Exhibit F.

Geology, Hydrogeology, and Geotechnical Report

6011 Greenwich Windpark, LLC

Project Approach

The Desktop Review was completed to gather that applicable geologic, hydrogeological, and geotechnical information specified in the Ohio Power Siting Board's current OAC rules (Chapter 4906-17, effective date May 7, 2009) concerning the preparation of a certificate application to site a wind-powered electric generation facility. The information was gathered by completing a literature search of existing and readily available documents related to the hydrological and geotechnical conditions of the study area. This information was reviewed and generalized to form an understanding of the conditions for the proposed construction within the Study Area. The information summarized below was obtained from available on-line databases and/or documents maintained or produced by the following federal, state, and/or local agencies.

1. Federal Emergency Management Administration (FEMA)
2. Ohio Department of Agriculture (ODA)
3. Ohio Department of Natural Resources (ODNR)
4. Ohio Environmental Protection Agency (Ohio EPA)
5. United States Department of Agriculture (USDA) Soil Conservation Service Soil Survey of Huron County
6. United States Geological Survey (USGS)

No environmental studies or structural evaluations were performed as part of this scope of work, and therefore no recommendations relative to environmental or structural issues are included in the report.

FACILITY LOCATION

As shown in Figure 1, the Facility is located east of the Village of Greenwich in Huron County, within Greenwich Township. The Study Area encompasses the whole Project Area, show in Figure 1 and subsequent figures discussed below.

INFORMATION REVIEW AND ANALYSIS

The following provides a summary of the information reviewed and its applicability to the proposed project.

Geology

In general, the geologic setting of the study area consists of unconsolidated glacial deposits overlying bedrock. Greenwich Township in Huron County lies within the Galion Glaciated Low Plateau Section of the Central Lowland Physiographic Province. The Galion Glaciated Low Plateau is a rolling upland transitional area between the gently rolling till plains and hilly glaciated Allegheny plateau. Surficial glacial materials within the district are of Late Wisconsinan-age (ODGS, 1998).

The majority of glacial deposits within the study area consist of clayey till in the form of end moraines, which occur as hummocky ridges higher than the adjacent terrain in the southern half of the study area and ground moraines, in the northern half, which are flat to gently undulating (Pavey et. Al., 1999).

The Galion Glaciated Low Plateau is mantled with thin to thick drift covering bedrock. Moderate relief is present in the district (100 feet) with ground elevations between 800-1400 feet above mean sea level (msl) (ODGS,1998). As shown in Figure 1, surface elevations of the study area range from a low of approximately 950 feet above msl in the northern section of the study area to 1180 feet above msl in the southernmost part of the study area.

Depth-to-bedrock within the study area was approximated based on information obtained from the ODNR water well drilling log database for wells installed within the study area. The approximated bedrock topographic surface is shown in Figure 2. Bedrock depths documented in the water well drilling logs in the vicinity of the project area range from 21 to 123 feet (Hartzell, 1986). Generalized geologic cross-sections are included as Figure 3 and illustrate the typical geologic setting along northwest-southeast (A-A') and southwest-northeast (B-B') transects across the study area. The cross-sections were prepared using data from sources including, but not limited to, ODNR well logs and bedrock topographic maps, pursuant to rule 4906-17-05(A)(4). The cross-sections show that depth to bedrock in the study area typically ranges from 20 feet to 70 feet. Cross-sections A-A' and B-B' show the presence of pre-glacial valleys buried by approximately 100 to 150 feet of glacial till. The western valley is present in both cross-sections, this valley is present in the southwestern corner of the Project area traveling northwest, the valley changes heading west of the Village of Greenwich, traveling northeast outside of the Project area before joining the buried valley east of the project area. Bedrock topographic highs are located in the southern part of Greenwich Township.

Bedrock underlying the project area is primarily shale and is present in the three units which form the bedrock surface in Greenwich Township. The oldest unit is the Berea Sandstone and Bedford Shale undivided of Upper Devonian and Lower Mississippian age, this unit makes up a portion of a buried pre-glacial valley east of the project area. The Berea Sandstone and Bedford Shale undivided unit is overlain by Sunbury Shale of Lower Mississippian age. Sunbury Shale makes up a significant portion of a buried pre-glacial valley west of the project area. Sunbury shale is very thinly laminated and carbon rich making it black in color. The overlying Cuyahoga Formation consists of thin to massive bedding of shale with interbedded sandstone, siltstone, and conglomerate. The Cuyahoga Formation is the youngest bedrock, of Lower Mississippian age and forms the bedrock surface of the project area, and significant portion of the buried pre-glacial valleys to the east and west of the project area.

The Project Area contains no known or probable karst formations. Karst formations are caused by the dissolution of soluble rocks and characterized by sinkholes, caves, and underground drainage systems. The nearest probable karst formation is in the northwestern corner of Huron County.

<u>Seismology</u>

A review of documented geologic structural and seismic information was conducted for the project area. Documented structural features and earthquake epicenters located within Ohio are shown on Figure 4. Seismic information was obtained from the ODNR, Division of Geological Survey, Ohio Seismic Network (Hansen, 2007). The study area contains no fault zones; the nearest fault zone is the Crawford faults located approximately 20 miles to the southwest. There have been 2 earthquake epicenters near the project area approximately 3 miles to the west in Ripley Township. In 1998 the larger of the 2 earthquakes occurred with a magnitude of 3.2, and then in 2001 a 2.7 magnitude earthquake occurred with the epicenter less than a mile to the southwest of the 1998 earthquake epicenter.

Hydrology and Hydrogeology

The project area is located within the Vermilion River drainage basin. Surface water flow is predominantly in a northern direction.

The Project Area was reviewed for the presence of any areas designated as a 100-year flood plain. Flood plain information for the Project area was obtained from the ODNR and FEMA, and is shown on Figure 1. It should be noted that as part of FEMA's Map Modernization program, which is designed to convert National Flood Insurance Maps to digital format, the 100-year floodplain shown is a published preliminary version that has been released for review purposes and is subject to change. Several 100-year floodplains are present outside of the project area but none are present inside the project area. The nearest 100 year floodplain to the project area is 250 feet from the nearest involved land owner property line and 1711 feet from proposed turbine number 2.

The principle groundwater source within the vicinity of the Project Area is the Mississippian sandstone and sandy shale bedrock aquifers. Water wells installed yield less than 10 gallons per minute. However drilling over 100 feet into Berea Sandstone can produce salt water or gas (Hartzell, 1986). Unconsolidated aquifers overlying the Mississippian bedrock aquifer in the vicinity of the project area are shown in Figure 5. The map shows that wells may be developed in the unconsolidated deposits throughout the Project Area. The Galion End Moraine and Galion Ground Moraine Aquifers occupy the largest portions of the project area, and are capable of producing 5-25 gpm. The Mohican Complex Aquifer located in the southern portion of Greenwich Township is capable of producing 5-25 gpm. The Galion Thin Upland Aquifer is located in the northeastern portion of the Project Area produces less than 5 gpm.

The Study Area lies within a rural portion of Huron County. There are no urban areas in close proximity to the project area that are large enough to extend municipal water service out into rural areas. As a result, residents rely on private groundwater wells for water. The information on Figure 5 was compiled from well location information provided by ODNR and Ohio EPA. Due to the number of private wells specific information associated with the wells has not been reviewed, nor have there been any attempts to differentiate between wells installed in unconsolidated aquifers or installed within the underlying bedrock.

Soil Survey

The USDA Soil Conservation Service Soil Survey Huron County was reviewed. Soil surveys furnish surface soil maps and provide general descriptions and potentials of the soil to support specific uses, and can be used to compare the suitability of large areas for general land uses. The surface soils in the study area are comprised mostly of Bennington and Cardington silt loams (Figure 6). The soil survey information indicates that Bennington silt loams are poorly drained, have low to moderately high capacity to transmit water (0.06-0.20 inches/hour), with the depth to water table being approximately 12 to 30 inches. Cardington silt loams are moderately well drained, have low to moderately high capacity to transmit water (0.06-0.60 inches/hour), with the depth to water table being approximately 18 to 36 inches. The soil surveys also indicate that the soils do not frequently flood or pond surface water runoff.

Underground and Surface Mines

Review of information obtained from the ODNR, Division of Geological Survey did not reveal any suggestion that underground or surface mines are located in the project area. Soil survey information provided by the USDA shows no indication of former gravel pits or quarries located within the Study Area. Figure 4 illustrates that no known abandoned mines or probable mines are located within the Project Area.

Preliminary Construction Considerations

Based on the earthwork in the region, conventional, shallow foundations may be able to support turbines and the substation. However, this assumption will need to be confirmed by a detailed geotechnical exploration and evaluation for each turbine-site and the substation location. If it is determined that shallow foundations are not suitable for structural support, other suitable foundation types may be utilized according to their compatibility with the geotechnical parameters of the specified turbine-site and substation.

The geotechnical engineer, or a designated representative, should examine foundation designs and compatibility with the supporting soils and approve work prior to placement of foundation components.

Based on the information collected to date, it is anticipated that access roads will have no construction concerns. This assumption will need to be confirmed by a geotechnical exploration and evaluation of each access road when considering site-specific subgrade conditions at the time of construction, anticipated vehicle loads, grading plans, etc.

Adequate surface water run-off drainage should be established at each turbine-site, access road and the substation to minimize any increase in moisture content of the subgrade material. Drainage of each turbine-site, access road, and substation location should be created by gently sloping the surface water toward existing or proposed drainage swales. Surface water should be properly controlled and drained away from the work area. It should be noted that subgrade soils are subject to shrinking and swelling with variation in seasonal moisture content, this should be considered during constructability reviews to determine how best to deal with potential moisture fluctuations.

The contractors should be prepared to deal with any seepage or surface water that may accumulate in excavations. Site dewatering may be required during construction if excavations extend below the water table, or significant precipitation events occur when the foundation excavations are exposed. The contractor should be able to minimize the amount of excavation exposed at one time, especially when precipitation is forecasted. Fluctuations in the groundwater level may occur seasonally due to variations in rainfall, construction activity, surface runoff, and other factors. With these anticipated variations in groundwater levels, it is recommended that design drawings and/or specifications accommodate such possibilities and that construction planning be based on the assumption that such variation may occur.

The foundations and excavations are to be designed by the contractor’s structural designer. The contractor should be solely responsible for constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. All excavations should comply with applicable local, state, and federal safety regulations including the current Occupational Safety and Health Administration (OSHA) Excavation and Trench Safety Standards (29 CFR part 1926).

Based on a review of the soil survey information the soils should be suitable for grading, compaction, and drainage when each turbine-site is prepared as discussed in this report and the guidance provided in a Geotechnical Exploration Report for each individual turbine location. Due to the anticipated depth to bedrock, it is anticipated that conventional excavation equipment (e.g., trackhoe, dozer, ripper) could be used for excavating and that bedrock blasting will probably not be necessary; however this assumption must be confirmed with geotechnical test boring prior to construction. If bedrock blasting is required it will be performed in accordance to all applicable laws and regulations.

SUMMARY

Based on the information reviewed to date, it does not appear that the local geology and/or hydrogeology will be prohibitive to construction of the proposed wind turbines, access roads, interconnects and substation. In addition it does not appear that the construction of the proposed wind turbines will have a significant impact on the local geology and/or hydrogeology of the Project Area. Therefore, based on the information presented herein and the associated analysis, construction of the wind turbines or other components are not anticipated to result in any significant negative impact to drinking water wells in the study area.

With a minimum setback distance for a turbine to the nearest residential structure, although that exact location of each potable well cannot be determined with the information obtained to date, it is assumed that the wells are located in close proximity to each property owners’ residence. Therefore, based on the information presented herein and the associated analysis, construction of the wind turbines or other project components are not anticipated to result in and significant negative impact to the property owners’ wells.

Based on the information reviewed, it appears that the primary geotechnical issue for the turbines, access roads, and substation location that should be considered during construction is the poor drainage of the surface soils within the Project Area. As previously discussed, adequate surface water run-off drainage should be established at each turbine, access road, and substation location to minimize any increase in the moisture content of the subgrade material. Surface water runoff drainage can be managed by implementing techniques such as surface water swales, drainage berms, ect.

Site-specific geotechnical information should be obtained prior to the design of the turbine foundations, and prior to preparation of construction specifications and design plans. This may require, but not limited to, completion of geotechnical explorations to further evaluate the *in situ* materials at each turbine.

The conclusions included in this Desktop Review are based on general summaries available through the resources previously listed. There may be anomalies in the hydrogeology or geotechnical conditions of a specific turbine location that cannot be resolved at the scale of the publicly available data used in this study. As noted previously, site-specific geotechnical information should be obtained prior to final turbine foundation design.

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United States Department of Agriculture, Soil Conservation Service, *Soil Survey of Huron County*, 1994.

