Exhibit L

Socioeconomic Study
(Public Version)

NOTTINGHAM SOLAR SITE
HARRISON COUNTY, OHIO
SOCIOECONOMIC REPORT

JULY 2021

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EXECUTIVE SUMMARY

Nottingham Solar LLC is proposing to develop, construct, and operate the 100-megawatts alternating current power (MWac) Nottingham Solar Project (Project), a PV solar energy generation facility in Harrison County, Ohio. The Project will include PV modules mounted on a racking system to maximize solar energy capture and electric generation of the array. The Project will connect to the regional transmission grid via AEP owned Nottingham 138 kV Substation. The purpose of the Project is to provide 100 MW of clean, cost-effective, renewable energy to the PJM Interconnection, LLC (PJM) transmission grid. The Project will generate electricity using virtually no fuels or water and with effectively zero air emissions and waste generation.

This report reviews socioeconomic conditions in the Study Area and evaluates trends and patterns of change as represented by various demographic and economic indicators. Potential impacts to employment, earnings, and overall economic output from the Project are then assessed considering the current socioeconomic conditions within the Study Area.
Population projections estimate that the populations in Harrison County will remain relatively steady by 2030 while the local municipalities surrounding the Study Area may see some decline. Employment related to the construction of the Project will be relatively short-term and is not expected to result in permanent impacts to statewide or regional industrial sectors and is not anticipated to generate significant population growth within the Study Area. This Project is compatible with the Harrison County infrastructure goal to advance the alternative energy portfolio within Ohio. It also does not interfere with existing land uses or promote development that is not planned in the area.

To quantify the local economic impacts of constructing and operating the Project, the IMPLAN input-output model was used. The construction of the Project includes [redacted] in construction labor costs and [redacted] in costs for construction services and materials. Over the 30-year operations period, employee compensation costs averaged an estimated [redacted] per year, while additional operational costs averaged [redacted] per year. The expenditures related to the construction and operations phases of the Project are shown in Table ES-1.

Table ES-1. Schedule of Costs for the Construction and Operations Phases (2020 dollars)

	Construction Costs (in 2022)	Annual Operations Costs (2023 to 2052)
Total Material Costs	[redacted]	[redacted]
Total Labor Costs	[redacted]	[redacted]
Total Costs	[redacted]	[redacted]

Quantifying the economic impacts of the proposed Facility provides an understanding of how capital and operational cash flows support businesses and workers in the local economy. Solar power development, like other commercial development projects, can support jobs and businesses in the local economy through direct, indirect and induced impacts. The labor income and business purchases generated by the proposed Facility during the construction and operations phases creates household income and business revenues throughout Harrison County, OH. As households spend their income on goods and services in their local economy, the sales revenues of businesses support the income of their employees and the costs of material inputs.

In the analysis, the data from IMPLAN represents the market linkages in Harrison County, OH in the year 2019. The IMPLAN model uses deflators to provide the model outputs at the present value in 2019 dollars. To account for cost inflation over the analysis period, an annual escalation rate of 1 percent is applied to the baseline material cost estimates. The analysis evaluated a schedule with construction completed in 2022 and 30 years of operations starting in 2023.

The labor income and other expenditures during the construction and operations phases are expected to significantly support households and businesses throughout Harrison County. The total impacts from construction and 30 years of operations of the Project on industries throughout Harrison County, including the on-site labor impacts that occur specifically within the local economy are shown Table ES-2.

Table ES-2. Economic Impacts of the Construction and Operation of Nottingham Solar Project (2019 dollars)

	Employment (Job-Years)	Labor Income	Economic Output
Construction Impacts			
Direct Impacts	429	$28,593,000	$46,456,000
Indirect Impacts	59	$2,893,000	$5,300,000
Induced Impacts	47	$1,518,000	$3,984,000
Total Impacts	**534**	**$33,004,000**	**$55,740,000**
Operations Impacts (over 30-year Period)			
Direct Impacts	575	$40,310,000	$106,860,000
Indirect Impacts	126	$4,522,000	$7,454,000
Induced Impacts	64	$2,078,000	$5,450,000
Total Impacts	**764**	**$46,910,000**	**$119,764,000**

Source: IMPLAN, 2021 and WSP, 2021

Note: Values are rounded to the nearest thousandth.

As a result of the Project's impacts on household incomes and business revenues throughout Harrison County, the construction and operation of the commercial solar farm is expected to generate tax revenues for the local and state government. Lease payments, short- and long-term job creation, and tax revenues will benefit private landowners, Project site employees, businesses, and taxing jurisdictions. Over the construction and 30-year operations period, the Project is estimated to generate over $39 million in additional tax revenues for local, county and state governments, along with approximately $11 million for the federal government. Since PILOT program payments would be collected in the county government's general fund, without an allocation for specific economic development or infrastructure programs, the additional economic impact of those payments cannot be determined. Therefore, the PILOT program payments are represented in the local government revenues.

1 INTRODUCTION

Nottingham Solar LLC is proposing to develop, construct, and operate the 100-megawatts alternating current power (MWac) Nottingham Solar Project (Project), a PV solar energy generation facility in Harrison County, Ohio. The Project will include PV modules mounted on a racking system to maximize solar energy capture and electric generation of the array. The Project will connect to the regional transmission grid via AEP owned Nottingham 138 kV Substation. The purpose of the Project is to provide 100 MW of clean, cost-effective, renewable energy to the PJM Interconnection, LLC (PJM) transmission grid. The Project will generate electricity using virtually no fuels or water and with effectively zero air emissions and waste generation.

This report reviews socioeconomic conditions in the Study Area and evaluates trends and patterns of change as represented by various demographic and economic indicators. Potential impacts to employment, earnings, and overall economic output from the Project are then assessed considering the current socioeconomic conditions within the Study Area.

The majority of the Study Area is within the rural area of southwest Ohio in Athens Township, Harrison County (Figure 1) approximately 2.5 miles north of Flushing. The Project is also located approximately 30 miles from the Ohio-West Virginia state border. For the purpose of the socioeconomic analysis, the area of potential benefits and impacts includes a 5-mile radius which encompasses all or parts of the following communities: Harrison County, Belmont County, Moorefield Township, Cadiz Township, Flushing Township, Wheeling Township, and The Villages of New Athens, Flushing, Cadiz, and Holloway.

