) impacts the value of proximate properties to the extent that the SEGPS is viewed, in the market, as a negative externality. As an externality, it is typically not considered to be economically “curable” under generally accepted appraisal theory and practice. Some of this loss in value may be attributable to stigma, when there are unknowns and risk associated with ownership of the property.¹⁸

From an economic perspective, the rights enjoyed by a fee-simple¹⁹ owner fall into three categories: (1) right of use and enjoyment, (2) right of exclusion²⁰, and (3) right of transfer. In the United States, property itself is not “owned,” but rather the rights of the property are owned. The ability to delineate these rights, and the ability of owners to transfer some or all these rights voluntarily is a necessary condition for property valuation.

The right of use and enjoyment is generally interpreted to mean that the owner may determine how property will be used, or if it is to be used at all. The right of use traditionally is limited by both public restriction (e.g., eminent domain, police power) and private restriction (e.g., liens, mortgages). Private restrictions are generally voluntary, and property

¹⁸ Kirkpatrick, John A., “Concentrated Animal Feeding Operations and Proximately Property Values,” *The Appraisal Journal*, (July 2001): 301.

¹⁹ Definition of Fee Simple: Absolute ownership unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power and escheat. *The Dictionary of Real Estate Appraisal*, 6th ed., s.v. “fee simple estate.”

²⁰ Definition of Exclusion: Denial of Entry or Admission. *Black’s Law Dictionary*, 6th ed., s.v. “exclusion.”

owners willingly submit to the disutility of such restrictions in trade for some other economic benefit.

Impairment often places a restriction on the right of use without some economic compensation. This is illustrated in the potential restriction that may be placed on the use of real estate due to a physical impairment and can thus limit the property to something less than its highest and best use. For example, odor or flies from a nearby animal operation or dust from an adjacent cement plant will restrict the use and enjoyment of impaired property without compensation.

The right of exclusion—often called the right of exclusive use or right of exclusive enjoyment—provides that those who have no claim on property should not gain economic benefit from enjoyment of the property. In other words, the right of use is exclusive to the property owners, and any violation of the right of exclusive use typically carries either payment of compensation to the rightful owner or assessment of a penalty. Physical impairment, such as odor, flies, noise or dust, in effect, is a trespass on property rights and violates the right of exclusion.

The right of transfer provides the owner with the ability to swap one resource for another. An impairment restricts the right of transfer and may destroy the right of transfer altogether.

Real estate value is a function of the **perception of the participants within the market**. All factors that influence a property's desirability, and therefore, its value is the result of the market's perception. Richard Roddewig noted that:

Appraisers must look to the marketplace for answers and analyze what the marketplace itself is actually saying. Scientific conclusions about persistence of contaminants do not necessarily correlate with the marketplace's conclusion about the duration of economic impact on real estate.²¹

²¹ Richard J. Roddewig, "Temporary Stigma: Lessons from the Exxon Valdez Litigation," The Appraisal Journal (January 1997): 100.

Not only are property values diminished by environmental problems, but property owners are also denied opportunity costs stemming from the inability to move. Homeowners, for example, are stuck holding houses unable to be sold with stagnate prices, while homes in other neighborhoods are selling at increasing values. Thus, the owners are **harmed not only by the diminution of value** in the existing residence, but by the **opportunity costs inherent in lost gains** from alternative home investments.

In studying the “most likely impact” of SEGPs on real estate, it should be recognized that there are outlying extremes. Like many detrimental conditions, there is a segment of the market that appears to be almost immune to the effects, while at the opposite extreme there is often a segment that will not purchase a property at any cost that is impacted by a detrimental condition.²²

DAMAGE STUDY METHODOLOGY

The primary source of chronicled methodology regarding damage studies is the Third Edition of *Real Estate Damages* published by the Appraisal Institute and written by Randall Bell, PhD, MAI.

Like all appraisal related analyses, damage studies are predicated on empirical research of data derived from the market. According to Randall Bell:

Applications of empirical research in real estate include the collection of transactional market data, such as sale or lease comparables, vacancy rates, expenses and capitalization rates. A key benefit of empirical research methods such as comparable sales is that tests can be replicated and measurements can be tested and validated or invalidated by others. A negative aspect of empirical studies is that they can lack the “story behind the data” and are only as good as the data relied upon.

In real estate valuation, empirical data is essential for use in the sales comparison, income capitalization and cost approaches. This data is also required for both simple and multiple

²²²² Randall Bell, “The Impact of Airport Noise on Residential Real Estate,” *Appraisal Journal* (July 2011): 318.

regressions. Case studies can be a valid means of empirical research. These are all staple valuation methodologies.²³

Regarding specific applications of the sales comparison approach for damage studies is the use of **paired sales analysis**. This methodology consists of comparing the subject property or similarly impacted sales by a detrimental condition, known as test areas, to unimpaired properties in control areas. A comparison can also be made of the subject property before and after the identification of the detrimental condition. The latter is known as a **sale-resale analysis**.

According to Randall Bell:

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 detrimental condition. As with a conventional appraisal, care should be taken by the appraiser or analyst when using a paired sales analysis in a sale-resale context to consider and adjust for any major alternations or renovations made to the properties after the first sale but before the subsequent sale.²⁴

Although the trend to industrial scale solar farms is relatively recent and data is limited, it is even more relevant to analyze all the available data as thoroughly as possible. The most recent publication by Randall Bell, MAI, PhD numerates the methods available to the appraiser for such damage studies:²⁵

The Appraisal of Real Estate, 15th Edition, under the section “Contamination and Environmental Risk Issues,” outlines the use of paired sales, case studies, multiple regression and adjustments of income and yield capitalization rates on income-production properties. **In addition** to those methodologies, an appraiser can consider using sale/resale, simple regression, market surveys, literature review, foreclosure rates, sales volume, days on market, listing discounts, mortgage rate adjustments, insurance adjustments, project delay and other methods.

The following is the correct methodology for a damage study.

²³ Randall Bell, PhD, MAI, *Real Estate Damages*, 3rd edition, (Chicago, Appraisal Institute, 2016): 9.

²⁴ *Ibid.*: 33.

²⁵ Randall Bell and Michael Tachovsky, “Real Estate Damage Economics: The Impact of PFAS “Forever Chemicals” on Real Estate Valuation,” *Environmental Claims Journal*, 2021: 11-12.

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

Case Studies are another useful method for documenting damage studies. According to Randall Bell:

A case study approach can be advantageous when there is a lack of direct market data or where analyses of direct market data need additional support...In that case, a case study approach enables an appraiser to study an otherwise similar situation with informed market data and draw on those findings to develop opinions about the subject area.

When applying the results of environmental case studies, an appraiser should consider whether the case studies are similarly situated with respect to the subject property(ies) and the environmental condition. However, when performing a case study, the similarly situated property(ies) do not need to be in the same area as the subject property(ies). Data limitations usually necessitate searching a broad geographical area. In case studies and mass appraisals, things do not have to be identical or similar; its rare, if not impossible, to find identical case studies. The objective is to find case studies that are similar on some meaningful level.²⁶

²⁶ Bell, Ibid.: 17.

DETRIMENTAL CONDITIONS

A detrimental condition is also known as an external obsolescence. The Bell Chart of 10 Classifications of Detrimental Conditions (DC) has become an industry standard for the analysis of damage studies. Class V detrimental condition applies to industrial scale solar systems.

According to Bell, Class V—Imposed Condition is defined as:

Adverse external factors, eminent domain, undesirable acts or forced events by another person or entity constitute Class V conditions...Examples of adverse external factors are dumps, landfills, factories that produce noise and bad odors, neighbors that allow their property to deteriorate and transmission lines. They may also include the discovery that improvements were illegally constructed, or the development of surrounding nuisances (or perceived nuisances) such as a sewer treatment plant, airport noise, or a prison.

Graphically, Class V often reflects a sudden drop in value upon the occurrence of the DC and a **permanent loss in value** as a result of the imposed condition.²⁷

Chief among the characteristics of a detrimental condition is the concept of incompatible land uses, particularly as industrial solar facilities relate to agricultural zoning.

Until recent years, uses within the agricultural zone were limited to farming related pursuits. For example, the Bourbon County, Kentucky zoning ordinance lists uses permitted in the Agricultural Zone (A-1) as:

- A. Production of agricultural, horticultural, floricultural or viticultural crops or livestock commodities and incidental retail sales by the producer of these commodities raised on the site.
- B. Single-family dwellings occupied by the owner or operator of the farm and such additional single-family dwellings as are necessary for occupancy by the employees of the farm operation.

²⁷ Randall Bell, MAI, "The Impact of Detrimental Conditions on Property Values," *Appraisal Journal*, October 1998: 384-385.

- C. Public, semi-public, and private land for open-space reserves that may be permanent open spaces or for future development in accordance with this order.
- D. Home occupancies as defined and restricted in Section 1.8 herein. No home occupation shall be permitted with changes the appearance of the structure from that of a residence.

Additional uses, such as cemeteries, churches, museums, animal hospitals, country clubs, etc. are permitted by Conditional Use approved by the Board of Adjustment. Any other use is a **non-conforming use**.²⁸ According to Edward J. Holmes, AICP, one of Kentucky's most recognized planners:

It should be noted that although some uses are non-conforming, there still could exist **uses that should be prohibited or considered incompatible** when it comes to **encroachment into areas designated for agricultural use**. Uses that should be considered would be those uses that tend to either significantly interfere with agriculture operations or are negatively affected by generally accepted agriculture practices on neighboring lands.

Taking into consideration the value and significance of agriculture in the community policies and regulations should be enacted that protect agriculture land and minimize land use conflicts with prohibited, non-conforming or incompatible uses. This can be implemented through development and zoning regulations.

A community should make efforts through comprehensive land use planning to protect soils that are most suitable for agriculture and directing other development or encroachment uses to non-suitable soils, and areas adjacent to or near urbanized lands, while maintaining continued use of the prime agricultural areas.

It is important to protect agricultural lands by retaining and protecting a critical mass of agricultural land that promotes effective and efficient agricultural activities. **More intensive development or uses of lands should be located away from prime agricultural lands that have not been planned for future growth and development.**²⁹

²⁸ Definition of Non-conforming use: Improvements that are not in line with surrounding uses, such as a jail in the middle of a residential neighborhood. Randall Bell, PhD, MAI, *Real Estate Damages*, 3rd Edition, (Appraisal Institute, Chicago, 2016).

²⁹ Edward J. Holmes, AICP, President, EHI Consultants, Lexington, KY.

A non-conforming use in the agricultural zone has the potential of negatively impacting the value of adjacent properties as a result of its lack of compatibility³⁰ and risk of hazard or nuisance. In other words, **compatibility maximizes real estate values, and in the reverse, incompatibility diminishes market value.** Any issue or condition that may cause a **diminution of value to real estate is defined as a detrimental condition.**³¹

Because utility scale solar plants are relatively new local existing comprehensive plans and ordinances do not provide for them. The **American Planning Association (APA)**, in its advisory regarding utility scale solar facilities, states that “the emphasis for planners is on the direct land-use considerations that should be carefully evaluated (e.g. **zoning, neighbors, viewsheds and environmental impacts**).”³²

According to APA, “Utility-scale solar facility proposals must be carefully evaluated regarding the size and scale of the use; the conversion of agricultural, forestry or residential use; and the potential environmental, social and economic impacts on nearby properties and the area in general.” For example, “if a solar facility is close to a major road or cultural asset, it could affect the **viewshed and attractiveness of the area.**”³³

Among the land use impacts noted by the APA that utility scale solar may have on nearby communities include “the removal of forest or agricultural land from active use. An argument often made by the solar industry is that this preserves the land for future agricultural use, and applicants typically state that the land will be restored to its previous condition.” However, the APA acknowledges that it is “challenging” to restore. The organization also notes that, “it is important that planners consider whether the **industrial nature** of a utility scale solar use is **compatible** with the locality’s vision. The **use of**

³⁰ Definition of compatibility: The concept that a building is in harmony with its uses and environment. Dictionary of Real Estate Appraisal, 5th Edition.

³¹ Bell, op cit.: 458.

³² Darren Coffey, AICP, “Planning for Utility-Scale Solar Energy Facilities,” September/October 2019: 2.

