



Exhibit K

Socioeconomic Report

Case No. 20-0972-EL-BGN

Socioeconomic Report

Yellowbud Solar Project

Union, Wayne, Deerfield, and Deer Creek Townships,
Pickaway and Ross Counties, Ohio

Prepared for:



Yellowbud Solar, LLC
8400 Normandale Lake Blvd, Suite 1200
Bloomington, MN 55437

Prepared by:

Environmental Design & Research,
Landscape Architecture, Engineering & Environmental Services, D.P.C.
217 Montgomery Street, Suite 1000
Syracuse, New York 13202
P: 315.471.0688
F: 315.471.1061
www.edrdpc.com

June 2020

TABLE OF CONTENTS

List of Tables.....	iii
List of Figures	iii
EXECUTIVE SUMMARY	iv
Introduction.....	2
Part I: Socioeconomic Profile.....	2
1. Population trends	2
2. Employment statistics.....	3
Part II: Regional Development Impacts	5
1. Housing	6
2. Commercial and Industrial Development.....	6
3. Transportation	7
4. Local and Regional Plans.....	8
5. Concurrent or Secondary Uses	8
Part III: Measuring Economic Impacts.....	8
1. Calculating Economic Benefits	8
2. Methodology.....	9
Part IV: Economic Impact on the Local Economy	12
1. New Jobs in the Local Economy	13
2. Local Economic Impact: Construction Phase	13
3. Local Economic Impact: Operations and Management Phase.....	14
4. Land Lease Payments.....	14
Part V: Local Tax Revenues.....	14
1. Legislative Context	14
2. Estimated Payments In Lieu Of Taxes	15
Conclusion	15
References.....	17
Figures	18

LIST OF TABLES

Table ES-1. Summary of Estimated Results of Statewide Jobs and Economic Impact Analysis	v
Table 1: Population	2
Table 2: Local Labor Force and Unemployment	3
Table 3a: Employment and Payroll by NAICS Sector in Pickaway County	4
Table 3b: Employment and Payroll by NAICS Sector in Ross County	4
Table 4: Study Area Housing Characteristics.....	6
Table 5: Adjustments Made to JEDI Model Cost Inputs.....	10
Table 6: Local Economic Impacts	12

LIST OF FIGURES

- Figure 1: 5-Mile Study Area
- Figure 2: Regional Facility Location

EXECUTIVE SUMMARY

On behalf of Yellowbud Solar, LLC (the Applicant), Environmental Design & Research, Landscape Architecture, Engineering & Environmental Services, D.P.C. (EDR) has prepared this socioeconomic report for the proposed Yellowbud Solar Project, an up to 356 megawatt of direct current (MW_{DC}) (274 MW alternating current [MW_{AC}]) solar power generating facility (Facility) located in Union, Wayne, Deerfield, and Deer Creek townships in Pickaway and Ross counties, Ohio. The materials contained herein are developed in support of the Applicant's submittal (the Application) for a Certificate of Environmental Compatibility and Public Need (the Certificate).

The Facility is located approximately 4 miles east of the Village of Clarksburg, 5 miles southeast of the Village of Williamsport, 8 miles southwest of the City of Circleville, 10 miles north of the City of Chillicothe, and 20 miles east of the City of Washington Court House, Ohio. The Facility is also surrounded by smaller unincorporated communities, including Yellowbud and Westfall. The closest metropolitan area is Columbus, Ohio located approximately 30 miles north of the Facility (see Figure 2: Regional Facility Location). The proposed Facility will include a solar field of photovoltaic (PV) modules and associated support facilities, consisting of fence line, below-ground or hybrid electrical collection lines, inverters, access roads, a substation, an operations and maintenance (O&M) building, weather stations, and laydown yards. The Facility is scheduled to begin construction as early as second quarter of 2021.

The focus of this report is to assess the potential socioeconomic impacts of the proposed Facility on the two local municipalities, seven townships, and two counties that are within a 5-mile radius from the Facility (the Study Area) (see Figure 1). It reviews relevant conditions throughout the area and interprets trends and patterns of change as represented by several demographic and economic indicators. Potential impacts including those to employment, earnings, and overall economic output resulting from the Facility are then assessed considering the current socioeconomic conditions within the Study Area.

The construction and operation of the Facility will have positive impacts throughout the local and statewide economy. Businesses involved in on-site Facility construction and operations, as well as those associated throughout the industrial supply chain, are expected to see a measurable increase in the demand for their services. In addition, the earnings by workers during construction and operation of the Facility are expected to generate additional spending, creating a "ripple effect" throughout the economy. The employment and economic impacts of the Facility were assessed using the Jobs and Economic Development Impact (JEDI) photovoltaics model (version PV12.23.16), a model established by the National Renewable Energy Laboratory (NREL), with results shown in Table ES-1. The JEDI model estimates that Facility construction could increase onsite and off-site employment by 657 workers statewide, with total earnings of approximately \$42.2 million. The operation and maintenance of the installed Facility is estimated to increase onsite and off-site employment demand by an additional 29 workers statewide annually, with total annual earnings of approximately \$1.8 million. The total value of onsite and off-site industrial production and induced benefits in the

statewide economy associated with Facility construction is estimated at \$63.9 million and at \$4.0 million annually during operation.

Table ES-1. Summary of Estimated Results of Statewide Jobs and Economic Impact Analysis

	Jobs (FTE)	Earnings (Millions)	Output (Millions)
Construction			
Project Development and Onsite Labor Total	453	\$31.6	\$32.2
Construction & Installation Labor	442	\$30.8	-
Construction and Installation Related Services	11	\$0.8	-
Module & Supply Chain Impacts	109	\$5.6	\$16.9
Induced Impacts	95	\$5.0	\$14.8
Total Impacts	657	\$42.2	\$63.9
Annual Operation			
Onsite Labor Impacts	11	\$0.7	\$0.7
Local Revenue & Supply Chain Impacts	5	\$0.3	\$1.1
Induced Impacts	13	\$0.7	\$2.2
Total Impacts	29	\$1.8	\$4.0

Source: NREL JEDI Model (version PV12.23.16) (USDOE NREL, 2016). Cost values verified by the Applicant in June 2020

Notes: Earnings and Output values are millions of dollars in 2020 dollars. Construction and operating period jobs are full-time equivalent for one year (1 FTE = 2,080 hours). "During operating years" represent impacts that occur from system/ plant operations/ expenditures. Impact totals and subtotals are independently rounded, and therefore may not add up directly to the integers shown in this table.

