

Appendix W
Socioeconomic Report from EDR,
January 2017

Socioeconomic Report

Icebreaker Wind

Lake Erie, City of Cleveland

Cuyahoga County, Ohio

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EXECUTIVE SUMMARY

This socioeconomic report is prepared in support of the proposed Icebreaker Wind-Powered Electric Generation Facility (“the Project”), an offshore demonstration wind-powered generating Facility in Cuyahoga County of the state of Ohio (see Figure 1: Regional Context Map). The Project consists of six offshore turbines 8 to 10 miles off the coast of Cleveland in Lake Erie, with a transmission line extending to the Cleveland Public Power (“CPP”) Lake Road substation. The Applicant entered a 50-year submerged lands lease (SLL) with the State of Ohio. The SLL covers the proposed turbine sites, the cable right-of-way, and the Project Substation situated within the CPP Substation. The leased area for the Facility consists of 0.4 acre for the substation and 4.2 acres for the six turbine sites. The leased area for the cable right-of-way consists of a 100-foot-wide strip along the approximately 12-mile cable route (inter-array cables and the export cable). The Applicant also leased a small area (under 1 acre) from Great Lakes Towing to serve as its Operations and Maintenance Center. The CPP Substation site is located within a 5-mile radius of seven nearby municipalities in Ohio (see Figure 2: Local Context Map). The Project has an installed capacity of 20.7 megawatts (MW) and will deliver up to 75,000 MW-hours of electrical power to the regional power grid. Construction is scheduled to begin in 2018.

The focus of this report is to assess the potential socioeconomic impacts of this Project on local municipalities within a 5-mile radius from the CPP Substation Site (“the Study Area”). This involves a review of the past and current demographic and economic characteristics and trends in the Study Area, which includes seven municipalities, and (where applicable) those of the greater region. The regional economy surrounding the Study Area is shaped in large part by the local economy of the Cleveland metropolitan areas located within Cuyahoga County, as well as other areas in northern Ohio and further afield. Potential impacts including those to employment, earnings, and overall economic output resulting from Project construction and operation are assessed in light of socioeconomic conditions within the Study Area.

In short, the Icebreaker Wind-Powered Electric Generation Facility is expected to produce a 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 each participating taxing jurisdiction, the Project will supply a revenue stream to each of these jurisdictions without requiring significant services or expenditures on their behalf.

Part I: Introduction

This socioeconomic report is prepared in support of the proposed Icebreaker Wind-Powered Electric Generation Facility (“the Project”), an offshore demonstration wind-powered generating Facility in Cuyahoga County of the state of Ohio (see Figure 1: Regional Context Map). The Project consists of six offshore turbines 8 to 10 miles off the coast of Cleveland in Lake Erie, with a transmission line extending to the Cleveland Public Power (“CPP”) Lake Road substation. The Applicant entered a 50-year submerged land lease (SLL) with the State of Ohio. The SLL covers the proposed turbine sites, the cable right-of-way, and the Project Substation situated within the CPP Substation. The leased area for the Facility consists of 0.4 acre for the substation and 4.2 acres for the six turbine sites. The leased area for the cable right-of-way consists of a 100-foot-wide strip along the approximately 12-mile cable route (inter-array cables and the export cable). The Applicant also leased a small area (under 1 acre) from Great Lakes Towing to serve as its Operations and Maintenance Center. The CPP Substation site is located within a 5-mile radius of seven nearby municipalities in Ohio (see Figure 2: Local Context Map). The Project has an installed capacity of 20.7 megawatts (MW) and will deliver up to 75,000 MW-hours of electrical power to the regional power grid, and construction is scheduled to begin in 2018.

This analysis examines estimated impacts to the local population and economy generated from the construction and operation of the Project. It includes a review of existing demographic and economic characteristics in the area, as well as several trends affecting both. When such comparison is informative, state and federal demographic and economic data are also included. Unless noted otherwise, the Study Area for this report includes the following seven municipalities in Cuyahoga County; all of which are found wholly or partially within a 5-mile radius of the Facility Substation, which is located within the Project area:

- City of Cleveland
- City of Cleveland Heights
- City of East Cleveland
- City of Shaker Heights
- Village of Bratenahl
- Village of Cuyahoga Heights
- Village of Newburgh Heights

Part II of this report provides an examination of population trends within the Study Area, from 1990 through 2010, including projected population growth through 2030. In addition, Part II provides data regarding the civilian labor force for 2015 by county and impacted cities (latest data available). Part III 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 IV describes the methods of analysis of potential economic benefits provided within this report, including an overview of the Job and Economic Development Impact (JEDI) Wind Model. This is followed by the JEDI results (Part V), 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 wind farm land leases. Part VI reviews potential

impacts of the Project from the perspective of local taxing jurisdictions. The findings of this report are summarized in Part VII, which is followed by a bibliography of cited sources in Part VIII.

Part II: Socioeconomic Profile

1. Population trends

As shown in Table 1, the total population of Cuyahoga County, which covers all the 5-mile radius of the Project was 1,280,122 in 2010, marking a decrease of 9% over the course of the previous two decades. The County's population decreased during each of the two decades between 1990 to 2010, with the sharpest decrease occurring between the years 2000 to 2010, at a rate of -8.2%. Population within the villages and cities mostly decreased from 2000 to 2010. Only the Village of Bratenahl experienced a population increase (+2%) over the same span. The City of Cleveland is the largest of the seven municipalities within a 5-mile radius of the proposed turbines and, along with the City of East Cleveland, has experienced the greatest decline of growth of all the affected municipalities (Table 2).