³³ Ibid.: 3.

primefarmland and ecologically sensitive lands (e.g. riparian buffers, critical habitats, hardwood forests) for these facilities should be **scrutinized**.³⁴

According to the APA:

Solar facilities can be appropriately located in areas where they are **difficult to detect**, the **prior use** of the land has been **marginal** and there is no designated future use specified (i.e., not in growth areas, **not on prime farmland** and **not near recreational or historic areas**). Proposed facilities adjacent to corporate boundaries, public rights-of-way or recreational or cultural resources are likely to be more controversial than facilities that are well placed **away from existing homes**, have natural buffers and don't change the character of the area from the view of local residents and other stakeholders.³⁵

Tourism is recognized as a key sector for economic growth in many regions and any utility-scale solar facilities might be visible from a scenic by-way, historic site, recreational amenity, or similar resources could have **negative consequences** for those tourist attractions.³⁶

The APA acknowledges that “**negative impacts to property values are rarely demonstrated** and are **usually directly addressed by applicants** as part of their **project submittal**.”³⁷

EVIDENCE OF DETRIMENTAL CONDITIONS FROM THE MARKET CONTAMINANTS

The solar panels contain toxic materials such as cadmium telluride, lead and chromium and other toxic materials. Among the problems with such toxins, is that most solar panels are manufactured in China, where the manufacturing process is beyond the United States' control and the panel composition is often unknown. Moreover, current zoning applications do not require that the solar developer identify the source of the panels or the model number.

³⁴ Ibid.: 4.

³⁵ Ibid.: 4.

³⁶ Ibid.: 7.

³⁷ Ibid.: 7.

GenX: Among the most concerning contaminants in solar panels is GenX. According to a DuPont marketing publication:

DuPont Teflon **fluoropolymer films are ideal as protective sheets for solar modules** because they have a unique balance of properties. They are smooth, flexible, lightweight, and long lasting with superior power output. Teflon films also have proven performance in both solar thermal and **photovoltaic (PV) applications**, offering a preferred, technologically advanced alternative to traditional glass.”³⁸

This contaminant was first identified in 2015 in the Cape Fear River downstream from a DuPont chemical plant, the Fayetteville Works, where it had polluted drinking water supplies and private wells. According to an EPA physical scientist, Dr. Mark J. Strynar, “GenX technically is not a chemical but rather a chemical process. The GenX process produces two PFAS (perfluorinated alkylated substances) compounds commonly referred to as FRD903 and FRD 902...and the GenX chemicals are included in the broad classification of PFAS compounds.”³⁹ According to the EPA, “PFASs (which include GenX precursors PFOA and PFOS and the GenX chemical) are in a class of man-made chemicals not found naturally in the environment... Both chemicals are very persistent in the environment and in the human body when exposure occurs... The long-term health effects of chemicals related to the GenX process in humans is unknown, but studies submitted to the EPA by DuPont from 2006 to 2013 show that it caused tumors and reproductive problems in lab animals.”⁴⁰ Dr. Strynar has confirmed that certain PFASs are used in the production of solar panels by documenting 39 records from the SciFinder database used by the EPA to identify applications of PFAS with solar panels. Dr. Strynar has concluded that solar panels have the capacity to be sources of PFAS.

³⁸ DuPont, “DuPont Teflon Films for Photovoltaic Modules: Lightweight, Long Lasting, Flexible Films Offer Greater Power Output,” December 2006.

³⁹ Donna, King, “Solar panels could be a source of GenX and other perfluorinated contaminants; Environmental group has revealed PFAS contamination in 11 counties in N.C.,” North State Journal, February 19, 2018.

⁴⁰ Ibid.

Reportedly, PFAS leach out continuously over their life. Among the drawbacks of the toughness of PFAS is that the chemical degrades slowly, if at all, once it is released into the environment. It is also unaffected by most drinking water treatment. In 2017, the Cape Fear Public Water Utility Authority filed a federal lawsuit against DuPont and Chemours for polluting water, river sediments, soil and air.⁴¹

One of the first to raise concerns about GenX in solar panels was with state Utilities Commissions were the neighbors opposing the industrial-scale Wilkinson Solar Plant in Beaufort County. They expressed “concerns about toxic chemicals, fluids, and substances leaking into the soil and groundwater as solar installations age and deteriorate or suffer damage from windstorms or other disasters.”⁴²

In addition to citizen concern, “Donald van der Vaart, former secretary of the N.C. Department of Environmental Quality, who holds a doctorate in chemical engineering, sees reasons for concern given North Carolina’s more than 7,500 solar installations. ‘North Carolina’s solar power capacity is now the second highest in the nation. **EPA researchers recognize that solar panels may be a source of GenX compounds...**I would expect Duke Energy and the Public Utilities Commission would want to see test results to protect them from future liability.’”⁴³

“Noting that GenX ‘may present an unreasonable risk of injury to human health and the environment,’ EPA requires that the company keep 99 percent of the potential pollutants from entering the environment.”⁴⁴

On February 14, 2019, the EPA unveiled the Agency’s Per- and PolyfluoroalkylSubstances (PFAS) Action Plan to identify, monitor and define clean up

⁴¹Catherine Clabby, “Local Scientists Uncovered Cape Fear GenX Story,” *NC Health News*, October 18, 2017.

⁴² Dan Way, “EPA confirms GenX-related compounds used in solar panels,” *CJ Exclusives*, August 27, 2018.

⁴³ Ibid.

⁴⁴ Vaughn Hagerty, “Chemours vows to reduce pollutants, but concern persist downstream,” *Carolina Public Press*, January 5, 2018 newsobserver.com.

strategies for these substances. The **action plan is the most comprehensive cross-agency plan to address an emerging chemical of concern ever undertaken by the EPA.**⁴⁵

Subsequently, On February 26, 2020, the EPA (U.S. Environmental Protection Agency) issued an update on the Action Plan. Listed among the key highlights from the past year include:

- On February 20, 2020, EPA issued a supplemental proposal to ensure that new uses of certain persistent long-chain PFAS chemicals in surface coatings cannot be manufactured or imported into the United States without notification and review under TSCA
- On November 22, 2019, EPA announced availability for \$4.8 million in funding for new research on managing PFAS in agriculture.⁴⁶

Solar farms with their thousands or millions of solar panels are of concern to the EPA because they concentrate the PFAS source in a relatively small area. In other words, a single panel may not be a problem, but a large collection of them changes the equation.

Zinc: Many solar panels are supported by galvanized steel platforms. The steel oxidizes over time and releases zinc into the soil, which can be toxic to plants at certain levels. Zinc is also detrimental to micro-organisms in the soil. Therefore, the impact of zinc is on and below the surface of the soil compounding the poor prospects of potential future reclamation of the land.

EROSION

One of the most dramatic examples of erosion is the result of the construction of a 500 MW SEGPS on 6,300 acres in Spotsylvania County, Virginia by sPower. Michael O'Brier, whose property has been impacted by the project was cited in one of the project's zoning violations. According to Mr. O'Bier, "it's been a war zone." Impacts from

⁴⁵ U.S. Environmental Protection Agency News Release, February 26, 2020, "EPA Releases Action Plan: Program Update."

⁴⁶ Ibid.

construction of the project range from muddy runoff streaming through his property to having portable toilets placed across his property line by the developers get submerged in muddy water after a rain storm.⁴⁷

As a result of the damage to Mr. O'Bier's farm the solar developer, Sustainable Property Holdings, LLC, purchased his 3.00 acre property on June 8, 2020 for \$460,000. The assessed value at the time of sale, according to the deed, was \$231,200. The tax map parcel number is 17-2-10A and the transaction is recorded Instrument #200011260.

Other serious erosion problems have occurred in Virginia, most notably in Essex and Louisa Counties. The 200.00 acre 20 MW Essex Solar Center off US Hwy 17 (Tidewater Trail at Muddy Gut Road), as a result of clear cutting and excavation experienced a sediment runoff problem shortly after it opened in 2018. In Louisa County, Dominion Energy's Belcher Solar Project has experience excessive stormwater runoff that has negatively impacted adjacent properties.

Soil scientists note that "the data shows that **solar panels 'channelize water,'** causing it to leave the site faster, and infiltrate neighboring properties. Some farmers have confirmed their fields became wetter than before the placement of a nearby solar facility, and they were having difficulty getting in to till their land to prepare it for the growing season."⁴⁸

Tree removal results in barren land whose topsoil is removed and compacted, along with frequent mowing to control vegetation compacts the soil and leads to the soil being resistant to absorbing water.

VIEWSHED

Unlike most adverse influences upon adjacent properties that have a direct impact upon their utility to function (noise, odor, contaminants, traffic, etc.) **SEGPS's predominant impact is to the viewshed.**

⁴⁷ Mark Hand, "Solar Farm's Construction Upsets Spotsylvania Residents: Report," *Patch*, January 29, 2020.

⁴⁸ Dan Way, "Big solar farms may be stressing agricultural ecosystem," <https://carolinajournal.com/news-article/>, May 25, 2017.

Real Estate appraisers recognize that view affects property value. According to *The Appraisal of Real Estate*, “**The physical characteristics of a parcel of land that an appraiser must consider** are size and slope, frontage, topography, location and **view**.”⁴⁹

View Characteristics

“A view is normally considered a scene or outlook from a property. Views of bodies of water, city lights, natural settings, parks, golf courses and other amenities are considered desirable features, particularly for residential properties. Such desirable views are typically an enhancement to value. In some cases, however, a view can be considered a negative attribute. A vista of incompatible land, dilapidated buildings, junk vehicles and other **undesirable features can be detrimental to value**. Allegations of **value diminution** most often arise from situations in which the **view is altered or changed**. Examples might include the blockage or obstruction of a desirable view or the creation of an undesirable view. The rezoning of a neighboring property to allow for an undesirable land use could legitimately result in a negative impact on value when such rezoning was not known or anticipated on the date of value.”⁵⁰

Ultimately, issues relating to view diminution are dependent on relevant market data. The value of an obstructed view can be measured by the difference between properties with and without similar views.⁵¹

“View diminution, therefore, is any impact on the ability to see or be seen that is perceived by the market as negative. As usual, **what the market considers to be a negative impact depends on the actual property in question**.”⁵²

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

⁴⁹ Appraisal Institute, *The Appraisal of Real Estate*, 11th Ed. (Chicago, Illinois: Appraisal Institute, 1996): 323.

⁵⁰ Bell, *Ibid.*: 146.

⁵¹ *Ibid.*

⁵² Anderson, *Ibid.*: 28.

147.20 percent; lake front 7.50 to 126.70 percent; golf course vacant lots: 7.00 to 85.00 percent; rivers/streams: 3.00 to 54.4 percent; forest/farms: 1.50 to 35.00 percent; golf course: 7.00 to 28.00 percent; trails and greenways: 3.40 to 20.20 percent; and urban parks: 1.00 to 20.00 percent.⁵³

“Clearly, **view amenities are valuable**, and different types of good views can have significantly different quantitative effects on property values.”⁵⁴

With respect to the **intrusion of SEGPPS into the landscape, what happens when desirable views are blocked?** “In real estate, a view can generally be defined as the ability to see or be seen. View diminution, therefore, is any impact on the ability to see or be seen that is perceived by the market as negative.”⁵⁵

“Since views from a residential property often carry a large premium, **changes to a desirable view may be perceived by the market as having a negative impact on value**. When a desirable view is blocked, the question of damages is often a question of abutter’s rights—a property owner’s rights to air, light, view, visibility and access.”⁵⁶

This concept is particularly significant in areas where the market is largely driven by the scenic landscape, such as the inner Bluegrass and historic districts.

Central Kentucky Market

With respect to market expectations, the counties that constitute the Lexington Metropolitan Statistical Area (MSA) including Bourbon, Fayette, Woodford, Jessamine, Scott, and Clark constitute a significant portion of what is uniquely and geographically known as the Inner Bluegrass. This highly fertile area has been **recognized since the antebellum period** as a center for breeding quality livestock, especially thoroughbred racehorses. Not only does the area have a reputation going back over two hundred years, but

⁵³ Jay Mittal, “Valuation Capitalization Effects of Golf Courses, Waterfronts, Parks, Open Spaces, and Green Landscapes—A Cross Disciplinary Review,” Auburn University, *JOSRE*, Vol. 8. No. 1, 2016: 62.

⁵⁴ James R. Rinehart, PhD. and Jeffery J. Pompe, PhD., “Estimating the Effect of a View on Undeveloped Property Values,” *Appraisal Journal*, January 1999: 61.

⁵⁵ Orell Anderson, MAI, “The Value of a View,” *Right of Way*, March/April 2017: 28.

⁵⁶ *Ibid.*: 28.

the breath of its reputation extends world-wide. In fact, in 2006, the World Monument Fund included the Bluegrass region on its global list of 100 most endangered sites.

Few agricultural regions of the country have a real estate market demand that spans the globe. This is not only true because of the fertility of the soil, but the beauty of the landscape. Despite its threat due to development, the surrounding natural landscape is enhanced by the manicured condition of thoroughbred farms that populate the entire area. **This unique, protected and scenic landscape is a large component of the property characteristics that constitute demand for the land. As a result of the scenic viewsheds** roadways throughout the region are designated by the state as **scenic byways.**

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

Other areas of Kentucky and throughout the United States have unique landscapes that are inherent determinants of real estate demand and value.