Section 2 of the report presents a socioeconomic profile of the Study Area and the State of Ohio, including a demographic profile with data on population trends, projected population growth, and civilian labor force data. Section 3 reviews the types of potential impacts that could be experienced throughout the state and region, including increased housing demand, commercial and industrial employment, and changes to the transportation network. Section 4 describes the methods of analysis of potential economic benefits provided within this report, including an overview of the IMPLAN model. The results of the IMPLAN model are presented in Section 5, which describes the jobs created by the construction and operation of the Project, as well as a summary of payments to landowners as a result of land leases. Section 6 reviews the potential impacts of the Project on local taxing jurisdictions.

2 SOCIOECONOMIC PROFILES

2.1 POPULATION TRENDS

Table 1 lists the population trends from 2010 to 2019 and projected populations to 2030 for the communities within the Study Area. While Ohio, saw a 1.3% growth from 2010 to 2019, Harrison County and Athens Township saw a decline during the same time period. Belmont County also saw a decline in total population. However, population projections estimate that the populations in both counties will remain relatively steady by 2030 while the local municipalities surrounding the Study Area may see some decline.

Table 1. Population Characteristics

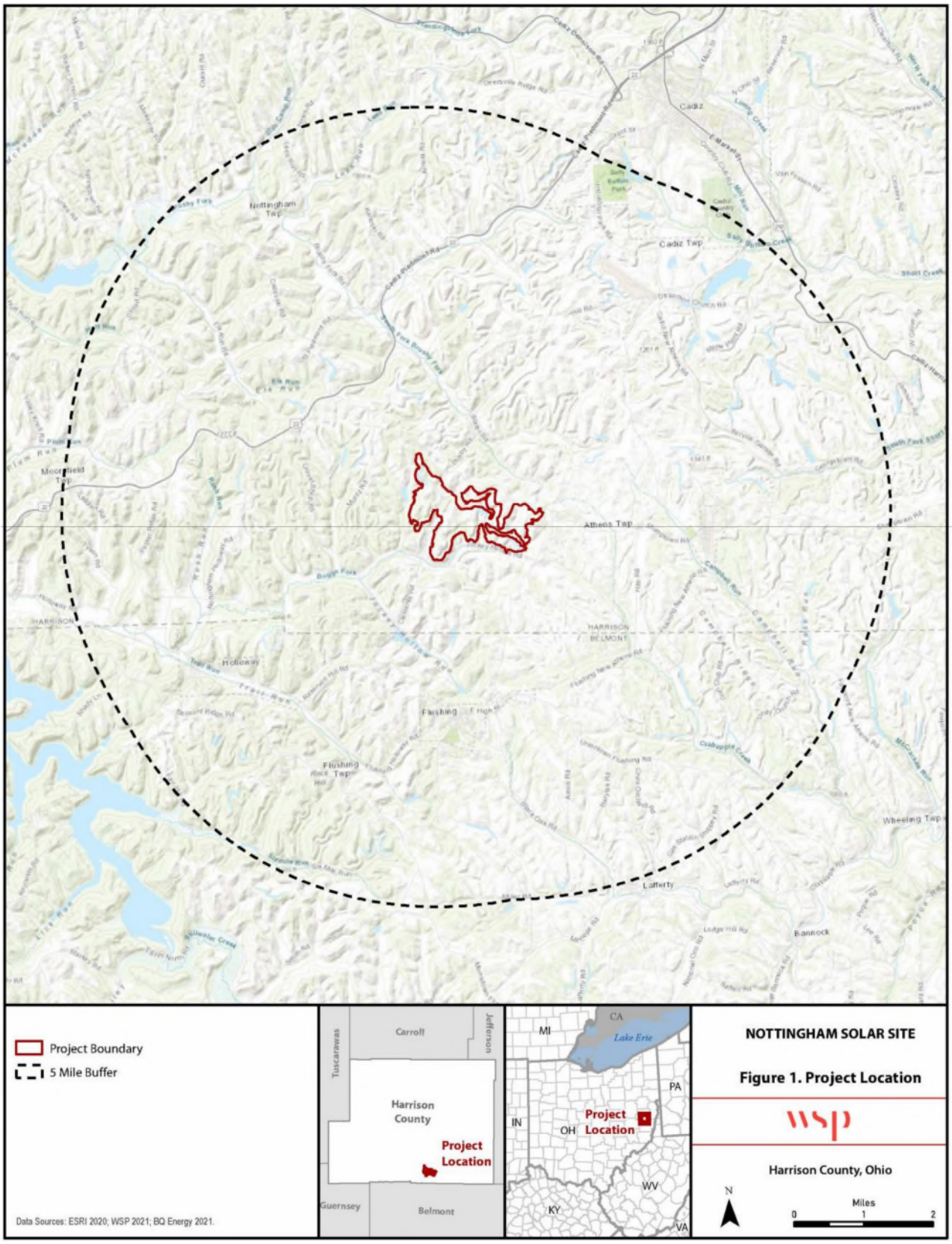
Jurisdiction within a 5-Mile Radius of Project	2010 Population	2019 Population	Population Change (%)	Annual Growth Rate (2010-2019)	Projected 2030 Population
Ohio	11,536,504	11,689,100	1.3%	0.13%	11,615,100
Harrison County	15,860	15,040	-5.2%	-0.6%	15,100
Belmont County	70,400	67,006	-4.8%	-0.5%	67,330
Athens Township	503	476	-5.4%	-0.6%	445
Moorefield Township	403	383	-5.0%	-0.5%	362
Cadiz Township	3,687	3,481	-5.6%	-0.6%	3,258
Flushing Township	2,016	1,901	-5.7%	-0.6%	1,779
Wheeling Township	1,699	1,614	-5.0%	-0.6%	1,510
Village of Flushing	881	832	-5.6%	-0.6%	780
Village of Holloway	336	317	-5.7%	-0.6%	296
Village of New Athens	328	308	-6.1%	-0.7%	288
Village of Cadiz	3,351	3,161	-5.7%	-0.6%	2,958

Source: Ohio Development Services Agency, 2019 Population Estimates: Cities, Villages and Townships by County, May 2020 Population Growth Calculator (https://calculator.academy/population-growth-calculator/) Accessed June 14, 2021.

Note: Projections calculated for villages and townships based on annual growth rates.