Table 1: Countywide Population Trends

County	1990 Population	2000 Population	2010 Population	% Change 1990-2010
Cuyahoga County	1,412,140	1,393,978	1,280,122	-9.3%

Source: U.S. Census Bureau, Decennial Census

For the purposes of this report, the trends experienced by each community from 2000 to 2010 are expected to continue regardless of whether the proposed Project is built. Over the next decade, the population within the Study Area is projected to decrease by 27% from 2020 to 2030, from 439,047 to 370,169. Meanwhile, county population projections are only expected to decline 8% between the same time span, from 1,209,550 in 2020 to 1,179,030 in 2030 (Table 2).

Table 2: Population Projections

Jurisdiction within 5-Miles Radius of Facility	2000 Pop.	2010 Pop.	% Change 2000-2010	Est. 2020 Pop.	Est. 2030 Pop.	% Change 2010-2030
Cuyahoga County	1,393,978	1,280,122	-8.2%	1,209,550	1,179,030	-8%
City of Cleveland	478,403	409,221	-14%	350,043	290,866	-29%
City of Cleveland Heights	49,958	46,797	-6%	43,836	40,875	-13%
City of Shaker Heights	29,405	28,458	-3%	27,541	26,625	-6%
City of East Cleveland	27,217	19,426	-29%	13,865	8,304	-57%
Village of Cuyahoga Heights	599	547	-9%	500	452	-17%
Village of Newburgh Heights	2,389	2,108	-12%	1,860	1,612	-24%
Village of Bratenahl	1,337	1,369	2%	1,402	1,435	5%
Total ¹	589,308	507,926	-14%	439,047	370,169	-27%

¹ Totals calculated by formula, may reflect rounding errors

Source: U.S. Census Bureau, 2016 (2000 and 2010 population figures), Ohio Development Services Agency (2020 and 2030 projections for Cuyahoga County), Municipality projections based on their respective 2000-2010 growth rates

Although construction employment related to the construction of the Project 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 Project 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 Project is discussed in further detail below.

2. Employment statistics

Table 3 illustrates the size of the local labor force in cities located either wholly or partially within 5 miles of the proposed Facility, as well as the broader Cuyahoga County and State of Ohio. The total annual unemployment rate for Cuyahoga County has been relatively consistent with that of the state over the last two years. Annual average unemployment rates have decreased both state-wide and county-wide from 2013 to 2015.

Table 4 illustrates employment in Cuyahoga County broken down by sector for 2014 (latest data available at time of writing).

Table 3: Local Labor Force and Unemployment

Place	Labor Force	Employed	Unemployed	Unemployment rate	Unemployment rate, 2014 (annual)	Unemployment rate, 2013 (annual)
Cuyahoga County	610,000	579,500	30,500	5.0	6.2	7.0
State total	5,700,000	5,423,000	277,000	4.9	6.2	7.5

Note: Not Seasonally Adjusted; Source: U.S. Bureau of Labor Statistics, 2015.

Table 4: Employment and Payroll by NAICS Sector in Cuyahoga County

NAICS code description	Paid employees for pay period including March 12, 2014	First-quarter payroll (\$1,000)	Annual payroll (\$1,000)	Total establishments
Total for all sectors	664,773	8,386,436	33,123,486	33,016
Agriculture, Forestry, Fishing and Hunting	7	53	284	4
Mining, quarrying, and oil and gas extraction	c	D	D	13
Utilities	g	D	D	37
Construction	18,865	245,150	1,217,312	1,977
Manufacturing	69,685	1,109,037	4,338,234	1,811
Wholesale trade	39,107	597,972	2,405,537	2,323
Retail trade	62,232	365,641	1,534,962	4,262
Transportation and warehousing	17,422	209,500	839,754	793
Information	13,931	232,766	889,751	533
Finance and insurance	45,335	1,082,683	3,671,479	2,622
Real estate and rental and leasing	15,330	222,299	804,169	1,544
Professional, scientific, and technical services	40,735	684,135	2,912,475	4,014
Management of companies and enterprises	30,098	851,856	2,697,960	329
Administrative and support and waste management and remediation services	43,286	321,610	1,389,774	1,870
Educational services	30,595	196,006	814,393	510
Health care and social assistance	141,315	1,671,570	6,962,513	3,601
Arts, entertainment, and recreation	10,375	130,713	729,613	423
Accommodation and food services	56,795	217,643	928,508	3,034
Other services (except public administration)	27,681	198,250	822,274	3,273
Industries not classified	58	374	1,662	43

a: 0-19 employees

b: 20-99 employees

c: 100-249 employees

f: 500-999 employees

g: 1,000-2,499 employees

h: 2,500-4,999 employees

D: Withheld to avoid disclosing data for individual companies; data are included in higher level totals.

Source: U.S. Census Bureau, 2014

Part III: Regional Development Impacts

The regional economy surrounding the Study Area is shaped in large part by the metropolitan economy of Cuyahoga County including but not limited to the City of Cleveland. Although the post-industrial economy within this region has seen significant changes in the past several years, the area has made substantial progress toward stabilization and growth as it emerges from the recent recession. The regional context for the development of this Project 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 Project with regional developmental goals and plans is reviewed.