Alternative Detrimental Conditions Can Be a Proxy for Solar Farms

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

Of the “three critical drivers of HVTL effect on residential property values that are generally assumed—proximity, visibility and encumbrance,” the first two apply to solar farms.⁵⁷

“The two concerns of aesthetics and property values are intrinsically linked. It is well established that a **home’s value will be increased if high-quality scenic vista** is enjoyed from the property (e.g. Seiler, et al, 2001). Alternatively, it is reasonable to assume that if a

⁵⁷ James A. Chalmers, “High-Voltage Transmission Lines and Residential Property Values in New England: What Has Been Learned,” Appraisal Journal, Fall, 2019: 266.

home's scenic vista overlaps with a **view of a disamenity, the home might be devalued**, as has been found for high-voltage transmission lines (HVTL) (Kroll and Priestly, 1992; DesRosier, 2002)...Additionally, there is evidence that proximity to a disamenity , even if that disamenity is not visible and is not so close to as have obvious nuisance effects, may still decrease a home's sales price, as has been found in the case for a land fill (Thayer et al., 1992).”⁵⁸

The 2002 published study by Des-Rosier measured how views of a disamenity affected sales prices. This study found that **homes adjacent to a power line and facing a HVTL tower sold for as much as 20.0 percent less than similar homes that are not facing a HVTL tower.**”⁵⁹

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

It is unclear how well the hedonic literature on other disamenities applies to wind turbines, but there are likely some similarities. For instance, in general, the existing literature seems to suggest that concerns about lasting health effects provides the largest diminution in sales prices, followed by concerns for one's enjoyment of the property, such as **auditory and visual nuisances** (emphasis added), and that all the effects tend to fade with distance to the disamenity – as the perturbation becomes less annoying.⁶⁰

⁵⁸ Ben Hoen, et al, “The Impact of Wind Power Projects on Residential Property Values in the United States: A Multi-site Hedonic Analysis,” Ernest Orlando Lawrence Berkley National Laboratory Publication No. LBNL-289E, December 2009: 52.

⁵⁹ Ibid.: 55.

⁶⁰ Ibid.: 55.

SOLAR ENERGY GENERATION POWER SYSTEMS DAMAGE STUDIES

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

PEER REVIEWED JOURNALS

UNIVERSITY OF TEXAS STUDY

The first study to discuss any diminution in value as a result of proximity to SEGPSs is a May 2018 study conducted by economists at the LBJ School of Public Affairs at the University of Texas at Austin.⁶¹ This Policy Research Project “investigates where large solar installations are located, the housing and income characteristics of the surrounding areas, and if the installations affect nearby residential properties.”⁶² The study area ranged from a 100.00 foot to 3.00 mile radius from solar facilities ranging from 1MW to 100MW+.

The study was based on geospatial analysis and a survey of residential property assessors’ opinions of the impact. The respondents included both assessors who have “and have not assessed nearby solar installations.”⁶³ The study “results show that while a majority of survey respondents estimated a value impact of zero, some estimated a **negative impact associated with close distances between the home and the facility, and larger facility size.**”⁶⁴

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

⁶¹ Leila Al-Hamoodah, et al, “An Exploration of Property-Value Impacts Near Utility-Scale Solar Installations,” LBJ School of Public Affairs, The University of Texas at Austin, May 2018.

⁶² Ibid.: 1.

⁶³ Ibid.: 15.

⁶⁴ Ibid.:1

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

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

UNIVERSITY OF RHODE ISLAND STUDY

A study documenting the effect of solar development in Rhode Island and Massachusetts was published in September 2020.⁶⁵“The purpose of this paper is to quantify the externalities associated with proximity to utility-scale solar installations using hedonic valuation.”⁶⁶ This study used “a difference-in-difference (DID) identification strategy, which compares changes in housing prices after construction for nearby properties with those further away.”⁶⁷ The study included 208 solar installations, 71,337 housing transactions occurring within one mile (treated group), and 347,921 transactions between one to three miles (control group).

The study’s “results suggest that solar installations negatively affect nearby property values...Property values in the treatment group decline on average 1.7% (or \$5,671) relative to the control group.”⁶⁸ The study also found, with respect to proximity, substantially larger negative impacts on homes located within 0.1 mile of solar installations (-7.0%, or \$23,682).

⁶⁵ Vasundhara Gaur and Corey Long, “Property Value Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island,” Department of Environmental and Natural Resource Economics, University of Rhode Island, September 29, 2020.

⁶⁶ Ibid.: 3.

⁶⁷ Ibid.: 4.

⁶⁸ Ibid.: 4.

This confirms the hypothesis that nearby solar installations are a **disamenity**.⁶⁹ Also, “these results suggest extremely large disamenities for properties in very close proximity.”⁷⁰

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

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

PROFESSIONAL APPRAISER REPORTS

FRED H. BECK & ASSOCIATES, LLC

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

⁶⁹ Ibid.: 15.

⁷⁰ Ibid.: 17

Strata Solar Case Study

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

According to the Beck report, the potential purchaser stated:

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

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

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

Clay County Solar Farm Case Studies

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

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

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

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

Non-residential Use View Impairment Case Study

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

AM Best Solar Farm Study

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

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

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

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

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

MARK W. HECKMAN REAL ESTATE APPRAISERS

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

Adams County View Case Study

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

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

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

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

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

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

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

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

MADISON COUNTY INDIANA CASE STUDY

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

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

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

GREENFIELD ADVISORS

This conclusion of no impact is contradicted by **Greenfield Advisors** of Seattle, Washington. This firm is one of the most published in the field of environmental damage studies in the United States. An April 5, 2019 blog addressed the impact of wind turbines on property value.⁷¹

According to the blog, "wind turbines interferes with the use and enjoyment of residences. Noise pollution is created by wind turbines, more particularly, groups of turbines at wind farms. Shadows and flicker may impact nearby homes, depending on their proximity to the wind farm. Health impacts may arise for nearby residents whose sleep is interrupted by the noise and light issues noted above. **Impacts to view** may be considered a **disamenity** to residents who experience limited overall visibility and/or a change from **natural vistas to a more industrial view**."

With respect to stigma and decreased demand, "the anticipation of adverse effects from wind farms has been noted in some studies to have more impact on value, than the effects of the wind farms themselves. While all the above may not deter every buyer or

⁷¹ Abigail Mooney, "Do 'Windmills' Affect Property Value?," Greenfield Advisors, April 5, 2019.

homeowner, the stigma of such issues alone can diminish the pool of potential buyer, thus causing some negative impact on the price of the property.”

“Among the studies we reviewed, the **highest diminution** we saw was **-40%**, and that was in circumstances where the wind turbine was located directly on the property. While that loss percentage was on the high end, **most studies** show that the losses in property value from wind farms in the United States is somewhere between **0% and -35%**.”

GOOD NEIGHBOR AGREEMENTS

WESTERN MUSTANG SOLAR, LLC’S NEIGHBOR AGREEMENT

In reviewing numerous reports, prepared by MAI designated appraisers for various solar developers, without exception, the appraisers have concluded that, “no consistent negative impact has occurred to adjacent property that could be attributed to proximity to the adjacent solar farm.”⁷²

Furthermore, the Solar Energy Industries Association (SEIA) published the following claim that “large-scale solar arrays often have no measurable impact on the value of adjacent properties, and in some cases many even have positive effects.”⁷³ This publication also included the following quotes from appraisers used by the solar developers.

- A study conducted across Illinois determined that the value of properties within one mile increased by an average of 2 percent.⁷⁴
- An examination of 5 counties in Indiana indicated that upon completion of a solar farm, properties within 2 miles were an average of 2 percent more valuable compared to their value prior to installation.⁷⁵
- An appraisal study spanning from North Carolina to Tennessee shows that properties adjoining solar farms

⁷² CohnReznick, “Adjacent Property Values Solar Impact Study: A Study of 8 Existing Solar Facilities – Lapeer County, MI; Chisago County, MN; Marion County, IN; LaSalle County, IL, Cumberland, Rutherford and Wilson Counties, NC; Isle of Wright County, VA,” June 10, 2020.

⁷³ SEIA, “Solar and Property Values, Correcting the Myth that Solar Harms Property Value,” July 2019, www.seia.org.

⁷⁴ Richard C. Kirkland, “Grandy Solar Impact Study,” Kirkland Appraisals, February 25, 2016.

⁷⁵ Andrew Lines, “Property Impact Study: Solar Farms in Illinois,” McLeanCounty.gov, Nexia International, August 8, 2018.

match the value of similar properties that do not adjoin solar farms within 1 percent.⁷⁶

These conclusions, however, are belied by the actions of their solar developer clients who have not only **acquired, in fee, adjoining residential properties** to their solar farms and resold them (North Star Solar Farm, North Branch, MN), but have **paid nearby adjoining property owners** a “good neighbor” fee to **refrain from objecting** to their proposals. The question is: if industrial-scale solar farms are benign and could possibly even enhance adjacent property values, then why is it necessary for solar developers to not only pay adjoining owners, but purchase their properties?

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

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

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

The Western Mustang Solar, LLC agreement is included in the Addendum.

LIGHTHOUSE BP’S NEIGHBOR AGREEMENT

A second “Neighbor Agreement,” was discussed in a November 23, 2020 article in *The Lima News* of Lima, Ohio. This article described the second public forum which was

⁷⁶ Patricia McGarr, Property Value Impact Study, Cohn Reznick, LLP Valuation Advisory Services, May 2, 2018.

required by the Ohio Power Siting Board (OPSB) that approves or rejects the proposed 2,600.00 acre 300 MW Birch Solar Project. Lighthouse BP, the developer, stated that: “Landowners who are adjacent to the project will be offered anywhere from **\$5,000 to \$50,000**, depending on their closeness to the solar farm.”

POSEY SOLAR NEIGHBOR AGREEMENT

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

VESPER ENERGY NEIGHBOR AGREEMENT

A fourth agreement was issued by Vesper Energy described as the “Kingwood Solar Neighboring Landowner Compensation Agreement.” The letter sent to the Greene County, Ohio residents, “invites you to receive revenue as a participant of the Kingwood Solar Project through a Good Neighbor Agreement.” Although the stipulations regarding receiving the revenue are not stated within the offer to sign letter, the “payment amounts subject to terms of Good Neighbor Agreement” are delineated.

Agreement Signing: \$1,000.00

Payment Schedule: Lump-sum payment issued at Notice to Proceed with Project Construction

Tiered Payment	Tier 1 = \$25,000
Structure:	Tier 2 = \$15,000
	Tier 3 = \$10,000
	Tier 4 = \$ 7,500

NORTH STAR SOLAR BUYOUT

The North Star solar facility is the example of a solar farm that resulted in the purchase and subsequent resale of adjoining properties.

In addition, the documents filed with the Minnesota Public Utilities Commission (MPUC) belie the claim that the seven properties that are surrounded by solar panels were purchased for interim employee housing. A letter dated March 15, 2016 from Community Energy Solar to the Executive Secretary of MPUC states:

North Star Solar PV LLC ("North Star") respectfully submits this filing in accordance with the February 16, 2016 Order Granting Site and Route Permits with Conditions, requiring that: 'North Star shall notify the Commission of the resolution of the negotiations with the seven remaining landowners surrounded by the solar panels by providing a copy of any signed agreements or **agreed-upon mitigation** by March 15, 2016.

While the precise **terms of the resolutions** reached with these landowners are **confidential**, North Star attached a recorded Memorandum of Purchase Option Agreement. The letter is included in the Addendum.

According to the Minnesota Public Utilities Commission in a February 4, 2021 email to this office:

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

At the time of its completion, in December 2016, North Star Solar PV was the largest industrial scale plant in the Midwest. This 1,000:00 acre, 138 MW solar farm is in North Branch, Minnesota. It is notable that it cost the North Star developer \$627,000 more to acquire these properties than the price for which they were sold.

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

MARY MCCLINTON CLAY, MAI

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

NORTH STAR SOLAR PV CASE STUDY – SALE-RESALES ANALYSIS

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

At the time of its completion, in December 2016, North Star Solar PV was the largest SEGPS in the Midwest. This 1,000.00 acre, 138 MW facility is in North Branch, Minnesota. As a result of pressure from property owners who abutted at least three sides of the SEGPS, the developer purchased their seven properties and subsequently resold them. The following charts summarize the sale-resale data of these seven properties.⁷⁷ A map depicting these properties follow and are followed by a map depicting the solar farm.

The chart depicting the seven sales purchased and resold by the developer, CER Land, LLC, for deed transfer purposes, includes three transfers for each property. The first deed represents the sale to the original property owner, which is an arms-length or market sale because it meets the definition of market value.⁷⁸ The second sale is from the original

⁷⁷ The sales data was obtained from county records, MLS data, and information present to the Minnesota Public Utilities Commission on March 15, 2016 regarding the resolution of the negotiations with landowners.