Construction of the Project will produce short-term jobs and is not expected to result in permanent relocation of construction workers to the area. While the Project is anticipated to generate about 16 full-time jobs it is not anticipated to generate significant population growth within the Study Area. It is also anticipated that some full-time employees may commute to the Project rather than relocate to the Study Area. The number of potential short- and long-term employment opportunities associated with the construction and operation of the Project is discussed in further detail in Section 5.

Figure 1. Project Location Map



2.2 EMPLOYMENT STATISTICS

Table 2 shows the unemployment rates in counties within 5-miles of the proposed Project, as well as the broader State of Ohio. Unemployment rates in Harrison and Belmont Counties have been slightly higher than the State of Ohio from 2017 to 2020. Annual average unemployment rates have gone down both state-wide and county-wide in the Study Area from 2017 to 2019 but have increased from 2019 to 2020 likely due to the COVID-19 pandemic.

Table 2. Civilian Labor Force and Unemployment Rate (2017-2020)

Location	2017		2018		2019		2020	
	Labor Force	Unemployment Rate	Labor Force	Unemployment Rate	Labor Force	Unemployment Rate	Labor Force	Unemployment Rate
State of Ohio	5,779,000	5.0	5,781,000	4.5	5,802,000	4.2	5,832,000	8.1
Harrison County	7,100	6.0	6,900	5.2	6,800	5.3	6,754	9.2
Belmont County	30,300	6.3	30,500	5.5	30,200	5.7	28,888	10.1

Source: US Bureau of Labor Statistics, Labor Force Data by County Annual Averages, 2017-2020; Ohio Department of Development, Ohio County Profiles, 2020 Annual Edition

Table 3 illustrates statewide employment broken down by North American Industry Classification System (NAICS) sectors for 2017, indicating the statewide number of employees, payroll, and number of operations in construction, administration, and accommodation industries, along with other sectors. The top three largest sectors for employment in the state included health care and social assistance, manufacturing, and retail trade.

Table 3. Employment and Payroll by NAICS Sector in Ohio (2017)

NAICS Code Description	Total Establishments	Annual Payroll ($1000)	Number of full and part-time employees
Total for all sectors	242,537	$ 349,749,016	4,667,086
Mining, quarrying, oil and gas extraction	677	$600,406	9,215
Utilities	703	$2,496,000	24,526
Construction	19,908	$12,096,870	197,082
Manufacturing	13,922	$36,256,774	652,462
Wholesale trade	13,630	$14,577,328	238,916
Retail trade	35,500	$148,861,420	588,060
Transportation and warehousing	7,698	$9,020,346	189,666
Information	4,295	$6,957,124	102,069
Finance and insurance	17,229	$19,921,015	260,044
Real estate and rental and leasing	10,782	$2,986,225	62,902
Professional, scientific, technical	23,854	$17,058,693	250,438
Management of companies and enterprises	2,448	$15,099,898	157,474
Administrative and support and waste management and remediation services	13,485	$12,928,773	380,754

NAICS Code Description	Total Establishments	Annual Payroll ($1000)	Number of full and part-time employees
Educational services	2,041	$495,537	18,776
Health care and social assistance	29,595	$39,468,461	856,794
Arts, entertainment, and recreation	3,999	$2,832,117	76,914
Accommodation and food services	24,346	$4,048,101	474,616
Other services (except public administration)	18,425	$4,043,928	126,378

Source: US Census Bureau, American Community Survey, 2017

Table 4 identifies the employment percentages by industry for Harrison and Belmont Counties. Belmont County's top three largest sectors are accommodation and food services, retail trade, and health care and social assistance. In Harrison County, the top three largest employment sectors are health care and social assistance, manufacturing, and mining, quarrying, oil and gas extraction. The relevant employment sectors that this project would fall under would generally include construction, manufacturing, utilities, trade and professional services. Locally, the region is not economically diverse. Energy is the third largest industry employer in the region, specifically advanced materials, mining, and fabricated and primary metal product manufacturing (OMEGA, 2020).

Table 4. Employment Percentage by Industry in Harrison and Belmont Counties, Ohio (2018)

NAICS Code Description	Annual Employment % by Industry	
	Harrison County	Belmont County
Mining, quarrying, oil and gas extraction	8.1	8.5
Utilities	2.9	0.9
Construction	5.5	5.5
Manufacturing	16.5	3.9
Wholesale trade	4.6	3.1
Retail trade	6.8	16.4
Transportation and warehousing	5.9	3.4
Information	1.4	2.1
Finance and insurance	1.8	3.7
Real estate and rental and leasing	2.2	1.4
Professional, scientific, technical	1.7	2.0
Management of companies and enterprises	N/A*	0.1
Administrative and support and waste management and remediation services remediation services	3.6	3.8
Educational services	7.1	8.1
Health care and social assistance	15.1	18.1
Arts, entertainment, and recreation	0.4	0.5
Accommodation and food services	4.7	10.8
Other services (except public administration)	4.2	2.8

Source: Ohio Economic Profile, Belmont and Harrison Counties, July 2020.

Note: *Data non-disclosable as it does not meet U.S. Census Bureau publication standards. Columns may not sum to 100 percent due to both U.S. Census Bureau methodology and the effects of rounding.

Construction employment for the Project will be short-term and is not expected to result in permanent impacts to statewide or regional industrial sectors. Operations and maintenance of the Project will include permanent labor (about 16 new jobs) and indirect jobs created through local revenue, supply chains, and induced impacts. While these permanent positions will have positive impacts throughout the statewide economy, the scale of job creation is not anticipated to be significant when compared with current statewide employment and payroll by industry sector. Therefore, the Project is not anticipated to have a significant impact on statewide industrial sectors during construction or operation. Locally, the creation of 16 new jobs for operations and maintenance would add to the number of employees in sectors to help diversify the economy in Harrison County. The short- and long-term employment opportunities associated with the construction and operation of the Project are discussed in further detail Section 5.

3 REGIONAL DEVELOPMENT IMPACTS

The regional economy surrounding the Study Area is based on the rural economy of the Mideastern Ohio region and is relatively not diverse. The regional context for the development of the Project is discussed below in terms of housing, commercial and industrial development, and transportation. In addition, the compatibility of the proposed Project with economic and development strategies is discussed.