1. Housing

As with all sectors of the economy, the housing market throughout the region has felt the impact of population loss. In the local region, the housing unit vacancy rate is higher for rental properties than those that are owner-occupied. Owner-occupied vacancy rates in this region are slightly higher than the statewide average (0.3% higher), while the 8.5% rental vacancy rate in Cuyahoga County is substantially higher than the statewide average of 7.2%.

Table 5: Study Area Housing Characteristics, 2014

County/ State	Total housing units	Occupied units	Vacant units	Vacancy rate		Median housing value of owner-occupied units	Median gross rent	% of households with gross rent > 35% of household income
				Home-owner	Rental			
City of Cleveland	212,269	166,650	45,619	3.3%	8.0%	\$73,100	\$661	49.6%
City of Cleveland Heights	22,157	19,530	2,627	2.8%	9.1%	\$129,200	\$853	40.1%
City of East Cleveland	12,689	7,982	4,707	4.2%	17.6%	\$65,100	\$593	58.8%
City of Shaker Heights	12,882	11,447	1,435	3.6%	8.6%	\$217,600	\$929	40.3%
Village of Cuyahoga Heights	258	229	29	1.2%	15.7%	\$138,400	\$756	41.3%
Village of Newburgh Heights	1,050	883	167	0%	6.9%	\$76,000	\$701	44.6%
Village of Bratenahl	813	660	153	2.4%	18.0%	\$264,500	\$1,183	35.4%
Cuyahoga County	619,863	534,721	85,142	2.3%	8.5%	\$123,300	\$736	44.1%
Ohio statewide	5,135,173	4,570,015	565,158	2.0%	7.2%	\$129,600	\$729	41.1%

Source: U.S. Census Bureau, American Community Survey 5-Year Estimates 2010-2014

Cuyahoga County features a median \$736 monthly gross rent level, which is above the statewide average of \$729/month, and a higher proportion of renters whose rent accounts for more than 35% of their household income (44.1%). In addition, Cuyahoga County's median housing value is below the statewide average of \$129,600, with the County featuring a measure at \$123,300.

It is estimated that more than 85,142 housing units within Cuyahoga County are currently vacant. Given these figures, in addition to the population projections discussed in Part II of this report, it is not expected that the development of the Project will have a significant impact on the regional housing market. While the Project development may not represent a widespread boom for rental property owners, it is worth noting that the availability of vacant rental housing also indicates that the Project should not have a destabilizing effect on current renters.

2. Commercial and Industrial Development

The diversification of Ohio's energy portfolio will have significant and positive economic impacts beyond a reduced dependence on coal imported from outside of the state. The Environment Ohio Research & Policy Center estimated that if the State of Ohio increased wind power production to 20% of the state's total energy portfolio by 2020, such development would create 3,100 permanent, full-time positions within the state, and result in cumulative wages totaling \$3.7 billion. This same analysis estimated that such a commitment would result in an increase in gross state product of approximately \$8.2 billion by 2020 (Environment Ohio, 2007).

These impacts are principally due to the impact of wind energy development on the manufacturing sector. The State of Ohio is uniquely positioned to take advantage of advanced manufacturing opportunities for the development and distribution of wind power technology, according to the Renewable Energy Policy Project's (2004) report, "Wind Turbine Development: Location of Manufacturing Activity." This analysis estimates that if the United States were to invest \$50 billion into 50,000 MW of new wind power production, Ohio manufacturers could stand to create 11,688 jobs in wind turbine and related manufacturing, accounting for 3.9% of the total investment; by way of comparison, the American Wind Energy Association estimates that the State of Ohio alone has enough wind resources to generate nearly 359 MW at 80m hub height and 110,439 MW at 110m hub height of onshore wind energy (AWEA, 2015). Additionally, the National Renewable Energy Laboratory (NREL) estimates that the state of Ohio has enough wind resources to generate 9,237 gigawatts (GW) at 90 m hub height (Schwartz et al., 2010).

The Environmental Law & Policy Center estimated that the State of Ohio is currently home to 106 wind power supply chain businesses, providing 1,000 to 2,000 jobs throughout the state (ELPC, 2011). Wind energy technology manufacturing opportunities include rotors, controls, drive trains, generators, and towers. Several of these manufacturers and other wind power-related businesses are located in the Greater Cleveland Region (AWEA, 2015).

Specific short- and long-term economic impacts of this Project 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 Project area features numerous Interstate, U.S, and State highways, as well as county and local roadway networks, in addition to freight rail lines and small airports. These facilities are described in further detail below.

The main transportation route to the Project area is Interstate 90 (Cleveland Memorial Shoreway/Innerbelt), which runs adjacent to the CPP Substation Site. US Route 20/State Route 2 (which is the western branch of the Cleveland Memorial Shoreway) runs adjacent to the Port of Cleveland, the location of the Operations and Maintenance Center, and main port to the turbines. Interstates 77 and 71 converge near the Project area downtown from the south and southwest, respectively. US Routes 480 and 271 provide bypass routes that avoid the congestion near downtown Cleveland. These and other primary routes facilitate transportation between the Project area and the surrounding metropolitan areas. The City of Cleveland is accessed via I-90 from the east and the west; Interstate 77 from the south; and Interstate 71 from the southwest.

Workers coming to and from the site will most likely enter via Interstate 90 and, if bound for the Operations and Maintenance Center, US Route 20/State Route 2. Construction traffic bound for the substations will likely use Exit 175 as the primary route, while traffic bound for the Operations and Maintenance area will most likely use the W 45th St exits off of US Route 20/State Route 2. The proposed Project is not expected to cause any substantial disruption to major transportation corridors serving the Study Area, as most transportation of turbine components and equipment will occur via barge.