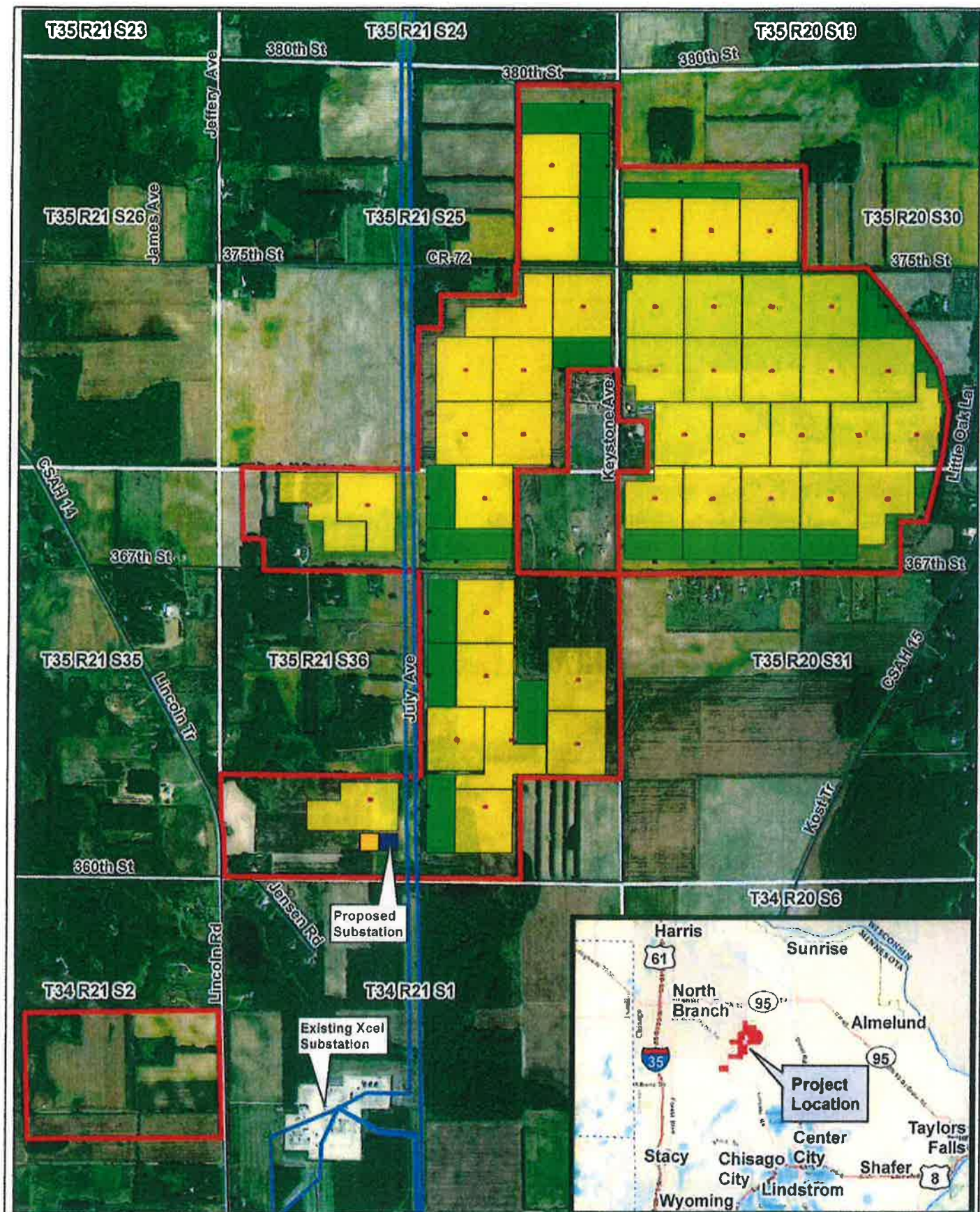
⁷⁸ Definition of Market or Arms-length Sale: A transaction between unrelated parties who are each acting in his or her own best interest. *The Dictionary of Real Estate Appraisal*, 5th ed., s.v. "arms-length transaction." Definition of Market Value: The most probable price that the specified property interest should sell for in a competitive market after a reasonable exposure time, as of a specified date, in cash, or in terms equivalent to cash, under all conditions requisite to a fair sale, with the buyer and seller each acting prudently,

**SALE/
RESALE**

Sale/ Resale	Parcel No.	Address	Sale Date	Grantor	Grantee	Net Sale Price	\$ Change	% Change	Annual % Chng	Sale Tax Assess'm't	Acres	Comments
1	110072810	10090 367th Street	05/07/10	Corey Holcomb	Scott Dornbusch	\$216,600	NA	NA	NA	NA	10.090	2001 1,990 SF 4LS, 800 SF Fin.
1	110072810	10090 367th Street	08/03/16	Scott Dornbusch	CER Land, LLC	\$360,800	\$144,200	66.57	8.50	\$250,600	10.090	4BR-3B; Adj. SF at W & Rear
1	110072810	10090 367th Street	03/21/18	CER Land, LLC	Scott Dornbusch	\$302,500	(\$58,300)	-16.16	NA	\$269,500	10.090	Time Adjustment from 5/7/10
	5/7/10 Sale Price was \$219,900 with seller paid amount of \$3,300, or \$216,600.											
												Sale to 3/21/18, or 7.9 yrs. \$216,600/7.9 Yr/6.8% = \$364,296 \$364,296 v. \$302,500 = -17.0%
2	110073210	10095 367th Street	07/09/10	Rense Dresel	Shawn Yerges	\$299,000	NA	NA	NA	NA	9.900	2002 1,677 SF 3LS, 1000 SF Fin Bsm't,
2	110073210	10095 367th Street	05/18/16	Glenn J. Yerges	CER Land, LLC	\$365,000	\$66,000	22.07	3.46	\$277,900	9.900	4BR, 2.5B; Adj. SF 2 Sides, Rear
2	110073210	10095 367th Street	06/15/17	CER Land, LLC	Shawn Campbell	\$328,004	(\$36,996)	-10.14	NA	\$301,500	9.900	Dense Mature Trees Adj. SF
	6/15/17 Sale Price was \$336,900 with seller paid amount of \$8,896, or \$328,004.											
												Time Adjustment from 7/9/10 Sale to 6/15/17, or 6.9 yrs. \$299,000/6.9 Yr/6.3% = \$455,851 \$455,851 v. \$328,004 = -28.0%
3	90035100	37083 Keystone Ave	08/08/00	P.W. Lee	Douglas Melby	\$100,000	NA	NA	NA	NA	6.000	1964 1,442 SF 1 Sty, 228 SF Fin Bsm't
3	90035100	37083 Keystone Ave	10/11/16	Douglas Melby	CER Land, LLC	\$302,500	\$202,500	202.50	7.08	\$179,300	6.000	3BR-2B; Adj. SF 2 Sides & Rear
3	90035100	37083 Keystone Ave	08/28/17	CER Land, LLC	Richard Brandt	\$252,290	(\$50,210)	-16.60	NA	\$199,140	6.000	Time Adjustment from 8/8/00
	8/28/17 Sale Price was \$257,000 with seller paid amount of \$4,710, or \$252,290.											
												Sale to 8/28/17, or 17.1 yrs. \$200,000/17.1 Yr/2.4% = \$300,034 \$300,034 v. \$252,290 = -15.9%
4	110072840	10254 367th Street	11/29/05	Nielson Const.	Kory Abell	\$360,000	NA	NA	NA	NA	9.280	2005 2,326 SF 4LS, Unfin. Bsm't,
4	110072840	10254 367th Street	07/27/16	Kory B. Abell	CER Land, LLC	\$535,000	\$175,000	48.81	3.78	\$285,000	9.280	3BR-2.5B: Corner Lot, Opposite
4	110072840	10254 367th Street	10/27/17	CER Land, LLC	Todd J. Huebl	\$324,950	(\$210,050)	-39.26	NA	\$304,600	9.280	SF at W and Front
	11/29/07 Sale Price was \$373,000 with seller paid amount of \$13,050, or \$360,000.											
												Time Adjustment from 12/16/05 Sale to 10/17/17, or 11.8 yrs. \$390,000/11.8 Yr/0.0% = \$390,000 \$390,000 v. \$324,950 = -16.7%
												\$30,000 Pole Barn was constructed in 2006. \$390,000 is the adjusted SP for the 11/29/05 sale.
												10/27/17 Sale Price was \$335,000 with seller paid amount of \$10,050, or \$324,950.

**SALE/
RESALE**

Total Purchase Price to CRE Land, LLC	\$2,773,000
Total Sales Price from CRE Land, LLC	\$2,143,044
Total Loss	\$629,956
	-22.72%



Data Source(s): Data and map are approximate. MNDOT
Basemap (2014); Chicago County GIS (2013); ESRI (2012);
ESRI Online Basemap Service (2015); Minnesota (MNP) imagery
(2015); North Star Solar PV, LLC (2015).

Site Boundary

Existing Transmission Line

Existing Road

Section Boundary

Proposed Substation

Proposed Operations and Maintenance Facility

Proposed 1MW Inverter

Proposed 1MW Array

Proposed 2MW Inverter

Proposed 2MW Array

SITE PERMIT MAP

North Star Solar Energy Generating Facility

PUC Docket IP-6943/GS-15-33

owner to CER Land, LLC. This is not considered a market value sale because it does not meet the definition of market value, primarily because it was negotiated under duress. The third sale is from the developer to a new owner (except for Sale-resale No. 1 which was sold back to the original owner). The third sale is a market value sale because, except for No. 1, the sales were adequately exposed to the market having been placed on the local Multiple Listing Service prior to the last sale.

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

In order to compare the two sales, an adjustment must be made to the older sale to bring it up to the value level of the second sale. This is done by making a time adjustment based on supporting data from the market. The following chart represents the annual median and average sale price for houses in North Branch and Chisago County.⁷⁹ The median sale price for North Branch, specifically, was judged to be the most relevant of the two sources since it does not include the extreme values.

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

⁷⁹ The time adjustment chart was prepared by David Abbot, a statistician with the Minneapolis Area Board of Realtors.

North Branch

	Median	% YoY Chg	Average	% YoY Chg
2000	\$ 139,000		\$ 147,552	
2001	\$ 155,389	11.8%	\$ 174,121	18.0%
2002	\$ 171,900	10.6%	\$ 188,163	8.1%
2003	\$ 182,000	5.9%	\$ 207,129	10.1%
2004	\$ 197,000	8.2%	\$ 212,733	2.7%
2005	\$ 208,900	6.0%	\$ 230,131	8.2%
2006	\$ 201,950	-3.3%	\$ 214,891	-6.6%
2007	\$ 202,150	0.1%	\$ 206,783	-3.8%
2008	\$ 159,382	-21.2%	\$ 166,781	-19.3%
2009	\$ 141,000	-11.5%	\$ 143,056	-14.2%
2010	\$ 136,000	-3.5%	\$ 147,947	3.4%
2011	\$ 115,544	-15.0%	\$ 121,466	-17.9%
2012	\$ 123,650	7.0%	\$ 129,505	6.6%
2013	\$ 149,900	21.2%	\$ 159,728	23.3%
2014	\$ 163,700	9.2%	\$ 168,857	5.7%
2015	\$ 175,000	6.9%	\$ 195,721	15.9%
2016	\$ 187,750	7.3%	\$ 198,888	1.6%
2017	\$ 208,195	10.9%	\$ 221,678	11.5%
2018	\$ 230,000	10.5%	\$ 251,715	13.5%
2019	\$ 231,800	0.8%	\$ 248,021	-1.5%
2020	\$ 262,500	13.2%	\$ 275,585	11.1%

2007 chg
2020 chg
2020 chg

45.4%
29.9%
88.8%

40.1%
33.3%
86.8%

Chisago County

	Median	% YoY Chg	Average	% YoY Chg
	\$ 147,900		\$ 161,997	
	\$ 164,900	11.5%	\$ 178,846	10.4%
	\$ 181,900	10.3%	\$ 199,640	11.6%
	\$ 200,000	10.0%	\$ 219,703	10.0%
	\$ 210,000	5.0%	\$ 235,939	7.4%
	\$ 229,000	9.0%	\$ 250,686	6.3%
	\$ 224,325	-2.0%	\$ 248,741	-0.8%
	\$ 215,000	-4.2%	\$ 231,397	-7.0%
	\$ 176,000	-18.1%	\$ 192,913	-16.6%
	\$ 155,000	-11.9%	\$ 164,975	-14.5%
	\$ 148,875	-4.0%	\$ 157,998	-4.2%
	\$ 140,000	-6.0%	\$ 146,672	-7.2%
	\$ 139,900	-0.1%	\$ 153,268	4.5%
	\$ 166,950	19.3%	\$ 182,321	19.0%
	\$ 185,000	10.8%	\$ 199,015	9.2%
	\$ 197,500	6.8%	\$ 215,329	8.2%
	\$ 215,000	8.9%	\$ 230,247	6.9%
	\$ 233,250	8.5%	\$ 249,491	8.4%
	\$ 254,900	9.3%	\$ 268,737	7.7%
	\$ 261,403	2.6%	\$ 282,035	4.9%
	\$ 285,500	9.2%	\$ 304,938	8.1%

42.8%
31.8%
88.2%

45.4%
32.8%
93.0%

Description of the Sales Chart

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

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

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

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

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

Grantor: This is the seller of the property.