Furthermore, the Facility is anticipated to have a positive impact on local taxing jurisdictions, likely through a payment-in-lieu of tax agreement (PILOT) and other payments. Taxing jurisdictions located within the Study Area that receive various forms of payments include Pickaway County, Ross County, Union Township, Wayne Township, Deerfield Township, Deer Creek Township, Union-Scioto Local School District, Circleville City School District and Adena Local School District. Assuming that a PILOT payment is implemented, it will be a positive revenue stream to municipalities and other local taxing jurisdictions. The PILOT amount is anticipated to total \$2,466,000 annually for the lifespan of the Facility. The Facility will not impose significant additional burdens on municipal and school district services and thus will not increase the costs to the communities in the region.

These estimates suggest that the construction and operation of the Facility will have positive economic impact on the communities within the Study Area. Through lease payments to private landowners, short- and long-term job creation, and tax payments to the taxing jurisdictions, the Facility will supply a revenue stream to each of these jurisdictions without requiring significant services or expenditures on their behalf.

INTRODUCTION

This report reviews relevant conditions in the Study Area and interprets trends and patterns of change as represented by several demographic and economic indicators. Potential impacts to employment, earnings, and overall economic output from the Facility are then assessed considering the current socioeconomic conditions within the Study Area. When such comparison is informative, state, and federal demographic and economic data also are included. Unless noted otherwise, the Study Area for this report includes the following nine communities, all of which are found wholly or partially within the Study Area: Green, Union, Deerfield, and Concord townships, and the village of Clarksburg, in Ross County; and, Pickaway, Wayne, and Deer Creek townships, and the village of Williamsport, in Pickaway County.

Part I of this report presents a socioeconomic profile of the Study Area and the State of Ohio, including a demographic profile with specific data on population trends, projected population growth, and civilian labor force data. Part II reviews the types of potential impacts that could be experienced throughout the region, including those regarding housing demand, commercial and industrial employment, and transportation networks. Part III describes the methods of analysis of potential economic benefits provided within this report, including an overview of the JEDI Model. The results of the JEDI Model are presented in Part IV, which describes the jobs created by the construction and operation of the Facility, as well as a summary of payments to landowners as a result of land leases. Part V reviews the potential impacts of the Facility from the perspective of local taxing jurisdictions.

PART I: SOCIOECONOMIC PROFILE

1. Population trends

As shown in Figure 1, the majority of the 5-Mile Study Area is almost equally divided between Ross and Pickaway counties. Both counties are just south of the Columbus metropolitan area. Regionally, as indicated in Table 1, the area is growing, although at a slower rate in Ross County, which is further from the suburban reaches of Columbus. At a local level, most of the townships within the 5-mile study have a growing population. Study Area jurisdictions featuring declining populations are densely populated villages with greater than 500 people per square mile, apart from Deer Creek Township, which is a sparsely populated community.

Table 1: Population

Jurisdiction within a 5-Mile Radius of Facility	2000 Population	2018 Population	Annual Growth Rate (2000-2018)	Projected 2030 Population	Projected Total Growth (2018-2030)	2018 Population Density (people per square mile)
Pickaway County	46,230	57,420	1.3%	67,403	17.4%	113
Ross County	67,916	77,051	0.7%	84,251	9.3%	111
Concord Township	4,052	4,425	0.5%	4,704	6.3%	58
Deer Creek Township	1,615	1,329	-1.0%	1,180	-11.2%	37
Deerfield Township	1,078	1,182	0.5%	1,260	6.6%	39

Green Township	4,446	4,879	0.5%	5,205	6.7%	112
Pickaway Township	1,851	2,203	1.1%	2,499	13.4%	45
Union Township	7,171	12,763	4.3%	21,231	66.4%	191
Wayne Township	565	650	0.8%	718	10.5%	24
Village of Clarksburg	498	478	-0.2%	465	-2.6%	2,988
Village of Williamsport	988	955	-0.2%	934	-2.2%	723

Source: U.S. Census Bureau Decennial Census (2000), ACS 5-Year Estimates (2014-2018), population projections based on respective 2000-2018 growth rates. Note that 2000 institutionalized population numbers are not available for Union Township, however, as of 2010, the institutionalized population (specifically those residing in adult correctional facilities) for Union Township was 5,504.

The population trends experienced by each community from 2000 to 2018 are expected to continue regardless of whether the proposed Facility is built. Over the next decade, the population within the Study Area is estimated to increase for jurisdictions currently undergoing population increases and decrease for the jurisdictions currently undergoing population decreases. Meanwhile, county populations are all expected to continue the overall trend of population increase over the next decade, ranging from 17.4% and 9.3% (see Table 1).

Although construction employment related to the construction of the Facility will be substantial, this employment is relatively short-term and is not expected to result in the permanent relocation of construction workers to the area; therefore, the Facility is not anticipated to generate significant population growth within the Study Area. The number of potential short- and long-term employment opportunities associated with the construction and operation of the Facility is discussed in further detail below.

2. Employment statistics

Table 2 illustrates the size of the local labor force in counties within 5 miles of the proposed Facility, as well as the broader State of Ohio. Annual average unemployment rates have decreased both state-wide and county-wide from 2016 to 2018. The total annual unemployment rate for Pickaway County and the State of Ohio has been relatively lower than that of Ross County over the last three years. Tables 3a-b illustrate employment in Pickaway County and Ross County, respectively, broken down by sector for 2019 (most current data available).

Table 2: Local Labor Force and Unemployment

County	Labor Force	Employed	Unemployed	2016 Annual Unemployment Rate	2017 Annual Unemployment Rate	2018 Annual Unemployment Rate
Pickaway	26,073	24,995	1,078	6.0%	5.2%	4.1%
Ross	31,357	30,398	2,490	9.9%	7.6%	7.6%
State of Ohio	5,938,035	5,549,577	343,232	7.2%	6.5%	5.8%

Note: Not Seasonally Adjusted, Source: U.S. Bureau of Labor Statistics, July 2019.