Due to its proximity to the Port of Cleveland and other major Great Lakes ports, the proposed Project is well-positioned to take advantage of barge transportation where necessary or appropriate. There are three known shipping channels within the Study Area, two of which cross over the underwater transmission cable that connects the turbines to the substations. Because the transmission cable will be buried, it is not anticipated to cause disturbance to shipping commerce. Nearly all of the project suppliers will be shipping via barge.

Freight rail lines connect several of the municipalities throughout the Study Area, nearly all converging near the site of the Operations and Maintenance Center in downtown Cleveland. CSX and Norfolk Southern operate the majority of Ohio's freight rail system, although smaller operators such as Amtrak, Rail America and the Wheeling & Lake Erie

Railway also operate in the area. Study Area municipalities connected to freight rail lines include the Cities of Cleveland and East Cleveland and the Villages of Bratenahl and Cuyahoga Heights. The rail system may be used for the transportation of a very small number of turbine component and equipment suppliers, but the Applicant does not anticipate making any modifications to the system.

The Study Area is also in proximity to the Cleveland Hopkins International Airport and the Cleveland Burke Lakefront Airport, the closest airport facilities to the proposed Project. Construction and operation of the Project will be designed according to Federal Aviation Administration (FAA) standards and are not expected to result in any adverse impacts to the regional air transportation network. The Applicant will file a notice of proposed construction or alteration (Form 7460-1) with the FAA to confirm the structure will not result in a substantial adverse impact.

4. Regional Plan Compatibility

Many, but not all, of the municipalities within the Study Area have adopted comprehensive land use plans. Others have adopted city- or village-wide strategic economic development plans.

- In the City of Cleveland, the Connecting Cleveland 2020 Citywide Plan was adopted in 2007, and charts Cleveland's general plan for growth throughout its neighborhoods. The citywide plan does not change land use regulations directly, but rather serves to articulate goals and objectives that guide the City on decisions related to zoning, development, and capital improvements. The Facility is compatible with the City's existing land use, as the upland components of the Facility occur on existing transportation, industrial and public utility lands (City of Cleveland, 2007a; City of Cleveland, 2007b). It is noted that the proposed plan identifies a proposal to transform the parcel containing the CPP substation site into a Recreation/Open Space (City of Cleveland, 2007a), however, given the historic and existing use of the parcel as a Public Utility this incompatibility is not severe nor does it impede the surrounding area to be developed into Recreation and Open Space. Additionally, the Project is compatible with the plan's regional economic development goal to "discuss with surrounding communities the possibility of collaboration on the construction of an alternative-power generation station, such as a wind farm, biomass-fueled furnace, or fuel cell utility, whose output could be used to lower energy costs for all partnering communities and to allow for low-cost energy to be used as an economic development tool" (City of Cleveland, 2007c). In 2008, the year following the adoption of the 2020 Citywide Plan, the City of Cleveland adopted a citywide Advanced Energy Portfolio Standard, which stipulated that 15% of Cleveland Public Power comes from advanced or renewable sources by 2015, 20% by 2020 and 25% by 2025 (City of Cleveland, 2016). In 2009, the City updated the zoning code regulations to guide the development of turbines within any zoning district of the city (City of Cleveland, 2016). Although the wind turbines of this project are not located within the city boundaries, this project is complementary to

Cleveland's renewable energy policies, comprehensive planning efforts, and its position as a "leader in advanced energy generation" (City of Cleveland, 2016).

- In 2003, the City of East Cleveland Master Plan was adopted by the Council of the City of East Cleveland as "a comprehensive process designed to develop a unified vision of East Cleveland's future and the steps that need to be undertaken to make that vision a reality" (City of East Cleveland, 2003). The citywide plan does not change land use regulations directly, but rather serves to articulate goals and objectives that communities within the city, be it public or private, can act upon in updating zoning, subdivision, or other local ordinances. The Project is compatible with the following Master Plan goal: "strengthening employment and economic development opportunities" (City of East Cleveland, 2003).
- The 2011 City of Cleveland Heights Strategic Development Plan "provides perspective on how best to plan for, encourage and prioritize future development and community initiatives in conjunction with private investments" (City of Cleveland Heights, 2011). The plan prioritizes initiatives that "increase population, average household income and commercial tax revenue while maintaining the City's affordable housing options" (City of Cleveland Heights, 2011). The Project is compatible with those goals by providing PILOT payments to the City, as well as job opportunities in close proximity to the City.
- The City of Shaker Heights' most recent citywide economic plan, the Strategic Investment Plan, was finalized in July 2000, and was designed to "advise the City on how to best leverage its limited assets to encourage appropriate private investment, and to ensure that Shaker Heights remains one of the premier communities in the country" (City of Shaker Heights, 2000). The plan prides the City on the current state of economic diversity and prioritizes economic stability and economic development that enhances its role as an extremely desirable and highly prized residential community (City of Shaker Heights, 2000). This Project is compatible with that goal by providing economic opportunity to local residents and providing job opportunities within proximity to its housing stock.
- The Village of Cuyahoga Heights Master Plan Update was adopted in 2013 to "review the goals, policies and strategies of the 2002 Plan, keeping in mind current conditions and trends, and adjust, refine or expand as necessary" (Village of Cuyahoga Heights, 2013). The citywide plan does not change land use regulations directly, but rather serves to articulate goals and objectives that communities within the city, be it public or private, can act upon in updating zoning, subdivision, or other local ordinances. Included within the economic goals is to broaden and diversify the industrial base and to promote locational advantages and business opportunities, both of which are compatible with the proposed Facility.
- In 2012, the Village of Newburgh Heights Comprehensive Plan Update was adopted by the Village Council to provide a number of physical plan recommendations, to clarify planning policy related to overall community development and to recommend policy related to specific plan elements such as land use. The proposed Facility is compatible with these land use goals, specifically with regard to long-term strategies for government

investment for economic development and diversification of the industrial base (Village of Newburgh Heights, 2012).