Grantee: This is the buyer of the property.

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

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

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

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

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

Comments: The comments include a description of the property in the following order: date of construction; square footage above ground level; architectural design (3 or 4

level split, 1-story, tri-level, split entry); basement square footage of finish; number of bedrooms and baths; location of solar farm, i.e. rear and front.

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

Sale-Resale Analysis

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

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

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

suggests that this encumbrance would add an additional -11.00 percent, despite that it contributes an annual income stream of \$12,000.

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

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

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

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

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

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

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

MCBRIDE PLACE SOLAR FARM CASE STUDY – SALE-RESALES ANALYSIS

McBride Place Solar Farm is on Mount Pleasant Road in Midland, North Carolina. The project consists of 627 acres of a total tract of 974.59 acres. The 74.9 MW project was approved in 2017.

An analysis of the sales of the single-family dwellings that surround the project indicate that three sale-resales have occurred spanning the time period before and after the project was approved.

A time adjustment derived from the Zillow Home Value Index for North Carolina Single Family Market from 2014 to 2021. The first sale was increased for time based on the indicated rate of appreciation of 5.35 percent, 5.08 percent and 5.00 percent respectively. This resulted in the anticipated value based on market appreciation, as if the solar farm had not been constructed. When comparing these values to the actual sale prices after construction, these **sales indicate diminution of -15.65 percent, -15.51 percent and -16.44 percent**, respectively. The analysis is depicted on the following chart and map.

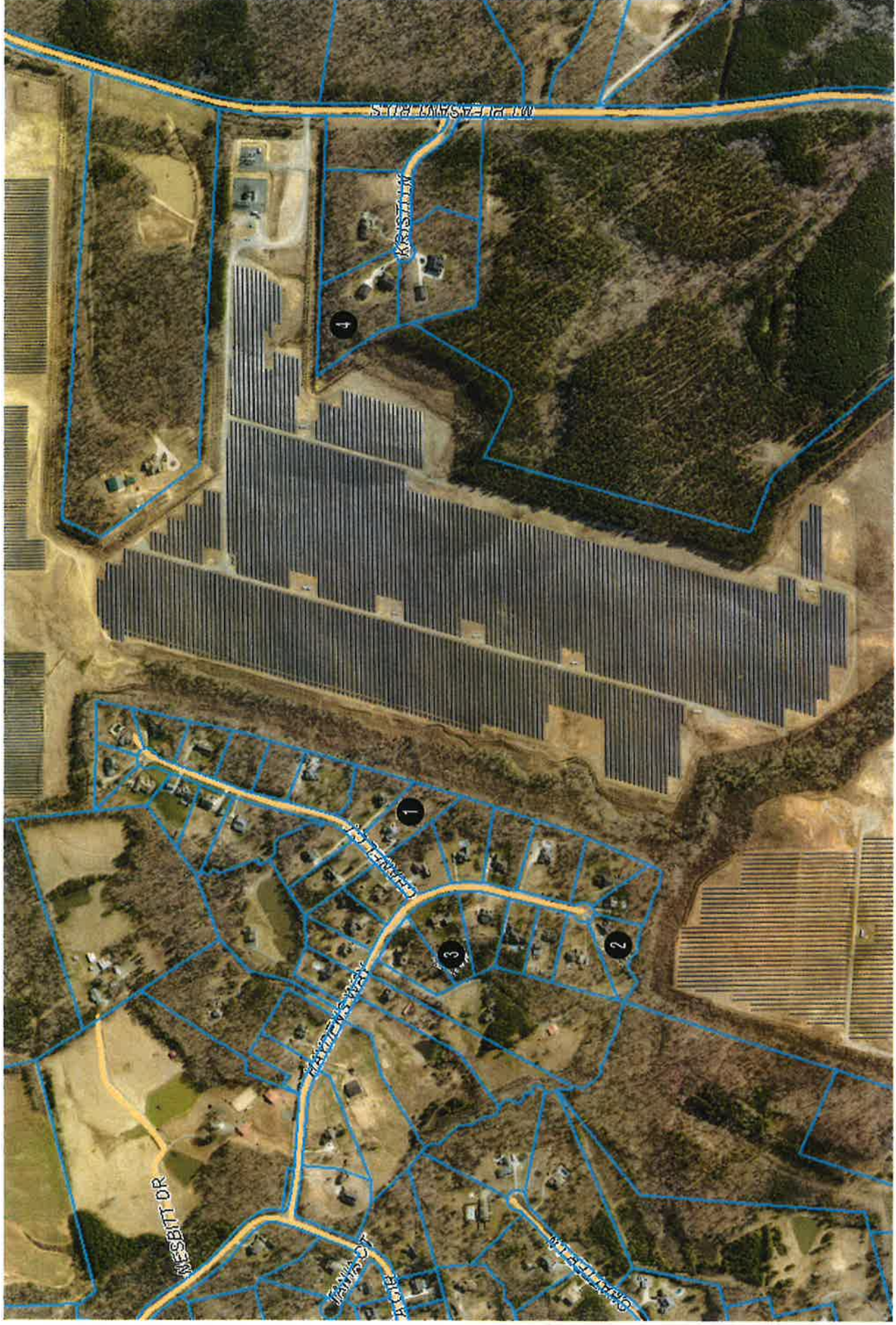
It is notable that a fourth sale, though not a sale-resale, was **-16.81 percent** below its assessment at the time of sale.

It is significant that Sale-Resale No. 1's property line is **325.0 linear feet west of the closest solar panel and the dwelling is 550.0 linear feet west**. Sale-resale No. 2's rear property line is **200.0 linear feet north of the closest solar panel and the dwelling is 350.0 linear feet north**. Sale-resale No. 3 is one lot removed from the solar panels on the west side of Haydens Way. Sale No. 4's east property line is within 150.0 linear feet of the closest solar panel while the dwelling is within 550.0 linear feet. Dense woodland is between the solar panels and all the examples of diminution.

SALE/RESALES ADJOINING MCBRIDE PLACE SOLAR FARM - MIDLAND, NC

SALE/ RESALE	PARCEL NO.	ADDRESS	SALE DATE	DEED BOOK/PG	GRANTEE	SALE PRICE	SALE TAX ASSESSM'T	ACRES	COMMENTS
1	5556-26-2054	4504 Chanel Court	1/17 1/20	12328-116 13932-047	NA Phillip G. Pees	\$399,000 \$393,500	\$396,720 \$474,750	1.730	2005 2,558 SF 1 Sty BV, 4-3.5, Full Bsmt, 2-CAG, FAG, CA, FP Adjust 1/17 Sale to 1/20, or \$399,000/3.0 Yr/5.35%* = \$466,527, or -15.65%
2	5556-27-5419	4599 Chanel Court	9/15 8/20	11575-087 14404-283	NA Peter Weinziel	\$462,000 \$500,000	\$473,490 \$531,440	1.000	2007 2,411 SF 2 Sty BV, 5/4.5 Full Bsmt, 2-CAG, HP, CA, FP Adjust 9/15 Sale to 8/20, or \$462,000/5.0 Yr/5.08% = \$591,775, or -15.51%
3	5556-15-6844	8704 Haydens Way	7/12 4/19	10081/209 13463/180	NA Ben. Merriman	\$322,000 \$375,000	\$306,680 \$372,460	1.960	2001 1,353 SF 2 Sty BV, 4/3 Full Bsmt, 2-CAG, HP, CA, FP Adjust 7/12 Sale to 4/19, or \$322,000/6.8 Yr/5.0% = \$448,771, or -16.44%
4	5556-46-7264	5811 Kristi Lane	4/20	14095/125	Fred E. Trull, Jr.	\$530,000	\$637,100	3.740	2019 2,462 SF 2 Sty BV, 6/4 Part. Bsmt, 2-CAG, FAE, CA Sale Price compared to Assessment = -16.81%

*The time adjustment was based on the Zillow Home Value Index for the North Carolina Single Family Market from 2014 to 2021.



SUNSHINE FARMS CASE STUDY – SALE-RESALE ANALYSIS

Ecoplexus, Inc., a San Francisco solar developer built a 20 MW project on the former 121.4 acre Goose Creek Golf and Country Club at 6562 Caratoke Highway in Grandy, North Carolina. This is an example of single-family lots that were generally acquired by virtue of their abutting a golf course view, and then having it replaced by the view of solar panels.

The North Carolina Utilities Commission gave its approval for the facility in January 2015. Based on concerns from the neighbors regarding its incompatibility with neighboring residential lots, the Currituck County Planning Board denied Ecoplexus a permit in April 2016. The solar company filed suit, and in March 2017, a Superior Court judge upheld the county's decision to turn down the project. However, on appeal, the North Carolina Court of Appeals overturned the decision in December 2017. The project was constructed in 2019.

The solar farm is surrounded by 62 properties, which consist predominantly of single-family lots and improved tracts on Grandy Road and Uncle Graham Road. The east side, on Caratoke Highway, is predominantly improved with commercial tracts. The northern property line abuts a single-family subdivision, Carolina Club, that also encircles a second golf course.

All the properties that encircle the solar farm were examined for sale-resales prior to and after the knowledge of the proposed golf course. Since there were no sale-resales, which are the most reliable measure of damage since they require the least adjustment, the only sale-resales available to analyze were the vacant lot sales from the adjacent Carolina Club Subdivision on Savannah Drive.

The following chart represents two groups of sales—those abutting the solar farm or commercial uses and those not abutting. Sale Nos. 1 through 5 represent the former, while Sale Nos. 6 through 13 represent the latter. Sales No. 1, No. 2 and No. 3 contain approximately 0.50 acre and sold in mid-2017 for \$27,000 to \$28,000, or an average of \$27,500. Sale No. 4 is larger, containing 0.870 acres and sold for \$29,500 during this same

period. Though Sale No. 5 did not abut the solar farm, it was only two lots to the northwest. This sale sold in late 2018 for \$30,000.

Sale Nos. 6 through 13 sold between late 2017 and mid-2021. These sales are 0.50 acre in size and ranged in price from \$32,500 in 2017 to \$38,500 in 2021.

Comparing the two groups of sales from 2017 indicates a range in price from \$27,500 to \$32,500, or a **difference of -15.38 percent**.

There is insufficient data to determine if the lots that adjoin the solar farm continue to increase in value at the same or a reduced rate as the rest of the local market, or if their value stabilized. Nonetheless, this case study indicates a minimal diminution of **-15.50 percent R** as a result of their proximity to the solar farm. This diminution in value reflects an ordinance that requires a **300.0 linear feet setback for the solar panels from the residential property line; no chemicals can be used to control vegetation throughout the life of the project; and the solar farm had to submit a decommissioning plan.**

Among the neighboring property owners' concerns during the permitting process was the potential damage to their residences in the case of a hurricane. The developer claimed that the arrays would withstand winds up to 120 miles per hour. However, the effect of Hurricane Dorian in 2019 was that dozens of frames and panels were mangled even though the storm was 50 miles offshore and the winds were 60 miles per hour. This is an example of the solar developer's misrepresentation and the unpredictable nature of the impact of an unstable structure occupying immense areas of land.