Figures

windlab

Greenwich Wind Park Project Area
Project Area, Topography & 100 Year Floodplain

Date: **May 2013**

Prepared By:
John Sidor
Project Analyst- Geology & GIS

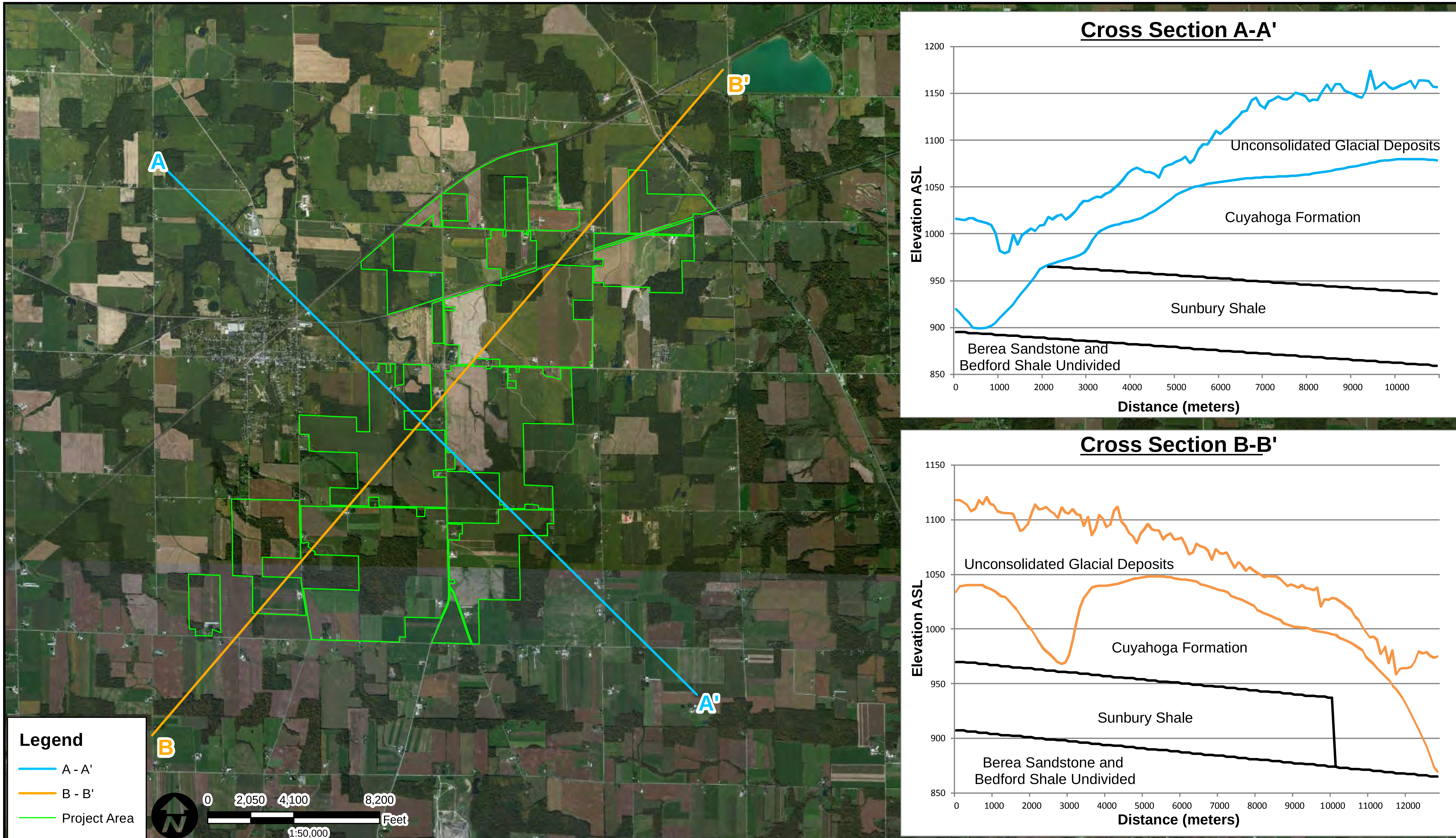
Figure: **1**

Greenwich Wind Park Project Area
Bedrock Topography

Date: May 2013

Prepared By: John Sidor, Project Analyst- Geology & GIS

Figure: 2



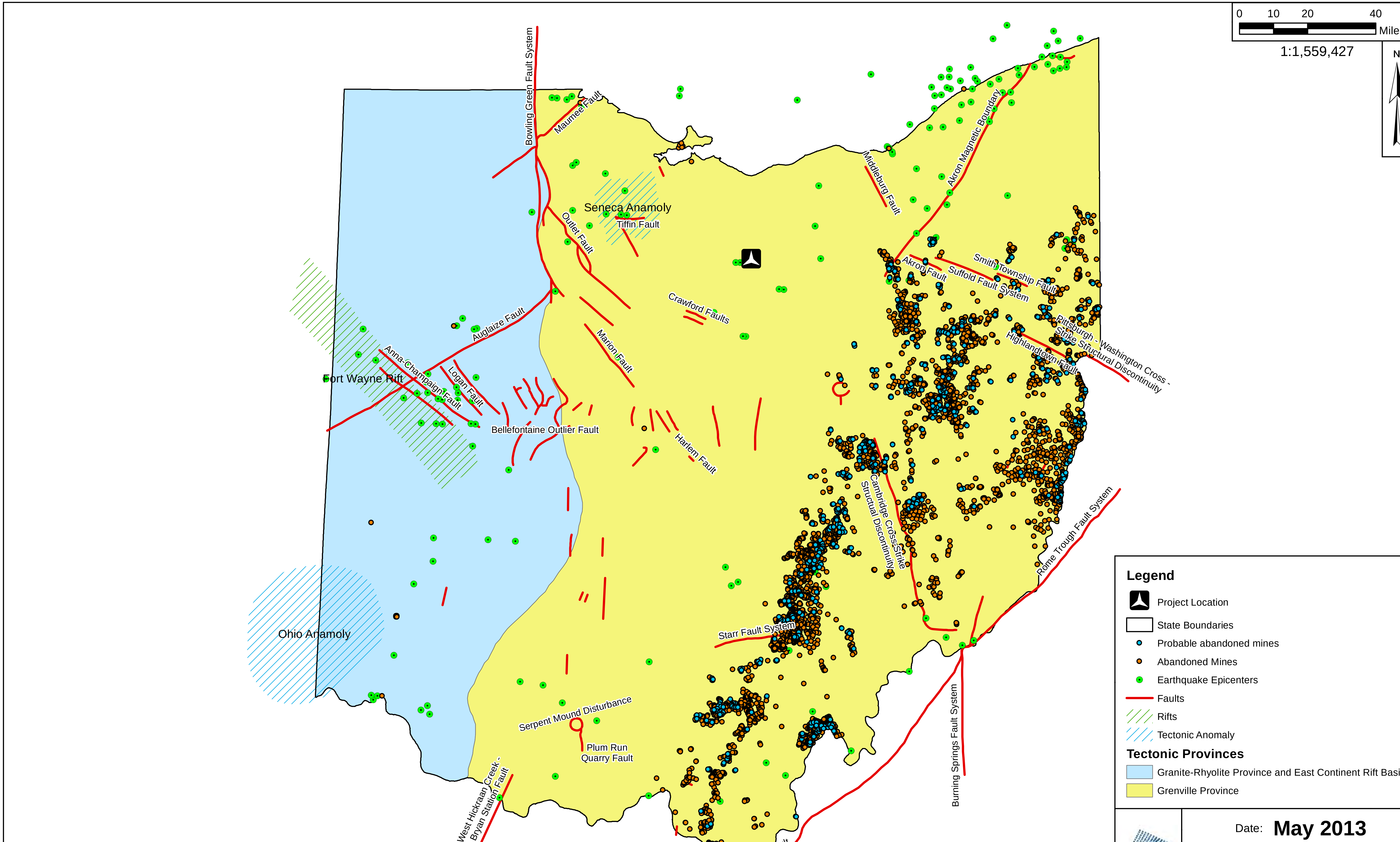
windlab

Greenwich Wind Park Project Area
Cross Section Map

Date: **May 2013**

Prepared By:
John Sidor
Project Analyst- Geology & GIS

Figure: **3**



Greenwich Wind Park Project Area
State Geophysical Map

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Greenwich Wind Park Project Area
Aquifers & Water Wells

Date: May 2013

Prepared By:
John Sidor
Project Analyst- Geology & GIS

Figure: 5

Greenwich Wind Park Project Area
USDA Soil Map

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Date: May 2013

Prepared By:
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Project Analyst- Geology & GIS

Figure: 6

ATTACHMENT A

General Earthwork Recommendations

ATTACHMENT A

GENERAL EARTHWORK RECOMMENDATIONS

Earthwork is most efficiently accomplished using large, heavy-duty equipment, unimpeded by obstacles. Consequently, it is preferable to complete as much of this work as is possible prior to initiating other phases of construction, such as footing excavation and installation of underground utilities. The following are general recommendations concerning earthworks construction and may not be applicable to site-specific conditions. Furthermore, the contractor is responsible in selecting and implementing the most appropriate construction techniques (e.g., construction means, methods, sequences, or for safety precautions or programs) for each site-specific condition(s).

1. Stripping, clearing and grubbing

In areas where fill is to be placed to support structures, drive and parking areas, the following is proposed:

- Strip and remove all sod, topsoil, and organic contaminated soils.

- Remove all trees and shrubs, designated to be cleared, inclusive of grubbing roots of larger trees.

- Remove all trash, debris, rubble, existing random fill, soil softened by standing water, and any other soft soil as determined necessary by the geotechnical engineer. The fill placement should begin on firm, relatively unyielding foundation material.

- The fill foundation should be stripped and cleared beyond the limits of the structure by a distance equal to not less than the thickness of the fill below the structure foundation plus ten feet. For drives and parking areas, the fill foundation should be stripped and cleared for a distance at least 5 feet beyond the limits of the pavement.

2. Fill Material- Composition

Material satisfactory for use as fill includes clayey silt and silty (lean) clay soils or sand and gravel, free of topsoil, organic or other decomposable matter, rocks having a major dimension greater that 6 inches, or frozen soil.

Soils having a maximum dry density of less than 90 pounds per cubic foot as determined by the moisture-density relationship are not considered suitable for use as fill.

Soils described as SILT (USCS ML, MH or ODOT A-4B) are considered questionably suitable for use as fill material because the stability of these materials is very sensitive to increases in moisture. These soils should not be placed within three feet of the top of the subgrade.

3. **Fill Material- Moisture**

Predominately fine grained fill materials clayey silts and silty (lean) clays are recommended to contain moister not exceeding two percent above optimum moisture as determined by the moisture-density relationship, or less if found to be needed to obtain stability below the compaction equipment. This provides the best assurance of establishing not only adequate density for ultimate support of construction but also provides stability of the compacted soil under the dynamic loading induced by the heavy weight construction equipment during placement.

4. **Moisture Adjustment**

If the moisture content of the material from the fill source or native subgrade is not appropriate to establish density, moisture adjustment of the material will be required.

If the moisture content of the fill being placed or the native subgrade is too high, appropriate adjustment entails spreading and exposing to the sun and wind for drying and using equipment such as a disc and/or a grader. This may not be feasible during wet seasonal conditions. Wet soils will pump and may cause excessive rutting under heaving equipment traffic. Therefore, improvements to the subgrade may be achieved by undercutting and replacing with suitable granular subbase (possibly in combination with a non-woven geotextile or biaxial geogrid) or stabilization with lime or cement. The most appropriate subgrade improvement technique should be determined at the time of construction.

If the moisture content of the fill is too low, a water truck with a sprinkler bar may be required. After sprinkling, the soil should be thoroughly mixed with a disc and/or a grader.

5. **Equipment**

Equipment to compact the fill should be heavy duty. For example:

- Fine-grained materials (clayey silt and lean clays) may be efficiently compacted using a sheepsfoot roller comparable to a caterpillar 815 self-propelled roller.

- Coarse-grained materials (sand and gravel) having little or no silt and clay sizes may be efficiently compacted using a heavy, self-propelled, vibratory smooth wheel roller.

- Coarse-grained materials having about 10% or more silt and clay sizes may be efficiently compacted using a sheepsfoot roller comparable to a caterpillar 815 self-propelled sheepsfoot roller.

6. **Lift Thickness**

Fill should be placed in horizontal layers, 8-inch loose thickness, compacted uniformly to approximately 6-inch thickness.
If equipment is used which is lighter weight than recommended above, lift thickness should be appropriately thinner.

7. **Fill Density**

In areas to support pavements and building construction, the fill and backfill should be compacted to the density requirements as recommended in the main body of the report.

8. **Season of Earthwork**

Weather conditions are very important to efficiency in working soils. Generally earthwork is accomplished most efficiently between May and November. Cold periods may hamper moister adjustment. If the temperature is below 32 degrees Fahrenheit for prolonged periods, frozen material on the fill surface must be removed before subsequent lifts may be placed. Granular material, such as bank run sand and gravel is somewhat less sensitive to weather conditions but is not immune from difficulties that may be presented by precipitation and low temperatures.

9. **Trench Backfill**

Trench backfill should be controlled compacted fill, placed in accordance with recommendations presented above and as engineered for thermal properties in collection systems.

It is recommended that suitable granular material be used to backfill trenches that traverse beneath buildings, drives, or parking areas.

10. **Proof Rolling**

Upon completion of stripping, clearing, and grubbing, the areas planned to support pavement or building floor slab shall be proof rolled in accordance with ODOT Item 204 to identify and soft, weak, loose, or excessively wet subgrade conditions. At a minimum, the proof rolling should be completed with a minimum 20-ton loaded tandem axel dump truck. The vehicle should pass in each of two perpendicular directions covering the proposed work area. Any observed unsuitable materials should be undercut and replaced with suitable fill as directed by the geotechnical engineer.

11. **General**

All fill should be placed and compacted under continuous observation and testing by a soils technician under the general guidance of the geotechnical engineer.

ATTACHMENT B

Generalized Geotechnical Exploration Work Plan

ATTACHMENT B
GENERALIZED GEOTECHNICAL EXPLORATION WORK PLAN

A geotechnical engineer licensed by the State of Ohio shall prepare a proposal for a geotechnical site exploration in general accordance with the suggested scope of work provided below. The geotechnical engineer shall be qualified in geotechnical investigations within the region. The geotechnical exploration program suggested below (e.g,. boring frequency, location, and depth) should be adjusted by the geotechnical engineer based on their experience and to allow for specific geological, topographic, and drainage conditions of the site.

PROJECT DISCRIPTION

A geotechnical exploration will be performed at the proposed Study Area in Champaign County, Ohio. The project involves planned construction of wind turbine generators at various locations (Sites) for Greenwich Wind Park. Upon completion of the geotechnical exploration suitable foundation systems will be reviewed that will work with the Site conditions as determined by the geotechnical exploration and design preferences provided. The foundation types that will be considered include spread footings, P&H foundations, and pile supported foundations.

The purpose of the geotechnical exploration is to obtain geologic information and to determine relevant engineering properties of the Site soils. A review of generalized geologic references, including ODNR Well Logs and ODNR Groundwater Resource Maps, suggest the Study Area is underlain by glacial deposits with shale bedrock depths being highly variable (e.g., from 20 to over 100 feet below existing ground surface).

