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December 21, 2009

Via Hand Delivery

Ms. Renee Jenkins
Administration/Docketing
Ohio Power Siting Board
180 East Broad Street, 13th Floor
Columbus, Ohio 43215-3793

Re: Heartland Wind, LLC
Case No. 09-1066-EL-BGN

Dear Ms. Jenkins:

Enclosed, please find an original and twenty (20) copies of the Application of Heartland Wind, LLC, a limited liability company, for a Certificate of Environmental Compatibility and Public Need under Chapter 4906-17 of the Ohio Administrative Code (OAC). Pursuant to OAC 4906-5-03(A)(3), the applicant makes the following declarations:

Name of Applicant:
Heartland Wind, LLC
whose sole member and manager is
Iberdrola Renewables, Inc.
110 N Brockway Street, Suite 110,
Palatine, IL 60067

Name/Location of Proposed Facility:
Blue Creek Wind Farm
Tully, Union and Hoaglin Townships and
Blue Creek and Latty Townships
Van Wert and Paulding Counties, Ohio

Authorized Representative Technical:
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Iberdrola USA
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Legal:

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Notarized Statement:

See Attached Affidavit of Rany Raviv, Iberdrola Renewables, Inc. on behalf of Heartland Wind, LLC

Sincerely on behalf of
HEARTLAND WIND, LLC

Sally W. Bloomfield

Sally W. Bloomfield

Enclosure

BEFORE
THE OHIO POWER SITING BOARD

In the Matter of the Application of **HEARTLAND WIND, LLC** for a Certificate to Site a Wind-Powered Electric Generation Facility in the Counties of Van Wert and Paulding, Ohio.	))))	Case No. 09-1066-EL-BGN

AFFIDAVIT OF RANY RAVIV, IBERDROLA RENEWABLES, INC. ON BEHALF OF HEARTLAND WIND, LLC

STATE OF OREGON :
: ss.
COUNTY OF MULTNOMAH :

I, Rany Raviv, being duly sworn and cautioned, state that I am over 18 years of age and competent to testify to the matters stated in this affidavit and further state the following based upon my personal knowledge:

1. I am executing this affidavit on behalf of Heartland Wind, LLC as I am so authorized by Iberdrola Renewables, Inc, the sole member and manager of Heartland Wind, LLC.

2. I have reviewed Heartland Wind, LLC's Application to the Ohio Power Siting Board for a Certificate of Environmental Compatibility and Public Need for the Blue Creek Wind Farm project.

3. To the best of my knowledge, information and belief, the information and materials contained in the above-referenced Application are true and accurate.

4. To the best of my knowledge, information and belief, the above-referenced Application is complete.

Rany Raviv

Sworn to before and signed in my presence this 15th day of December 2009.

Notary Public

[SEAL]

OFFICIAL SEAL
CHELSEA C MC FARLAND
NOTARY PUBLIC - OREGON
COMMISSION NO. 443054
MY COMMISSION EXPIRES OCTOBER 1, 2013

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BEFORE THE OHIO POWER SITING BOARD

Application of a Certificate of Environmental Compatibility and Public Need

Blue Creek Wind Farm

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GLOSSARY

ABPP	Avian and Bat Protection Plan
ACACAS	Allen County Area Combined Aquifer System
AEP	American Electric Power
AEPS	alternative energy portfolio standard
ANSI	American National Standards Institute
APLIC	Avian Power Line Interaction Committee
the Applicant	Heartland Wind, LLC
Application	Application Filing Requirements for Wind-Powered Electric Generating Facilities
ASI	Aviation Systems, Inc.
ASTM	American Society for Testing and Materials
AWEA	American Wind Energy Association
BBS	*North American Breeding Bird Survey*
bgs	below ground surface
BMP	best management practice
CEDS	Comprehensive Economic Development Strategy
Certificate	Certificate of Environmental Compatibility and Public Need
CFR	Code of Federal Regulations
cfs	cubic feet per second
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CPT	cone penetration testing
dB	decibels
dB	decibels (A-weighted scale)
DECC	Department of Energy & Climate Change
DMT	dilatometer sounding