3.1 HOUSING

Table 5 summarizes housing characteristics in the State of Ohio and the communities within 5-miles of the Study Area. The Owner-occupied vacancy rates for the counties and municipalities in the region are higher than the State of Ohio. The median housing value of homes and gross rents in municipalities surrounding the Study Area are lower than the State of Ohio, as well as both counties within the 5-mile radius. The median home values in the region are between approximately $57,500 and $103,000, compared to the Ohio median of $145,000. This is reflective of the rural nature of the Study Area and surrounding areas. Likewise, the median gross rent in the jurisdictions in the Study Area is lower than the State of Ohio. Additionally, the percentage of vacant housing units is higher in all jurisdictions, with the exception of the Village of New Athens, Athens Township and Moorefield Township, within the Study Area as compared to the State of Ohio.

Table 5. Housing Characteristics

Jurisdiction	Total Housing Units	Occupied Units	Vacant Units	Homeowner Vacancy Rate	Rental Vacancy Rate	Median Home Value (owner - occupied)	Median Gross Rent	% of HH with Gross Rent > 30% of household income
Ohio	5,202,304	4,676,358	525,946	1.4	5.3	$145,700	$808	44.8%
Harrison County	8,089	6,223	1,866	1.1	8.6	$92,700	$607	42.7%
Belmont County	32,210	25,919	6,291	1.6	14.3	$100,500	$629	38.8%
Village of Cadiz	1,411	1,220	191	0.0	8.0	$83,100	$595	44.0%
Village of Flushing	424	309	115	3.1	20.2	$68,500	$770	36.1%
Village of Holloway	155	119	36	3.7	11.4	$57,500	$625	47.6%
Village of New Athens	156	143	13	3.2	0.0	$75,000	$506	47.0%
Athens Township	239	190	49	2.3	0.0	$86,500	$506	47.0%
Moorefield Township	282	200	82	0.0	0.0	$74,500	-	-

Jurisdiction	Total Housing Units	Occupied Units	Vacant Units	Homeowner Vacancy Rate	Rental Vacancy Rate	Median Home Value (owner - occupied)	Median Gross Rent	% of HH with Gross Rent > 30% of household income
Cadiz Township	1,582	1,346	236	0.0	7.6	$89,900	$598	43.2%
Flushing Township	1,103	743	360	2.0	11.3	$77,800	$766	26.5%
Wheeling Township	932	692	240	0.0	46.2	$102,500	$681	74.2%

Source: US Census Bureau, American Community Survey, 5-Year Estimates 2014-2019

The Project is not expected to have a significant impact on the local and regional housing market. The potential for impact to home values in the Study Area is expected to be low due to the low number of residences surrounding the Project. Since the Project is not anticipated to result in the permanent relocation of short-term construction workers and the number of new jobs for operations and maintenance is approximately 16 jobs, the availability of housing in the region can withstand those who may move to the area. Also, since an influx of renters to the area is not anticipated, rental rates are also anticipated to remain below the state median.

3.2 COMMERCIAL AND INDUSTRIAL DEVELOPMENT

The diversification of Ohio's energy generation portfolio into renewables will have significant and positive economic impacts. Through the first quarter of 2021, the Solar Energy Industries Association (SEIA) reported that Ohio had 527.09 megawatts (MW) of installed solar capacity, with $1.3 billion of total solar investment. In just 2020 alone, solar investment in Ohio was $250.24 million. At a national level, Ohio ranked 25th in the U.S. for total installed solar capacity and ranked 18th in 2020 capacity alone (SEIA, 2021). Ohio is positioned well for growth in solar capacity due to several factors such as favorable topography, relatively inexpensive land to develop, membership in the PJM Interconnection, central location, transportation infrastructure, established manufacturing base, and trained workforce (Choose Energy, 2021). SEIA projects that Ohio's installed solar capacity will grow to 2,955 MW over the next 5 years which would rank the state as 11th nationally.

SEIA estimates that there are currently 238 solar companies in the State of Ohio, comprised of 97 manufacturers, 71 installers/developers, and 70 as 'others' (SEIA, 2021). The number of solar jobs through the first quarter of 2021 is estimated at 6,532 in the Ohio. Solar jobs did fall in 2020, nationally, due primarily to the COVID-19 pandemic. Likewise, in Ohio, jobs dropped 10.3% from 2019 to 2020. Ohio ranked 9th in all U.S. states for solar jobs, dropping from a ranking of 7th in 2019. The 2020 Solar Jobs Census reported that Ohio had a total of 6,532 solar jobs in 2020. However, from 2015-2020, Ohio still saw a 36% growth in solar jobs (The Solar Foundation, 2020). According to the *US Energy + Employment Report 2020*, solar jobs makes up the second largest segment of electric power generation jobs in Ohio. It is also up 7.4% over the past year. Although the rate of job growth in Ohio's solar industry is leveling off some the steady and continued solar industry growth reflects a stable foothold in the state. Solar jobs increased by 21.2% in 2016, 11.8% in 2017, 10.5% in 2018, 1.7% in 2019, but did decrease by 10.3% in 2020, due to the COVID-19 pandemic, as previously noted.

The State of Ohio has developed a specific renewable energy portfolio requirement, that applies to all utilities/entities that provide electricity to consumers in the state (see Section 4928.64 of the Ohio Revised Code). The requirement calls for annual increases in the percentage of renewable energy that contributes to the overall statewide generation. The requirement lays out a goal of 8.5% renewable energy by 2026, and the Project is compatible with that goal. According to the US Energy Information Administration, rooftop and utility scale solar generation accounted for one-tenth of Ohio's total renewable energy portfolio in 2019. Utility scale solar made up about half of the total solar generation (U.S. Energy Information Administration, 2021). Specific short- and long-term economic impacts of this Project on commercial and industrial development throughout the region are described in further detail in Section 5 of this report.

3.3 TRANSPORTATION

The region surrounding the Study Area features US and state highways, and county and local roadway networks. State Route (SR) 519 (Stumptown Road) runs along the northern boundary of the Project. US 22 is located to the west and SR 149 and SR 9 are located to the east of the Project. Jockey Hollow Road runs along the southern boundary of the Project. There are three locations where traffic can access the Project from SR 519. The Project is approximately 12 miles northwest of Interstate 70 (I-70) by way of SR 9 and SR 519.

While routes for delivery of Project components and construction traffic have not been finalized, traffic is assumed to use Interstates (I-70) and Principal Arterial roadways (US 22) to travel to the general Study Area. From there, traffic would access the Project from Major Collectors (SR 519 and SR 9). There is also the potential for Jockey Hollow Road, a local road, to be utilized for construction traffic. These interstates, principal arterials and major collectors have the capacity to accommodate construction and operational traffic generated from the Project.