PROPOSED SCOPE OF WORK

<u>Reconnaissance, Planning and Boring Layout</u>

The follow will be conducted as part of this task:

1. A review of pertinent, readily available subsurface geotechnical information for the Site that is provided to the Geotechnical Engineer will be performed.
2. A site visit will be performed to lay out the borings and clear underground utilities at the boring locations. The landowner will be consulted to provide the geotechnical engineer with information and the locations of all private utilities at the site. The geotechnical engineer will be responsible for locating the boring, which should be surveyed and staked on the site prior to drilling.
3. The Ohio Utility Protection Service (OUPS) and Ohio Oil & Gas Producers Underground Protection Service (OGPUPS) will be notified a minimum of 48 hours prior to the commencement of drilling services.

Drilling and Sampling

After the geotechnical engineer has reviewed all available desktop information, they will determine the number of borings to be drilled at turbine locations. In addition, borings will be taken at the proposed substation locations, the borings will extend to the proposed depth or competent bedrock, whichever is encountered first.

For all borings, the following will be performed:

1. Split-barrel sampling of soil will be performed in accordance with American Society for Testing Materials (ASTM) D 1586 for each boring in increments of 2.5 feet to the depth of 10 feet and at five-foot intervals below 10 feet to the depth of the borings. In all the borings, Standard Penetration Test (SPT) data will be developed and representative samples preserved.
2. It is anticipated that the drilling will be accessible with and performed by a truck-mounted drilling rig. Provisions shall be made by the Geotechnical Engineer based on the time of year the fieldwork will occur in using an ATV drill rig if the borings cannot be accessed with a truck-mounted drilling rig.
3. Water observations in the boreholes will be recorded during and at the completion of drilling.
4. All borings will be backfilled at the completion of drilling with bentonite chips and drill cuttings.

Geotechnical Laboratory Testing

A laboratory testing program will be established by the geotechnical engineer based on the observations made during the drilling activities and experience. The following laboratory tests shell be performed on samples retained during the drilling activities:

1. All samples will be classified in the laboratory based on the visual-manual examination (ASTM D 2488) Soil Classification System and the laboratory test results. Formal boring logs will be prepared using the field logs and the laboratory classifications.
2. Laboratory testing will include moisture content, particle-size analyses, and Atterberg limits of a limited number of samples considered to be representative of the foundation materials encountered by the borings. Unconfined compression and consolidation tests will be performed if low strength and/or highly compressible cohesive soils are encountered as deemed necessary by the geotechnical engineer.
3. All laboratory testing will be performed in accordance with ASTM or other specified standards.

Geotechnical Exploration Report

The geotechnical engineer will prepare a Geotechnical Exploration Report that will include the findings, conclusions and recommendations concerning proposed geotechnical related design-construction considerations and foundation design recommendations. The report shall also include an Appendix, which will include a boring location plan, a legend of the boring log terminology, the boring logs, and the results of any laboratory tests. Three (3) copies of the report will be presented by the Geotechnical Engineer.

Exhibit G

Economic Impact Assessment

6011 Greenwich Windpark, LLC

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LIST OF FIGURES

ASSESSING THE ECONOMIC IMPACTS OF GREENWICH WIND FARM

An Evaluation of Potential Impacts on the Local Economy

As part of the application and approval process for this project, pursuant to Ohio Administrative Code Chapter 4906: Public Utilities, this report evaluates the economic impacts of constructing and operating the proposed Greenwich Wind Farm on the local economy. For the purposes of this study, the local economy includes Huron, Erie, Lorain, Ashland, Richland, Crawford, Seneca and Sandusky Counties. Specifically, this report analyzes and quantifies impacts within four economic components: employment, total dollars injected into the local economy, land lease revenue to participating land owners, and payments in lieu of taxes made to local governments, resulting from the construction of the proposed 60 megawatt wind farm.

The analysis concludes that the project will result in a positive economic benefit to the local economy, including the creation of new jobs as well as an increase in local spending. The project will also provide taxes to local governments and confer land lease payments to participating land owners.

To research the economic impact of the proposed wind farm, a desktop review was performed. Data from the U.S Census Bureau was used to formulate population projections for communities within a five mile radius of the proposed wind farm. Data was also reviewed from the U.S. Bureau of Labor Statistics and comprehensive plans and zoning policy from communities in the eight - county region. Local economic impacts were estimated based on data reviewed by Aristeo Construction from similar completed projects and by using an input-output model designed by the U.S. Department of Energy for wind energy facilities based on data from existing wind farm projects around the United States.

The economic analysis is based on reasonable assumptions of future expenditure patterns for constructing and operating the proposed wind farm. Findings from the analysis should not be taken as precise projections of future performance. Rather, the values included in this report provide insight into the likely economic impact of the project.

I. INTRODUCTION

There are several kinds of natural resources used for energy production. The major types of energy used today are derived from fossil fuels, and include coal, oil, and natural gas. Alternatives to this type of energy production are referred to as "clean energy" and include wind energy, solar power, geothermal energy and hydroelectric power. Wind energy is currently the second most prevalent pollution-free source of power in the United States behind hydroelectric power and does not create emissions associated with the production of energy from fossil-fuels. While China leads the world in total installed capacity of wind energy, the United States is a close second, followed by Germany, Spain, India and Italy.

6011 Greenwich Windpark, LLC is currently developing plans and seeking approvals for the construction of the proposed Greenwich Wind Farm to be located upon approximately 4,650 acres in southeast Huron County, Ohio. If approved, the project will construct 25 wind turbines with a total nameplate capacity of approximately 60 megawatts. The project is expected to be constructed over an 8 month period beginning in late 2012 to mid 2013.

Total investment in the wind farm project has been estimated at $115 million through development, engineering and construction. During construction, the project will result in the direct employment of 56 workers, a substantial portion of which will be hired from within the seven-county region, herein referred to as the *local economy*[1]. Total estimated construction labor costs are approximately $2.87 million.

Total yearly costs for the operations and management phase of the project are estimated at $1.26 million. Approximately 4 new jobs will be directly related to operating and managing the wind farm. Estimated annual direct labor costs for operations are $220,000.

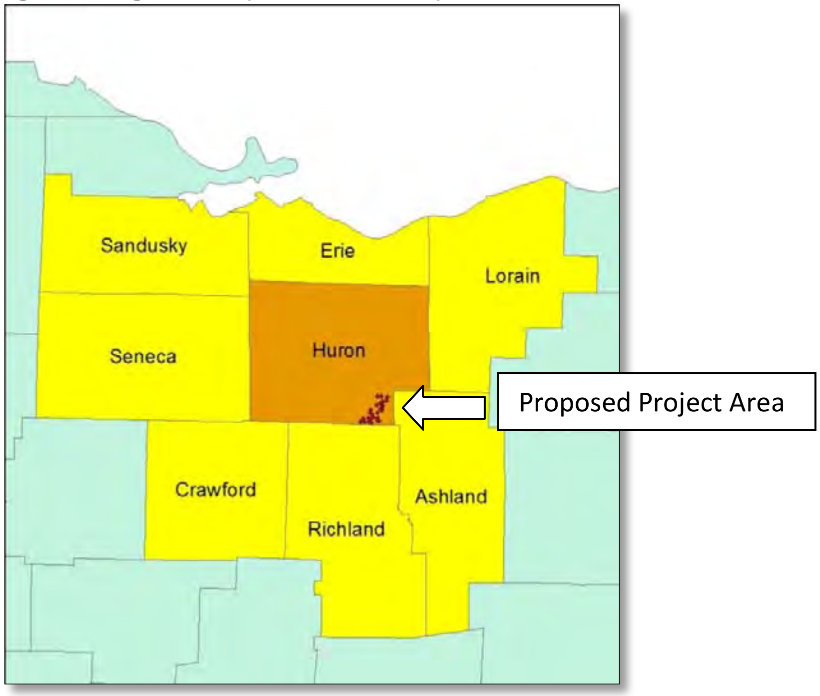
The Local Economy

This economic analysis focuses on the anticipated impact of the project on the local economy. The proposed wind farm is located in rural Huron County, approximately 65 miles southwest of Cleveland. It is expected that economic activity created by the project will reach beyond Greenwich Township and Huron County into surrounding rural counties and nearby population centers. The project will draw new employees and derive its necessary goods and services primarily from the surrounding area.

Huron County, the site of the proposed wind farm, is bounded by the Ohio counties of Erie to the north, Lorain and Ashland to the east, Richland and Crawford to the south, and Seneca and Sandusky to the west. For the purposes of this analysis, these eight counties make up the *local economy.* See <u>*Figure 1: Eight County Local Economy*</u>.

[1] For the purposes of this analysis, the "local economy" shall be the whole area of the Ohio counties of Huron, Erie, Lorain, Ashland, Richland, Crawford, Seneca and Sandusky.

Figure 1. Eight County Local Economy



II. SOCIOECONOMIC PROFILE

Population Trends

The population of the local economy in 2010 was approximately 777,148. The majority of this population is located within Lorain County and Richland County. The remaining five counties each had a population of less than 80,000 in 2010. Since 1990, Lorain and Ashland Counties have experienced an 11 percent growth in population, while Huron and Erie Counties have had population growth of 6 percent and 0.4% percent, respectively. Richland, Crawford, Seneca, and Sandusky Counties have lost population over the last two decades. See *Figure 2: Local Economy Population Trends*.

Figure 2: Local Economy Populations Trends

County	1990 Population	2000 Population	2010 Population	% Change 1990-2010
Huron County	56,240	59,487	59,626	6.0%
Erie County	76,779	79,551	77,079	0.4%
Lorain County	271,126	284,664	301,356	11.2%
Ashland County	47,507	52,523	53,139	11.9%
Richland County	126,137	128,852	124,475	-1.2%
Crawford County	47,870	46,966	43,784	-8.5%
Seneca County	59,733	58,683	56,745	-5.0%
Sandusky County	61,963	61,792	60,944	-1.6%
Local Economy Total	**747,355**	**772,518**	**777,148**	**4.0%**

Source: U.S. Census Bureau, 2013.

The Ohio Administrative Code requires the preparation of ten year population change estimates for communities that are located within a five-mile radius of a proposed wind farm. *Communities* are defined as incorporated municipalities and/or townships. There are three incorporated municipalities and eight townships that are fully or partially within five miles of the proposed wind farm. Because local level population projections are not conducted for interim years at this geography, projections for these communities were created using the methodology prescribed by the U.S. Census Bureau. Straight line population projections were made based on the change in population between U.S. Census data from 2000 to 2010, for which an average annual rate of change was calculated and interpolated at five year intervals to the year 2022. Population projections were generated using this methodology for the years 2012, 2017 and 2022.

As *Figure 3: Population Projections* illustrates, each of the three municipalities within a five-mile radius of the wind farm are projected to experience a loss in population by 2022. These municipalities are located in Huron and Richland Counties.

Figure 3: Population Projections

Municipalities Within Five Miles of Project Site	2000 Pop.	2010 Pop.	Est. 2012 Pop.	Est. 2017 Pop.	Est. 2020 Pop.	% Change 2012-2022
Village of Greenwich, Huron Co.	1,525	1,476	1,463	1,440	1,416	-3.2%
Village of New London, Huron Co.	2,696	2,461	2,434	2,328	2,222	-8.7%
Village of Shiloh, Richland Co.	721	649	637	605	573	-10.0%
Total Population	**4,942**	**4,586**	**4,534**	**4,373**	**4,211**	**-7.1%**
Townships Within Five Miles of Project Site	**2000 Pop.**	**2010 Pop.**	**Est. 2012 Pop.**	**Est. 2017 Pop.**	**Est. 2020 Pop.**	**% Change 2012-2022**
Greenwich Township, Huron Co.	954	1,044	1,044	1,093	1,142	9.4%
Fitchville Township, Huron Co.	1,012	1,056	1,048	1,071	1,093	4.3%
New London Township, Huron Co.	3,440	3,268	3,234	3,121	3,072	-5.0%
Ripley Township, Huron Co.	943	1,024	1,016	1,060	1,103	8.6%
Fairfield Township, Huron Co.	1,284	1,218	1,204	1,173	1,143	-5.1%
Ruggles Township, Ashland Co.	857	905	904	929	955	5.6%
Butler Township, Richland Co.	1,386	1,205	1,187	1,109	1,032	-13.1%
Blooming Grove Township, Richland Co.	1,157	1,204	1,186	1,210	1,235	4.1%
Total Population	**11,033**	**10,924**	**10,823**	**10,766**	**10,775**	**-0.4%**

Source: U.S. Census Bureau, 2013.

Townships within five miles of the project site are projected to follow very different population trends. Of the five townships located in Huron County, three are projected to have population gains that range from approximately 4.3 to 9.4 percent. Of the three townships in neighboring Ashland and Richland Counties, two are projected to have population gains. Overall, the population of the region is expected to remain relatively stable over the next ten years, with the townships in the area projected to decrease by approximately 0.4 percent.

Employment

According to the U.S. Bureau of Labor Statistics, 386,216 people are currently in the labor force of the local economy. Of this total, there are approximately 358,144 employed and 28,072 unemployed persons (May 2013). The average unemployment rate rose slightly from 7.1% in May

2012 to 7.3% in May 2013. Huron and Crawford Counties have the highest current unemployment rate, at 8.9 and 8.2 percent, respectively. See *Figure 4: Civilian Labor Force Estimates*.

Figure 4: Civilian Labor Force Estimates

County	Labor Force May 2013	Employed May 2013	Unemployed May 2013	Unemployment Rate May 2012	Unemployment Rate May 2013
Huron County	27,135	24,719	2,416	8.4%	8.9%
Erie County	41,971	39,229	2,742	6.1%	6.5%
Lorain County	153,722	142,805	10,917	7.0%	7.1%
Ashland County	25,959	24,168	1,791	6.9%	6.9%
Richland County	56,723	52,324	4,399	7.7%	7.8%
Crawford County	20,518	18,838	1,680	8.1%	8.2%
Seneca County	28,068	26,089	1,979	7.0%	7.1%
Sandusky County	32,120	29,972	2,148	6.6%	6.7%
Local Economy Total	**386,216**	**358,144**	**28,072**	**7.1%**	**7.3%**
State of Ohio	*5,756,022*	*5,359,910*	*396,112*	*6.8%*	*6.9%*

Source: U.S. Bureau of Labor Statistics, May 2013.