E&SCP	Erosion and Sediment Control Plan
EHS	environmental health and safety
ESRI	Environmental Systems Research Institute
FAA	Federal Aviation Administration
the Facility	Blue Creek Wind Farm
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
G-90	Gamesa G-902.0 MW
GE	General Electric
GHG	greenhouse gas
GIS	geographic information system
GL	Germanischer Lloyd
gpd	gallons per day
gpm	gallons per minute
GNA	Good Neighbor Agreement
HUC	Hydrologic Unit Code
IBR	Iberdrola Renewables, Inc.
IEC	International Electrotechnical Commission
IRHI	Iberdrola Renewables Holdings, Inc.
ISO	International Organization for Standardization
ITC	Investment Tax Credit
IWEA	Irish Wind Energy Association
kV	kilovolts
kW	kilowatt
L_{eq}	equivalent sound level

m/s	*meter per second*
mph	miles per hour
MRA	Minimal Risk Area
msl	mean sea level
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NHD	National Hydrographic Dataset
NO_2 or NOx	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTIA	National Telecommunications and Information Administration
NWI	National Wetlands Inventory
O_3	ozone
O&M	operations and maintenance
OAC	Ohio Administrative Code
OBBA	*Ohio Breeding Bird Atlas*
ODNR	Ohio Department of Natural Resources
ODOD	Ohio Department of Development
ODOT	Ohio Department of Transportation
OEPA	Ohio Environmental Protection Agency
OGRIP	Ohio Geographically Referenced Information Program
OHPO	Ohio Historic Preservation Office
OPSB	Ohio Power Siting Board
ORAM	Ohio Rapid Assessment Method
OSMP	*On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocols for Commercial Wind Energy Facilities in Ohio*
OWI	Ohio Wetlands Inventory

PE	particulate emissions
PEM	palustrine emergent
PER	Permit Evaluation Report
PFO	palustrine forested
PFO1	palustrine forested, deciduous
PJM	PJM Interconnection
PLC	process logic controller
PM	particulate matter
$PM_{2.5}$	particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10}	particulate matter less than 10 micrometers in aerodynamic diameter
POTW	publicly owned treatment works
PPA	power purchase agreement
PPM	PPM Energy, Inc.
ppsm	persons per square mile
PSD	prevention of significant deterioration
PSS	palustrine scrub-shrub
RCNM	*Roadway Construction Noise Model*
ROW	right-of-way
rpm	revolutions per minute
RPW	relatively permanent water
RTO	regional transmission organization
SCADA	supervisory control and data acquisition
SO_2	sulfur dioxide
SODAR	sonic detection and ranging
SPCC	Spill Prevention, Control, and Countermeasures Plan
SWPPP	Storm Water Pollution Prevention Plan
TNW	traditional navigable water

USACE	United States Army Corps of Engineers
USCB	U.S. Census Bureau
USDOC	U.S. Department of Commerce
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
VCEDG	Van Wert County Economic Development Group
VDI	Verein Deutscher Ingenieure
VIA	Visual Impact Assessment
VMT	vehicle miles traveled
VOC	volatile organic compound
WindFarm	WindFarm 4.1.1.2
WMRS	Wildlife Monitoring and Reporting System

4906-17-02 Project Summary and Facility Overview

(A) PROJECT SUMMARY AND OVERVIEW OF THE PROPOSED PROJECT

Applicant Heartland Wind, LLC (the Applicant), a limited liability company whose sole member and manager is Iberdrola Renewables, Inc. (IBR), is proposing to construct, own and operate up to 350 megawatts (MW) in nameplate capacity of wind-powered electric generation located in Van Wert and Paulding Counties, Ohio (the Blue Creek Wind Farm or the Facility[1]). The Facility would consist of the following:

- Up to 175 wind turbine generators[2];
- Electrical collection system using underground and aboveground 34.5 kilovolt (kV) collection lines and aboveground 115 kV collection lines;
- Three intra-project collection substations;
- One interconnection substation;
- Gravel access roads;
- A temporary staging and construction laydown area;
- Up to two permanent meteorological facilities consisting of up to two permanent meteorological towers (met towers) and a sonic detection and ranging (SODAR) facility;
- A temporary concrete batch plant[3]; and
- An operation and maintenance (O&M) building.

Electricity generated by the Facility would be integrated into the existing regional transmission system grid operated by PJM Interconnection (PJM).

[1] According to OPSB regulations at OAC Rule 4906-17-01, the term Facility is defined as "all the turbines, collection lines, any associated substations, and all other associated equipment."

[2] The proposed Facility will have up to 175 turbines for a maximum potential output of 350 MW. Within this Application, specific locations for 167 turbines and other related Facility infrastructure are identified. An additional eight turbines will be located in an area along the eastern portion of the Project area boundary. The Applicant will provide the locations of the eight turbines in the shaded areas on an updated map (Updated Figure 2-1) by March 15, 2010 and appropriate site-specific information by April 1, 2010 in sufficient time for the OPSB Staff to consider the information in the Staff Report.