- In 2013, the Village of Bratenahl adopted a Strategic Master Plan to provide a community investment and development framework to guide decision-making by local officials. The Facility is compatible with the Village's goals to develop community investment strategies that address its challenges in strengthening the local financial resource base and in investing in public facilities that bring new revenues to the community (Village of Bratenahl, 2013).

At the county level, Cuyahoga County adopted an Economic Development Plan in May 2011 as required by County Charter. This 5-year plan was drafted by the Cuyahoga County Department of Development and submitted to County Council. The Plan was created to “improve the County’s global competitiveness through economic growth and ensure that Cuyahoga County is a vibrant, healthy and welcoming place” (Cuyahoga County, 2011). This strategy identifies offshore wind energy as a key industry cluster and an asset for economic development initiatives. Wind energy development is specifically listed as a likely growth sector within the strategy, and wind energy projects are highly prioritized. The development of the proposed Project is compatible with this Economic Development Strategy in a number of ways. In terms of economic development, the Facility offers an opportunity for the use of local goods and services, including but not limited to labor, equipment, maintenance and supply-chain manufacturing. This plan has been updated annually by the Cuyahoga County Planning Commission, incorporating place-based research and analysis focused on developing economic strategy areas. While no Facility components are located within the most recent plan’s strategy areas (Cuyahoga County, 2015), the Project does help to diversify the region’s energy resource portfolio, adding resilience and reliability to the supply of energy resources to local businesses and homeowners (Cuyahoga County, 2016).

The Project area is largely urban and suburban, featuring developed land use patterns; however, the actual proposed turbines are exclusively limited to underutilized industrial or submerged land. Many of these Facility areas are located within the City of Cleveland, which features industrial zoning laws compatible with the proposed substations and port.

5. Concurrent or secondary uses

The waterways in the Study Area experience traffic from a variety of both commercial and recreational vessels. Both commercial and recreational vessels operate in increased numbers during the boating season. There are three known shipping channels within the Study Area, two of which cross over the underwater transmission cable that connects the turbines to the substation. Because the transmission cable will be buried, it is not anticipated to cause disturbance to commercial shipping or recreational boating. Pending final decision from the US Coast Guard, the public will be

excluded from the turbine platforms and other Facility components due to safety concerns expressed by the Department of Homeland Security.

Part IV: Measuring Economic Impacts

1. Calculating Economic Benefits

Quantifying the economic impacts of the proposed Icebreaker Wind-Powered Electric Generation Facility is essential to understanding the potential benefits that the Project could have on the local economy. Wind 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 phases of the wind farm is subsequently used to purchase local goods and services, creating a ripple effect throughout the local economy. This report analyzes three levels of impact that the proposed Project may have on the economy:

- **On-site labor impacts:** These are the direct impacts experienced by the companies 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.
- **Local revenue 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). Indirect measures account for the demand for goods and services such as turbine components, project analysis, legal services, financing, insurance, etc.
- **Induced impacts:** Induced impacts measure the estimated effect of increased household income resulting from the project. 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, on household goods, entertainment, food, clothing, transportation, etc.

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 facility development. These positions are measured across each level of impact, so 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 development. Persons employed for less than full time or less than a full year are included in this total, each representing a fraction of a FTE position (e.g. a half-time, year-round position is 0.5 FTE).

- **Earnings:** This measures the wages earned by 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 line, concrete, or motor vehicle fuel to the Project sponsor.

2. Methodology

To quantify the local economic impacts of constructing and operating the Icebreaker Project, the Job and Economic Development Impact (JEDI) model (version OSW08.19.16) was used, which was created by the National Renewable Energy Laboratory (NREL), a facility of the United States Department of Energy. The JEDI model requires project-specific data input (such as year of construction, size of project, turbine size and location), and then calculates the impacts described above through the use of 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 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 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 commercial wind farm scheduled to begin construction in 2018 with a rated capacity of 20.7 MW and an assumed six turbines on monopile foundations at an average depth of 19 meters, sized at 3.45 MW, located 15 km from port and 16 km from landfall and connected to two substations. The results of this 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 Project on industries throughout the state, including the on-site labor impacts that occur specifically within the local economy.

Table 6: Local Economic Impacts

During Construction Period	Jobs	Earnings	Output
Construction and Interconnection Labor	105	\$14.7	
Construction Related Services	54	\$9.1	
Subtotal Project Development and Onsite Labor Impacts	159	\$23.8	\$31.2
Turbine and Supply Chain Impacts	187	\$10.2	\$33.4
Induced Impacts	150	\$7.2	\$20.9
Total Construction Impacts	496	\$41.2	\$85.5
During Operating Years (Annual)	Jobs	Earnings	Output
Onsite Labor Impacts	9	\$0.6	\$0.6
Local Revenue and Supply Chain Impacts	11	\$0.7	\$5.0
Induced Impacts	8	\$0.4	\$1.1
Total Annual Operational Impacts	28	\$1.6	\$6.7

Notes: Earnings and Output values are millions of dollars in 2016 dollars. Totals may not add up due to independent rounding. Results are based on model default values.