GRANDY, NORTH CAROLINA SINGLE FAMILY LOT SALES

SALE	PARCEL ID	ADDRESS	GRANTOR	GRANTEE	DB/PAGE	SALE PRICE	LOT SIZE	SP/SF	SALE DATE	COMMENTS
Lots Abutting Solar Farm or Commerical Use										
1	94G-16	125 Savannah	George Mills	Earl Thomas Hall	1404-149	\$27,000	0.510	\$1.22	4/25/17	Abutts Commercial at Rear
2	94G-5	147 Savannah	Wm Weatherly	Branden Shuler	1404-848	\$27,000	0.580	\$1.07	4/28/17	Abutts Solar Farm
3	94-G	143 Savannah	Wm Weatherly	Roger Mihovch	1404-848	\$28,000	0.460	\$1.40	6/20/17	Abutts Solar Farm
4	94G-4	149 Savannah	Wm Weatherly	David A. King	1402-737	\$29,500	0.870	\$0.78	7/13/17	Abutts Solar Farm
5	94G-2	153 Savannah	Rodney Blake	G. Romero-Mendez	1465-529	\$30,000	0.510	\$1.35	12/10/18	2 Lots NW of Solar Farm
Lots Not Abutting Solar Farm or Commerical Use										
6	94G-35	112 Savannah	Jeff Weatherly	Frasca Custom Hms	1425-482	\$32,500	0.460	\$1.62	11/15/17	
7	94G-1	155 Savannah	Keith Ostrom	Hunter D. Wright	1447-837	\$35,000	0.490	\$1.64	06/15/18	
8	94G-5	142 Savannah	Michael Mills	Lutz Quality	1510-321	\$35,000	0.460	\$1.75	12/17/18	
9	94G-24	109 Savannah	John Peterson	Michael Locicero	1430-662	\$33,000	0.450	\$1.68	01/09/18	
10	94G-46	134 Savannah	Bernard Hall	Anthony Leete	1534-847	\$37,000	0.460	\$1.85	05/11/20	
11	94G-44	130 Savaanah	John Bergstrom	Scott Shaker	1601-332	\$38,500	0.610	\$1.45	02/23/21	
12	94G-34	110 Savannah	Jonathan Thau	Kelly Coon	1591-766	\$38,000	0.460	\$1.90	01/14/21	
13	94G-33	108 Savannah	Lina Ward	Joaquin Salazar	1618-635	\$37,400	0.460	\$1.87	04/27/21	

Currituck County GIS Data Viewer



- County Boundary
 - State
 - County
- Streets
 - Wright Memorial Bridge
 - Major Streets
 - Arterial_Principal
 - Arterial_Major
 - Collector_Major
 - Parcels
- Currituck County
- Aerial Photography (2011)
 - Red: Band_1
 - Green: Band_2
 - Blue: Band_3

Currituck County GIS

Phone: (252) 232-2034

E-mail: gis@currituckcountync.gov

This map should be used for general reference purposes only. Currituck County assumes no legal liability for the information shown on this map.

SPOTSYLVANIA SOLAR CASE STUDY – PAIRED SALES ANALYSIS

Spotsylvania Solar in northern Spotsylvania County Virginia, adjoining the 2,350 acre Fawn Leaf gated community to the south. The development consists of 1,398 single family lots with 900 residences and a 288.0 acre lake. Home prices range from the high \$500,000s to \$2,500,000. Of the 1,398 single family lots, 1,080 have sold, leaving a current inventory of 318.

Spotsylvania Solar is a 617 MW industrial scale electrical generating plant, comprised of four solar phases—Pleinmont 1, Pleinmont 2, Richmond and Highlander. The project sites contain a total of 6,350 acre of which 3,500 will be developed with solar panels. The developer is sPower who merged with AES in 2020. The project was announced in 2018 and approved in April 2019. Approximately half of the project was completed in July 2021 with the remaining anticipated to be completed in the fall of 2021. The surrounding areas to the east, west and south are rural, yet populated.

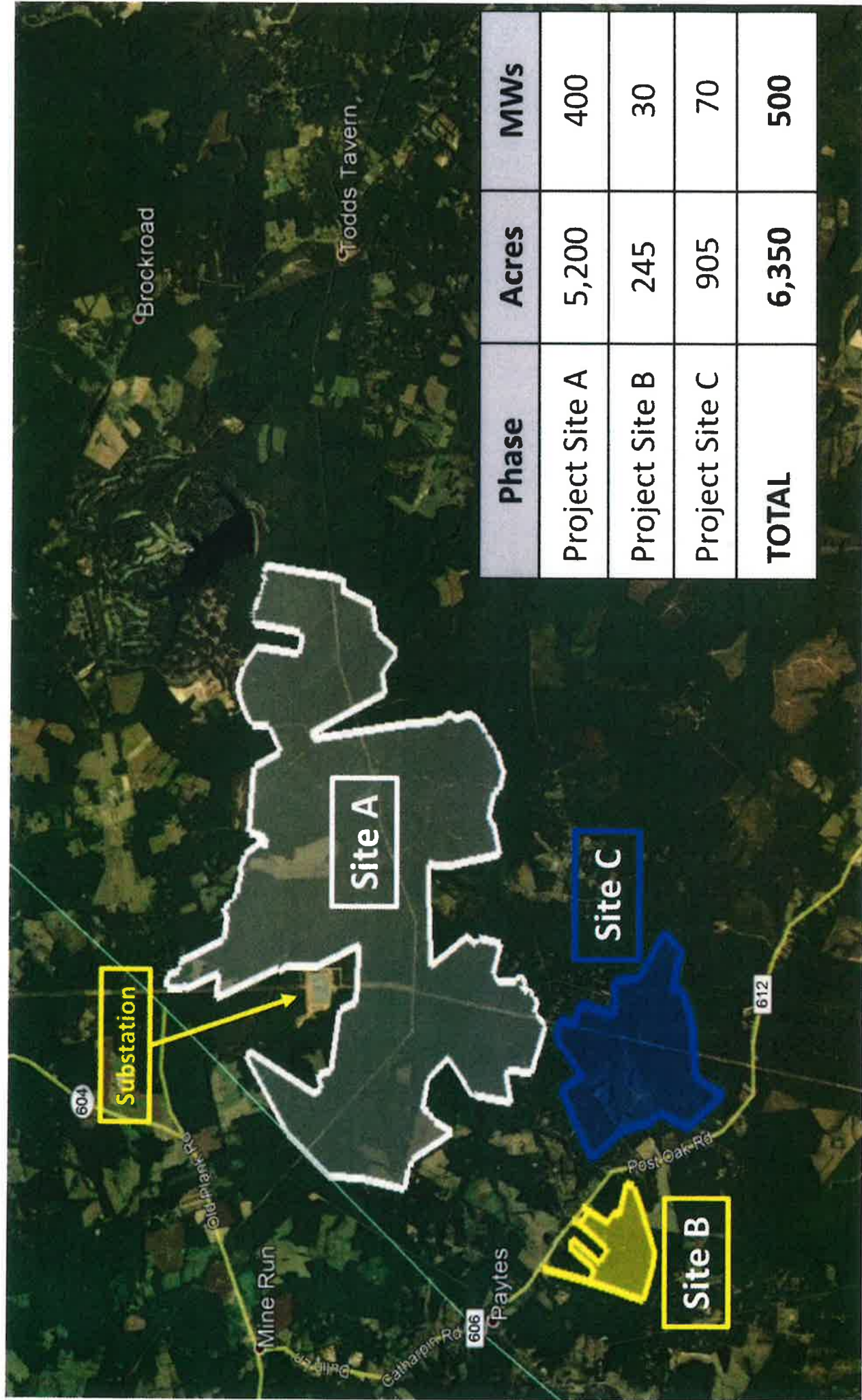
The northeastern most portion of Site A adjoins the Fawn Lake subdivision at the development's southwestern property line as indicated on the following aerial photograph. The chart following represents five land sales that occurred before and after the knowledge of the solar farm. A plat of the five lots follows.

Land Sales No. 1 and No. 2 occurred in 2015 indicating a range of values from \$85,000 to \$90,000 depending on size. Sale No. 3 is a 2017 sale that adjoins the site of the future solar farm, which is a slightly more remote location than the prior sales abutting the main road. This property sold for \$77,250.

Sale No. 4 and 5 represent land sales that occurred after the approval of the solar farm. Sale No. 4 is at the corner of the main road and are in Site A. The lots on Bander Way and Southview Hill are also in Site A. This sale sold for \$65,000, while Sale No. 5, which adjoins the solar farm sold for \$55,000.

Comparing Sales No. 3 and 5 without any adjustment for market change (time) indicates a diminution in value of a minimum of -30.0 percent.

Comparable Sale No. 3:	\$77,250
Comparable Sale No. 5:	<u>\$55,000</u>
Difference:	\$22,500, or -28.8, or -30.0 percent (R)



Phase	Acres	MWs
Project Site A	5,200	400
Project Site B	245	30
Project Site C	905	70
TOTAL	6,350	500

**FAWN LAKE LOT SALES
SPOTSYLVANIA SOLAR**

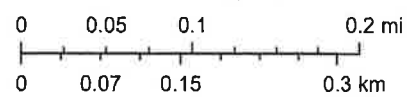
NO.	ADDRESS	GRANTOR	GRANTEE	DATE	PRICE	SIZE	SP/SF	DB INST	MAP	COMMENTS
1	11200 Brander Way	Simply Home LLC	Christopher Pichurko	03/17/15	\$90,000	32,470	\$2.77	0003 960	18C-43-1-205	Interior Lot, North of Brandermill Pk
2	11709 Southview CT	Simply Home, LLC	Bernard J. Logan	06/25/15	\$85,000	23,599	\$3.60	0010 297	18C-43-1-192	Interior Lot, North Side of Southview
3	11602 Southview CT	NA	Casey Pence	11/03/17	\$77,250	30,122	\$2.56	0019 899	18C-43-1-183	Adjoins Solar Farm, S. Side SV
4	11009 Southview HL	NA	Mark S. Wilson	08/05/19	\$65,000	26,893	\$2.42	0012 434	18C-43-1-177	SE Corner of Brandermill & SV HL
5	11700 Southview CT	NA	Charles Pattillo	09/27/19	\$55,000	32,958	\$1.67	0016 191	18C-43-1-185	Adjoins Solar Farm, S. Side SV



July 29, 2021

 Tax County Boundary

1:9,028



CONCLUSION

The following charts and graphs summarize the current available known damage studies regarding utility scale solar facilities. The data is limited because few industrial generating plants in excess of 100 MW, though they have been approved for development, have been constructed. It also takes time for the market to react to this relatively recent trend. Nonetheless, the evidence is compelling and contradicts the claims by solar developers that there is no diminution in property value as a result of proximity to utility scale solar farms.

The previously discussed data is from two peer reviewed journals and includes case studies from appraisers in several states. Though diminution in value varies, as the result of a detrimental condition's impact upon a property's utility, the evidence presented by these case studies, indicates that utility scale solar farms damage property values by **at least -15.0 percent**.

One of the North Branch properties indicated as much as **-28.0 percent**. It is significant that this 9.90 acre property was the most impacted because its rear yard was encumbered by solar panels. A 30 year lease to the solar developer for \$6,240 annually was not enough to offset the decline in value because of the nuisance. This example illustrates the fact that the greater the impact of the solar farm, the greater the reduction in utility and the greater the resulting diminution in value.

The preponderance of evidence based on these empirical studies indicates that **industrial scale solar plants do negatively impact adjacent properties** to the extent that their utility, as interpreted by the market, is affected. For, this reason, the **market considers solar powered electric generating facilities to be a detrimental condition**.

It is reasonable to anticipate that **utility scale solar farms larger than 100 MW** will have **greater negative impact**, particularly in areas where the unique quality of the landscape is a signature characteristic, such as the inner Bluegrass Region of Kentucky.

SUMMARY OF INDICATED VALUE DECLINE

DATE	STUDY	RESULT
2018	University of Texas	Assessor survey responses ranged from value impact of zero to estimation of negative impact associated with close distance between the homes and the facility, and impact increased with increased size of the solar plant.
2020	University of Rhode Island	Average decline within 3.0 mile radius was -1.7% , or \$5,671. Average decline within 0.1 mile was -7.0% , or \$23,682. The "results suggest extremely large disamenities for properties in very close proximity."
2013	Fred H, Beck & Associates, LLC	Strata Solar Case Study: Potential Purchasers cancel contract upon learning of the solar facility. Clay County Case Study: Lot sales stopped after announcement of solar plant. Clay County Board of Equalization reduced affected property assessments -30.0% . Non-residential Use View Impairment Study: Adjacent incompatible use adversely impacted nearby properties -10.7% to -25.1% , or an average of -15.2% . AM Best Solar Farm Study: No diminution in value due to pre-existing industrial zoning for solar farm.
2020	Mark W. Heckman, R.E. Appraisers	Adams County View Case Study: The loss of view results in a -15% to -20.0% loss in value.
2019	Madison County Indiana	Potential purchaser offered -16.43 % less than appraised value upon learning of the proposed solar plant.