[3] As part of the Facility, the Applicant is evaluating the option of constructing a temporary concrete batch plant for producing concrete required during construction. This temporary batch plant would be located in the southern portion of the Project area, adjacent to the O&M building site.

Unlike traditional power plants that combust fossil fuel to generate electricity, the proposed Facility will not emit air pollutants, require water for cooling purposes, or require process wastewater to be discharged from the Facility. In addition, the Facility will not produce any solid combustion wastes as a by-product of its energy production process. Therefore, the Applicant's proposed Facility will avoid major impacts associated with decreased air quality, water consumption, thermal pollution and ash landfills.

IBR has experience in developing wind power facilities across the United States, including everything from site acquisition and wind measurement to facility construction and operation. IBR has proven expertise in getting projects online, on time, and on budget by working successfully with landowners, permitting agencies, communities, local governments, environmental agencies, customers, and financial institutions. IBR is the largest owner and operator of wind generating assets with more than 10,000 MW of wind power capacity in operation globally. In the United States, IBR owns and operates approximately 3,500 MW of wind facilities and employs more than 800 people. IBR's U.S. headquarters is located in Portland, Oregon. Additional information about the company can be found at www.iberdrolarenewables.us.

IBR currently operates wind farms in 20 states and constructed five new projects in 2009. The Applicant and its parent company, IBR, are well-capitalized and committed to providing the necessary financial resources to develop and build the Facility.

(1) General Purpose of the Facility

Power from the Facility would provide clean, renewable energy to utility customers through wholesale market sales or a contracted power sales agreement, often referred to as a power purchase agreement (PPA). A PPA is entered into between the owner of a generating facility and a Federal Energy Regulatory Commission (FERC)-licensed wholesale power purchaser, such as an energy company or an electric utility. Energy produced by the Facility could be sold to utilities inside the state of Ohio or across the PJM transmission grid, which supplies customers in Delaware, Indiana, Illinois, Kentucky, Maryland, Michigan, Maryland, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia.

A wind farm is an electricity generator that uses the wind as its fuel. Because the wind is renewable and free, a wind farm has operating expenses that are very predictable. Therefore, wind farm owners are able to offer stable, predictable energy prices for long-term PPAs. This is a significant advantage over most other long-term PPAs from fuel-based generating facilities where the electricity price typically will vary significantly over time as the price of fuel changes. PPAs are typically entered into for 10- to 25-year periods, thereby ensuring the stability and longevity of the facility. The Applicant's Facility may also utilize short-term sales for a portion of the power, depending on market or customer demands.

Another advantage of the Facility is that it would assist Ohio in meeting alternative energy goals and help provide a more diverse national energy portfolio. The Ohio General Assembly recently enacted the Ohio alternative energy portfolio standard (AEPS) through Amended Substitute Senate Bill 221. The AEPS requires that by 2025, at least 25 percent of the electricity sold in Ohio be supplied by alternative energy resources. Of the 25 percent requirement, at least half must come from renewable energy sources, such as wind, and at least half of this amount must be generated in Ohio.

(2) Facility Description

The Facility is located within the approximately 40,500-acre Project area (the Project area[4]) in Benton, Blue Creek, and Latty townships in Paulding County, Ohio and Tully, Union, and Hoaglin townships in Van Wert County, Ohio. The Project area consists primarily of agricultural land situated amongst the communities of Van Wert, Scott, Cavett, Haviland, and Convoy, with approximately 140 participating landowners representing approximately 17,000 acres of leased land.

The Facility would consist of up to 175 wind turbine generators and associated infrastructure, including underground and aboveground collection lines, access roads, substations, a temporary staging and construction laydown area, a temporary concrete batch plant, a permanent met tower, a SODAR facility, and an O&M building. The wind

[4] As defined in the OPSB rules, "Project area means the total wind-powered electric generation facility, including all associated setbacks." See OAC Rule 4906-17-01(B)(1).

turbine model to be utilized at the Facility has not yet been selected; however, each turbine would have a nameplate capacity rating of 1.5 to 2.4 MW, which would result in a total generating capacity of up to 350 MW. The distance between turbines ranges from 764 feet to 2,986 feet.

The Facility would interconnect to the existing 345 kV transmission line that runs through the southern portion of the Project area. The 345 kV transmission line is owned by American Electric Power (AEP) and controlled by PJM, the large regional independent system operator. The PJM transmission system is one of the leading and most efficient regional transmission systems in the country.