No active rail lines are located within the Study Area. One historic, freight rail line runs partially within the 5-mile Study Area near the Village of Cadiz. The former Columbus & Ohio River Railroad – Cadiz Branch is listed as inactive on the Ohio Rail Development Commission GIS mapping tool. The former line generally ran east of SR 9 and south of Service Garage Road.

Harrison County Airport is located on SR 9 in the Village of Cadiz, approximately 3.5 miles due northeast of the Project and approximately 6 miles driving distance by way of SR 519 and SR 9 (Harrison County, 2021). The airport is public, general aviation airport and include a 3,765-foot primary runway and partial parallel taxiway (Harrison County, 2021). The most frequent general aviation operations at Harrison County include powerline and pipeline operations, flight training, drug enforcement flights, and recreational flights. Hopedale Mining uses the airport to access the nearby ODNR Mine Safety Training Center. The airport is also home to air services company providing aircraft maintenance and painting. The Project is not anticipated to impact the airport as the typical operations will remain.

The proposed Project 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 the roadway network and traffic, see the Transportation Study, included with the Certification Application.

3.4 LOCAL AND REGIONAL PLANS

The Project is located in Athens Township, Harrison County, Ohio. The surrounding 5-mile Study Area for socioeconomic study is comprised of Harrison and Belmont counties; Moorefield, Cadiz, Flushing, and Wheeling Townships; and the villages of New Athens, Flushing, Cadiz, and Holloway. The land use within the Study Area for the Project is comprised of reclaimed mine land with some forest land, pasture/crop land, and open space. There is limited, scattered residential use in the vicinity of the Project and is concentrated along existing roadways. Neither Harrison County nor Belmont County have a Comprehensive Plan. Additionally, the local townships and villages do not have current comprehensive plans. The following area plans are available to guide development in the region and the Project's compatibility with those plans is evaluated.

- Harrison County Economic Development Plan (2016) – This strategic plan lays out how Harrison County can build an environment for success today and for future generations. The plan calls for developing a comprehensive and sustainable infrastructure to attract commercial, industrial, and residential growth, including addressing the use and development of abandoned mine lands (AML). The county would work with private developers and other stakeholders to evaluate the feasibility of solar and wind farm development. They would also create an alliance with power companies to conduct studies to create an independent power producer base in the county. The economic development plan also has a specific Energy goal to address the requirements of Ohio Senate Bill 221's mandate by 2025 to advance 25% Alternative Energy Portfolio throughout Ohio, including investigating the feasibility of developing solar panel farms.

- Belmont County Economic Development Plan (2011) – While no components of the Project are located within Belmont County, major access to the Project can be through SR 9 and I-70 in Belmont County. The plan does not identify the area along the SR 9 corridor between the Project and St. Clairsville as one for development priority, but does note that action steps to attract new manufacturing and industry, in general, should be a focus on business sectors that bring the highest value to reclaimed land.

- Ohio Mid-Eastern Governments Association (OMEGA) Comprehensive Economic Development Strategy Report (2019 and 2020) – This annual report updates the 2017 report that presents a comprehensive regional overview and analysis of important issues that impact regional growth, including, but not limited to workforce, infrastructure, land use. More than one half (56.02%) of the OMEGA region is classified as forested land. Pastured land, hay and cultivated crop land are about 31% of regional land use, consistent with past years. Less than 10% of the total region is developed; this includes both higher-and lower-intensity development. The development rate for the state is 13.75% (OMEGA, 2019). The 2020 update indicates the extreme lack of developable sites and notes that AMLs limit economic development. Sites located on AMLs generally require costly remediation before being developed leading to a lack of competitiveness with other areas. Remediation of AML is needed to transform vacant, unusable land into a productive use that leads to business development and more jobs. The Study Area is in a rural area that does have some challenges for new infrastructure and improved utilities. Additionally, topography can have an impact on access to the rural areas in the region. It is anticipated that the location of the Project along a state route and proximity to I-70 will not result in challenges for access during construction. Also, the Project's land use is identified as mostly reclaimed mine land and is anticipated to have a positive impact as it transforms once unusable land into usable land for economic development in the county and region.

This Project is compatible with the local infrastructure goal to advance the alternative energy portfolio within Ohio. It also does not interfere with existing land uses or promote development that is not planned in the area.

3.5 CONCURRENT OR SECONDARY USES

There are no plans for concurrent or secondary uses of the Project. The public will be prohibited from entering the facility, which will be enclosed by perimeter fencing. These prohibitions against entry, as well as warnings regarding the dangers of high-voltage equipment, will be displayed on appropriate signage at the Facility.

4 MEASURING ECONOMIC IMPACTS

4.1 CALCULATING ECONOMIC BENEFITS

Quantifying the economic impacts of the proposed Facility provides an understanding of how capital and operational cash flows support businesses and workers in the local economy. Solar power development, like other commercial development projects, can support jobs and businesses in the local economy through direct, indirect and induced impacts. The labor income and business purchases generated by the proposed Facility during the construction and operations phases creates household income and business revenues throughout Harrison County, OH. As households spend their income on goods and services in their local economy, the sales revenues of businesses support the income of their employees and the costs of material inputs. These incomes and revenues perpetually circulate through household and business transactions until the money flows to outside of the county. This report analyzes the direct, indirect and induced impacts of the proposed Project on the economy in Harrison County, OH:

- Direct impacts: The direct impacts include the labor income and other expenditures made during the construction and operation of the Project to generate economic output. The value includes the expenditures for labor and professional services provided by project developers, consultants, and construction contractors, as well as operations and facility personnel directly employed by the Facility. The expenditures also include the cost of inputs for the construction and operational phases necessary to build and maintain the facility, including real estate, equipment, materials and administrative costs.
- Indirect impacts: The indirect effects include the business-to-business purchases in the supply chain within the region from the initial input industry expenditures supporting the construction and operations of the Project. These purchases include materials, finished products, equipment, financing and insurance, and other professional services.
- Induced impacts: Induced impacts measure the effect of household spending in the local economy by employees within the supply chain of businesses supporting the construction and operations of the Project. The household spending supports retail businesses, housing and other household expenditures, such as entertainment, food, clothing, and transportation.