Source: NREL JEDI Model (version OSW08.19.16) (USDOE NREL, 2016)

Part V: Economic Impact on the Local Economy

1. New Jobs in the Local Economy

Demand for new jobs associated with the Project Icebreaker Wind-Powered Electric Generation Facility will be created during both the initial construction period and the years following construction, in which the Project 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

Based upon JEDI model computations, it is anticipated that construction of the proposed Project will directly generate employment of an estimated 159 on-site construction and project development personnel. Turbine manufacturing and supply chain industries could in turn generate an additional 187 jobs over the course of Project construction. In addition, Project construction could induce demand for 150 jobs through the spending of additional household income. The total impact of 496 new jobs could result in up to approximately \$41.2 million of earnings, assuming a 2018 construction start and wage rates consistent with statewide averages. Project construction labor wages for similar construction positions within the Cleveland region range from approximately \$14 for Pipefitters to \$31 per hour for First-Line Supervisors, and around \$51 per hour for Project Management occupations (Bureau of Labor Statistics, 2015). Local

employment will primarily benefit those in the construction trades, including equipment operators, barge drivers, laborers, and electricians. Project construction will also require workers with specialized skills, such as crane operators, turbine assemblers, specialized excavators, and high voltage electrical workers. It is anticipated that many of the highly-specialized workers will come from outside the area and will remain only for the duration of construction.

In addition to jobs and earnings, the construction of the Project 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 Project construction is estimated to be \$85.5 million. Between workers' additional household income and industries' increased production, the impacts associated with the Project are likely to be experienced throughout many different sectors of the statewide economy. Pursuant to Section 5727.75 of the Ohio Revised Code (ORC), the Project may qualify for tax incentives based on the degree to which it employs in-state construction labor (see Part VI). At the time of the publication of this report, it is not yet known what portion of construction labor will be Ohio-domiciled.

3. Local Economic Impact: Operations and Management

Based upon JEDI model computations, the operation and maintenance of the proposed facility are estimated to generate 9 full-time equivalent jobs with estimated annual earnings of approximately \$0.6 million. These FTE job positions are all anticipated to be administrative employees. Wage rates are projected to be \$24 per hour, consistent with statewide averages which are estimated to be around \$18 per hour for administrative personnel (Bureau of Labor Statistics, 2015).

Operations and maintenance 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. Increased employment demand throughout the supply chain is estimated to result in approximately 11 jobs with annual earnings of around \$0.7 million. In addition, it is estimated that 8 jobs with associated annual earnings of \$0.4 million will be induced through the increased household spending associated with Project operations. In total, while in operation, this Project is estimated to generate demand for 28 jobs with annual earnings of approximately \$1.6 million. Total economic output could also increase by an estimated \$6.7 million as a result of Project operations and maintenance.

4. Land Lease Payments

Each turbine installed as part of the Project Icebreaker Wind-Powered Electric Generation Facility will be placed on submerged County property in accordance with a lease agreement. In exchange for allowing the siting of turbines and transmission line on their land, the County will be compensated with annual lease payments totaling approximately

\$7,971.45 for the entire Project each year it is in operation. Additional area will be leased for an estimated \$60,000 annually from Great Lakes Towing to use as a docking location in the Port of Cleveland. This lease will continue for the entire Project each year it is in operation. The money from these payments, like the other expenditures associated with the Project, will be put back into the local economy by the County to the extent that they are spent on public services in the area and save on fees or taxes charged to local residents.

Part VI: Local Tax Revenues

1. Legislative Context

Wind 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 ORC. Operators of these exempted projects, known as qualified energy projects (QEP), are instead required to make annual payments in lieu of taxes (PILOT). In order 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 OAC must be submitted to the director of the Ohio Development Services Agency (ODSA) on or before December 31, 2020;
- an application under Section 4906.20 of the ORC must be submitted to the Ohio Power Siting Board (OPSB) on or before December 31, 2020;
- the county commissioners of a 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);
- at least 50% of the full-time equivalent construction and installation employees, as defined in Section 5727.75 of the ORC, must be Ohio-domiciled; and
- 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 into, whichever is earlier) must begin by January 1, 2021.

If an applicant is granted exemption from taxation for any of the tax years 2011 through 2021, the QEP will be exempt from taxation for tax year 2022 and all ensuing years if the property was placed into service before January 1, 2022. The amount of PILOT to be paid annually to the county treasurer, ranging from \$6,000 and \$8,000, is assessed per megawatt (MW) of nameplate capacity, with the rate dependent on the percentage of construction/installation employees who are domiciled in Ohio. The PILOT would be: \$6,000 per MW, if during construction the project employs 75% or more Ohio-domiciled employees; \$7,000 per MW, if during construction the project employs 60% or more Ohio-domiciled employees; and \$8,000 per MW, if during construction the project employs the minimum requirement of 50% or more Ohio-domiciled employees (Table 7). County commissioners may require an additional service payment, as long as the total of the additional payment and the PILOT do not exceed \$9,000 per MW.