Table 3a: Employment and Payroll by NAICS Sector in Pickaway County

NAICS code description	Number of full and part-time employees*	First-quarter payroll (\$1,000)	Annual payroll (\$1,000)	Total establishments
Total for all sectors	(x)	(x)	(x)	(x)
Agriculture, forestry, fishing and hunting	(x)	(x)	(x)	(x)
Mining, quarrying, oil and gas extraction	(x)	(x)	(x)	(x)
Utilities	b	D	D	D
Construction	(x)	(x)	(x)	(x)
Manufacturing	(x)	(x)	(x)	(x)
Wholesale trade	f	D	30,034	D
Retail trade	1,583	9,697	39,205	128
Transportation and warehousing	254	2,610	12,643	42
Information	56	598	2,407	10
Finance and insurance	e	D	D	51
Real estate and rental and leasing	115	908	3,755	30
Professional, scientific, technical	183	1,644	7,187	44
Administrative and support and waste management and remediation services	481	2,910	13,170	38
Educational services	(x)	(x)	(x)	(x)
Health care and social assistance	1,890	18,045	72,472	88
Arts, entertainment, and recreation	168	594	3,117	14
Accommodation and food services	1,487	5,020	20,805	73
Other services (except public admin.)	138	913	4,258	45
Industries not classified	(x)	(x)	(x)	(x)

* Paid employment (Mid-March employment) consists of full- and part-time employees, including salaried officers and executives of corporations, who are on the payroll in the pay period including March 12. Included are employees on paid sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses.

b: 20-99 employees; e: 250-499 employees; f: 500-999 employees; D: Withheld to avoid disclosing data for individual companies; data included in higher level totals. While there are establishments engaged in industry sector, the number of establishments and receipts cannot be shown.; (x)=data unavailable

Source: U.S. Census Bureau, 2018

Table 3b: Employment and Payroll by NAICS Sector in Ross County

NAICS code description	Number of full and part-time employees*	First-quarter payroll (\$1,000)	Annual payroll (\$1,000)	Total establishments
Total for all sectors	(x)	(x)	(x)	(x)
Agriculture, forestry, fishing and hunting	(x)	(x)	(x)	(x)
Mining, quarrying, and oil and gas extraction	(x)	(x)	(x)	(x)
Utilities	183	4,331	14,287	7
Construction	(x)	(x)	(x)	(x)

NAICS code description	Number of full and part-time employees*	First-quarter payroll (\$1,000)	Annual payroll (\$1,000)	Total establishments
Manufacturing	(x)	(x)	(x)	(x)
Wholesale trade	503	6,845	26,638	49
Retail trade	3,993	24,337	95,370	244
Transportation and warehousing	1,003	9,961	41,906	52
Information	303	3,915	16,534	15
Finance and insurance	479	5,694	21,415	74
Real estate and rental and leasing	1179	1,094	4,674	45
Professional, scientific, and technical services	e	D	D	D
Management of companies and enterprises	(x)	(x)	(x)	(x)
Administrative and support and waste management and remediation services	954	7,172	31,556	52
Educational services	b	D	D	D
Health care and social assistance	5,004	62,031	262,730	163
Arts, entertainment, and recreation	229	579	3,198	19
Accommodation and food services	2,929	9,924	41,413	123
Other services (except public administration)	605	3,900	16,546	84
Industries not classified	(x)	(x)	(x)	(x)

* Paid employment (Mid-March employment) consists of full- and part-time employees, including salaried officers and executives of corporations, who are on the payroll in the pay period including March 12. Included are employees on paid sick leave, holidays, and vacations; not included are proprietors and partners of unincorporated businesses.

b: 20-99 employees; e: 250-499 employees; D: Withheld to avoid disclosing data for individual companies; data are included in higher level totals. While there are establishments engaged in industry sector, the number of establishments and receipts cannot be shown; (x)=data unavailable
Source: U.S. Census Bureau, 2018

While not captured in the 2019 US Census data demonstrated in Tables 4a and 4b, the agricultural sector plays a substantial role in the regional economy. 2017 data from the USDA National Agricultural Statistics Service indicates that there were 1,360 agricultural producers and 805 total agricultural operations in Pickaway County and 1,827 agricultural producers and 1,121 total agricultural operations in Ross County.

PART II: REGIONAL DEVELOPMENT IMPACTS

The regional economy surrounding the Study Area is shaped in large part by both the rural economy of Ross and Pickaway counties and the manufacturing economy of the greater Columbus metropolitan region. As a primarily agricultural economy in proximity to one of the strongest manufacturing hubs in the U.S., this area has made substantial progress toward stabilization and growth as it emerges from the recent recession. The regional context for the development of this Facility is discussed in further detail below in terms of three primary components: housing,

commercial and industrial development, and transportation. In addition, the compatibility of the proposed Facility with regional developmental goals and plans is reviewed.

1. Housing

Table 4 below summarizes housing characteristics in the State of Ohio and the communities within the Study Area.

Table 4: Study Area Housing Characteristics

Jurisdiction	Total housing units	Occupied units	Vacant units	Vacancy rate		Median value (owner-occupied)	Median gross rent	households with gross rent > 35% of household income
				Home-owner	Rental			
State of Ohio	5,188,270	4,653,075	534,195	1.6	5.6	\$140,000	\$788	37.3%
Pickaway County	21,362	19,728	1,634	1.7	9.1	\$157,800	\$792	36.0%
Ross County	32,073	28,747	3,326	1.4	3.6	\$120,900	\$727	40.0%
Concord Township	1,958	1,712	24	0.6	2.9	\$134,900	\$674	30.5%
Deer Creek Township	563	491	72	9.5	9.9	\$123,100	\$784	24.8%
Deerfield Township	453	438	15	0.0	0.0	\$151,700	\$598	41.2%
Green Township	2,132	1,907	225	0.0	0.0	\$153,500	\$861	50.6%
Pickaway Township	818	722	96	0.0	0.0	\$227,100	\$1,090	0.0%
Union Township	3,275	3,040	235	1.5	3.4	\$135,500	\$787	45.4%
Wayne Township	249	202	47	19.2	0.0	\$125,600	\$589	20.0%
Village of Clarksburg	201	186	15	0.0	0.0	\$69,500	\$579	32.2%
Village of Williamsport	391	319	72	15.8	10.9	\$96,000	\$750	28.3%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates 2014-2018.

The Study Area features a diverse array of housing options. Among the counties within the Study Area, Pickaway County's housing has a substantially higher median value and median gross rental value than Ross County. At a local scale, Pickaway Township has the highest median housing value in the Study Area, whereas the Village of Clarksburg has the lowest median housing value and the lowest median gross rent value in the Study Area. More than 4,960 housing units within both counties are reported to be currently vacant, 801 of which occur within the Study Area municipalities. Given these figures, it is not expected that the development of the Facility will have a significant impact on the regional housing market. While the Facility development may not represent a widespread boom for rental property owners, it is worth noting that the availability of vacant rental housing throughout the Study Area indicates that the Facility should not have a destabilizing effect on current renters.

2. Commercial and Industrial Development

The diversification of Ohio's energy generation portfolio will have significant and positive economic impacts. At both regional and national levels, the State has a relatively high capacity for both distributed and utility-scale solar photovoltaic systems. In a recent report, the Environmental Law & Policy Center (ELPC) found that Ohio had the

second-highest solar capacity in the Midwest region, at 119 MW at the time of the report (ELPC, 2016). At a national level, The Solar Foundation ranked Ohio 30th in the US for installed solar capacity (The Solar Foundation, 2019). Furthermore, there is tremendous capacity for growth due to an established manufacturing base and trained workforce, central location and reliable transportation infrastructure, and a diverse array of research centers and technical advisory services (ELPC, 2016).