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

- Employment: Job-years represent the increase in employment demand for one year resulting from the construction and operations of the Project. The changes in employment are measured for direct, indirect and induced effects, measuring the jobs supported directly at the Facility, in supporting industries, and in the businesses benefiting from household spending. For the purposes of this analysis, job-years refers to the total number of positions equivalent to a full-time employee (FTE) supported by the development over one year. Employees supported for less than full-time or less than a full year represent a fraction of a FTE position (e.g., a half-time, year-round position is 0.5 FTE).
- Labor Income: Labor income includes the total compensation provided to employees, including wages, payroll taxes and benefits, and proprietor income.

— Economic Output: Economic output refers to the total annual production value of the goods and services generated by the Project and the businesses within its supply chain in the local economy. For the manufacturing sector, output is calculated by total sales plus net inventory value. 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 be the net revenues above intermediate inputs and labor income incurred by those businesses that sell electrical transmission cable or motor vehicle fuel for use in the Project.

4.2 METHODOLOGY

To quantify the local economic impacts of constructing and operating the Facility, the IMPLAN input-output model was used (IMPLAN 2019). The foundational concept of an input-output model is that all industries, households, and government in the economy are connected through buy-sell relationships, therefore a given economic activity supports a ripple of additional economic activity throughout the economy. IMPLAN is an I-O modeling system that uses annual, regional data to map these buy-sell relationships so users can predict how specific economic changes will impact a given regional economy or estimate the effect of past or existing economic activity. Input-output models describe how relationships between different industries determine the total economic impact of a particular type of spending; for example, how new expenditures in the construction sector will cycle through the intermediate steps in the supply chain and generate increased demand for intermediate goods and services ranging from concrete to carpenters. In addition, input-output modeling considers how the additional labor income generated by spending in a particular industry—e.g., the salaries earned by construction workers employed by the Project—will translate into increased consumer spending in the form of household expenditures.

In the analysis, the data from IMPLAN represents the market linkages in Harrison County, OH in the year 2019. The IMPLAN model uses deflators to provide the model outputs at the present value in 2019 dollars. The analysis evaluated a schedule with construction completed in 2022 and 30 years of operations starting in 2023.

The IMPLAN model requires project-specific data input (such as year of construction and location), and then calculates the impacts described above using county-specific multipliers. These multipliers account for the change in jobs, income, and output likely to occur throughout the local economy as a result of project-related expenditures. The resulting data 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 direct, indirect, and induced impacts. The 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 the fourth quarter of 2022 with a nameplate capacity of 100 MW (100,000 kW) with baseline direct operations and maintenance costs of [redacted]. The construction of the Project includes [redacted] in construction labor costs and [redacted] in costs for construction services and materials. Over the 30-year operations period, employee compensation averaged an estimated [redacted] per year, while other operational costs averaged [redacted] per year; the total expenditures over the analysis period equals [redacted] in employee compensation and [redacted] in material and service costs. The labor income and other expenditures during the construction and operations phases are expected to significantly support households and businesses throughout Harrison County. The total impacts from construction and 30 years of operations of the Project on industries throughout Harrison County, including the on-site labor impacts that occur specifically within the local economy are shown in Table 7 and summarized in the narrative that follows.

4.2.1 CAPITAL AND INTANGIBLE COSTS

In addition to the aforementioned construction costs specified as inputs for the IMPLAN analysis, the cost estimates include other capital and intangible costs related to the Project for the purposes of responding to the Application requirements. As such, 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. The cost schedule for the construction are shown below in **Error! Reference source not found.**.

Table 6. Schedule of Baseline Costs for the Construction Phase

Baseline Costs	Value
Total Material Costs	[redacted]
Construction of Power Structures	[redacted]
Architectural and Engineering Services	[redacted]
Electric Power Generation Systems	[redacted]
Electric Power Transmission and Distribution Systems	[redacted]
Insurance	[redacted]
Total Labor Costs	[redacted]
Construction Labor	[redacted]
Total Costs	[redacted]

Source: IMPLAN 2019 Data for model region including Harrison County, Ohio.

(1) COST COMPARISON WITH SIMILAR FACILITIES

Installed project costs compiled in the *U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark Report* published by the U.S. Department of Energy's Lawrence Berkeley National Laboratory in January 2021 indicate that the capital costs of the Facility are in line with recent industry trends. The installed costs for the Facility are estimated at [redacted]. The U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark Report shows the capacity-weighted average installed costs for a 100 MW one-axis tracker utility-scale PV project in 2020 averaged roughly $1,010/kWDC, which is roughly equivalent to $1,224/kWAC (Feldman et al, 2021). The 2021 update of the report illustrated the installed costs of a 100 MW one-axis tracker utility-scale PV project decreased by 13 percent from 2017 to 2020. To compare, installed solar project costs in the Midwest region in 2017 averaged $1,900/kWAC, which would be equivalent to $1,654/kWAC in 2020 (Bolinger, Seel, & Robson, 2019). Considering how the differences in the use of panel technology, density of projects and system size by region influences installed costs per output, the average cost of projects in the Midwest region were second-lowest across the nation. The installed costs for the Facility are in line with the average cost of $963/kWAC estimated for the Water Strider Solar Facility in Halifax County, VA, which could be attributed to locational and system size differences. The Hillcrest Solar Farm in Brown County, OH estimated their installed costs at $1,000/kWAC in their Socioeconomic Report submitted to the OPSB (EDR 2017). Considering these factors, the estimated cost of the Facility is not substantially different from other Facilities submitting applications to the OPSB.

(2) 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 of the start of construction in 2022. Therefore, a present worth analysis is essentially the same as the costs presented above in **Error! Reference source not found.**. 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.

4.2.2 OPERATIONS AND MAINTENANCE COSTS

In addition to the aforementioned operations costs specified as inputs for the IMPLAN analysis, the cost estimates include other capital and intangible costs related to the Project for the purposes of responding to the Application requirements. As such, the total estimated operations costs of the Facility are [redacted] over 30 years. 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. The staffing of the Facility includes 16.5 FTEs to support administrative and operations and maintenance positions within facility operations on an annual basis; the position title, utilization and base salary are shown below in **Error! Reference source not found.**.