Figure 2-1 shows the Project area and the 5-mile buffer around the Project area. Section 4906-17-03, *Project Description and Schedule,* provides a detailed description of the Facility components and the anticipated Facility schedule.

(3) Site Selection Process

The Project area was selected based primarily upon the wind resource; transmission line access; land availability; community support; site accessibility; and minimal risk associated with environmental, ecological, and agricultural impacts. The following provides an overview of the selection criteria:

(a) High Quality Wind Resource

The Project area was identified in 2006 as having the potential for a productive wind resource by studying state overview maps. The Applicant began scientifically studying the wind resource by erecting meteorological towers in September 2007 and additional towers in early 2009. Through the initial and more detailed wind resource assessments, the Applicant has determined the Project area is suitable for wind development.

(b) Suitable Transmission

Large-scale wind energy facilities must be located within a reasonable distance to an interconnection point on a transmission line with sufficient capacity to allow for the economical delivery of power to customers on the transmission grid. With the nearby presence of two AEP transmission lines, the Facility has excellent transmission access, both in terms of proximity and availability. The Facility would connect to the grid through a new 345 kV Interconnection Substation along the existing 345 kV AEP transmission line. The Facility would include 78.6 miles of underground collection lines and 3.7 miles of aboveground collection lines (rated at 34.5 kV) that would tie into two smaller collector substations. Approximately 6.0 miles of 115 kV aboveground collection lines would connect the two collector substations to the 345 kV Interconnection Substation. The Applicant began through the interconnection queue process in January 2007 by filing interconnection queue position R60 with PJM. The ability to interconnect the Facility to an existing transmission line without great expense makes this site suitable for wind development.

(c) Available Land and Land Use Constraints

The Project area consists primarily of agricultural land situated amongst the communities of Van Wert, Scott, Cavett, Haviland, and Convoy. Once the Project area boundary was roughly defined, the process of obtaining landowner agreements began. Additional research on the Project area led to a continuous narrowing of the Project area for the Applicant. For example, an aeronautical study was performed and the Project area boundary was reduced in size to have no impacts on local airports. The Facility layout incorporates numerous setbacks to comply with Ohio Power Siting Board (OPSB) requirements and to minimize impacts on residents of the Project area.

(d) Ecological and Environmental Impacts

In 2008, the Applicant performed a due diligence study to assess potential environmental constraints, such as avian and bat, threatened and endangered species, environmentally sensitive habitats, aviation, and other features in the general Paulding and Van Wert County area. The results of the due diligence study were incorporated into Facility development decisions and the Project area was further refined to avoid and minimize potential impacts to environmentally sensitive issues and features.

In early 2009, the Applicant began ecological and environmental studies in the Project area to further evaluate potential environmental issues. The studies performed were avian and bat, wildlife, aviation, wetlands and waterbodies, cultural resources (historic architecture and archaeology), noise, and visual (including shadow flicker) studies. According to United States Fish and Wildlife Service (USFWS), the Ohio Department of Natural Resources (ODNR), and the Ohio Environmental Protection Agency (OEPA), the Facility is expected to have minimal impact to ecological and environmental resources.

(e) Community Support

The Applicant initiated discussions about leases with private landowners in March 2007. In November 2008, the Applicant held a meeting with all engaged landowners and received a very favorable response to the Facility. In addition, the Applicant advertised for and hosted a public meeting in January 2009 to provide an overview of the Facility. To date, several other meetings and presentations have taken place within the community. Based on these meetings which involved hundreds of local residents, the community appears to support the Facility, as demonstrated by the success of the Applicant's leasing program, strong positive comments toward the Facility at many of the public meetings (especially the 2009 Van Wert County Fair), and the complete absence of negative comments towards the Facility.

(f) Site Accessibility

The site is accessible using an existing network of public roads and is near the confluence of U.S. Highways 30, 127, and 224. Active rail lines are also present near the Project area. Access roads required within the Project area would be designed and constructed to avoid to the extent possible deep drainage ditches. Studies have been undertaken to plan and avoid to the extent possible impacts to waterways and bridges, and to maximize convenience for the Facility and landowners. The Applicant has coordinated with federal, state, and local permitting agencies, and will obtain the appropriate federal, state, and local permits.