The Environmental Law & Policy Center estimated that the State of Ohio is currently home to 207 solar power supply chain businesses, including many component and equipment manufacturers (ELPC, 2016). Many of the State's plastic and glass manufacturers have taken advantage of the growing demand for solar by becoming suppliers for these components and equipment. The 2019 Solar Jobs Census reports that Ohio ranks in the top seven states for solar jobs, with 7,282 workers in the solar industry (a 1.7% increase over 2018). Most these jobs (57%) were for installation, while the remainder were for manufacturing (28%), wholesale trade distribution (10%), operations and maintenance (3%), and other fields (3%). Since 2018, jobs in the field of installation and operations have increased, while jobs in the manufacturing and distribution fields have decreased slightly (The Solar Foundation, 2019). Although the rate of job growth in Ohio's solar industry is beginning to plateau (solar jobs increased by 21.2% in 2016, 11.8% in 2017, 10.5% in 2018, and 1.7% in 2019), the steady and continued solar industry growth reflects the industry's stable foothold in the state. Given the economic disruption currently underway at the time of submission of this Application, due to COVID-19, additional employment in the solar industry sector may be especially welcome.

The State's current energy generation portfolio aims for an 8.5% overall renewable energy component by 2026. With the recent increases in its PV capacity, Ohio is on a path to achieving this target. Specific short- and long-term economic impacts of this Facility on commercial and industrial development throughout the region are described in further detail in Part V of this report.

3. Transportation

The region surrounding the Facility features U.S. and Ohio highways, as well as a network of county and local roadway networks, in addition to rail lines and small airports. These facilities are described in more detail below.

The primary transportation routes to the Facility are State Route (SR) 104, which runs north-south along the east border of the Facility, and a series of country and local roads that intersect the Facility. Delivery routes have not been finalized, but it is likely that the delivery of Facility components to the Project Area will be from the north by way of U.S. Route (US) 23 to SR 56 then SR 104. An alternate route from the south could also be utilized by way of US 35 to SR 104. Once at the Project Area, county and township roads will be utilized. The proposed Facility is not expected to cause any substantial disruption to major transportation corridors serving the Study Area, as most solar photovoltaic components and equipment are relatively small and require only relatively low impact means of transport. For more information about roads, see the Route Evaluation Study, included with the Application.

One freight rail line operated by CSX Transportation runs through the Study Area. The rail line runs north-south and bisects the eastern part of the Study Area. CSX Transportation has significant operations across North America. The portion of rail extending through the Study Area is part of the national corridor. No municipalities in the Study Area appear to be connected to the CSX Transportation line and the rail system is not anticipated be used for the transportation of any Facility components.

The Facility is also located approximately 2 miles southwest of the Pickaway County Memorial Airport and approximately 2.5 miles north of the Ross County Airport. Operation of the Facility is not expected to result in any adverse impacts to the regional air transportation network. The Applicant filed Form 7460-1 with the FAA and received a determination of no hazard to air navigation from the FAA on April 30, 2020. Additionally, a glare analysis determined that no glare was detected at any observation points along the flight path at either airport. Therefore, the Facility design meets FAA standards for aircraft final approach, and glare impacts from the Facility are not anticipated.

4. Local and Regional Plans

None of the counties (Pickaway and Ross), townships (Pickaway, Wayne, Deer Creek, Green, Union, Deerfield or Concord) or villages (Williamsport or Clarksburg) within the 5-mile study area have comprehensive plans or land use plans in place. The Ross County Planning Commission adopted the Ross County/City of Chillicothe Thoroughfare Plan Update (most recently amended in 2012); however, the plan goals and recommendations apply to areas within and surrounding the City of Chillicothe, well outside of the Study Area for this Facility.

5. Concurrent or Secondary Uses

The Applicant has no plans for concurrent or secondary use of the Facility, other than potentially entering into a grazing agreement if a willing landowner is found. Grazing would primarily be used as a vegetation management technique. See the Vegetation Management Plan submitted with the Application for more detail.

PART III: MEASURING ECONOMIC IMPACTS

1. Calculating Economic Benefits

Quantifying the economic impacts of the proposed Yellowbud Solar Project is essential to understanding the potential benefits that the Facility could have on the local economy. Solar power development, like other commercial development projects, can expand the local economy through both direct and indirect means. Income generated from direct employment during the construction and operation of the Facility will subsequently be used to purchase local goods and services, creating a ripple effect throughout the local economy. The employment and economic impacts of the Facility were assessed using the JEDI photovoltaics model (version PV12.23.16). The JEDI model was created by the National Renewable Energy Laboratory (NREL)—a government-owned, contractor-operated laboratory funded by the U.S. Department of Energy—to assess the economic impacts of proposed solar energy generating facilities during both the construction and operation phases (USDOE NREL, 2017).

This report analyzes three levels of impact that the proposed Facility may have on the economy:

- **On-site labor impacts:** These are the direct impacts experienced by the companies/individuals residing in Ohio engaged in the construction and operation of the Facility. This value estimates the dollars spent on labor and professional services by project developers, consultants, and construction contractors, as well as on operation and maintenance (O&M) personnel. On-site labor impacts do not reflect material expenditures.
- **Module and supply chain impacts:** These impacts measure the estimated increase in demand for goods and services in industry sectors that supply or otherwise support the companies engaged in construction and operation (also known as “backward-linked” industries). These measures account for the demand for goods and services such as project components, project analysis, legal services, financing, and insurance.
- **Induced impacts:** Induced impacts measure the estimated effect of increased household income resulting from the Facility. Induced impacts reflect the reinvestment of earned wages, as measured throughout the first two levels of economic impact. This reinvestment can occur anywhere within the economy, such as on household goods, entertainment, food, clothing, and transportation.

Each of these three categories can be measured in terms of three indicators: jobs (as expressed through the increase in employment demand), the amount of money earned through those jobs, and the overall economic output associated with each level of economic impact. These indicators are described in further detail below:

- **Jobs:** Jobs refer to the increase in employment demand as a result of the development of the Facility. These positions are measured across each level of impact, such that they capture the estimated number of jobs on site, in supporting industries, and in the businesses that benefit from household spending. For the purposes of this analysis, this term refers to the total number of year-long full-time equivalent (FTE) positions created by the Facility. Persons employed for less than full time or less than a full year are included in this total, each representing a fraction of an FTE position (e.g., a half-time, year-round position is 0.5 FTE).
- **Earnings:** This measures the wages and salary compensation paid to the employees described above.
- **Output:** Output refers to the value of industry production in the state or local economy, across all appropriate sectors, associated with each level of impact. For the manufacturing sector, output is calculated by total sales plus or minus changes in inventory. For the retail sector, output is equal to gross profit margin. For the service sector, it is equal to sales volume. For example, output would include the profits incurred by those businesses that sell electrical transmission cable or motor vehicle fuel for use in the Facility.