Table 7. Staffing Levels and Base Salaries for the Operations Phases from 2023 to 2052

Position	Number of Staff	Annual Utilization	Annual Base Salary
Financial Managers	1	50%	$137,890
Budget Analysts	1	50%	$76,770
Insurance Underwriters	1	50%	$77,150
Tax Preparers	1	100%	$47,560
Electrical and Electronic Engineering Technologists and Technicians	2	100%	$61,060
Landscaping and Groundskeeping Workers	4	75%	$30,870
Bill and Account Collectors	1	100%	$36,960
Bookkeeping, Accounting, and Auditing Clerks	2	100%	$40,530
Electricians	3	100%	$53,540
First Line Supervisors of Mechanics, Installers, and Repairers	1	50%	$67,330
Electrical and Electronics Repairers, Powerhouse, Substation, and Relay	1	50%	$67,400
Maintenance and Repair Workers, General	2	100%	$41,930

Source: IMPLAN 2019 Data for model region including Harrison County, Ohio.

The IMPLAN model uses total employee compensation, which includes base salary, payroll taxes, insurance and other benefits, to calculate the economic impact of household spending, so a factor of 0.68 was applied to estimate the total compensation of the Facility staff.[1] Additionally, the income expenditures were allocated to the appropriate industry based on the map of the NAICS to IMPLAN 546 Sectoring Scheme to attribute the expenditures to the most relevant sectors of the

[1] "*Employer Cost for Employee Compensation Summary March 2021"*, US Department of Labor

market[2]. The IMPLAN model uses the market's average employee compensation rates by position in Harrison County based on total wage and material cost expenditures, resulting in a slightly higher direct employment of for total economic output than the planned 16.5 FTEs estimated in **Error! Reference source not found.**. The cost schedule for the operations phase is shown in Table 8.

Table 8. Schedule of Baseline Annual Costs for the Operations Phases from 2023 to 2052

Costs	Value
Total Annual Material Costs	[redacted]
Power Generation	[redacted]
*Real Estate**	[redacted]
Administrative Services	[redacted]
Insurance	[redacted]
Landscaping	[redacted]
Total Annual Labor Costs	[redacted]
Office Administration	[redacted]
Electric Power Transmission and Distribution	[redacted]
Facility Maintenance and Repair	[redacted]
Landscaping	[redacted]
Total Costs	[redacted]

Source: IMPLAN 2019 Data for model region including Harrison County, Ohio.
*Real Estate costs were estimated and inflated separately from other cost items based on negotiated contracts

(1) COST COMPARISON WITH SIMILAR FACILITIES

Operations and maintenance (O&M) costs are a significant component of the overall cost of solar projects but can vary widely between facilities. The *U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark Report* published by the U.S. Department of Energy's Lawrence Berkeley National Laboratory in January 2021 outlined O&M cost data for one-axis tracker 100 MW utility-scale solar power projects in the United States, calculating an average cost of $17/kW-year based on projects operating in 2020. To compare, facilities constructed in 2011 had an average cost of $28/kW-year, demonstrating facilities installed more recently incur lower O&M costs. According to the *U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark Report*, the decrease in O&M costs could be the result of utility companies leverage economies of scale as part of power generation operations. The baseline O&M costs, which include labor and materials, for the Facility are estimated to be [redacted] per year, with the costs of materials inflated annually at 1 percent to account for cost inflation. These estimated O&M costs exclude all other ongoing expenses related to environmental monitoring, property taxes, land royalties and reverse power. Relative to other facilities, the baseline O&M costs equal an average cost of [redacted]. These costs will be lower than the average costs detailed in the *U.S. Solar Photovoltaic System and Energy Storage Cost Benchmark Report*, as described above. The O&M costs for the Facility are not anticipated to be significantly different from other facilities the Applicant operates.

[2] *546 Industries, Conversions, Bridges, & Construction - 2018 Data*, IMPLAN

(2) PRESENT WORTH AND ANNUALIZED CAPITAL COSTS

The annual O&M costs will be subject to real and inflationary cost increases over the 30-year operations period. Considering wage expenditures make up approximately half of annual operations and maintenance costs and wages and material costs have historically inflated at differing rates in the market, the inputs and outputs of the IMPLAN model are calculated in 2019 constant dollars. The inputs and outputs of the IMPLAN model are calculated in 2019 constant dollars, as the latest year of data is from the year 2019. As a result, the IMPLAN model accounts for inflation in wages and material costs over the analysis period using price deflators developed from values based on historical data published by the Bureau of Economic Analysis. An annual inflation rate of 1 percent is applied to the material cost inputs to capture the greater historical volatility in goods and services, as compared to labor wages. 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.

5 ECONOMIC IMPACT ON THE LOCAL ECONOMY

5.1 LOCAL ECONOMIC IMPACT: CONSTRUCTION AND OPERATIONS PHASE

Based upon the annual salary and staffing estimates of the operational state at the Facility, the operation and maintenance of the proposed Project are to support 16.5 full-time equivalent jobs with annual labor income earnings of [redacted]. These FTE job positions represent the various categories of staff necessary to support operations at the facility, including managers, administrative and financial staff, and maintenance staff. Average wage rates are projected to be [redacted] per hour, consistent with regional averages which are estimated to be around $18 per hour for administrative personnel (Bureau of Labor Statistics, 2020). For specialized labor and managerial positions, the average wage rates are expected to be above the average hourly rate for administrative staff. Over the operations period, the average annual total compensation of direct employees is approximately [redacted] per person in constant 2019 dollars.

Operations and maintenance of the Project should also generate new jobs in other sectors of the economy through supply chain impacts and the expenditure of new and/or increased household earnings. These impacts may include restaurant, hospitality and other tourism-derived local spending from employees and visitors to the Project. The total employment, labor income and economic output related to the construction and operations phases of the Project are shown Table 9.

Table 9. Economic Impacts of the Construction and Operation of Project

	Employment (Job-Years)	Labor Income	Economic Output
Construction Impacts			
Direct Impacts	429	$28,593,000	$46,456,000
Indirect Impacts	59	$2,893,000	$5,300,000
Induced Impacts	47	$1,518,000	$3,984,000
Total Impacts	**534**	**$33,004,000**	**$55,740,000**
Operations Impacts (over 30-year Period)			
Direct Impacts	575	$40,310,000	$106,860,000
Indirect Impacts	126	$4,522,000	$7,454,000
Induced Impacts	64	$2,078,000	$5,450,000
Total Impacts	**764**	**$46,910,000**	**$119,764,000**

Source: IMPLAN 2019 Data for model region including Harrison County, Ohio.

Note: Values are rounded to the nearest thousandth.