(4) Principal Environmental and Socioeconomic Considerations

As part of the Facility development process, the Applicant conducted an analysis of potential environmental and socioeconomic impacts from construction and operation of the Facility. Section 4906-17-07, *Environmental Data,* of this Application, provides a detailed discussion of potential direct and indirect environmental impacts from construction and operation of the Facility, as well as potential mitigation measures for such impacts. Section 4906-17-08, *Social and Ecological Data,* provides a detailed discussion of the social and ecological impacts from the Facility. A brief summary of the major environmental and socioeconomic considerations, including ecological, land use and community development, socioeconomic, cultural resources, noise and visual impact, is provided below.

(a) Ecological

Numerous site visits were performed to characterize the habitat and identify wetlands and waterbodies in the Project area. No wetlands or waterbodies were delineated near any of the turbine locations; however, potential impacts to wetlands or waterbodies may occur during the installation of the electric collection systems and access roads. All of the potential impacts would be to wetlands that are considered Category 1 (lowest quality) wetlands according to OEPA's Ohio Rapid Assessment Method (ORAM) assessment. It is the intent of the Applicant to keep total wetland impacts to less than 0.5 acres so the Facility can be authorized by the United States Army Corps of Engineers (USACE) Nationwide permit program.

Desktop studies were also conducted for major species of biota, including those of commercial or recreational value, and those designated as threatened or endangered. The Applicant is not anticipating impacts to occur to any threatened or endangered species or their habitat. The Applicant will continue correspondence with the ODNR in designing the Facility to avoid impacts to threatened or endangered species.

The Applicant has also conducted bat acoustic monitoring within the Project area. The bat acoustic monitoring was completed in mid-November 2009. A full report will be provided in early February 2010 once the analysis is completed.

Impacts due to the construction of the Facility are anticipated to be minimal and would likely be limited to incidental injury and mortality of sedentary or slow-moving species due to construction activity and increases in vehicular movement; habitat disturbance or loss associated with clearing and earth-moving activities; and displacement of wildlife due to increased noise and human activities. However, because most of the Facility is proposed to be sited in active agricultural land that provides limited wildlife habitat, and which currently (and historically) experiences frequent agricultural-related disturbances, incidental injury and mortality impacts are expected to be minor. In addition, soil disturbance and exposure would likely occur in areas previously subjected to regular plowing, tilling, and harvesting. The majority of the habitat and vegetation disturbance and loss would be temporary in nature.

The Applicant would mitigate short-term construction disturbance by restoring disturbed areas to similar vegetation types in accordance with an Erosion and Sediment Control Plan (E&SCP) that would be prepared for the Facility. The Applicant also plans to conduct post-construction monitoring for birds and bats in order to monitor and track impacts to these species. Based on Project area siting within ODNR's Minimal Risk Areas (MRAs), the potential for impacts are expected to be low.

(b) Land Use and Community Development

Agricultural uses are the predominant land use in both Paulding and Van Wert Counties. Land use surveys were conducted to verify land use within 5 miles of the Project area. These surveys confirmed the area as being predominately agricultural cropland. The Van Wert County comprehensive plan objectives directly involve agricultural land use and open space, including: continuing to develop a land use pattern that balances between rural and urban, encourages open space preservation, and conserves and protects and enhances areas of agriculture and open space. Paulding County currently lacks a comprehensive plan; however, they have developed a Comprehensive Economic Development Strategy (CEDS) that discusses specific goals related to economic development activities and other initiatives.

(c) Socioeconomic

The Facility would create employment opportunities during the three-year construction phase and during the 25-year operational phase. The construction work force is estimated at 250 onsite workers. If the Applicant's recent experience constructing a similarly sized project in Illinois is a guide, the Applicant could expect to obtain up to 75 percent of the construction workforce from the local/regional workforce. A construction payroll of approximately $20 million is anticipated during both phases of construction. It is anticipated that up to 10 full-time employees would be used during the first two years of operation during the equipment warranty period and up to 20 full-time employees subsequent to the expiration of the equipment warranties.

Discussions concerning an enterprise zone property tax abatement are ongoing between the Applicant and Van Wert and Paulding Counties. The Applicant's proposal to both Van Wert and Paulding Counties would provide approximately $8 million in combined new tax revenues over a period of 15 years.

The proposed Facility would benefit the rural economies of Van Wert and Paulding Counties by providing local jobs during construction and increasing activity at local commercial businesses and industries that can provide some of the needed materials and services for construction of the wind farm. Local fuel retailers would also benefit from increased purchases of gasoline and diesel purchases that would be required for construction vehicles and equipment. Hotels and restaurants would benefit as well, since a portion of the construction workforce would need to be obtained from non-local, highly specialized labor pools.