2. Methodology

Using the JEDI model to calculate the number of jobs and economic output from a proposed facility is a two-step process. The first step requires project-specific data input (e.g., year of construction, size of facility, type of PV module, and location), and then calculates the impacts described above using state specific multipliers. These multipliers

account for the change in jobs, earnings, and output likely to occur throughout the local, regional, and statewide economy as a result of project-related expenditures. The most currently available 2018 IMPLAN multipliers for the state of Ohio were used during the time of analysis (March 2020). The multipliers are paired with industry standard values (e.g., wage rates) and data reflecting personal spending patterns (e.g., percent of household income dedicated to housing expenditures) to calculate on-site, supply chain, and induced impacts (USDOE NREL, 2010). This model allows impacts to be estimated for both the construction and operation phases of the proposed development. An economic impact analysis was performed for a large commercial solar farm scheduled to begin construction in 2021 with a rated capacity of 356 MW_{DC} and single axis, crystalline silicon photovoltaic panels with the base installed system cost of \$1,000/kW_{DC} and the default annual direct operations and maintenance cost of \$4/kW_{DC}.

Using this Facility-specific data, the JEDI model then creates a list of default values, which include project cost values, default tax values, default lease payment values, and default local share of spending values. These default values are derived from 10 years of research by NREL, and stem from various sources, including interviews and surveys of leading project owners, developers, engineering and design firms, and construction firms active in the solar energy sector. The second step of the JEDI model methodology requires the review, and if warranted, the customization of default project cost values to more reasonable estimates. The Applicant reviewed the default project cost values and statewide shares subtotaled by each of the following categories in the JEDI model: Materials and Equipment during Installation (i.e., Construction), Labor during Installation (i.e., Construction), Other Costs during Installation (e.g., permitting and overhead during Construction), Labor during Operation & Maintenance (O&M), Materials and Services during Operation & Maintenance, Debt Financing, Tax Parameters, Payroll Parameters. The Applicant’s team then made specific adjustments to improve accuracy (see Table 5).

Table 5: Adjustments Made to JEDI Model Cost Inputs

Facility Expenditure Categories	JEDI Default Value	Adjusted Value	Change
Construction Materials & Equipment Costs	████████	████████	████████
Construction Labor Total Costs	████████	████████	████████
Construction - Other Costs	████████	████████	████████
Construction Materials and Equipment Sales Tax	████████	████████	████████
Operating/Maintenance Labor Costs	████████	████████	████████
Operating/Maintenance Materials and Services	████████	████████	████████
Operating/Maintenance Materials/Equip. Sales Tax	████████	████████	████████
Local Property Tax Payments	████████	████████	████████
Payroll Parameters Construction Worker Hourly Wage	████████	████████	████████
Payroll Parameters O&M Technician Hourly Wage	████████	████████	████████
Payroll Parameters Construction Worker Employer Overhead	████████	████████	████████
Payroll Parameters O&M Technician Employer Overhead	████████	████████	████████

Source: Jobs and Economic Development Impact Model (USDOE NREL, 2017); Cost values verified by the Applicant in June 2020.

a. Capital and Intangible Costs

In addition to the aforementioned construction costs specified as inputs for the JEDI analysis, the Applicant is presenting additional capital and intangible cost details for the purposes of responding to the Application requirements.

i. Estimated Capital and Intangible Costs by Alternative

The total estimated capital and intangible costs of the Facility are [REDACTED]. As described in Section 4906-4-04 of the Application, the Applicant has not proposed alternative project areas. Therefore, no cost comparison between alternatives is available.

ii. Cost Comparison with Similar Facilities

Installed project costs compiled by the U.S. Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Laboratory) in December 2019 indicate that the capital costs of the Facility are in line with recent industry trends. The Berkeley Laboratory compilation shows that capacity-weighted average installed costs in 2018 averaged roughly \$1,640/kW_{AC} (Bolinger, Seel, & Robson, 2019).

By way of further comparison, installed solar project costs in the midwestern region in 2018 had a median of around \$1,600/kW_{AC} (Bolinger, Seel, & Robson, 2019). These costs are slightly higher than the average cost estimated for the Facility, which could be attributed to locational and system size differences. The estimated cost of the Facility is not anticipated to substantially differ from other Facilities completed the Applicant

iii. Present Worth and Annualized Capital Costs

Capital costs will include development costs, construction design and planning, equipment costs, and construction costs. The costs will be incurred within a year or two of start of construction. Therefore, a present worth analysis is essentially the same as the costs presented above [REDACTED]. As alternative project areas and facilities were not considered in this Application, the capital cost information in this section is limited to the proposed Facility.

b. Operation and Maintenance Expenses

In addition to the aforementioned operation and maintenance costs specified as inputs for the JEDI analysis, the Applicant is presenting additional O&M cost details for the purposes of responding to the Application requirements.

i. Estimated Annual Operation and Maintenance Expenses

For the first two years of commercial operation, staffing is estimated to be [REDACTED]. O&M costs are estimated at [REDACTED], including staffing costs.

ii. Operation and Maintenance Cost Comparisons

O&M costs are a significant component of the overall cost of solar projects but can vary widely between facilities. The Berkeley Laboratory has compiled O&M cost data for 48 installed utility-scale solar power projects in the United States, totaling 900 MW_{AC} of capacity, with commercial operation dates of 2011 through 2018. In general, facilities installed more recently have incurred lower O&M costs than those installed in 2011. Specifically, capacity-weighted average O&M costs for projects constructed in 2011 equal \$32/kW_{AC}-year. The O&M costs dropped to around \$16/kW_{AC}-year for projects installed in 2015, and to \$19/kW_{AC}-year for projects installed in the 2018 (Bolinger, Seel, & Robson, 2019). According to the Berkeley Laboratory, this decrease could be the result of utility companies capturing economies of scale as their solar operations grow over time.

The O&M costs for the Facility are estimated to be approximately [REDACTED], depending on the maturity of the project each year of its life cycle. These estimated O&M costs exclude any other ongoing expenses related to environmental monitoring, property taxes, land royalties, reverse power, and insurance. These costs will be consistent with the average costs compiled by the Berkeley Laboratory, as described above. The O&M costs for the Facility are not anticipated to be significantly different from other facilities the Applicant operates.

iii. Present Worth and Annualized Operation and Maintenance

The annual O&M costs will be subject to real and inflationary increases. Therefore, these costs are expected to increase with inflation after the first two years. The net present value of the O&M costs per kW, assuming a 30-year Facility life, and inflation rate of 2% and a 6% discount rate, is approximately [REDACTED]. As alternative project areas and facilities were not considered in this Application, the O&M cost information in this section is limited to the Facility.