The average unemployment rate within the local economy is currently 0.4 percent higher than the unemployment rate for the State of Ohio. Economic development and the creation of new jobs continue to be an important economic priority throughout the local economy and for Ohio as a whole.

III. REGIONAL DEVELOPMENT IMPACTS

The eight-county region which makes up the local economy is predominately rural. As previously described, the population has increased just 4.0 percent since 2000. This growth has occurred in Lorain, Ashland, and Huron Counties, while Erie County has remained virtually unchanged. The remaining four counties in Ohio have lost population over that same period. As is common in rural areas, this trend of migration toward urban areas is expected to continue. The regional impacts of the proposed wind farm on future development, including the anticipated impacts to housing demand, commercial and industrial development, and regional transportation, and land use compatibility are described in further detail below.

Housing

As previously shown in *Figure 3: Population Projections*, the population of townships within five miles of the proposed wind farm is projected to decrease from 10,823 in 2012 to approximately 10,775 by 2022. This modest decline is projected to create pockets of both population growth and population loss throughout the area within five miles of the project area.

Given these population estimates, a local unemployment rate of approximately seven percent and an average housing vacancy rate of four percent within the eight-county region according to the U.S. Census, it is unlikely that demand for housing will increase due to the construction or operation of the proposed wind farm. While the project will result in a substantial increase in temporary jobs during the construction phase of the project, these jobs are short term in nature and will not have an impact on demand for new housing development over the long term. Permanent jobs created as a result of the project are far more limited in number, and will have some appreciable effect on housing demand within the region.

Commercial and Industrial Development

The construction and operation of the proposed wind farm will have a significant positive impact on commercial and industrial development within the region. The positive impacts on commercial activity are described in detail in Section V of this report.

In terms of industrial development, wind power projects typically require a substantial number of inputs from outside the local area as is the case with the proposed wind farm. In Ohio, there is a substantial amount of growth potential in renewable energy production and the manufacturing sectors that support it according to a 2004 report by the Renewable Energy Policy Project (REPP) entitled "*Wind Turbine Development: Location of Manufacturing Activity.*" This benefit would include job creation in the manufacturing sector, particularly for those companies already involved in wind infrastructure production.

REPP assessed the location of manufacturing activity related to wind turbine development. It measured the number of potential employees at existing companies capable of manufacturing turbine parts. Ohio ranked second in the nation behind California in the number of employees at companies with the potential for wind farm infrastructure manufacturing. This report estimates existing firms in Ohio with the technical potential to become involved in wind turbine development have approximately 80,500 employees and the potential for approximately 11,500 new jobs in the wind farm component industry. Currently, manufacturers in Ohio are already producing wind turbine components including blade extenders, brakes, cooling systems, gear boxes, pitch drives, power electronics, rotor blades, tower flange and bolts, and yaw drives.

Transportation

The eight-county region is served by a network of Interstate, U.S. and State routes, and local roads. This existing roadway network provides access to the Toledo, Cleveland, and Columbus metropolitan areas, as well as smaller communities including Freemont, Findlay, and Akron.

There are two interstate highways serving the greater region: I-80/90, which connects Toledo to Cleveland, and I-71, which connects Columbus to Cleveland. The Project Area is also served by U.S. Routes 225 and 250, and State Route 13. Given the limited population and the existence of alternate routes around the proposed project site, temporary road closures during construction are not expected to create any significant adverse impacts on the vehicular transportation network.

One CSX-operated rail line is located in the vicinity of the proposed wind farm. This provides the area with freight access to and from various regional locations. Neither the construction nor operation of the proposed facility is expected to create any significant adverse impact on the railroad network.

There are numerous airports located within a two hour drive of the proposed wind farm. Cleveland Hopkins International Airport is the largest of the primary airports in the region. The airport is owned and operated by the city of Cleveland and is the largest airport in the state of Ohio. The other major airport in the area is the Toledo Express Airport, located 10 miles west of Toledo. There are also many smaller municipal or private airfields in proximity to the Project Area, used primarily for recreational purposes. Neither the construction nor operation of the proposed facility is expected to have any significant impact on these airports or the existing air travel network.

Regional Plan Compatibility

Several comprehensive plans exist for the counties, townships, cities and villages that surround the proposed Greenwich Wind Farm within the eight-county region. All of the counties in the region have updated their comprehensive plans since 1995. Six of the eight townships within five miles of the proposed wind farm have zoning regulations in place, as do a majority of the townships in the eight-county area. See *Figure 5: Comprehensive Plans and Zoning Ordinances*.

Land use designations for the townships within five miles of the proposed wind farm are predominantly agriculture, open space and other types of low density development. A common goal among the comprehensive plans that have been adopted throughout the region is utilizing agricultural land in order to encourage economic diversity and to promote the conservation of high quality farm land. Residential, commercial, industrial and mixed-use development should be directed to existing population centers and away from agricultural land. The proposed Greenwich Wind Farm project aligns with these comprehensive planning goals, and the proposed facility will be compatible with the land uses and zoning policy within five miles of the project site.

Figure 5: Comprehensive Plans and Zoning Ordinances

County	Comprehensive Plan Adopted/Expected	Zoning Ordinance
Huron County	2007	Fifteen of nineteen townships have zoning ordinances
Erie County	1995	Seven of nine townships have zoning ordinances
Lorain County	2000	All eighteen townships have zoning ordinances
Ashland County	2000	Thirteen of fifteen townships have zoning ordinances
Richland County	2005	Thirteen of eighteen townships have zoning ordinances
Crawford County	2000	Three of sixteen townships have zoning ordinances
Seneca County	2001	Seven of fifteen townships have zoning ordinances
Sandusky County	2002	Nine of twelve townships have zoning ordinances

Source: Huron County, Erie County, Lorain County, Ashland County, Richland County, Crawford County, Seneca County, Sandusky Regional Planning Commission, 2013.

IV. MEASURING ECONOMIC IMPACT

Wind farms across the country have had a positive economic impact on the communities where they are located. They represent large capital investments that drive various sectors of the local economy and have a positive impact on local employment and local government revenues. Wind farms also provide significant benefits to property owners who lease land for the turbines.

This analysis addresses the anticipated economic impact that the proposed wind farm will have on the local economy, as defined in Section I of this report. The projected economic impact was analyzed separately for the construction phase and the operations and management phase of the project. The economic impacts measured are new jobs and wages, new dollars injected into the local economy through total local spending on goods and services, and land lease payments to participating land owners.

Calculating Economic Benefits

Wind farms and other economic investments that bring new dollars and jobs to a community are typically measured using three components of economic impact: *direct, indirect* and *induced impacts*. Variables that determine the extent of these impacts include project size and duration, construction and operating costs, and the availability of local goods and services. Direct, indirect, and induced impacts are defined as follows:

- **Direct impacts** are immediate impacts created by expenditures that are directly applied to the project. In constructing a wind farm, a *direct impact* refers to such things as the money spent on labor, including site crews, contractors, maintenance workers, consultants and engineers. It also includes the money spent to pay those working at the turbine and blade manufacturing plants, the purchase and delivery of construction materials, property taxes, other direct purchases and lease payments. Of course, not all of these direct impacts will occur in the local economy but those that do become the *local share*, which is made up of the impacts that originate in the local economy.

- **Indirect impacts** refer to the secondary benefits that result from the increase in economic activity when businesses other than those directly working on the project support businesses that are. When a vendor receives payment for goods or services related to the project, the vendor is then able to pay others who support his/her own business. Examples of *indirect impacts* include bank financing, accountants, equipment and fuel suppliers. In this case, the indirect impacts are comprised of purchases from vendors who provide supplies and secondary services to businesses who are working directly on the project either building the wind farm or operating it after it is online.

- **Induced impacts** reflect increases in household spending as household income increases due to the additional economic activity created by the project. Induced impacts result when people and firms spend money for their personal needs, as opposed to project needs, which is the case with direct and indirect spending. *Induced impacts* result from the additional income accruing to households that in turn leads to greater spending on such things as food, clothing, housing, day care, medical services, and insurance. Those who benefit from this type of spending have more money to spend on their own needs as dollars cycle through the economy.

Together, the interrelationship among the direct impacts, indirect impacts and induced impacts gives the local economy a significant boost. The three measures reflect the total economic impact that a capital investment can be expected to have on the local economy. New jobs will be created and suppliers will see higher sales. The local economy will benefit and these new workers and suppliers will spend newly earned dollars on daily necessities and major purchases.

Methodology

The purpose of the economic analysis is to identify the direct, indirect, and induced economic impacts associated with construction and operation of the proposed Greenwich Wind Farm. Typically, input-output models are used to track the various economic benefits that will accrue to a local economy. The approximation of these benefits is based upon project-specific data, including estimated capital costs, project location and the size of the project, among others.

Windlab Developments USA Ltd. staff reviewed construction and operations data with representatives of Aristeo Construction to determine the amount of spending and employment expected for the proposed Greenwich Wind Farm. Research studies and contacts with the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) helped determine how economic projections anticipated from the proposed wind farm compared to completed wind farm projects around the country. Using this information, an input-output model with data specific to the local economy was developed to estimate the economic impacts of the proposed project. The model looks at both the construction phase of the project and its ongoing operations and management phase.

The model used for this analysis is called the *Job and Economic Development Impact* (JEDI) *Wind Model*. The JEDI Wind Model is specifically designed for wind power generation projects. The model was developed for NREL under the auspices of the U.S. Department of Energy's *Wind Powering America* project and is regularly updated to provide current industry data and facilitate a more accurate description of local impacts. Originally developed with state-specific parameters, subsequent refinements make it possible to analyze impacts on regional and county level economies. The input values come from Aristeo Construction's past experience constructing wind farms and the budget values that Windlab Systems Pty has established for the proposed wind farm. Output values result from a combination of factors, including the amount of direct and indirect impacts, the population of the local economy which sets the local share, state specific multipliers, and expenditure patterns taken from the JEDI Wind Model database.

Windlab Developments USA Ltd. staff confirmed the size of the project, turbine locations, and costs related to the construction and operation of the proposed wind farm. In cases where input data was not available locally, values were taken from the JEDI model's database for the State of Ohio, which are based on averages of existing wind farms as measured by NREL.

As stated above, spending and economic impact from the proposed wind farm will have a positive economic benefit on the local economy. What is most important to host communities is the share of the economic benefits that will accrue to and recycle through that local economy. Projects of local share are set forth in the sections of this report that follow.

V. ECONOMIC IMPACT ON THE LOCAL ECONOMY

New Jobs in the Local Economy

Jobs created by the proposed Greenwich Wind Farm will include workers who will be directly employed to construct and subsequently operate and maintain the wind farm. Other jobs will also be created that play a supportive role in the local economy. The increased wealth from jobs and spending will have a ripple effect in the local economy thereby creating the need for additional jobs in the area as the wages of local workers support households and businesses in the community.

The construction and operation of a wind farm requires a portion of workers to have highly specialized skills, which creates the opportunity for high-paying jobs. Generally, two to three managers are required for every ten crew members on a wind farm project, but this can vary based on the stage of development. Managers are expected to earn a base wage of approximately $30 per hour, or $62,000 per year. Field crews, or technicians, are expected to earn approximately $19 per hour, or $39,000 per year. These figures are estimates and may be subject to change based on benefits, number of hours worked and overtime. It is the policy of Windlab Developments USA Ltd. to maximize the number of local workers, subject to the nature and stage of the construction process, whenever possible.

The proposed wind farm will take approximately eight months to construct, beginning in 2013. The size of the construction crew is variable based on the stage of construction, hours worked per week and weather conditions. Generally, the construction period can be divided into three phases. The first phase of the project is startup, which typically calls for smaller construction crews. The second phase of the project, the peak phase of construction, includes the full complement of employees working at the site. The third phase of the project is the completion of the Greenwich Wind Farm and again calls for a reduced number of construction workers. Following this phase, workers at the site are employed as part of the operations and management of the wind farm.

Local Economic Impact: Construction Phase

Jobs, wages, and salaries. It is estimated that during the construction phase of the project, a total of 274 full-time equivalent jobs will be created within the local economy, generating $14 million in wages and salaries. Approximately 56 of these new jobs will be in those industries that directly support the project. Earnings from those jobs are expected to total $2.87 million. Another 166 jobs and $8.78 million in earnings are expected to be generated by indirect impacts, which result from the inter-industry economic activity created by the project. The induced impacts, which result from changes in local household spending, are projected to bring another 52 jobs and approximately $2.35 million in wages and salaries to the local economy.

Local expenditures. During the construction phase of the project, the proposed wind farm is expected to generate a total of $36 million in local expenditures. Approximately $3.2 million of this will be in direct local expenditures. Based on the availability of local goods and services, the indirect impacts on supportive businesses are expected to generate another $25.6 million. Induced impacts will generate approximately $7.1 million in local spending. This includes money expended by employees and others connected to the project for normal cost of living, including spending on groceries, clothing and the like.

The total estimated impact of wages and salaries, combined with local expenditures, is anticipated to have a *total local benefit* of approximately $50.0 million during the construction phase of the project. *Total local benefit* refers to the sum of economic activity, or the overall value of production, including new jobs, total wages and salaries for those new jobs, new dollars injected into the local economy through local spending on goods and services, and payments to participating land owners. *Figure 6: Benefits to the Local Economy during Construction Phase*, shows the estimates of the total benefits to the local economy during the construction phase of the project.

Figure 6: Benefits to the Local Economy during Construction Phase

Impact Type	Jobs	Wages and Salaries	Local Expenditures	Total Local Benefit
Direct Impacts	56	$2,870,000	$3,200,000	$6,070,000
Indirect Impacts	166	$8,780,000	$25,690,000	$34,470,000
Induced Impacts	52	$2,350,000	$7,150,000	$9,500,000
Total Impacts	**274**	**$14,000,000**	**$36,040,000**	**$50,040,000**

Source: JEDI Wind, Aristeo Construction, Windlab Developments USA Ltd., July 2013.
Note: Amounts rounded to the nearest hundred thousand dollars.

Local Economic Impact: Operations and Management Phase

The proposed wind farm is expected to have a twenty year life expectancy, and during that time will be producing positive economic impacts from wages and salaries, material purchases, local property taxes and payments to cooperating property owners. A proportion of that spending and employment will come from the local area and will provide continuing benefits to the local economy.