Lease payments to local landowners would also benefit the local economy because it is likely that a portion of the lease payments would be spent in the nearby communities within Van Wert and Paulding Counties. Lease payments would likely total approximately $1.6 million in the first year and approximately $53 million over the 25-year life of the Facility. All of this activity would result in a net inflow of millions of dollars into the local economy that will have a beneficial effect beyond that of the new employment that would be provided during construction and operation of the Facility.

(d) Cultural Resources

The Applicant performed cultural resources surveys for the Facility that entailed an archaeological survey and architectural survey. An archeological survey was undertaken within the areas of potential direct effects of the Facility. Additional survey activity is anticipated to take place in the spring of 2010 to supplement the current investigation and to reflect final Facility design. The results of the current investigation will be submitted to the Ohio Historic Preservation Office (OHPO), with a copy to OPSB Staff, in early February 2010. A summary of this investigation is presented in Section 4906-17-08(D), *Cultural Impact.*

Sites that were not found to be historic properties will not represent landmarks of cultural significance, as defined by OPSB regulations, and no avoidance or further archeological investigation will be necessary. For nine sites, avoidance is planned. If avoidance is not possible, Phase II archeological evaluation will be undertaken assess whether the sites represent historic properties and therefore landmarks of cultural significance, as defined by OPSB regulations. During construction, an unanticipated finds plan would be implemented in accordance with OHPO requirements, and discussions with OPSB Staff.

A reconnaissance-level architectural survey was conducted within a 5-mile (8-km) radius of each wind turbine identified as of September 2009 (architectural reconnaissance survey area). The architectural reconnaissance survey area is identified and discussed in the architectural reconnaissance survey report (submitted to the OHPO on November 19, 2009 and summarized in Section 4906-17-08(D), *Cultural Impact*. Additional survey activity is anticipated to take place in the spring of 2010 to supplement the current investigation and to reflect final Facility design.

No direct impacts resulting from the physical removal or alteration of historic properties are anticipated. Visual impacts related to potential historic properties are anticipated in varying degrees within the architectural reconnaissance survey area. The Facility will introduce elements to the surrounding area that will affect the quality of setting, as defined by the National Register guidelines. It is anticipated that adverse visual impacts will be addressed through a formal mitigation plan designed to promote the preservation and continued meaningfulness of historic resources. Such a plan, developed in consultation with OHPO, the OPSB Staff, and interested parties, such as the Van Wert County Historical Society, may be formalized through the negotiation of a formal Memorandum of Agreement that specifies mitigation measures, responsibilities, and implementation schedules.

(e) Noise

No existing national, state, or local regulations limit noise levels at wind energy facilities. Potential noise from the Facility was evaluated for 167 Gamesa G-902.0 MW (G-90) wind turbines on 328-foot (100-meter) tall towers and the associated electrical substations. The expected operational noise levels are anticipated to range between less than 30 decibels (A-weighted scale) (dBA) to 53 dBA. These noise levels are representative of Facility noise levels and an overall reduction in Facility noise levels is expected to be realized through the micro-siting process. Section 4907-17-03(A)(2), *Noise*, presents the findings of the noise assessment.

(f) Visual Impact

A Visual Impact Assessment (VIA) has been prepared for the Facility that describes the Facility location, viewpoint selection process, assessment methodology and results, proposed visual mitigation measures, and photosimulations for views from eight viewpoints.

To maximize the visual integration of the Facility into the overall pattern of the Project area landscape, the Applicant would incorporate best management practices (BMPs) related to Facility appearance. These measures are presented in more detail in the VIA and include use of turbines with uniform appearance, use of muted gray or white colors, and placement of as much of the Facility's electrical collection system underground, as practicable. These measures would be incorporated into Facility design to ensure an attractive appearance and good integration into its landscape setting. Section 4906-17-05(B)(3), *Photographic Interpretation or Artist's Pictorial Sketches,* provides more details on the visual impact assessment conducted for the Facility.

A shadow flicker analysis was performed for 167 G-90 wind turbines on 328-foot (100-meter) tall towers to evaluate the extent of potential shadow flicker experienced at each residence and primary transportation corridor in the Project area. There are currently no federal or state standards regulating frequency or duration of shadow flicker for wind turbines. International studies and guidelines from Europe and Australia have suggested 30 hours of shadow flicker per year as the threshold of significant impact, or the point at which shadow flicker can be considered a nuisance. The shadow flicker analysis resulted in predicted shadow flicker effects over 30 hours per year at 39 residences in the Project area. The Applicant plans to use a number of mitigation measures to reduce projected shadow flicker impacts to these affected residences. Section 4906-17-08(A)(6), *Shadow Flicker,* provides more details on the Shadow Flicker study that was conducted for the Facility.