PART IV: ECONOMIC IMPACT ON THE LOCAL ECONOMY

The results of the socioeconomic analysis are illustrated in Table 6 below and summarized in the narrative that follows. The results shown in Table 6 describe the potential impact of the Facility on industries throughout the state, including the direct labor impacts that occur specifically within the local economy.

Table 6: Local Economic Impacts

	Jobs (FTE)	Earnings (Millions)	Output (Millions)
Construction			
Project Development and Onsite Labor Total	453	\$31.6	\$32.2
Construction & Installation Labor	442	\$30.8	-
Construction and Installation Related Services	11	\$0.8	-
Module & Supply Chain Impacts	109	\$5.6	\$16.9

Induced Impacts	95	\$5.0	\$14.8
Total Impacts	657	\$42.2	\$63.9
Annual Operation			
Onsite Labor Impacts	11	\$0.7	\$0.7
Local Revenue & Supply Chain Impacts	5	\$0.3	\$1.1
Induced Impacts	13	\$0.7	\$2.2
Total Impacts	29	\$1.8	\$4.0

Source: NREL JEDI Model (version PV12.23.16) (USDOE NREL, 2016). Cost values verified by the Applicant in June 2020

Notes: Earnings and Output values are millions of dollars in 2020 dollars. Construction and operating period jobs are full-time equivalent for one year (1 FTE = 2,080 hours). "During operating years" represent impacts that occur from system/ plant operations/ expenditures. Impact totals and subtotals are independently rounded, and therefore may not add up directly to the integers shown in this table.

1. New Jobs in the Local Economy

Demand for new jobs associated with the Yellowbud Solar Project will be created during both the initial construction period and the years following construction, in which the Facility is in operation. The money injected into the statewide economy through the creation of these jobs will have long-term, positive impacts on individuals and businesses in Ohio as it ripples through the economy.

2. Local Economic Impact: Construction Phase

Based upon JEDI model computations, it is anticipated that construction of the proposed Facility could directly generate employment of an estimated 453 on-site construction and project development personnel FTE positions with a projected wage rate of \$23 per hour and 45.6% employer payroll overhead. Module and supply chain industries could in turn generate an additional 109 jobs over the course of Facility construction. In addition, Facility construction could induce demand for 95 jobs through the spending of additional household income. The total impact of 657 new jobs could result in up to approximately \$42.2 million of earnings, assuming a 2022 construction start and wage rates consistent with statewide and nationwide averages. Nationally, the estimated national wage rate for solar photovoltaic installers is \$22.12 per hour (U.S. Bureau of Labor Statistics, 2018) and statewide, labor wages range from approximately \$22 per hour for all installation, maintenance and repair operations to approximately \$50 per hour for construction management occupations (Ohio Bureau of Labor Statistics, 2018). Local employment could primarily benefit those in the construction trades, including laborers and electricians. Facility construction will also require workers with specialized skills, such as panel assemblers, specialized excavators, and high voltage electrical workers. It is anticipated that many of the highly specialized workers will come from outside the immediate area and will remain only for the duration of construction.

In addition to jobs and earnings, the construction of the Facility is expected to have a positive impact on economic output, a measurement of the value of goods and services produced and sold by backward-linked industries. As described in the definition above, output provides a general measurement of the amount of profit earned by manufacturers, retailers, and service providers connected to a given project. The value of economic output associated

with construction of the Facility is estimated to be \$63.9 million. Between workers' additional household income and industries' increased production, the impacts associated with the Facility are likely to be experienced throughout many different sectors of the statewide economy.

3. Local Economic Impact: Operations and Management Phase

Based upon JEDI model computations, the O&M of the proposed Facility is estimated to generate 11 direct FTE jobs with estimated annual earnings of approximately \$0.7 million. Wage rates for the direct operational employees are projected to be \$24.00 per hour with 45.6% employer payroll overhead, consistent with Ohio state averages estimated to be approximately \$22 per hour for installation, maintenance, and repair occupations (Ohio Bureau of Labor Statistics, 2018).

Operations and maintenance of the Facility also should generate new jobs in other sectors of the economy through supply chain impacts and the expenditure of new and/or increased household earnings. Increased employment demand throughout the supply chain is estimated to result in approximately five jobs with annual earnings of approximately \$0.3 million. In addition, it is estimated that 13 jobs with associated annual earnings of \$0.7 million will be induced through the increased household spending associated with Facility operations. These impacts may include restaurant, hospitality and other tourism-derived local spending from employees and visitors to the Facility. In total, while in operation, the Facility is estimated to generate demand for 29 FTE jobs with annual earnings of approximately \$1.8 million. Total annual economic output is estimated to increase by \$4.0 million as a result of Facility operations and maintenance.

4. Land Lease Payments

Operation of the Facility will result in payment to local landowners in association with the lease agreements executed to host Facility components. These annual lease and easement payments will offer direct benefits to participating landowners, which will be in addition to any income generated from the surrounding land use (e.g. agricultural production). The Applicant estimates that these payments will total approximately \$58.8 million over 25 years. These lease payments will have a positive impact on the region, to the extent that landowners will spend their revenue locally.

PART V: LOCAL TAX REVENUES

1. Legislative Context

Solar energy projects in the State of Ohio can be exempted from tangible personal property and real property tax payments if they meet certain conditions. These conditions are enumerated in Section 5727.75 of the Ohio Revised Code (ORC). Operators of these exempted projects, known as qualified energy projects (QEP), are instead required to make annual payments in lieu of taxes (PILOT). To be certified as a QEP by the State, a project must meet all of the following criteria:

- an application for certification of the energy project as a QEP that complies with the requirements under Section 5727.75 of the ORC and Chapter 122:23-1 of the Ohio Administrative Code (OAC) must be submitted to the director of the Ohio Development Services Agency (ODSA) on or before December 31, 2022;
- an application under Section 4906.20 of the ORC must be submitted to the Ohio Power Siting Board (OPSB) on or before December 31, 2022;
- the county commissioners of the county in which property of the project is located must have adopted a resolution approving the application submitted to ODSA or the county commissioners must pass a resolution declaring the county an alternative energy zone (AEZ);
- construction (defined as either the date the application for a certificate is filed with OPSB or the date the contract for construction or installation is entered, whichever is earlier) must begin by January 1, 2022.

If an applicant is granted exemption from taxation for any of the tax years 2011 through 2023, the QEP will be exempt from taxation for tax year 2024 and all ensuing years, as long as the property is placed into service before January 1, 2024. The amount of PILOT to be paid annually to the county treasurer is assessed per megawatt (MW) of nameplate capacity, with the rate of \$7,000/MW. County commissioners may require an additional service payment, if the total of the additional payment and the PILOT do not exceed \$9,000 per MW.