SUMMARY OF INDICATED VALUE DECLINE

DATE	STUDY	RESULT
2021	Mary McClinton Clay, MAI	North Star Solar Case Study: An Analysis of the 7 adjoining properties purchased by North Star PV, LLC. A sale-resale analysis of the sale prior to and subsequent to the purchase by the solar developer. The sale-resales indicate a range of diminution from -6.3% to -28.0% with a median decline of -16.9% and an average decline of -16.8% .
2021	Mary McClinton Clay, MAI	McBride Place Solar Farm Case Study: Analysis of 3 sale-resales and a comparison of the sale price and tax assessment. The sale-resales indicate -15.65% , -15.51% and -16.44 percent diminution in value. The sale price/tax assessment indicates a -16.81% loss of value.
2021	Mary McClinton Clay, MAI	Sunshine Farms Case Study: Analysis of 13 vacant single family lot sales from a subdivision that abutts a solar farm. The sales that adjoin the solar farm sold for -15.5% percent less than the lots that did not abutt the solar farm.
2021	Mary McClinton Clay, MAI	Spotsylvania Solar Case Study: Analysis of 5 vacant single family lots from a section of Fawn Lake Subdivision that abutts a 6,412 acre solar farm. The lots that abutt the solar farm sold for -30.00 percent less than those that did not abutt.
2020	Western Mustang Solar Neighbor Agreement	Monetary offer of \$17,000 to adjacent property owners to quell opposition to the proposed solar facility.
2020	Lighthouse BP Neighbor Agreement	Monetary offer of \$5,000 to \$50,000 to adjacent property owners depending on proximity to the solar facility to quell opposition.

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[illegible]

ADDENDUM

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

KENTUCKY ENVIRONMENTAL DAMAGE STUDIES

In the event that there is insufficient sales data within a subject area to extract an indication of diminution of value as a result of a specific detrimental condition, it is acceptable appraisal methodology to use another location with sufficient data or a similar detrimental condition with similar diminution upon utility as a proxy for the subject area or detrimental condition.

The following summary of environmental damage studies conducted by this office include the following detrimental conditions: ground water contamination by tannery sludge; animal odors; leaking underground storage tanks; cell tower and transmission line easements; fugitive particulate emissions (dust), and airport proximity.

GROUND WATER CONTAMINATION

The ground water contamination study was prepared for the plaintiffs in *Yellow Creek Concerned Citizens v. Middlesboro Tannery*. This study estimated the effect of tannery contamination on 350 properties along Yellow Creek, in Bell County. This study was conducted after city water had replaced well water in the affected watershed. The analysis compared affected sales along Yellow Creek and associated Williams Creek with three creeks upstream that were not contaminated. The multiple regression analysis found that there was residual diminution in value of **-16.5 percent** for improved properties and **-22.00 percent** for unimproved land.

ANIMAL ODORS

A damage study prepared for the case *James E. Sullivan, et al v. Board of Regents, et al* estimated the effect of an animal waste fermentation project at the Organic Pasteurization

Plant at North Farm of Murray State University on Sullivan's Executive Par 3 Golf Course and Sports Center and on-site residential improvements in Murray. An income analysis of the golf course before and after the construction of the "manure cooker" indicated that the golf course was damaged 28.00 percent. Based paired sales analysis of dwellings within proximity to chicken houses, it was estimated that the two residential improvements had diminution in value from **-21.0 to -28.0 percent**.

Two studies in western Kentucky measure the effect of hog barns on proximate vacant land and residential properties. The first study estimated the damage of hog barns on residential properties in five western Kentucky counties including Calloway, Graves, Carlisle/Hickman, Warren and Davies. Sales data to within 2.00 miles of hog barns were analyzed using matched pairs. The study indicated that vacant land values within one mile of a hog barn diminished approximately 40.0 percent, while improved properties declined between 26.7 and 11.00 percent depending on their proximity to the barn. This study was prepared for the case of *Gene Nettles, et al v. Environmental and Public Protection Cabinet; Division of Water, David Morgan, Director, and J.P. Amberg Hog Farm*.

The second study was prepared for the case *Terry Powell, et al v. Tosh, et al*. This study estimated the diminution of value as a result of proximity to 5,000 hog confined animal feeding operations (CAFOs) in Marshall County. The results of the paired sales study were that improved properties adjacent to or within approximately 0.25 miles to hog farms are damaged approximately **-50.0 percent**. Properties from approximately 0.5 mile to 1.25 miles are damaged **-25.0 percent**. Farms beyond 1.25 miles to 1.5 miles and/or those adjacent to agricultural fields that may experience routine manure spreading are damaged approximately **-10.0 to -12.0 percent**. Vacant land was damaged **-40.0 percent**.

LEAKING UNDERGROUND GASOLINE STORAGE TANKS

This study was prepared for the case *Terrence G. Kerschner, et al v. Burley Oil Company, et al*. The study estimated the effect of leaking underground gasoline storage tanks

on Country Lane Estates in Frankfort and, specifically, on a residence where the petroleum surfaced. The results of this study was that the property most affected by the leak was damaged **-100.0 percent**, with adjoining properties damaged **-50.0 percent** and the remaining properties within the subdivision were damaged **-20.0 percent**.

CELL TOWERS AND HIGH VOLTAGE TRANSMISSION LINES

The overhead transmission line study was prepared for the case *Kentucky Utilities Company v. James and Mary Jent, CDH Preserve, LLC and Farm Credit Services of Mid-America, FLC, Violet Monroe* and estimated the effect of High Voltage Transmission Lines on three Hardin County agricultural properties. The study was later expanded to include cell towers in a Bourbon County property division dispute.

The paired sales analysis indicated a range of diminution in value as a result of the encumbrance of high voltage transmission lines (HVTL) on agricultural properties. The amount of damage is the result of the degree to which HVTL impact the utility and degree of trespass upon the bundle of rights. The study indicated a range of diminution in value from minimal impact of **-12.0 percent** to a **maximum of -50.0 percent** depending on the placement of the easement within the property.

The study also indicated buyer resistance to lots impacted by HVTL. Two subdivisions in the same area were analyzed—one with and one without the encumbrance. The subdivision without the easement consists of 14 lots that sold from 2005 until 2011, with the absorption rate of 2 lots per year. The other is significantly encumbered by the transmission line. This subdivision consists of 16 lots of which only 6 have sold from 2007 to 2011, or 1.2 lots per year. The transmission line diagonally traverses the remaining lots, which had yet to sell when the study was conducted in 2012.

With respect to the effect of cell towers on agricultural property a paired sales analysis was made between two farms on opposite sides of the road in Bourbon County. The

analysis indicated a **-24.28 percent** damage to the farm. The comparison indicates buyer resistance and damage as a result of proximity to vertical structures similar to HVTL.

FUGITIVE PARTICULATE EMISSIONS

This study examined the condition of Claremont Acres, a single-family residential subdivision in the closest proximity to the Louisville Gas and Electric Plant (LG & E) at 5252 Cane Run Road in western Louisville. This four street subdivision was developed in the late 1960s and consists of predominantly 1,000 square foot masonry ranch houses with detached garages. The subdivision abuts a single row of dwellings which front along Cane Run Road on the south side of the street opposite the LG & E facility. The properties suffered from air borne dust contamination from coal ash landfills that were expanded in 2010. The most affected properties were 300 feet southeast of the ash pond, 2,500 feet from the ash landfill, and 3,000 feet from the stacks. The Claremore Acres properties that suffered from the dust, which the EPA tested were 0.31 to 0.45 miles from the Cane Run generating plant.

The study documented **an overall diminution in value of -25.8 percent for properties within approximately 0.50 mile of the source of the detrimental condition.**

PROXIMITY TO REGIONAL AIRPORT

This 2019 study of a Kentucky regional general aviation airport was prepared for the case, *Mary Williams v. Henderson City-County Airport Board*. The study examined three 5.00 acre residential subdivisions in the vicinity of the Georgetown-Scott County Regional Airport. The control subdivision was 1.75 miles southwest of the runway. The two impacted subdivisions were within 0.33 and 0.50 miles northwest of the runway.

The study indicated a **diminution of -20.5 percent as a result of being within 0.5 mile west of the beginning of the Runway Protective Zone (RPZ) and diminution of -20.18 percent for lots abutting the RPZ from approximately the mid-point to the end. Lots within the RPZ indicated a diminution of -50.15 percent.**

DRAINAGE AND EROSION

A 2021 storm water drainage study was prepared for the Henderson County, Kentucky case, *Patricia Kushino, et al v. Federal Aviation Administration, et al*. This study estimated the diminution in value of an 80.00 acre woodland that was part of the 183.90 acre Williams Farm. The property was negatively impacted by the construction of a drainage ditch from the adjacent regional airport. Prior to the drainage ditch the woodland had natural drainage and a healthy stand of hardwood trees. After construction it suffered from constant flooding and become non-productive. The estimated contributing value of the woodland prior to the damage was \$3,000 per acre and after construction, its contributing value was \$850 per acre, or a **loss of -72.00 percent**.

A 2012 drainage study was prepared for the Fayette County case, *Jerry Whitson v. Donnie Cross*. This study involved the diminution in value to a rural residential tract improved with a dwelling a horse barn used for layups at the Kentucky Training Center. The property was encumbered by drainage from a pond on the adjoining tract which accumulated for extended periods of time at the front of the horse barn. The extent of the drainage rendered the horse barn non-contributing to the overall property value based on the expectations of the rental market for stalls. Although the contributing value of the horse barn was \$55,000, the cost to cure was less at \$32,614. Therefore, the estimate of damages was **-13.0 percent**.

NEIGHBOR AGREEMENT

This Neighbor Agreement (the "Agreement") is made as of this ____ day of _____, 2020 (the "Effective Date"), by and between **WESTERN MUSTANG SOLAR, LLC**, a Delaware limited liability company ("Western Mustang") and *****

RECITALS

A. Owner owns the residential property located at ****, identified by Parcel Identification Number 0000000000 (the "Property").

B. Western Mustang intends to study, develop and use certain property identified by Parcel Identification Number 00000000000 (the "Project Property"), which Project Property is adjacent to the Property, for a solar project (collectively, the "Project").

C. Owner has agreed to cooperate with Western Mustang's development, construction, and operation of the Project in accordance with the terms and conditions set forth herein.

D. The Owner is eligible for this Agreement because Western Mustang, LLC has determined that the Project Property is located on two or more sides of the Owner's residential Property.

AGREEMENT

NOW, THEREFORE, the parties agree as follows:

1. Cooperation. Owner shall fully support and cooperate with Western Mustang's development, construction, and operation of the Project, including in Western Mustang's efforts to obtain from any governmental authority or any other person or entity any environmental impact review, permit, entitlement, approval, authorization, or other rights necessary or convenient in connection with the Project. Without limiting the generality of the foregoing, in connection with any application by Western Mustang for a governmental permit, approval, authorization, entitlement or other consent related to the Project, Owner agrees not to oppose, in any way, whether directly or indirectly, any such application or approval at any administrative, judicial, or legislative level.

2. Consideration. All terms in this Section 2 shall be subject to Owner complying with this Agreement. Western Mustang shall pay Owner a signing payment of Two Thousand and 00/100 Dollars (\$2,000.00) within 45 days after the Effective Date. Within 45 days of the date when Western Mustang begins construction of vertical improvements for the Project and is diligently pursuing construction of the Project (such date being the "Construction Commencement Date"), Western Mustang shall pay Owner a one-time additional payment of Fifteen Thousand Dollars and 00/100 (\$15,000.00).

3. Merger. This Agreement, including any exhibits attached hereto, contains the entire agreement between the parties in connection with any matter mentioned or contemplated herein, and all prior or contemporaneous proposals, agreements, understandings and representations, whether oral or written, are merged herein and superseded hereby. No modification, waiver, amendment, discharge or change of this Agreement shall be valid unless the same is in writing and signed by the party against whom the enforcement thereof is sought

4. Confidentiality. Owner shall hold in confidence all information related to this Agreement and the Project (collectively, the "Confidential Information"). Owner shall not use any such Confidential Information for its own benefit, publish or otherwise disclose such Confidential Information to others, or permit the use of such Confidential Information by others for their benefit or to the detriment of Western Mustang. Owner may disclose Confidential Information to brokers, accountants and attorneys so long as such parties agree to not disclose the Confidential Information.

5. Attorney's Fees and Costs. Each party shall be responsible for their own costs and attorneys' fees in the event there is a dispute over this Agreement.

6. Governing Law. This Agreement shall be governed and construed in accordance with the laws of the State of Wisconsin.

7. Counterparts. It is anticipated that this Agreement will be executed in counterparts. This Agreement will, therefore, be binding upon each of the undersigned upon delivery to counsel for the parties of two or more counterparts bearing all required signatures.

8. Successors and Assigns. All provisions of this Agreement shall be binding upon and inure to the benefit of Western Mustang and Owner, and their respective successors, assigns, heirs, and personal representatives. Western Mustang may freely assign its rights and obligations under this Agreement without Owner's prior written consent; provided, however, that any such assignee is an owner or operator of the Project.

(Signatures on following page)

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed and delivered by their duly authorized representatives as of the Effective Date.