Table 7: Service Payment per Megawatt Schedule

Annual Service Payment per Megawatt of Nameplate Capacity	Ratio of Ohio-Domiciled Full-Time Equivalent Employees
\$6,000	75% or More
\$7,000	60% to 74%
\$8,000	50% to 59%

2. Estimated Payments In Lieu Of Taxes

Turbines for Project Icebreaker are anticipated to be located in a total of one municipality (City of Cleveland) and one school district (Cleveland Municipal School District) within Cuyahoga County. Table 8 displays the total estimated PILOT revenues to be distributed throughout all taxing jurisdictions under the three scenarios identified in the payment schedule in Section 5727.75 of the ORC.

Table 8: Estimated Total PILOT Revenue

Total Project capacity	PILOT at \$6,000/MW	PILOT at \$7,000/MW	PILOT at \$8,000/MW	PILOT at \$9,000/MW
20.7	\$124,200	\$144,900	\$165,600	\$186,300

Part VII: Conclusion

The socioeconomic effects of the Project Icebreaker Wind-Powered Electric Generation Facility, when assessed in light of regional and local 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 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.

1. Total Local Economic Benefit

The construction of the Project Icebreaker Wind-Powered Electric Generation Facility is expected to produce \$41.2 million in employment earnings and \$85.5 million in total economic output. Subsequently, each year the Project is operational it is expected to generate approximately \$1.6 million in earnings and \$6.7 million in total economic output.

2. Local Employment Benefits

During the construction period, the Project is expected to support demand for a total of 496 onsite, supply chain, and induced employment positions. It is expected to support a total of 28 positions during each year of its operation.

3. Land Lease Revenues

The development of the Project will result in \$67,971.45 in annual lease payments made to participating landowners.

4. Property Tax Revenues

Construction of the proposed Project Icebreaker Wind-Powered Electric Generation Facility will increase local government revenues through payments in lieu of taxes (PILOTs). Though the agreements outlining these payments are not yet finalized, it is estimated that annual PILOT revenues could amount to approximately \$124,200 – \$186,300 to be distributed to local taxing jurisdictions.

Part VIII: References

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Figures

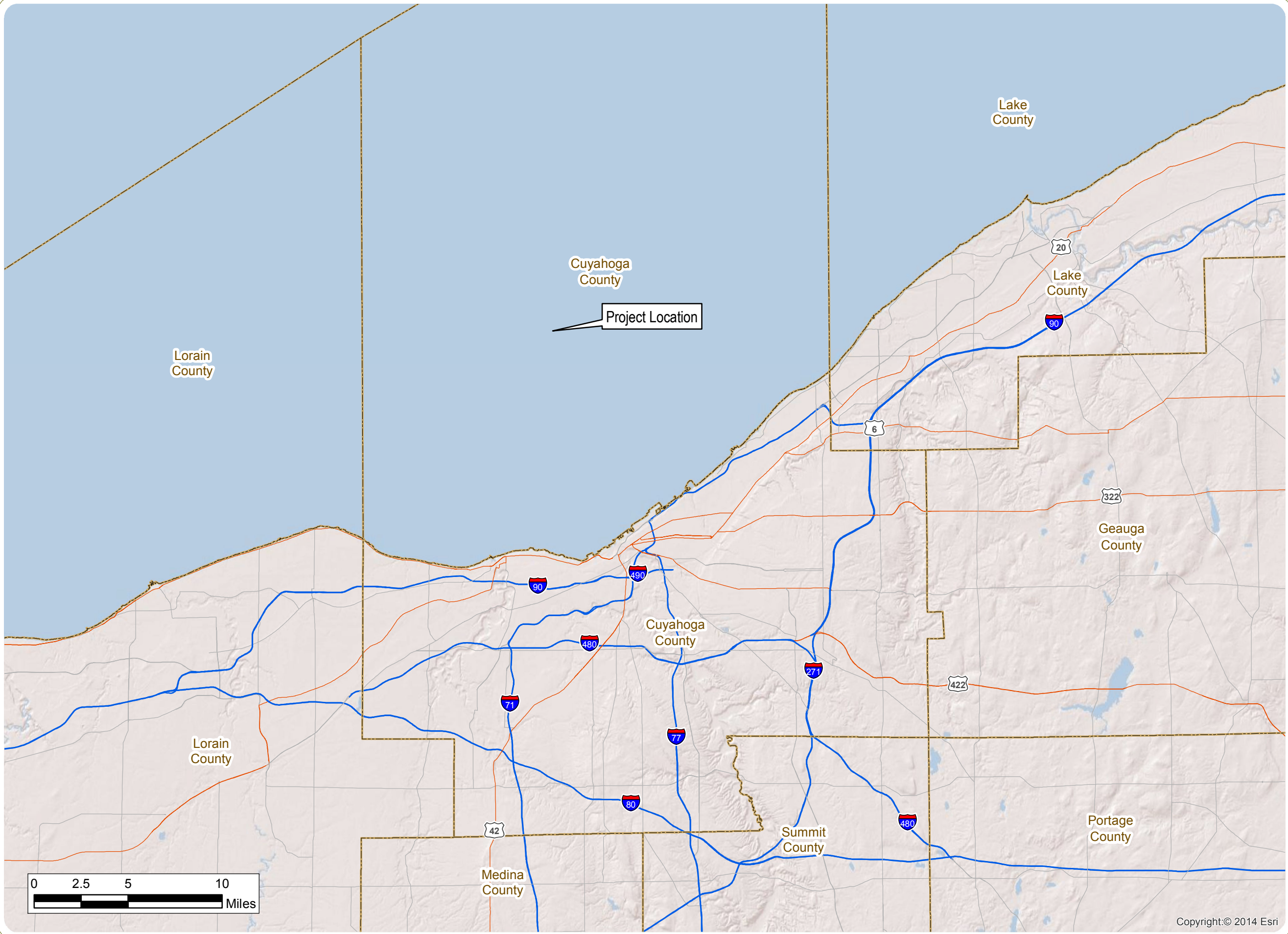
Project Icebreaker

Lake Erie, City of Cleveland
Cuyahoga County, Ohio

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Figure 1. Regional Context

January 2017



Notes:
1. Basemap: USS The National Map
"USGS Topo" Map Service Layer.
2. This is a color graphic. Reproduction in
grayscale may misrepresent the data.