2. Estimated Payments In Lieu Of Taxes

The model assumed that the applicant would execute a payment-in-lieu of tax agreement (PILOT), which would require annual PILOT payments to Pickaway County and Ross County. These funds would then be apportioned to Union Township, Wayne Township, Deerfield Township, Deer Creek Township, Union-Scioto Local School District, Circleville City School District, and Adena Local School District. The maximum payment of \$9,000/MW was assumed. Based on the maximum Facility capacity of 274 MW_{AC}, the PILOT amount will total approximately \$2,466,000 annually for the lifespan of the Facility. The Facility is expected to achieve commercial operations as early as 2022 and have a lifespan of approximately 30 years.

CONCLUSION

The socioeconomic effects of the Facility, when assessed considering state economic trends, will have a positive impact on the communities within the Study Area. Lease payments, short- and long-term job creation, and PILOT revenues will benefit private landowners, businesses, and taxing jurisdictions. The Facility is not expected to generate significant expenditures on behalf of these beneficiaries; therefore, it will have a positive impact on the social and economic conditions of these communities, as summarized below.

1. Total Local Economic Benefit: The construction of the Facility is expected to produce an estimated \$42.2 million in employment earnings and \$63.9 million in total economic output. Subsequently, each year the Facility is

operational it is expected to generate approximately \$1.8 million in earnings and \$4.0 million in total economic output.

2. Local Employment Benefits: During the construction period, the Facility is expected to support demand for a total estimate of 657 onsite, supply chain, and induced employment positions. It is expected to support an estimated total of 29 positions during each year of its operation.
3. Land Lease Revenues: The development of the Facility will result in approximately \$1,835,100 million in total annual lease payments made to participating landowners escalating at 2.0% for 25 years.
4. Property Tax Revenues: Construction of the proposed Facility will increase local government revenues. PILOT revenues could amount to approximately \$2,466,000 per year to be distributed to local taxing jurisdictions.

REFERENCES

Bolinger, M., Seel, J., & Robson, D. (2019, December). Utility Scale Solar: Empirical Trends in Project Technology, Cost, Performance, and PPA Pricing in the United States - 2019 Edition. Retrieved June 2020, from Berkeley Lab: https://eta-publications.lbl.gov/sites/default/files/lbnl_utility_scale_solar_2019_edition_final.pdf

Environmental Law & Policy Center (ELPC). 2016. Ohio Solar and Wind Power Supply Chain Businesses. Available at: <http://elpc.org/newsroom/publications/> (Accessed May, 2020).

Environment Ohio Research & Policy Center (Environment Ohio). 20014. Star Power: the Growing Role of Solar Energy in Ohio. Available at http://www.environmentohio.org/sites/environment/files/reports/OH_Star_Power_v5_screen.pdf (Accessed May 2020).

IMPLAN Group. 2019. Understanding Multipliers. Available at <https://implanhelp.zendesk.com/hc/en-us/articles/115009505707-Understanding-Multipliers> (Accessed January 2020).

State of Ohio. 2019. Section 5727. Ohio Revised Code. Available at: <http://codes.ohio.gov/orc/5727> (Accessed May 2020).

The Solar Foundation. 2019. Ohio Solar Jobs Census 2019. Available <https://www.solarstates.org/#state/ohio/counties/solar-jobs/2019> (Accessed May 2020)

U.S. Census Bureau. 2013-2017. American Community Survey County – Household, Population and NAICS Characteristics (web database portal). Available at: <http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml> (Accessed May 2020).

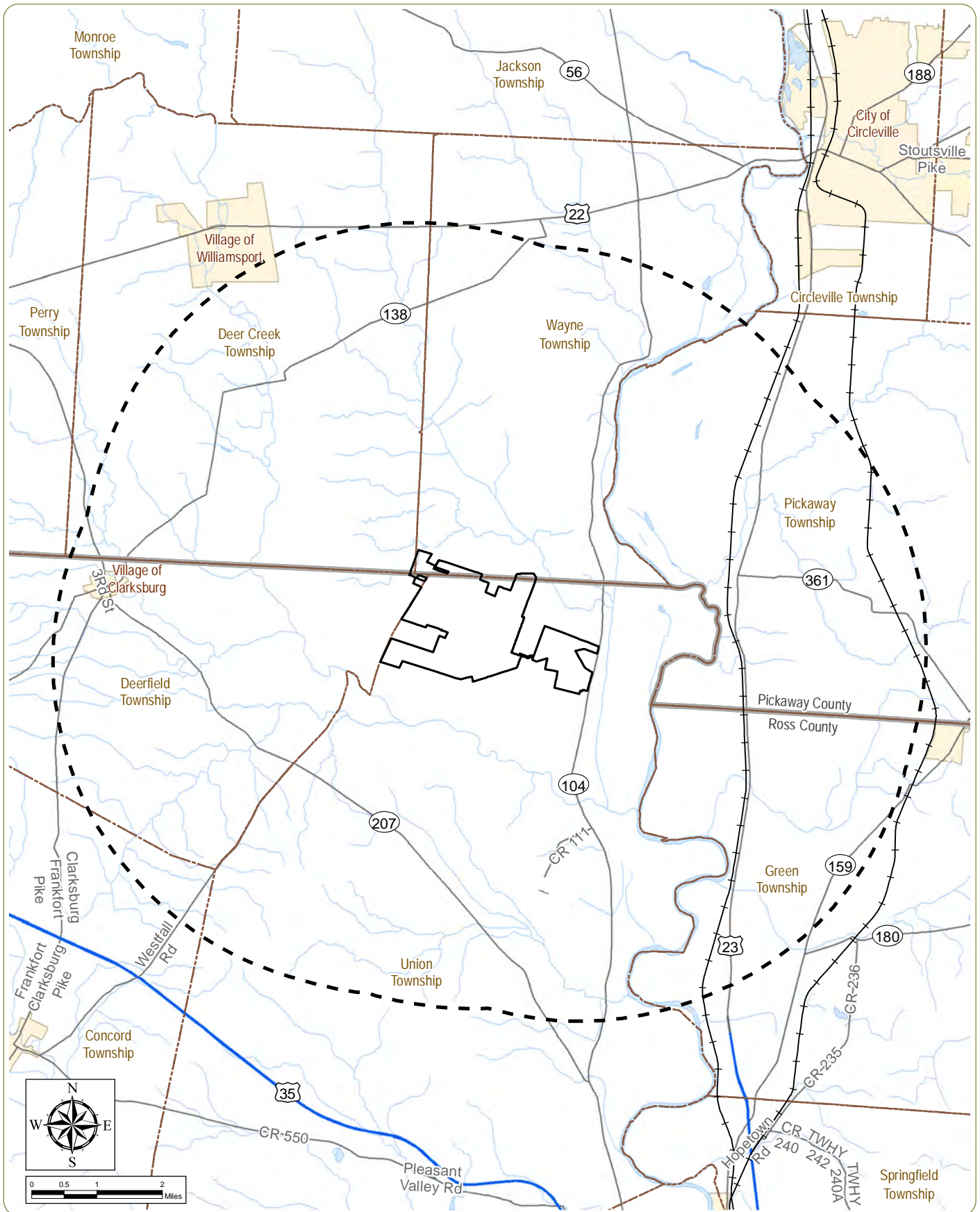
U.S. Census Bureau, 2000. Decennial Census, General Population Data. Available at: <http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml> (Accessed May 2020).