Table 9 illustrates the economic impact of the Project's construction and operations in supporting households, jobs and businesses throughout Harrison County, OH. As the construction phase of the Project supports different sectors of the market than the operations of the Facility, the impacts on local employment and businesses are expected to vary. During the construction phase, the Project is expected to support 534 job-years with a labor income of $33.0 million; 429 job-years are directly related to the contractors involved in the construction of the Facility, while 105 job-years are supported in the business supply chain and by household spending. During 30 years of operations, the Facility is expected to support 764 job-years with a total labor income of $46.9 million; 575 job-years are directly related to the workers employed or contracted at the Facility, while 189 job-years are supported in the business supply chain and by household spending.

On an annualized basis, the Facility is expected to support an average of 19 FTE positions during the operations phase with annual earnings of $1.3 million. Increased industry demand throughout the supply chain is estimated to support approximately 4.2 FTE positions with annual earnings of around $35,900. In addition, it is estimated that 2.1 FTE positions with associated annual earnings of $32,500 will be induced through the increased household spending associated with Project operations.

5.2 LOCAL LAND VALUE TRANSFER

The construction and operation of the Project will result in the increase in value of the land due to the addition of improvements. The increased value of the land and its real property improvements are expected to result in higher tax revenues for the local municipality to support community services, even as the Project is exempt from public utility tangible personal property tax. Annual lease and easement payments will offer indirect benefits to residents, even as the property owner does not reside locally. The Applicant estimates that these payments will average [redacted] on an annual basis over the operations period of the Project, a portion of which are expected to return as local property taxes. The Project will also generate lease payments during the construction phase, generating a beneficial impact on the local economy during construction.

6 LOCAL, STATE AND FEDERAL TAX REVENUE IMPACTS

6.1 METHODOLOGY

The IMPLAN model estimates the tax impacts on the local, state and federal level resulting from the Project expenditures during the construction and operations phases using a number of state- and national-level reporting resources. Taxes by level of government are obtained by combining data from the Annual Survey of State and Local Government Finances, the most recent state government tax collections (also reported by the Census Bureau), and the most recent Census of Government Finance, which is like the Annual Survey, but covers every single unit of government. Those sources report tax by type, by unit of government (ergo by level of government), and by location. State government revenue is assigned only at the state level (i.e., the data do not tell us how much state income tax came from a given county). Federal government revenue is known only at the national level from the National Income and Product Accounts.

Data for county, city, and special district governments are assigned to the counties containing those units of government. Data for state and federal government revenue are allocated to counties based on proxies (e.g., personal income by county is used to allocate state government personal income tax revenue to counties). The IMPLAN model uses national level controls for taxes by level of government and type of tax from the National Income and Product Accounts. We first distribute taxes to states using a combination of the combined finances data and data on total taxes by state (covering both state and local governments) from the BEA's Regional Economic Accounts. The IMPLAN model then distributes those state values to counties based on the combined finances data, where possible, and by proxies where not possible.

6.2 CHANGE IN TAX REVENUES

As a result of the Project's impacts on household incomes and business revenues throughout Harrison County, the construction and operation of the commercial solar farm is expected to generate tax revenues for the local and state government. These tax revenues provide an additional benefit when used to support public services, fund transportation and social infrastructure projects, or otherwise support the local community. Over the construction and 30-year operations period, the Project is estimated to generate over $38.4 million in additional tax revenues for local, county and state governments, along with approximately $18.2 million for the federal government. The detailed breakdown of tax revenues by impact type and jurisdiction are shown in Table 10.

Table 10: Tax Revenues from the Construction and Operation of Project

	Local Government	State Government	Federal Government
Direct Impacts	$25,787,000	$9,801,000	$15,933,000
Indirect Impacts	$1,043,000	$466,000	$1,457,000
Induced Impacts	$923,000	$369,000	$840,000
Total Impacts	**$27,753,000**	**$10,637,000**	**$18,230,000**

Source: IMPLAN 2019 Data for model region including Harrison County, Ohio.

Note: Values are rounded to the nearest thousandth.

Under the Qualified Energy Project Tax Exemption program supported by the Ohio Development Services Agency, the Project is granted an exemption from the public utility tangible personal property tax. Large projects (above 20 mega-watts) require approval from each Board of County Commissioners in which the project is located. In addition, these large projects require agreements to train and equip local emergency responders, repair roadway infrastructure following the construction of the project, hire Ohio residents to make up at least 80 percent of employees, and develop apprentice programs with the state university system. Under the PILOT (payment in lieu of taxes) provision, the lessee of the property makes an annual service payment in lieu of taxes to the county treasurer based on the nameplate capacity of the facility. Since the PILOT program payments would be collected in the county government's general fund, without an allocation for specific economic development or infrastructure programs, the economic impact of those payments cannot be determined. Therefore, the PILOT program payments are represented in the local government revenues shown in Table 10.

6.3 ESTIMATED PAYMENTS IN LIEU OF TAXES

The analysis assumes the Applicant would execute a PILOT agreement, which would require annual PILOT payments to Harrison County. A payment rate of $7,000/$MW_{AC}$ over the operations phase was assumed. Based on the maximum Facility capacity of 100 MW_{AC}, the PILOT amount is expected to average approximately $700,000 annually over the 30-year operations phase in the analysis for a total of $21,000,000 in nominal dollars.

7 CONCLUSION

The socioeconomic effects of the Project, 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 tax revenues will benefit private landowners, project site employees, businesses, and taxing jurisdictions. The Project 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.

- The construction of the Project includes [redacted] in construction labor costs and [redacted] in costs for construction services and materials.
- The operation and maintenance of the proposed Project are estimated to support 16.5 FTEs with estimated annual wages and salaries of [redacted]. Average wage rates are projected to be [redacted] per hour.
- Total annual economic output in the region associated with the facility operations is estimated at $11.7 million, with $1.1 million of economic output related to indirect and induced impacts.
- Operation of the Project will result in payment to local landowner in association with the lease agreements executed to host Project components. It is estimated that these payments will average approximately [redacted] on an annual basis over the operations period of the Project. The Project will also generate lease payments during the construction phase, generating a beneficial impact on the local economy during construction.
- Over the construction and 30-year operations period, the Project is estimated to generate over $38.4 million in additional tax revenues for local, county and state governments, along with approximately $18.2 million for the federal government.
- Based on the maximum Facility capacity of 100 MW_{AC} and the payment rate of $7,000/$MW_{AC}$, the PILOT amount is expected to average approximately $700,000 annually over the 30-year operations phase in the analysis for a total of $21,000,000 in nominal dollars.

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