WESTERN MUSTANG:

WESTERN MUSTANG SOLAR, LLC, a
Delaware limited liability company

By: _____

Printed Name: _____

Title:

OWNER:

By: _____

Printed Name: *****

MISCELLANEOUS DATA

PURPOSE OF THE APPRAISAL

The purpose of the appraisal is to summarize the available damage studies that pertain to solar energy generation power systems, otherwise known as solar farms.

INTENDED USER AND USE OF THE APPRAISAL

The intended user is the addressee; and the intended use is for submission to the Clark County Comprehensive Plan Update Committee.

SCOPE OF THE REPORT

The scope of the report examines all available published and empirical evidence to document diminution in value as a result of proximity to industrial scale solar farms.

CERTIFICATION

The undersigned does hereby certify that, except as otherwise noted in this appraisal report.

To the best of my knowledge and belief, the statements of facts contained in this appraisal report are true and correct.

The reported analyses, opinions and conclusions are limited only by the reported assumptions and limiting conditions and are our personal, unbiased professional analyses, opinions and conclusions.

I have no present or prospective interest in the property, which is the subject of this report, and I have no personal interest or bias with respect to the parties involved.

Compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in, or the use of, this report.

I do not authorize the out-of-text quoting from or partial reprinting of this appraisal report. Further, neither all nor any part of this appraisal report shall be disseminated to the general public by the use of media for public communication without the prior written consent of the appraisers signing this appraisal report.

As of the date of this report, Mary McClinton Clay, MAI has completed the requirements of the voluntary continuing education program of the Appraisal Institute.

The use of this report is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives.

Mary Clay performed the following functions on this appraisal report: 1) researched available data sources; 2) and wrote the appraisal report.

No one provided significant professional assistance to the persons signing this report.

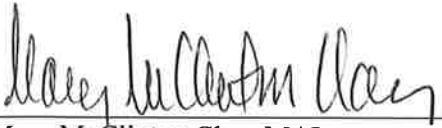
This report is in conformance with the USPAP Competency Provision.

The USPAP Departure Provision does not apply to this report.

The appraiser's employment is not conditioned on producing a specific value.

The owner or a representative of the property was interviewed. Interviews and research of necessary documents were conducted to confirm the accuracy of the supporting data.

No information pertinent to the valuation has knowingly been omitted.



Mary McClinton Clay, MAI

March 16, 2022

STATEMENT OF LIMITING CONDITIONS

1. Possession of this report or copy thereof does not carry with it the right to publication nor may it be used for any purpose by any but the applicant without the previous written consent of the appraiser(s), and in any event, only in its entirety.
2. The information contained in this report, gathered from reliable sources, and opinion is furnished by others, were considered correct, however, no responsibility is assumed as to the accuracy thereof.
3. The appraiser(s) is not required to give testimony in court with reference to the subject property unless further arrangements are made.
4. "The American Institute of Real Estate Appraisers conducts a voluntary program of continuing education for its designated members. MAI's who meet the minimum standards of this program are awarded periodic education certification." Mary McClinton Clay, MAI has completed this program.

MARY MCCLINTON CLAY
PROFESSIONAL QUALIFICATIONS

Mary McClinton Clay, MAI
218 Main Street, Paris, KY 40361
859-987-5698/Cell: 859-707-5575
mclayky@bellsouth.net

Market Area: Commonwealth of Kentucky

Primary Practice Focus: Litigation and zoning support with an emphasis on damage studies, including environmental and eminent domain.

Appraisal Experience:

1985 to Present: Self-employed - engaged in commercial, industrial and farm valuation.

1979-1984: Employed by Realty Research - engaged primarily in income property appraisal.

1976-1979: Residential appraisal experience with fee appraisers.

Previous assignments include: Eastern State Hospital; Gateway Shopping Center; Lakeside Heights Nursing Home, N. KY; L&N Office Building, Louisville; Alltech Biotechnology Center, Nicholasville, Paris Stockyards; Conrad Chevrolet, Lexington; CSX Rail Yards in Mt. Sterling and Paris; First Baptist Church, Cold Spring; Lusk-McFarland Funeral Home, Paris; Feasibility Study of proposed Hamburg Place Office/Industrial Park, Lexington; Rent Analysis of IRS Service Center, Covington; Surtech Coating, Nicholasville; Clem Refrigerated Warehouse, Lexington; Bluegrass Manufacturing, Lexington; Finley Adhesives, Louisville; Central Manufacturing and Central Light Alloy, Paris; Review Appraisal of Rand McNally Plant, Versailles and Timberland Distribution, Danville; Old Scott County Jail; Millspring Battlefield; Truck Terminals, Fast Food Restaurants, Retail Centers, Lumber Mills, Car Wash, Multi-Family Residential, Mobile Home Parks, Convenient Stores and Subdivision Analyses.

Thoroughbred Horse Farms including Pin Oak Farm, Bunker Hunt Farms, Pillar Stud Farms, Elmendorf Farm, Summer Wind Farm, Hidaway Farm, Stoner Creek Stud, Runnymede Farm, Wilshire Farm, Lynnwood Farms, Stonereath Farm, Idle Hour Farm, Canefield Farm, Elk Creek Farm, Lochness Farm, Stoneleigh Farm, Elizabeth Station Farm.

Right of Way Experience: Rose Street Extension, Lexington, 1986-87; AA Highway: Greenup Co., 1989, Carter Co., 1990-91; U.S. 27 Campbell Co. 1991-1992, 1993; Bridge Realignment, Walton, 1992; Industry Rd, Louisville, 1993; 19th St. Bridge, Covington, 1994; U.S. 27, Alexandria, 1994; S. Main St., London, 1995; Paris Pike, Paris and Bourbon County, 1995-98; KY Hwy 22 at I-75, Dry Ridge, 1996; Bridge Projects on KY Hwy 19, Whitley County, 1997; US 150, Danville, 1998; US 460 Morgan Co., 1999; US 62 South, Georgetown, 2000; Bluegrass Pkwy and KY 27 Interchange, Anderson Co., 2001; KY 519, Rowan County, 2002; US 641, Crittenden County, 2005; US 25, Madison County, 2008-09; US 68, Bourbon County, 2009-10; Clark County, 2011; US 68 Millersburg By-pass, Bourbon County, 2012-13; US 119, Bell County, 2014-15; US 25, Madison County, 2016-17; Excess Land, Georgetown By-pass, 2020; Access Break, Industrial Drive, Lebanon, 2020; Excess Land, Bluegrass Parkway and Harrodsburg Road, Lawrenceburg, 2021.

Railroad Right of Way Experience: CSX in Floyd, Perry, Clark, Woodford, Franklin, Montgomery, Johnson, Magoffin, Breathitt, Fayette, Madison, Mason, and Bourbon Counties, 1987-2016.

Rails to Trails: Rowan County, 2005; Montgomery County, 2009, Franklin County, 2014; Floyd County, 2016.

MARY MCCLINTON CLAY
PROFESSIONAL QUALIFICATIONS

Environmental Damage Studies: *Yellow Creek Concerned Citizens v. Middlesboro Tannery*: effect of tannery contamination on 350 properties along Yellow Creek, Bell County, KY, 1988; *James E. Sullivan, et al v. Board of Regents, et al*: effect of Animal Waste Fermentation Project at the Organic Pasteurization Plant at North Farm of Murray State University on Sullivan's Executive Par 3 Golf Course and Sports Center, Murray, KY, 2003; West Farm Subdivision, Pulaski County: effect of contamination of groundwater from underground storage of dry cleaning solvents on residential lot values, 2004; *Gene Nettles, et al v. Environmental and Public Protection Cabinet: Division of Water, David Morgan, Director and J.P. Amberg Hog Farm*: Diminution of Value Analysis As a Result of Proximity to Hog Facilities in Daviess, Warren, Calloway, Graves, Hickman and Carlisle Counties, Kentucky, 2006; *Terry Powell, et al v. Tosh, et al*: Diminution of Value Analysis as a Result of Proximity to Hog CAFOs in Marshall County, KY, 2007; *City of Versailles v. Prichard Farm Partnership, Ltd.*: effect of sewage treatment pump station and ancillary easements upon Woodford County cattle farm, 2008; *Kentucky Utilities Company v. James and Mary Jent, CDH Preserve, LLC and Farm Credit Services of Mid-America, FLC, Violet Monroe*: the effect of High Voltage Transmission Lines on three Hardin County agricultural properties, 2011; *Terrence G. Kerschner, et al v. Burley Oil Company, et al*: the effect of Leaking Underground Gasoline Tanks on Country Lane Estates, Frankfort, KY, 2013; *Jerry Whitson v. Donnie Cross*: effect of Drainage Encroachment upon Adjacent Property, 2013; the effect of Cell Tower on Bourbon County Farm, 2014; *Steve D. Hubbard v. Prestress Services Industries, LLC*: effect of Fugitive Particulate Emissions upon a Single Family Dwelling, 2016; *Henderson City-County Airport v. Mary Janet Williams, et. al.*: the effect of Proximity of a Regional General Aviation Airport on Agricultural Values, 2019; *Patricia Kushino, et al v. Federal Aviation Administration, et al*: the effect of Stormwater Drainage on Woodland Value, 2021.

Additional Damage Studies:

Faulty Construction: 172 Post Oak Road, Paris, KY; 152 Cross Creek Drive, Paris, KY; Hartland Subdivision, Lexington, KY

Flood Damage: 208 Cary Lane, Elizabethtown, KY

Blasting Damage: Chicken Farm, Tolesboro KY

Super Fund Sites: KY Wood Preserving, Inc., Winchester, KY; River Metals Recycling, Somerset, KY

Industrial Scale Solar Farms: "A Summary of Solar Energy Power Systems Damage Studies as of May 25, 2021"

Expert Witness: Circuit Courts of Bourbon, Carter, Fayette, Franklin, Hardin, Laurel and Woodford Counties

Court Testimony:

Laurel Circuit Court: *Yellow Creek Concerned Citizens v. Middlesboro Tannery*, 1995.

Franklin County Circuit Court: *Richard McGehee v. Commonwealth of Kentucky Transportation Cabinet*, 2008; *Terrence G. Kerschner, et al v. Burley Oil Co., et al*, 2014.

Hardin County Circuit Court: *Richard McGehee v. Commonwealth of Kentucky Transportation Cabinet*, 2008.

Woodford County: *Horn v. Horn*, 2009

Bourbon County Circuit Court: Blasting Case, 1980s; Waterway Impediment Case, 2000; Faulty Construction, 2009, *Hadden v. Linville*, 2015.

Fayette County Circuit Court: Faulty Construction, 1980s; Bluegrass Manufacturing (Divorce Case), 1999, *Whitson v. Cross*: Drainage Encroachment, 2013.

Carter County: Condemnation for Commonwealth of KY Transportation Cabinet.

MARY MCCLINTON CLAY
PROFESSIONAL QUALIFICATIONS

Conservation and Wetland Easements: Bluegrass Heights Farm, Fayette County: Conservation and Preservation Easement; Wetland Easements in Pulaski, Lincoln, and Fulton Counties for NRCS.

Zoning Support: *John Vance, et al v. Paris City Commission* 2019; *Citizens for Progressive Growth and Development v. Paris Bourbon County Planning Commission* 2004-2007 and 2016; *Paris First v. Paris Bourbon County Planning Commission* 2003-2006; *Paris First v. Paris City Commission* 2002-2003; *Coppers Run Historic District, Inc. v. Abundant Life Worship Center* 1995; *Sugar Grove Farm v. East Kentucky Power* 1994-1996; *Lawrence Simpson, et al v. Harry Laytart* 1986-1996.

Professional Organizations:

Appraisal Institute: MAI, 1985; SRPA, 1982; SRA, 1980

Appraisal Institute Education Certification:

The Appraisal Institute conducts a voluntary program of continuing education for its designated members. I am certified under this program through December 31, 2023.

Education: Hollins College, B.A., 1972

Appraisal Education: Society of Real Estate Appraisers Course 101, 1977; SREA Course 201, 1978; SREA Course 301, 1981; AIREA Course VIII, 1979; AIREA Course VI, 1979; AIREA Course II, 1980; AIREA Course in Investment Analysis, 1980; AIREA Course in Valuation Litigation, March, 1986; Appraisal Institute Standards of Professional Practice, 1992; AIREA Comprehensive Examination, August, 1983; Courses in Real Estate Finance, Income Property Appraisal, Real Property Valuation, and Investment Analysis, 1977-1978, Eastern Kentucky University; Appraisal Institute Course 400G, Market Analysis/Highest and Best Use, 2008, Conservation Easement Certification, 2008.

Attended numerous seminars covering a variety of topics including investment analysis, feasibility and market analysis, eminent domain and condemnation, valuation of lease interests, component depreciation, risk analysis, current issues in subdivision and zoning law, Yellow Book and appraiser as expert witness.