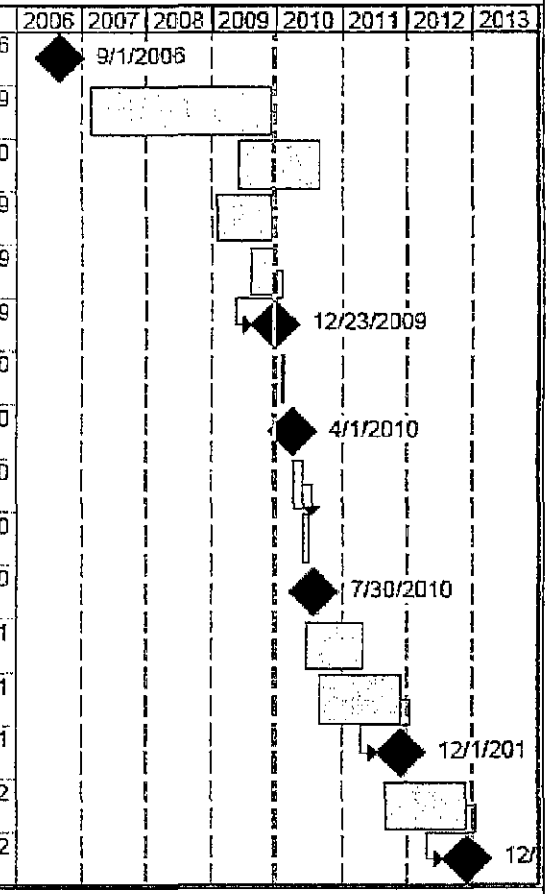
(5) Project Schedule

The Applicant began development of the Facility in Fall 2006. Due diligence of potential Facility environmental and regulatory constraints began in September 2008. Acquisition of land and land rights began in March 2007 and continued through November 2009. Wildlife surveys, including bird, bat, wetland, habitat, and vegetative surveys, began in February 2009 and continued into November 2009. The acoustic bat survey data report will be submitted in early February 2010. Site-specific geotechnical studies will be conducted from April to May 2010, with the final geotechnical report to be submitted in June 2010. Additional studies associated with eight additional turbines (and associated equipment) will be completed in early 2010 and submitted to the OPSB by April 1, 2010. The Facility schedule anticipates that the Certificate would be issued by late July 2010. The final design drawings for the Facility would be prepared beginning in June 2010. Phase I of Facility construction is anticipated to begin in September 2010 and extend through November 2011. Phase I of the Facility would be placed into service in December 2011. Phase II of Facility construction is anticipated to begin in September 2011 and extend through November 2012. Phase II of the Facility would be placed into service in December 2012. Figure 2-2 shows the anticipated Facility schedule.

FIGURE 2-2
Blue Creek Project Schedule

Blue Creek Wind Farm

ID	Task Name	Start	Finish
1	Applicant Begins Development of the Facility	Fri 9/1/06	Fri 9/1/06
2	Land Acquisitions and Land Rights	Thu 3/1/07	Mon 11/30/09
3	Good Neighbor Agreements	Mon 6/1/09	Wed 9/1/10
4	Wildlife Studies/Surveys	Mon 2/2/09	Mon 11/30/09
5	OPSB Application Preparation	Mon 8/3/09	Fri 12/18/09
6	OPSB Application for Certificate Submittal	Wed 12/23/09	Wed 12/23/09
7	Acoustic Bat Survey Data Report	Mon 2/1/10	Fri 2/12/10
8	Additional Site Specific Information	Thu 4/1/10	Thu 4/1/10
9	Geotechnical Studies (Site Specific)	Thu 4/1/10	Mon 5/31/10
10	Geotechnical Report (Final)	Tue 6/1/10	Wed 6/30/10
11	Issuance of the OPSB Certificate	Fri 7/30/10	Fri 7/30/10
12	Preparation of Final Design	Tue 6/15/10	Fri 4/29/11
13	Facility Construction (Phase I)	Wed 9/1/10	Wed 11/30/11
14	Placement of Facility in Service (Phase I)	Thu 12/1/11	Thu 12/1/11
15	Facility Construction (Phase II)	Thu 9/1/11	Fri 11/30/12
16	Placement of Facility in Service (Phase II)	Mon 12/3/12	Mon 12/3/12