Jobs, wages, and salaries. Wages and salaries from new jobs will continue to add to the local economy during the operation of the proposed Greenwich Wind Farm once it is completed and online. Operations and maintenance of the proposed wind farm will create approximately 15 new full-time equivalent jobs in the local economy, generating approximately $780,000 in annual wages and salaries. Of these 15 new full-time jobs, approximately four employees will *directly* support the operations of the wind farm, and earnings from those jobs will total $220,000 annually. Another 4 jobs and $230,000 in earnings are expected to be generated by the *indirect* impacts of the operations of the wind farm, which result from the inter-industry economic activity created by the project. The *induced* impacts, which result in changes in household spending, will bring another 7 jobs and $330,000 in earnings to the local economy.

Local expenditures. During the operations and management phase of the project, the proposed wind farm is expected to generate approximately $3.28 million in total local expenditures. This includes approximately $220,000 generated annually in *direct* expenditures. The *indirect* impacts of spending on supportive businesses are expected to include $2.06 million. *Induced* impacts will include another $1 million in local spending annually within the local economy. As shown in *Figure 7: Annual Benefits to the Local Economy during Operations Phase*, the total local benefit will be approximately $4.06 million each year the wind farm is in operation.

Figure 7: Annual Benefits to the Local Economy during Operations Phase

Impact Type	Jobs	Wages and Salaries	Local Expenditures	Total Local Benefit
Direct Impacts	4	$220,000	$220,000	$440,000
Indirect Impacts	4	$230,000	$2,060,000	$2,290,000
Induced Impacts	7	$330,000	$1,000,000	$1,330,000
Total Impacts	**15**	**$780,000**	**$3,280,000**	**$4,060,000**

Source: JEDI Wind, Aristeo Construction, Windlab Developments USA Ltd., July 2013.
Note: Amounts rounded to the nearest hundred thousand dollars.

Land Lease Payments

Each of the turbine sites in the wind farm will be leased from individual property owners who will have turbines and access roads located on their land. Total lease payments to participating property owners will average approximately $593,000 per year over the life of the project.

In addition, 6011 Greenwich Windpark LLC estimates there will be approximately 100 participants in the "Neighbor Payments Program" (NPP), who will receive a one-time pay out of approximately $1,000 per occupied residence. These one-time payments are to compensate neighbors who are not participating in the project. The Neighbor Payments Program is expected to pay out $100,000 in the first year of the project.

Like other expenditures, a portion of these lease payments will cycle through the local economy at relatively the same rate as wages and the purchase of materials in the course of property owners making choices on what and where to spend this extra money. These dollars will cycle through the local economy just as other dollar inputs and are reflected in the total local benefit.

VI. LOCAL TAX REVENUES

Legislative Context

Section 5727.75 of the Ohio Revised Code exempts qualified energy projects, including wind farms, from real and personal property taxation if certain conditions are met. Instead, owners and lessees of such projects are required to make annual payments in lieu of taxes (PILOT) of up to $9,000 per megawatt of installed nameplate capacity. To be certified by the Ohio Department of Development as a qualified energy project, at least fifty percent of the full-time equivalent employees employed in the construction or installation of the project must be Ohio-domiciled workers. The owner or a lessee must submit its application to the Ohio Power Siting Board for a certificate under Section 4906.20 of the Code on or before December 31, 2013. Construction or installation of the energy facility must begin on or after January 1, 2009, and before January 1, 2014. *Construction* is defined as beginning on the earlier of the date of application for a certificate, or the date the contract or installation of the energy facility is entered into.

The board of county commissioners of the host county (Huron County) must also adopt a resolution approving the wind energy project. Currently, Huron County has not adopted a resolution approving the Facility. However, the Applicant is in the process of finalizing the Road Agreement and School District Agreement, and anticipates that the Huron County Board of Commissioners will approve the proposed wind farm as a qualified energy project in the near future.

As an alternative to individual project consideration, the board of county commissioners may adopt a resolution declaring the county to be an Alternative Energy Zone and declaring all applications submitted to the Director of the Ohio Department of Development to be approved by the board. Huron County has not adopted a resolution designating the County as an Alternative Energy Zone.

Qualified energy projects are exempt from real estate property tax, sales tax on the purchase of energy conservation equipment, and annual public utilities excise tax. If tangible personal property of a qualified energy project using renewable energy resources was exempt from taxation under Section 5727.75 beginning in tax years 2011, 2012, 2013 or 2014, and its certification has not been revoked, the qualified energy project will be exempt from taxation for tax year 2015 and all subsequent tax years as long as the property was placed into service before January 1, 2015. No portion of the project's facility may have been used to supply electricity before December 31, 2009.

If exempted, the qualified energy project must make an annual payment in lieu of taxes (PILOT) of between $6,000 and $8,000 per megawatt of installed nameplate capacity. The amount of the annual service payment depends on the ratio of Ohio-domiciled full-time equivalent employees to total full-time equivalent employees during construction or installation as of December 31 of the preceding tax year as shown in *Figure 8: Service Payment per Megawatt Schedule*.

In addition to the annual service payments determined on the basis of the percentage of construction or installation workforce, the board of county commissioners may also specify that additional tax exemption payments be made to the county treasurer for deposit into the county's general fund. Huron County does not currently require an additional annual service fee payment. The county treasurer is responsible for allocating the payment on the basis of the project's physical location to the applicable taxing districts. However, the total of the PILOT and any additional service fee payment levied by the county may not exceed $9,000 per megawatt.

Figure 8: 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%

Source: Ohio Revised Code, Section 5727.75, May 2013.

The qualified energy project must also fulfill certain other obligations to the local area and the State of Ohio. Section 5727.75(F) of the Revised Code requires that prior to a sale and leaseback transaction of a qualified energy project with a nameplate capacity of five megawatts or greater, the owner or lessee must repair all roads, bridges, and culverts to their preconstruction condition. In addition, the owner or lessee must provide or facilitate training for fire and emergency responders for response to emergency situations related to the energy project and equip the fire and emergency responders with proper equipment, as reasonably required, to enable them to respond to such emergency situations, and also establish a relationship with a member of Ohio's university system or with other authorized entity providing employment and training programs to educate and train individuals for careers in the wind or energy industry.

Estimated Payment in Lieu of Taxes

The turbines within the Greenwich Wind Farm are located in one Huron County township (Greenwich Township) and one school district (South Central Local School District). *Figure 9: Estimated Payment in Lieu of Tax Revenue* identifies the estimated PILOT revenues that will accrue to the tax district based on the 25 turbines at an average of 2.4 megawatts.

There are various options for taxing wind farm infrastructure. Under the current Ohio Revenue Code 5725.75, the county may approve a tax rate assessed on the nameplate (the rated machine) capacity. Under this scenario, the Greenwich Windpark's estimated annual service payment would be $540,000 per year (=$9,000 (tax rate) multiplied by 60 MW (size of project). These funds would be paid directly to Huron County to distribute appropriately. All amounts are calculated on the full tax rate.

Figure 9: Estimated Payment in Lieu of Taxes (PILOT) Revenue

Tax Distribution	Scenario 1	Scenario 2
*County Wind Fund	$0	*$120,000
County General Fund	$18,568	$14,441
Alcohol, Drug Addiction, Mental Health Svcs.	$4,420	$3,440
Christie Lane (Developmental Disabilities)	$35,367	$27,506
Senior Citizens Center	$4,420	$3,440
South Central School District	$326,254	$253,753
Ehove (Adult Career Svcs.)	$34,925	$27,163
Greenwich Township	$56,587	$44,011
General Health District	$6,630	$5,158
Tri-Community Ambulance	$17,685	$13,753
Tri-Community Fire Department	$26,524	$20,630
Library	$8,620	$6,705
Annual PILOT at $9,000/MW	**$540,000**	**$540,000**

Source: Huron County Tax Assessor, May 2013.

*County Commissioners, by agreement, can designate up to $2,000/MW to a County Wind Fund.
NOTE: The tax distributions are a representation of the current ORC 5725.75, rates have not yet been finalized and are subject to change.

VII. CONCLUSION

This analysis concludes that the proposed Greenwich Wind Farm will have a significant positive effect on economic development within the local economy. This project will result in the creation of temporary and permanent jobs in the local economy during the construction and operation of the project, helping meet the goal of providing employment opportunities for residents of the eight-county region. Local governments will see net gains in revenue for a period of twenty years due to the wind farm and participating land owners will receive revenue from land lease payments. In addition, local businesses will have a new basic industry generating demand for goods and services.

Summary of Findings

- **Total Economic Benefit to the Local Economy**. During the construction phase of the project, the proposed Greenwich Wind Farm will generate approximately $50.04 million in total local benefit. Once complete, the project will continue to generate approximately $4.06 million annually in total local benefit.

- **Employment Benefits to the Local Economy**. During the construction phase of the project, the proposed wind farm will add an estimated 274 new full-time jobs to the local economy. These new jobs will generate approximately $14 million in wages and salaries.

  It is estimated that of these 274 new jobs, approximately 56 will directly support the construction of the wind farm. In addition, 166 jobs are expected to be added to the local economy through the indirect impacts associated with the project, and 52 jobs are expected to be added to the local economy through induced impacts created by the project.

  During the operations and management (O&M) phase of the project, approximately 15 new jobs will be added to the local economy. It is estimated that of these 15 new jobs, approximately four jobs will directly support the operation of the wind farm. These four new jobs will generate approximately $220,000 in earnings. Four additional new jobs are expected to be added to the local economy through indirect impacts associated with the project, and seven additional jobs are expected to be created through induced impacts of the project.

- **Land Lease Revenues**. Land lease revenue associated with the project will generate approximately $593,000 annually in increased income for participating property owners.

- **Property Tax Revenues.** The construction of the proposed Greenwich Wind Farm will increase revenues to local governments in accordance with the State of Ohio formula for establishing payments in lieu of taxes (PILOT) within five miles of the project site.

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Exhibit H

Surface Water, Ecological Communities

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December 12, 2013

Ms. Monica Jensen
Windlab Developments USA Ltd
927 Wing Street
Plymouth, MI 48170

submitted via email: monica.jensen@windlab.com

Re: Ecological Communities and Surface Water Assessments for the Greenwich Wind Project, Ohio

Dear Ms. Jensen:

This letter report summarizes the desktop ecological communities and surface waters assessment conducted by Ecology and Environment, Inc. for the proposed Greenwich Wind Project (Project) located in Huron County, Ohio in support of Windlab Developments USA Ltd (Windlab) application for a Certificate of Environmental Compatibility and Public Need (CECPN) from the Ohio Power Siting Board (OPSB).

INTRODUCTION AND SITE DESCRIPTION

The proposed Project is located in Huron County, Ohio in north-central Ohio near the town of Greenwich. The Project will consist of 25 turbines, associated access roads, underground collection lines, an operation and maintenance (O&M) building, and a substation. In addition, during the construction period there will also be a construction laydown yard and concrete batch plant and temporary extended construction rights-of-way (ROWs) and staging areas for construction of turbines, access roads, collection lines, and crane paths.

To satisfy the Ecological Impact assessment contained in the OPSB requirements for parts 4906-17-08(B)(1)(a)(ii) and 4906-17-08(B)(1) (b) of the CEPCN application, E & E has conducted a desktop assessment, supplemented with wetlands data collected by Windlab, to identify the wood lots, wetlands, and vacant fields present in the Project area and surrounding 0.5-mile radius, as well as to provide a summary of the vegetative communities present within that area. Based on the final Project layout provided by Windlab on December 4, 2013 and the anticipated construction and permanent disturbances for the Project infrastructure, E & E conducted a desktop analysis of the temporary and permanent habitat and vegetation impacts resulting from the Project as required in the CECPN application (4906-17-08(B)(2)(a) and 4906-17-08(B)(3)(a)).

In addition to the ecological community impacts, E & E used USGS National Hydrography Data (NHD) and aerial imagery to identify surface waters within the Project area that have the potential to be impacted by construction and/or operation of the Project as required in the CECPN application by OPSB regulations 4906-17-05(A)(1)(d) and (4906-17-07(C). Field verification and consultation with the Army Corps of Engineers and Ohio Environmental Protection agency regarding these stream crossings should be conducted prior to construction.

ECOLOGICAL IMPACT

E & E conducted a desktop assessment of the ecological communities present within the Project area and utilized the vegetation data collected by Windlab during wetland delineation surveys at the site to provide a catalog of flora species within the Project area, providing an overview of the ecological setting of the Project area and surrounding 0.5 mile radius. The desktop review was conducted utilizing spatial data from the United States Environmental Protection Agency (EPA), National Land Cover Database (NLCD), and the United States Geological Survey (USGS) National Gap Analysis Program (GAP) to assess the natural communities of the Project area plus a 0.5 mile buffer around the Project. Additionally, topographic maps, aerial photography, and available National Wetland Inventory (NWI) and Ohio Wetland Inventory (OWI) data were used to support this effort. The natural areas (i.e., wood lots, wetlands, and vacant fields) within the boundary of the Project area and the 0.5-mile buffer were used to categorize the ecological environment.

Collectively, the Project area and surrounding 0.5 mile buffer area encompass approximately 12,340 acres, with the Project area accounting for 4,650 acres. Agricultural lands, which represent approximately 63% (7,722 acres) of the Project area and 0.5 mile surrounding buffer, were omitted from the discussion as they are highly modified, non-natural areas (USGS 2001). Additionally, developed spaces are not discussed as they do not constitute natural areas. Low, medium, and developed open space comprises nearly 7.4% (910 acres) of the Project area and surrounding 0.5 mile buffer (USGS 2001). Pasture and hayfields are modified grassland areas, primarily managed for livestock foraging and production. While these can be considered modified, non-native areas, we have included them within the discussion of habitat impacts. These areas are often planted with foraging grasses or legumes for livestock grazing or to fix nitrogen in the soil for later crop production. Within the Project area and surrounding 0.5 mile buffer, pasture and hayfields represent roughly 8.1% (994 acres) of the total land cover. This community type is found throughout the Project and 0.5 mile surrounding buffer area, with the largest contiguous community being located in the southern extent of this area. This pasture is approximately 190 acres in size. Other communities are primarily located within the central Project area, leaving the northeast and southwest largely devoid of pasture and hayfields.