U.S. Department of Agriculture (USDA) National Agricultural Statistics Service (NASS). 2017 Census of Agriculture: New York State County-Level Data. Available at: <https://quickstats.nass.usda.gov/> (Accessed June 2020).

U.S. Department of Energy (USDOE) National Renewable Energy Laboratory (NREL). 2016. Jobs and Economic Development Impact (JEDI) model release PV12.23.16. (Accessed from NREL in November 2017).

U.S. Department of Labor (USDOL) Bureau of Labor Statistics. 2017, 2018, and 2019. Local Area Unemployment Statistics. Available at: <http://www.bls.gov/lau/data.html> (Accessed May 2020).

U.S. Department of Labor (USDOL) Bureau of Labor Statistics. 2018. May 2018 State Occupational Employment and Wage Estimates Ohio. Available at https://www.bls.gov/oes/current/oes_oh.htm#47-0000 (Accessed May, 2020).



Yellowbud Solar Project

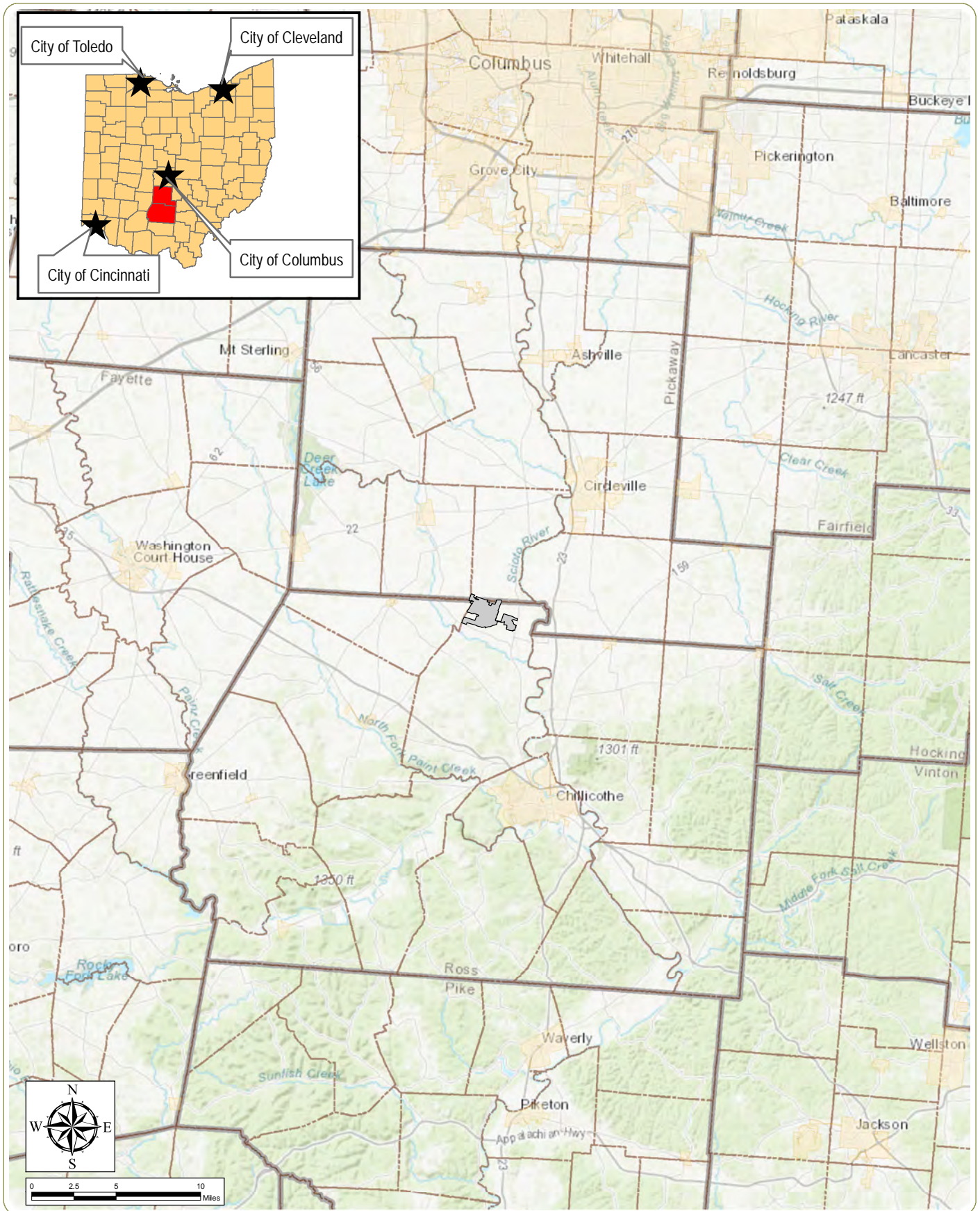
Union, Wayne, Deerfield, and Deer Creek Townships,
Pickaway and Ross County, Ohio

Figure 1: 5-Mile Study Area

Notes: 1. Basemap: ESRI StreetMap North America, 2008. 2. This map was generated in ArcMap on April 2, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

- Major Highways
- Highways
- Railroad
- Rivers
- Lakes
- Project Area
- 5-mile Study Area
- City/ Village Boundary
- Township Boundary
- County Boundary









Yellowbud Solar Project

Union, Wayne, Deerfield, and Deer Creek Townships,
Pickaway and Ross County, Ohio

Figure 2: Regional Facility Location

Notes: 1. Basemap: ESRI StreetMap North America, 2008. 2. This map was generated in ArcMap on April 14, 2020. 3. This is a color graphic. Reproduction in grayscale may misrepresent the data.

-  Project Area
-  Area of Intensive Land Use
-  Township Boundary
-  County Boundary



This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

7/21/2020 2:14:01 PM

in

Case No(s). 20-0972-EL-BGN

Summary: Application Exhibit K (redacted) electronically filed by Mr. Michael J. Settineri on behalf of Yellowbud Solar, LLC