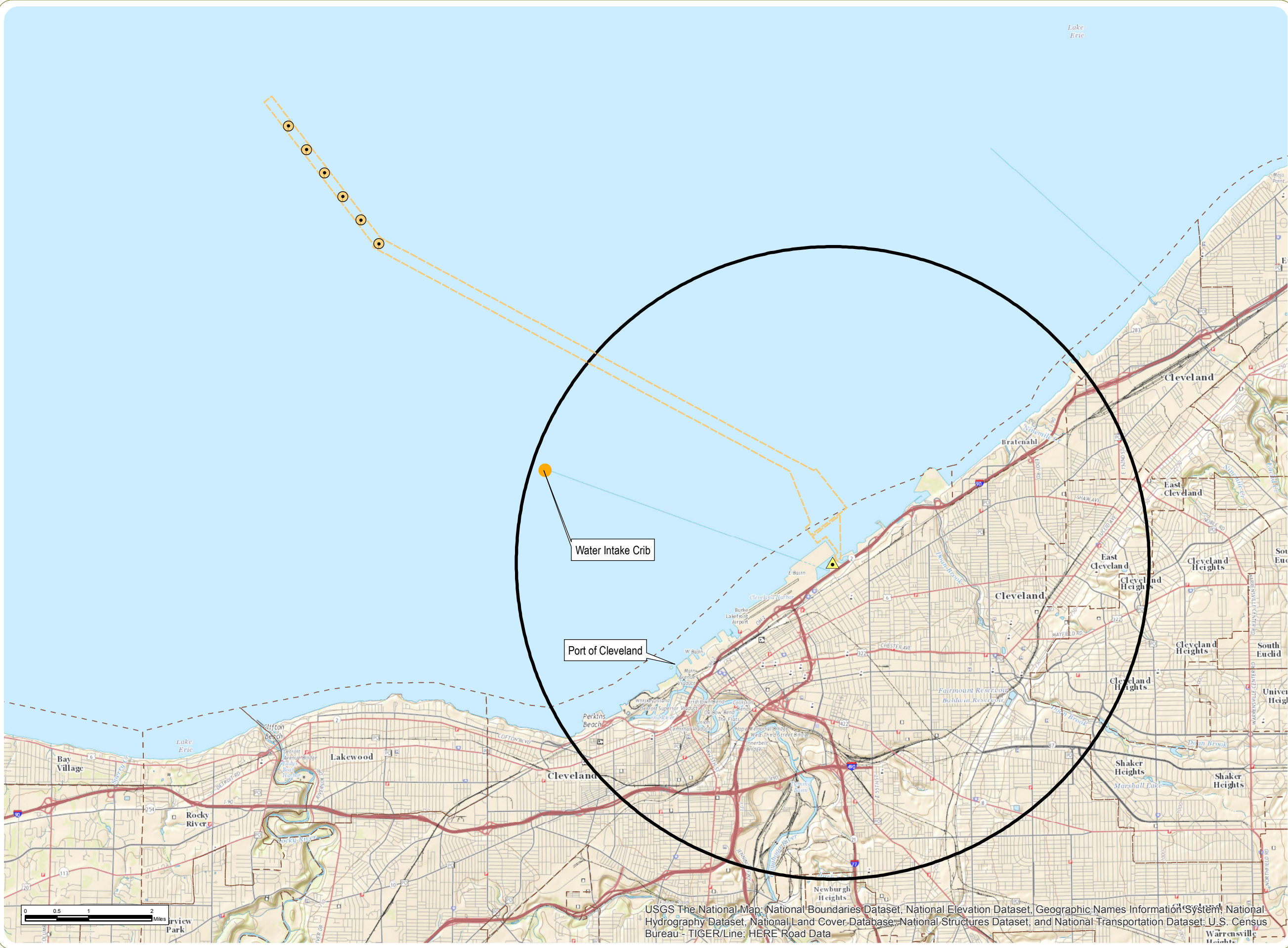


Project Icebreaker
Lake Erie, City of Cleveland,
Cuyahoga County, Ohio

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Figure 2. Local Context

January 2017



- Primary Turbine
- Primary Water Intake Crib
- Cleveland Public Power Substation
- Electric Collection Line Envelope
- Study Area: 5 Miles from Substation
- Municipal Boundaries

Notes:
1. Basemap: USS The National Map "USGS Topo" Map Service Layer. North America, 2008.
2. This is a color graphic. Reproduction in grayscale may misrepresent the data.



USGS The National Map; National Boundaries Dataset; National Elevation Dataset; Geographic Names Information System; National Hydrography Dataset; National Land Cover Database; National Structures Dataset; and National Transportation Dataset; U.S. Census Bureau - TIGER/Line; HERE Road Data