Ecoregions

The Project area is located along the western edge of the Low Lime Drift Plain Ecoregion and abuts the eastern edge of the Clayey High Lime Till Plains Ecoregion, within the broader Erie Drift Plain level III Ecoregion, as defined by the U.S. EPA (EPA 2013).

The Erie Drift Plain Ecoregion is located south of Lake Erie, from central Ohio north to western New York. The area was once covered by maple-beech-fir forests, but has since been largely converted to farmland. The area is characterized by low rounded hills, scattered end moraines, kettles, and areas of wetland, with hillier terrain occurring along the south and eastern extents of the zone, and flatter topography along the central and western extent, where the Project area is located (US EPA 2013a).

The Eastern Corn Belt Plains extends from central Ohio west to Indiana, and south to Kentucky. The Project area is located immediately along the northeastern extent of the Eastern Corn Belt Plains. This Ecoregion is composed primarily of rolling till plains with local end moraines. The region has loamier and better drained soils than the Huron/Erie Lake Plains, to the north, and richer soils than the Erie Drift Plain. This area was historically comprised of beech forest on the Wisconsinan soils, and elm-ash swamp forests dominated the wetter pre-Wisconsinan soils. Currently, much of the area has been converted to corn and soybean cultivation and livestock production, which impacts stream turbidity and water chemistry (EPA 2013a). While the Project area does not overlap with this Ecoregion, it is adjacent to the northwestern edge of this Ecoregion and reflects the surrounding vicinity of the Project area.

Within these broader Ecoregions, the Project area is located within the U.S. EPA delineated Low Lime Drift Plain level IV Ecoregion, and is directly adjacent to the eastern extent of the Clayey High Lime Till Plains level IV Ecoregion (EPA 2013). The Low Lime Drift Plain Ecoregion exhibits similar characteristics to the broader level III Ecoregion and contains low rounded hills with scattered end moraines and kettles, but with less fertile soils than Ecoregions within the Eastern Corn Belt Plains to the east. Crop cultivation, including soybean and corn production is common in this area, with many ridges and lowlands remaining wooded (EPA 2012). The Project area itself is located within the Low Lime Drift Plain, but the 0.5 mile buffer surrounding it which is used in this analysis encroaches into the Clayey High Lime Till Plains. The Clayey High Lime Till Plains Ecoregion is a transitional area between the Loamy High Lime Till Plains and the Maumee Lake Plains Ecoregions. The Clayey High Lime Till Plains Ecoregion contains less productive soils and is more artificially drained than the area to the south, and supports fewer swamps than the region to the northwest. Farming, including corn, soybean, and livestock production is the dominant land use of the Region, and has replaced the original beech forest and scattered elm-ash swamp forests (EPA 2012).

As defined by the USGS GAP Analysis program, the approximately 3,191 acres of forests occurring within this area are classified as eastern Northern American cool temperate forest and are almost entirely composed of four major types including: central mesophytic hardwood forest, central oak-hardwood and pine forest, northern mesic hardwood and conifer forest, and northern and central swamp forest (USGS 1999-2001). All four forest types are present within the Project area and surrounding 0.5 mile buffer and total approximately 2,594 acres. These four broad forest types are generally a composite of different forest communities or stands. These smaller forest communities are comprised of overstory and understory species that are specific to each type of forest community. Some forest communities may share characteristics that aggregate them into a broader forest type; however, they are unique based upon their species composition, geographic location, soil characteristics and moisture regimes in which they occur.

The central mesophytic hardwood forest type is the most dominant forest macrogroup, representing approximately 14% (1,753 acres) of the total land cover in the Project area and surrounding 0.5 mile buffer and is represented by north-central interior beech-maple forest community. Central oak-hardwood pine forest type comprises roughly 3% (416 acres) of the Project area land cover and surrounding 0.5 mile buffer and is characterized by both north-central interior dry-mesic oak forest and woodland and northeastern interior dry-mesic oak forest communities. Northern mesic hardwood and conifer forest type also comprises approximately

3% (349 acres) of the habitat in the Project area and 0.5 mile buffer, and is represented by an Appalachian hemlock-hardwood forest community. Northern and central swamp forest represent only roughly 0.5% (76 acres) of the total land cover of the Project area and surrounding 0.5 mile buffer, respectively (USGS 1999-2001). This forest type is represented by the north-central interior wet flatwood forest community and North-Central Interior and Appalachian Rich Swamp. These dominant forest communities, which represent the natural community and habitat present within the Project area and surrounding 0.5 mile buffer area, are discussed in more detail below.

North-Central Interior Beech-Maple Forest

Primarily found along the southern Great Lakes, this central mesophytic hardwood forest is dominated by a thick American beech (*Fagus grandifolia*) and sugar maple (*Acer saccharum*) canopy. Associated tree species of the north-central beech-maple forest can include red oak (*Quercus rubra*), American basswood (*Tilia Americana*), white ash (*Fraxinus Americana*), yellow buckeye (*Aesculus flava*), American hophornbean (*Ostrya virginiana*), and hornbeam (*Carpinus sp*.). Tree saplings of canopy trees are often the most abundant component of the shrub layer, but other common shrub species include various viburnums (*Viburnum spp.*), witch hazel (*Hamamelis sp.*), and spicebush (*Lindera sp.*) (TNC 2010a). This forest is typically found on flat to rolling uplands, with rich loam soils that have formed in glacial till. Flat and rolling terrain with rich loam soils produce prime farming conditions, and as a result the expanse of this forest has been significantly reduced in size due to agricultural conversion and development. Today few large stands remain intact (TNC 2010a).

The North-Central Interior Beech-Maple Forest is the dominant forest type in the area covering approximately 1,753 acres of the Project area and 0.5 mile buffer and comprises 14.2% of the total landcover in this area. In the northern half of the Project area these forests are found in relatively small fragments (approximately 50 acres or less); however, larger blocks exist in the southern Project area, specifically along the riparian corridors of the headwaters to the Southwest Branch Vermillion River.

North-Central Interior Dry-Mesic Oak Forest and Woodland

Primarily found in central oak-hardwood pine forests throughout the glaciated regions of the Midwest, and often on gentling rolling terrain, this hardwood forest can occur on uplands within the prairie matrix and near floodplains, or on rolling glacial moraines and amount kettle-kame topography. North-central interior dry-mesic oak forest and woodlands commonly contain a dense to moderately open canopy and dense shrub layer. Burr Oak (*Quercus macrocarpa*), red oak (*Quercus rubra*), and/or white oak (*Quercus alba*), which are fire resistant, are often the dominant overstory species. Hickory species (*Carya spp*.) including, shagbark (*Carya ovata*), bitternut hickory (*Carya cordiformis*), and mockernut hickory (*Carya alba/Carya tomentosa*) are characteristic of this forest type. Understory species may include American hazelnut (*Corylus Americana*), shadbush species (*Amelanchier spp*.), starry false lily of the valley (*Maianthemum stellatum*), blue cohosh (*Caulophyllum thalictroides*), Canada nettle (*Laportea Canadensis*), white trillium (*Trillium grandiflorum*), wild sarsaparilla (*Aralia nudicaulis*), and stinging nettle (*Urtica dioica*) (NatureServe 2009). Extensive conversation for agriculture has led to widespread fragmentation of this community type.

North-Central Interior Dry-Mesic Oak Forest and Woodlands is the second most common forest type covering 318 acres, but represents only 2.6% of the total land cover of the Project area and surrounding 0.5 mile buffer area. These forest types are found in small (less than 20 acres) blocks scattered throughout the Project area, but occur almost exclusively within the larger North-Central Beech-Maple Forest stands in the area.

Northeastern Interior Dry-Mesic Oak Forest

Northeastern Interior Dry-Mesic Oak Forests are one of the matrix forest systems of the northeastern and north-central United States, occurring as part of central oak-hardwood pine forests. They are often closed-canopy forests covering large expanses at low to mid elevations of flat to gently rolling topography. These forests are primarily characterized by a dominant presence of oak species, including northern red oak, white oak, eastern black oak (*Quercus velutina*), and scarlet oak (*Quercus coccinea*) in mature stands. Additionally, chestnut oak (*Quercus prinus*) may be present, but is less diagnostic than other oak species. Other associates may include red maple (*Acer rubrum*), sweet birch (*Betula lenta*) and yellow birch (*Betula alleghaniensis*), and occasionally sugar maple. Forested wetland pockets may be found within these forests along hillslopes with impeded drainages.

Within the Project area, Northeastern Interior Dry-Mesic Oak Forest represents the fourth most dominant forest community but only encompasses 96 acres of the Project area and surrounding 0.5 mile buffer, representing 0.8% of the total land cover. Due to the limited extent within the Project area, this forest community is found exclusively in small stands (less than 5 acres) within larger forest community composites, and are found peppered throughout the Project area and surrounding buffer area, with more and larger stands being located within the southern Project and surrounding 0.5 mile buffer area.

Appalachian Hemlock-Hardwood Forest

This forest community occurs on low, midslopes and valley bottoms and is considered a system with an intermediate moisture regime within northern mesic hardwood and conifer forests. The forest is often characterized by a canopy dominated by northern hardwoods, including American beech and sugar maple, with eastern hemlock (*Tsuga canadensis*), and may contain large proportions of eastern white pine (*Pinus strobus*) and oak species (*Quercus spp*). In some areas, including southern Ohio, these forests are being severely impacted by the hemlock woolly adelgid (*Adelges tsugae*), an insect which causes near 100% mortality to hemlock and spruce trees by feeding upon their sap. This infestation can lead to a forest community conversion as canopy hemlocks are killed off and replaced by other canopy trees (NatureServe 2009).

The 348 acres of Appalachian Hemlock-within the Project area and surrounding 0.5 mile buffer account for approximately 2.8% of the total land cover. This forest type is found in very small (less than 15 acres) stands within the Project area and 0.5 mile buffer and is almost exclusively located in association with larger North-Central Beech-Maple Forest and North-Central Interior Dry-Mesic Oak Forest and Woodland composites, and are scattered throughout the Project and surrounding 0.5 mile buffer area.

North-Central Interior and Appalachian Rich Swamp

A north-central interior and Appalachian Rich Swamp is a hardwood or mixed ecosystem located within swamp area of low to mid-elevation. The typically occur in poorly drained depressions or stream bottoms with higher pH and nutrient levels. These areas are typically dominated by red maple and black ash hardwoods, with larch species being the dominant conifer present. The swamp environment causes a more open canopy cover which leads to a shrubby or herbaceous understory. The understory is comprised of a diverse combination species, including ferns, herbs, and bryophytes characteristic of fen environments. Other common floral species include; autumn willow (*Salix serissima*), Engelmann's spikerush (*Eleocharis engelmannii*), Hill's pondweed (*Potamogeton hillii*), many-headed sedge (*Carex sychnocephala*), prairie straw sedge (*Carex suberecta*), short-fruit rush (*Juncus brachycarpus*), spreading globeflower (*Trollius laxus*), and weak stallate sedge (*Carex seorsa*) (TNC 2010b).

Within the Project area and surrounding 0.5 mile buffer this wetland forest community represents only 49 acres and 0.4% of the total land cover. This community type is found exclusively within wet depressions and pockets within larger forest matrix stands, and is typically found peppered throughout the Project area and surrounding 0.5 mile buffer, with the largest blocks occurring within the western and southern extent of the area.

North-Central Interior Wet Flatwood

A north-central interior wet flatwood is a hardwood forest of upland and wetland flora occurring within low-lying poorly drained depressions within northern and central swamp forests. These forests are typically dominated by pin oak (*Quercus palustris*), with other species such as swamp white oak, bur oak, black gum (*Nyssa sylvatica*), American sweet gum (*Liquidambar styraciflua*), and red maple often present, or potentially dominant. Shrub and herbaceous layer density is dependent upon canopy cover, with denser canopies resulting in sparser shrub and herbaceous cover. Buttonbush (*Cephalanthus occidentalis*), winterberry (*Ilex verticillata*), and alder species (*Alnus spp*.) commonly comprise the shrub understory, and sedges and cinnamon fern (*Osmundastrum cinnamomeum*) often are dominant in the herbaceous layer. These stands typically occur in drained uplands or depressions with impermeable clay soils, which creates a perched water table (TNC 2010c).

Within the Project area and surrounding 0.5 mile buffer this wetland forest community represents only 26 acres and 0.2% of the total land cover. This community type is found exclusively within wet depressions and pockets within larger forest matrix stands.

Other community types

Cultivated cropland, pasture and hayfields, open water, and developed open-space represent approximately 78% (9,674 acres) of the Project area and surrounding 0.5 mile buffer. The discussed forested communities account for the next highest acreage of land, collectively representing nearly (2,590 acres) 21% of the total land cover of this area. Combined, agricultural land, pasture and hayfields, developed spaces, open water (ponds) and the discussed forested communities account for 99% of the total land cover within the Project area and buffer area. The remaining 1% of the land cover is composed of Allegheny-Cumberland Dry Oak Forest and Woodland-Hardwood, Ruderal forest, Central Interior and Appalachian Floodplain, Riparian, and

Shrub-Herbaceous Wetland systems and Central Appalachian Pine-Oak Rocky Woodland. They are found in very small pockets, often less than 0.5 acres in size. All of these systems, with the exception of Central Appalachian Pine-Oak Rocky Woodland and Allegheny-Cumberland Dry Oak Forest and Woodland – Hardwood are associated with wetland ecosystems, and are discussed in more detail in in the Wetland Plant Communities section below. In general these wetland communities are found along riparian corridors and in small and isolated depressions and pockets throughout the Project area.

Delineated Wetland Plant Communities

Ohio Wetland Inventory (OWI) spatial data were analyzed to provide an indication on the extent of wetland resources within the Project area and the surrounding 0.5 mile buffer where field surveys could not be conducted due to land access issues. The OWI wetlands are based upon an analysis of satellite data, which utilizes a multi-spectral scanner to collect electromagnetic radiation from the earth's surface in the visible, near infrared, and mid-infrared wavelength bands. This data is intended solely as an indicator of wetland sites that should be reviewed by field investigation. The satellite data is temporal, and reflects conditions during a specific season and year; therefore, wetlands mapped as OWI may not be present during field ground-truthing investigations. The OWI data shows approximately 208 acres of wetlands within the Project area and surrounding 0.5 mile buffer. These numerous, small (less than 5 acres), OWI wetlands appear to be located along the southern and northeastern margins of the Project area and surrounding buffer, with the central area appearing to be comprised of more upland area (ODNR 1987).

Windlab conducted wetland delineation surveys within the Project area in the fall of 2013 in locations where Project infrastructure was planned. The 31 sample point surveys discovered and mapped a total of 11 wetlands, which included 10 palustrine emergent wetlands (PEM) and one palustrine forested wetland system (PFO), totaling 7.9 acres in size. Windlab-mapped wetlands within the Project area are generally located along riparian corridors or in low-lying depressions and range in size from 0.01 acres to 1.26 acres. The most dominant wetland plant species within the Project area include: common reed (*Phragmites australis*), giant goldenrod (*Solidago gigantea*), smooth white oldfield aster (*Symphyotrichum racemosum*), narrowleaf cattail (*Typha angustifolia*), and bluejoint (*Calamagrostis Canadensis*) in the herbaceous and shrub layers. These species were documented within nearly every PEM wetland and were often the dominant species. The PFO wetlands are dominated by shellbark hickory (*Carya laciniosa*) and American elm (*Ulmus americana*) tree species.

Construction Impacts

This section discusses the potential for impacts to ecological resources as a result of construction of the Project. As required by OPSB Rule 4906-17-08(B)(2)(a), the potential impacts to the vegetative communities and habitats found in the Project area are described below. Table 1 provides a breakdown of the temporary and permanent land use impacts, per the USGS GAP landcover database, as a result of construction and operation of the Project.

Where feasible, Windlab has sited Project facilities to minimize stream and wetland impacts, as well as forest clearing and fragmentation of forested habitat, thereby minimizing the potential for impacts to aquatic and forest dwelling wildlife species. Minor impacts to ecological resources will result from temporary and permanent loss of vegetation communities during construction activities. There will be temporary losses of vegetation from the clearing required to establish the construction and/or permanent ROWs for access roads, collection lines, crane paths, turbines, the construction laydown and concrete batch plant area, substation, and operation and maintenance (O&M) building.

Agricultural Land

Most land disturbance during construction of the Project will be to cultivated cropland; approximately 177.3 acres, or 84%, of the 212.2 acre temporary disturbance from construction of the Project will be to agricultural land. Of the temporary cultivated cropland land impact, only 24.9 acres of agricultural land will be permanently impacted by the Project. The permanent impact results from areas which will be converted for the foundations of turbine pads, access roads, the operations and maintenance (O&M) building, and the Project substation.

Undeveloped or Abandoned Land

The remaining impacts during construction will be to pasture and hayfields, forested communities, and developed areas. The clearing of forestland and pasture and hayfields communities has been minimized to the greatest extent practical in the development of the design of the Project.

Construction will result in a localized reduction in the amount of 18.1 acres of pasture and hayfields, and 11 acres of forested land. Specifically, approximately 6.2 acres of North-Central Interior Beech-Maple forest; 3.5 acres of Appalachian Hemlock-Hardwood Forest; 0.8 acres of North-Central Interior Dry-Mesic Oak Forest and Woodland; 0.4 acres of Northeastern Interior Dry-Mesic Oak Forest; and 0.1 acres of Central Appalachian Pine-Oak Rocky Woodland will be impacted from the construction of the Project. The permanent impact to undeveloped land will be significantly less as there is no permanent impact from collection lines, crane paths, and the construction laydown yard and batch plant, and a reduced impact from access roads and turbine pads.

Nearly all of the forested impacts will be allowed to regenerate or will be replanted after construction, as only 1.6 acres of permanent forested impact are anticipated. The reduction in the amount of forested habitat as a result of the Project is minor in comparison with the overall acreage of forestland located in the Project area. There is approximately 3,191 acres of forested habitat within the Project area and surrounding 0.5 mile buffer, meaning temporary forested impacts will only affect 0.3% of this habitat and only 0.05% of this total will be permanently impacted by the construction of the Project.

Approximately 18.1 acres of pasture and hayfield will be temporarily impacted from the construction of the Project, while only 0.6 acres will be permanently impacted. Of the 994 acres of pasture and hayfields within the Project area and the 0.5 mile buffer, this results in an overall loss of less than 0.1% of the available pasture and hayfields.

Wetland and Stream Crossings

Wetlands delineated within the Project area will be temporarily impacted by the construction of the Project. The turbine pads, O&M building, construction laydown and concrete batch plan area, and Project substation have been sited to avoid wetland resources, but linear components such as access roads, collection lines, and crane pathways will encroach into wetlands to a limited extent. The construction of access roads, collection lines, and crane paths will result in a total potential temporary wetland impact of approximately 0.5 acres. The permanent impact from access roads to wetlands is only expected to be approximately 0.1 acres. The Applicant will coordinate with USACE to design the Project such that construction impacts are minimized (e.g. use timber mats for wetlands crossed by crane paths) and if applicable, the necessary permits for wetland impacts are obtained.

Avoidance, Minimization, and Mitigation of Impacts

The overall impact of construction of the Project on vegetation is anticipated to be minimal due to careful site planning. The Project has been designed to protect existing habitat by avoiding development within forested areas, resulting in limited tree clearing required construction of the Project facilities. To further minimize impacts on vegetation, the Project has been sited, to the extent practicable, within previously disturbed areas, such as agricultural fields, along existing farm roads, or within developed open spaces. Where possible, access roads collection lines, and crane paths system have been located within areas with minimal tree growth, such as edges of agricultural fields, or co-located with existing utility ROWs or public road ROWs. The potential for construction impacts to aquatic habitats such as wetlands and streams have also been avoided through careful siting and the use of alternative construction techniques, such as implementing HDD to avoid these resources by tunneling collection lines under wetlands and streams.

Operation Impacts

Permanent impacts on vegetation or ecological communities will result from ongoing maintenance of the turbine sites, electrical collection system, access road ROWs, substation, and O&M building during operation of the Project. Of the approximately 28 acres of total permanent disturbance, agricultural land will comprise the largest ecological community impact with approximately 24.9 acres. The O&M building, Project substation, and all turbines will be located within agricultural land.

Approximately 0.9 acres of North-Central Interior Beech-Maple Forest, 0.6 acres of Appalachian Hemlock-Hardwood Forest, and 0.1 acres of North-Central Interior Dry-Mesic Oak Forest and Woodland and Northeastern Interior Dry-Mesic Oak Forest will be permanently converted for the construction of access roads. Permanent access roads will also result in the conversion of 0.6 acres of pasture and hayfields.

The Applicant does not expect to use herbicides or pesticides to control vegetation along access roads, turbine maintenance areas, O&M building, and the substation. Generally, these areas are not expected to promote vegetation growth because of the use of geotextile fabric and gravel construction, as well as the periodic use of the access roads by vehicles. In some cases, herbicidal spot control might be required along access roads, collection lines, and turbine maintenance areas. If herbicide use should become necessary, the Applicant will comply with applicable laws and BMPs to minimize the impact on natural resources.

As mentioned, permanent wetland impacts as a result of access road construction will only total approximately 0.1 acres. The Applicant will coordinate with the U.S. Army Corps of Engineers and the Ohio Environmental Protection Agency to obtain the necessary permits to permanently impact wetlands.

Table 1 Summary of USGS GAP Landcover and Impacts by Project Component

Land Use	Land Use within 0.5 miles of Project Area		Access Roads		Batch Plant and Laydown Area (Temp)	O&M Building (Perm)	Substation and Switchyard (Perm)	Collection Lines (Temp)	Crane Paths (Temp)	Turbines		Total Impact[2]	
	Acres	% Total	Temp	Perm						Temp	Perm	Temp	Perm
Agriculture	7,722	62.6	36.0	19.0	0.0	2.3	3.1	19.2	68.9	47.9	0.6	177.3	24.9
Forest	2,608	21.1	3.4	1.6	0.0	0.0	0.0	2.6	4.5	0.6	0.0	11.1	1.6
Pasture/Hay	994	8.1	1.2	0.6	8.3	0.0	0.0	3.1	4.2	1.3	0.0	18.1	0.6
Developed	909	7.4	1.6	0.8	1.4	0.2	0.0	0.9	1.9	0.0	0.0	5.9	1.0
Wetlands, floodplains, riparian areas, and open water[1]	107	0.9	0.2	0.1	0.0	0.0	0.0	<0.1	0.3	0.0	0.0	0.5	0.1
Grand Total[2]	12,340	100%	**42.2**	**22.0**	**9.6**	**2.4**	**3.1**	**25.7**	**79.4**	**49.8**	**0.6**	**212.2**	**28**

[1]Wetland impacts reflect the predicted impacts from the Windlab wetland delineation survey data and not USGS GAP Landcover data.
[2]As a result of rounding, totals may not match individual component impacts.

SURFACE WATERS

The Project area is located within Hydrologic Unit Code (HUC) 12 – South Branch Vermilion River watershed and HUC-10 – New London Upground Reservoir-Vermilion River watershed. The western two-thirds of the Project area drains into the South Branch Vermilion River drainage basin (HUC-12), while the eastern third of the Project area drains to the New London Upground Reservoir-Vermilion River drainage basin (HUC-10). Both of these sub-basins are within the larger Southwestern Branch Vermilion River watershed, a component of the Huron-Vermilion drainage basin (HUC-8) (USGS 2013). This entire region of northern Ohio is encompassed within the Lake Erie watershed. The Vermilion River watershed, which includes the Southwest Branch Vermilion River and Eastern Branch Vermilion River, drain 269 square miles of northern Ohio.

Within the Project area there are eight primary perennial streams, with 15 associated intermittent and ephemeral tributaries, and eight ponds, as defined by USGS National Hydrography Dataset (NHD) (USGS 2013a). All streams within the Project area are generally small and all are unnamed tributaries to the Southwest Branch Vermilion and Vermilion Rivers (see Figure 1). The majority of the southern and western Project area drains in a northwesterly direction through these small, unnamed headwater streams into the Southwest Branch Vermilion River. The northeastern extent of the Project area drains in a northeasterly direction through these unnamed systems into the Vermilion River. The impounded waterbodies within the Project area are small farm ponds. These are located in both the northern and southern Project area extent, with the largest measuring approximately 4.5 acres. Several larger reservoirs are located outside, but in close proximity of the Project area (within 0.5 miles). The Greenwich Reservoir is the most notable, and is located just south of the Village of Greenwich, approximately 0.5 miles to the west of the western Project boundary. The New London Upground Reservoir is the largest waterbody within one mile of the Project area; this is a 210 acre impoundment located approximately one mile to the northeast of the northeastern Project area.

Surface Waters Impacts

Stream crossings have been avoided to the greatest extent practicable, and further adjustments to the location of the Project infrastructure will be made throughout the OPSB application review and siting process. No streams will be impacted by construction of the turbines. However, due to the location and number of streams in the Project area and the linear nature of Project components like access roads and collection lines, it will be necessary to cross streams for the installation of the electrical collection lines.

To calculate the potential surface water impacts from the Project, USGS NHD geospatial data was combined with the Project infrastructure layout to determine where crossings may occur. At each crossing, aerial photography was then used to determine the width of the stream crossing and thus the stream impact. These NHD data contain features such as lakes, ponds, streams, rivers, canals, dams, and stream gages, and are designed to be used as for general mapping and analyses of surface water systems (USGS 2013). Each stream reach is assigned a NHD code, which acts an identifier, describing the basin and sub-basin the stream reach is located in.

Depending upon when the NHD data was generated and land use of the interest area, NHD data may not accurately reflect the current conditions of the waterway. The NHD data for highly modified areas such as agricultural land, which have typically been altered through the installation of drain tile, stream channelization, and undergone topographic contour modifications, can be slightly inaccurate as a result of these activities. Therefore, to more accurately assess the water resources within the Project area, NHD data was overlaid atop high-resolution aerial photography to perform a desktop level assessment of the surface waters within the Project construction impact areas. The condition of the stream reaches were assessed to determine if the stream reach had a defined bed and bank (definition of a stream), was a perennial, intermittent, or ephemeral stream; and to measure the wetted width of the stream, when applicable. Through this assessment supporting data regarding the surface waters within the Project area and the Project's potential impacts to them could be generated.

A review of USGS NHD water resources identified a total of 45 crossings of NHD stream reaches by linear Project facilities (see Figure 2). Through an analysis of high-resolution aerial photography, the majority of NHD streams within the impact areas of the Project were determined to lack defined stream bed and banks or were devoid of water. Therefore, it was determined that surface waters would not be impacted as a result of construction at these NHD identified crossings. Streams classified as being potentially jurisdictional waters of the U.S. include streams that appear to be relatively permanent waterway (RPW) and are hydrologically connected tributaries to traditional navigable waters (TNWs). Table 2 provides details on the stream reaches crossed by the access roads, collection lines, and crane pathways.

Impacts associated with collection lines and crane pathways are classified as temporary, as they will only occur during the construction phase and the stream systems will be restored to their natural conditions following construction. The construction of access roads will result in both temporary and permanent impacts to streams as these will be permanent features throughout the life of the Project. For construction of the Project, access roads may require a wider width to accommodate larger construction equipment. This will result in a greater temporary impact to surface waters. Following the construction phase however, these access road corridors will be narrowed, and the corridors returned to their natural state, resulting in a smaller permanent impact to surface waters.

A total of five streams, comprising an estimated 133 linear feet of streams, will be crossed by the crane pathways, the collection line system, and access roads. The stream reaches that will be impacted by the Project infrastructure are denoted in red in Table 2. Of the 133 linear feet of streams impacted by Project infrastructure, 53 linear feet will be impacted permanently as a result of the construction of new access roads. The remaining 80 linear feet will be temporarily impacted from the construction of crane pathways (estimated 34 and 22 feet) and access roads (estimated 24 feet). It is assumed that Windlab will utilize boring or horizontal directional drilling (HDD) of collection lines through streams, resulting in no disturbance to the bed or banks. If during final design of the Project it is determined that the collection lines cannot be installed via boring or HDD, the Applicant will coordinate with USACE to obtain the necessary permits.

Table 2 Impacts to National Hydrological Dataset (NHD) Waters and Streams

NHD Stream Reach Code	Stream Type	Type of Impact	Project Activity	Approximate Surface Water Disturbance (Linear Feet)	Potentially USACE Jurisdictional Waterway
4100012001380	Ephemeral	Temporary	Crane Pathway	NA	Yes
4100012001376	Ephemeral	Temporary	Collection Line	NA	No
4100012001375	Ephemeral	Permanent	Access Road	NA	No
	Ephemeral	Temporary	Access Road	NA	No
4100012001364	**Intermittent**	**Temporary**	**Crane Pathway**	**34 feet**	**Yes**
	Ephemeral	Temporary	Collection Line	NA	No
	Ephemeral	Permanent	Access Road	NA	No
	Ephemeral	Temporary	Access Road	NA	No
4100012000237	Ephemeral	Temporary	Crane Pathway	NA	No
	Ephemeral	Permanent	Access Road	NA	No
	Ephemeral	Temporary	Access Road	NA	No
4100012000234	Ephemeral	Temporary	Crane Pathway	NA	No
	Ephemeral	Temporary	Collection Line	NA	No
	Ephemeral	Permanent	Access Road	NA	No
	Ephemeral	Temporary	Access Road	NA	No
4100012000233	Ephemeral	Temporary	Crane Pathway	NA	No
	Ephemeral	Permanent	Access Road	NA	No
	Ephemeral	Temporary	Access Road	NA	No
4100012000231	Ephemeral	Temporary	Crane Pathway	NA	No
	Ephemeral	Temporary	Collection Line	NA	No
4100012000230	Ephemeral	Permanent	Access Road	NA	No
	Ephemeral	Temporary	Access Road	NA	No
4100012000229	Ephemeral	Temporary	Crane Pathway	NA	Yes
	Intermittent	Temporary	Collection Line	NA	Yes
4100012000228	Ephemeral	Temporary	Crane Pathway	NA	No
	Ephemeral	Permanent	Access Road	NA	No
	Ephemeral	Temporary	Access Road	NA	No
4100012000226	Ephemeral	Temporary	Crane Pathway	NA	No
	Ephemeral	Temporary	Collection Line	NA	No
4100012000225	Ephemeral	Temporary	Crane Pathway	NA	No
	Ephemeral	Temporary	Collection Line	NA	Yes
4100012000224	Ephemeral	Temporary	Collection Line	NA	No
4100012000221	**Intermittent**	**Temporary**	**Crane Pathway**	**22 feet**	**Yes**
	Intermittent	**Temporary**	**Collection Line**	**Bored or HDD – no impact**	**Yes**
	Intermittent	**Permanent**	**Access Road**	**53 feet**	**Yes**
	Intermittent	**Temporary**	**Access Road**	**24 feet**	**Yes**
4100012000215	Ephemeral	Temporary	Crane Pathway	NA	Yes
	Ephemeral	Temporary	Collection Line	NA	Yes
	Ephemeral	Permanent	Access Road	NA	Yes
	Ephemeral	Temporary	Access Road	NA	Yes

Table 2 Impacts to National Hydrological Dataset (NHD) Waters and Streams

NHD Stream Reach Code	Stream Type	Type of Impact	Project Activity	Approximate Surface Water Disturbance (Linear Feet)	Potentially USACE Jurisdictional Waterway
4100012000214	Ephemeral	Temporary	Crane Pathway	NA	No
4100012000213	Ephemeral	Temporary	Crane Pathway	NA	No
4100012000212	Ephemeral	Temporary	Crane Pathway	NA	No
	Ephemeral	Permanent	Access Road	NA	No
	Ephemeral	Temporary	Access Road	NA	No

Key: NA = Not applicable, no defined stream bed and bank, no surface water present
Stream reaches designated in red indicate an actual predicted stream impact

Source: USGS, National Hydrography Dataset (NHD) 2013.

The NHD streams determined to be impacted by the construction of the Project do not fall into the category of being TNW, but do appear to have hydrological connectivity to TNW, and therefore, may be determined to by waters of the U.S., and fall under the jurisdiction of the USACE, CWA Section 404 and RHA Section 10 regulations. Following a finalized Project layout with engineering plans for stream crossings, Windlab will consult with the USACE to determine whether construction minimization measures can be implemented to reduce impacts further.

The Applicant will use construction methods to cross streams that will avoid disturbances to the bed or banks of the streams such as boring or HDD. Impacts will be further minimized through the implementation of a Storm Water Pollution Prevention Plan (SWPPP) to prevent erosion and sedimentation into nearby waterbodies under Ohio EPA's National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Activities. Erosion control structures will be utilized to prevent an off-site migration of soil and to minimize impacts to fish and aquatic species. Silt fencing will be installed along the construction ROW in all areas adjacent to wetlands, in accordance with the SWPPP. Best Management Practices (BMPs) will be utilized during construction to prevent excess stormwater runoff from the construction areas. Further, areas temporarily disturbed during construction will be restored to pre-construction conditions as soon as possible in order to further minimize the impact of construction.

Sincerely,

ECOLOGY AND ENVIRONMENT, INC.

Courtney Dohoney
Project Manager

Attachments:
A – Figures

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Attachment A

Figures

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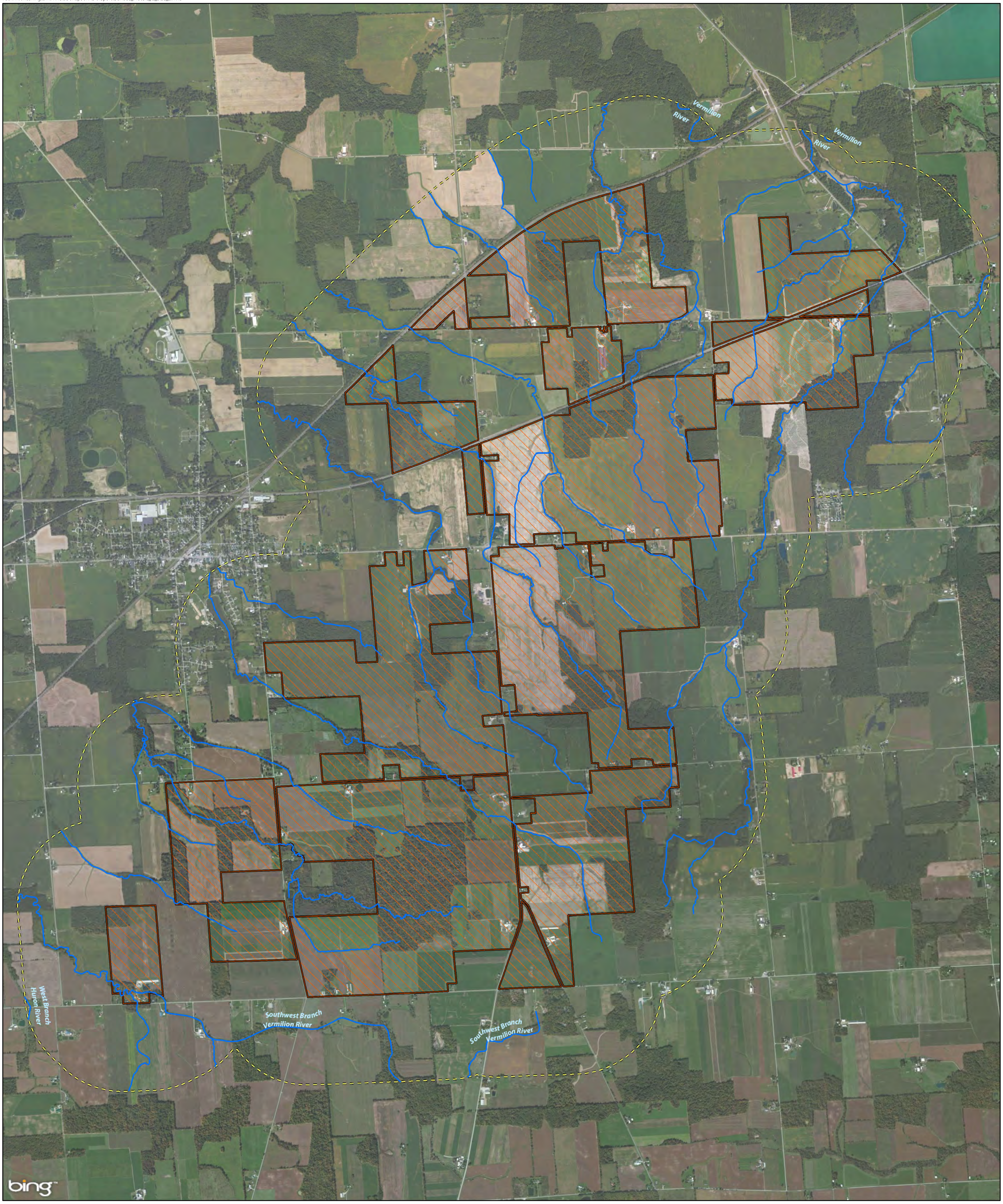

N

SCALE

0.25 0 0.25 Miles

SOURCE: Ecology and Environment, Inc. 2013; USGS NHD 2013; Service Layer Credits: Image courtesy of USGS State of Michigan.

Legend

- USGS NHD Streams and Rivers
- Project Area Plus a Half-Mile Buffer
- Project Area Boundary

Figure 1

USGS NHD Streams Within the Project Area Plus a Half-Mile Buffer

WindlabDevelopments USA, Ltd

Windlab Desktop Surface Waters

Huron County, Ohio

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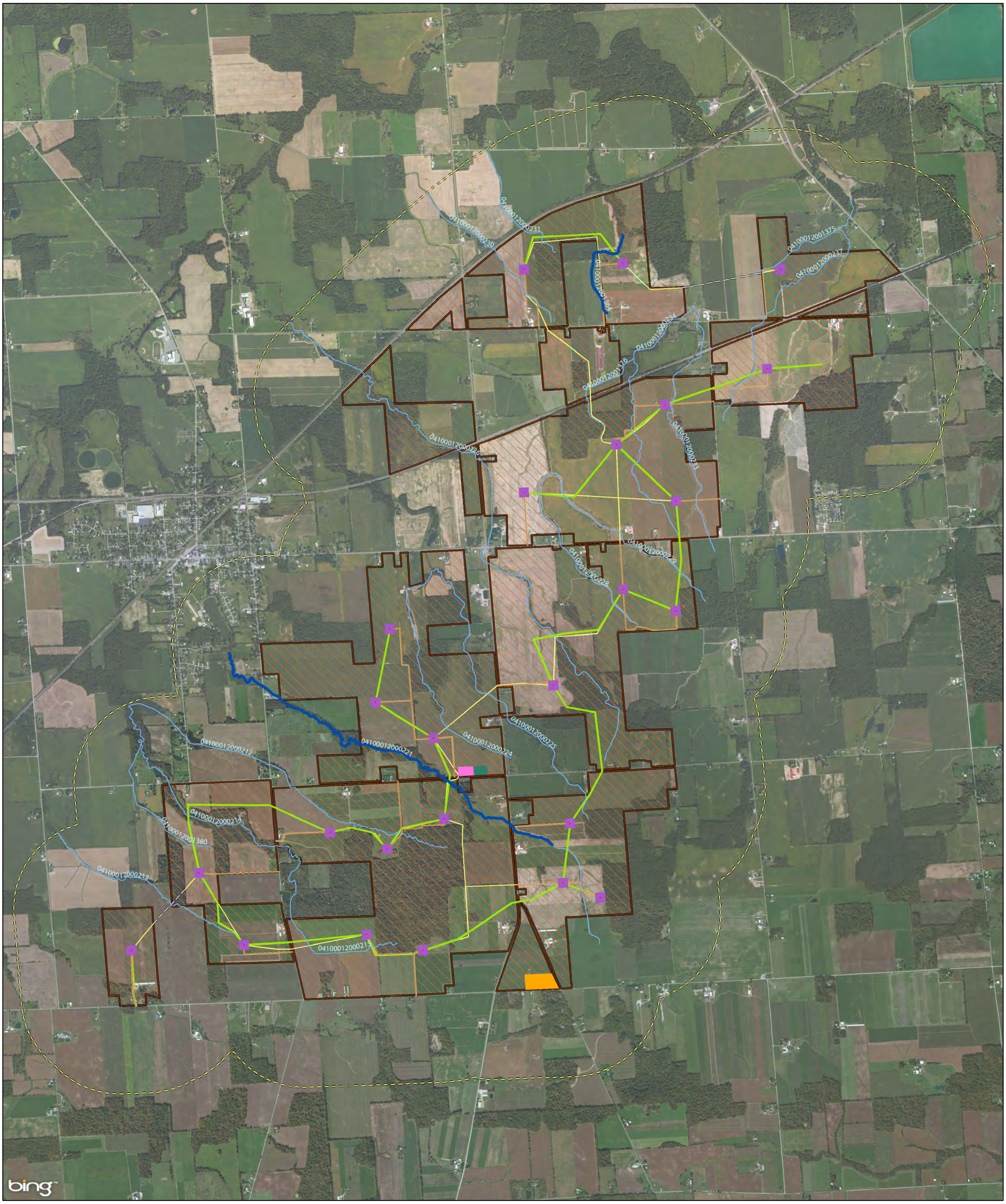

SCALE

0.25 0 0.25 Miles

SOURCE: Ecology and Environment, Inc. 2013; USGS NHD 2013; Service Layer Credits: Image courtesy of USGS State of Michigan.

Legend

- Predicted Stream Impact
- Non-Impacted Stream
- Project Area Plus a Half-Mile Buffer
- Project Area Boundary
- Directional Boring Lines

Impact Area Buffers by Type

- Turbine Permanent
- Access Road Perm
- Substation Temp/Perm
- O&M Facility Temp/Perm
- Turbine Temp
- Access Road Temp
- Crane Path Temp
- Collection Lines Temp
- Batchplant/Laydown Yard Temp

Figure 2

USGS NHD Streams Crossing Project Infrastructure

Windlab Developments USA, Ltd.

Windlab Desktop Surface Waters.

Huron County, Ohio