Date: Tue 12/8/09
Blue Creek Wind Farm Project Schedule_rev5.mpp

Task | Split | Progress | Milestone | Summary | Project Summary | External Tasks | External Milestone | Deadline

4906-17-03 Project Description and Schedule

(A) PROPOSED FACILITY DESCRIPTION

(1) Project Description

(a) Types of Turbines

At the time of this submittal, a specific turbine model has not been selected for the Facility. For the purpose of this Application, various studies (e.g., shadow flicker, noise, calculation of setbacks, production potential, tax revenue calculations, and others) were performed using the G-90 on a 328-foot (100-meter) tall wind turbine tower. *The G-90 is the most likely turbine to be used because of the* Applicant's experience with this machine in other Midwestern sites and large-scale purchase commitment with Gamesa for the next few years.

The Applicant works with a number of leading turbine manufacturers, including General Electric (GE), Mitsubishi, Vestas, Gamesa, and others. Wind turbine technology continues to improve, and the cost and availability of turbine types can change from year to year. Including multiple turbine models in the Application increases the viability of the Facility, which benefits the community and the Applicant. Therefore, the Applicant requests flexibility to use any new commercially available turbine model ranging in capacity from 1.5 to 2.4 MW. Table 3-1 identifies the range of characteristics for the primary turbines being considered for the Facility. The Applicant will provide the specific turbine model and specifications once selected. If a turbine other than the G-90 is selected, the Applicant will update the relevant studies to illustrate the impacts of the final turbine model.

TABLE 3-1
Wind Turbines Under Primary Consideration for the Facility

Turbine	GE 1.5 MW	Gamesa 2.0 MW	Mitsubishi 2.4 MW
Tower Type	Tubular	Tubular	Tubular
Rotor Diameter	77 - 83 meters (253– 271 feet)	87 - 90 meters (285 – 295 feet)	92 - 95 meters (302 feet)
Hub Height	65 - 100 meters (213 – 328 feet)	78 - 100 meters (256– 328 feet)	80 meters (262 feet)
Total Height	104 -141 meters (340– 463 feet)	122 - 145 meters (399– 476 feet)	126 - 128 meters (413 – 418 feet)

Up to one hundred and seventy-five (175) wind turbine generators would be used for the Facility (for which 167 planned locations have been identified), totaling up to 350 MW in nameplate capacity. If the Mitsubishi 2.4 MW turbine is selected, fewer total turbine locations will be used but the locations used will be selected from the provided set of locations. If the GE 1.5 MW turbine is used, the Applicant will use all of the proposed locations and submit an additional application to use the remaining capacity in the 350 MW interconnection position. It is estimated that the annual net capacity factor would be 25 to 40 percent.[1] A discussion of the detailed components of the wind turbines is provided below in Section 4906-17-03(A)(2)(a), *Wind Energy Turbines,* and Section 4906-17-05(C), *Equipment.*

(b) Land Area Requirements

The Facility is located within an approximately 40,500-acre Project area in Benton, Blue Creek and Latty townships in Paulding County, Ohio and Tully, Union, and Hoaglin townships in Van Wert County, Ohio. The Project area consists primarily of agricultural land situated amongst the communities of Van Wert, Scott, Cavett, Haviland, and Convoy. The actual Facility-related impact covers a much smaller footprint. Table 3-2 depicts the anticipated land area requirements for the Facility under the 167-turbine layout. The construction and operational footprints were calculated using the assumptions below.

[1] More detailed confidential and/or trade secret wind resource estimates are available for review at the offices of Bricker & Eckler LLP, 100 South Third Street, Columbus, Ohio 43215, by OPSB Staff.

TABLE 3-2
Anticipated Land Requirements for Construction and Operation of the Blue Creek Wind Farm

Facility Component	Assumptions	Total Area Disturbed During Construction (including temporary and permanent operational impacts)	Area of Permanent Disturbance
Wind Turbines	167 turbines, 1,200-foot radius construction and permanent buffer (12,178 acres total, considering overlap of adjacent turbines)	271.0 acres (150-foot radius around each turbine location)	28.8 acres (75-foot by 100-foot area)
Access Roads	37.0 miles, 40-foot wide construction; 20-foot wide permanent (20 feet of permanent gravel with 10-foot compacted shoulders during construction on each side for a total width of approximately 40 feet)	179.2 acres	89.6 acres
Underground collection lines (34.5 kV)	78.6 miles, 20-foot wide construction impact area (per circuit); No impact for permanent (per circuit)	190.6 acres	Zero
Aboveground collection lines (34.5 kV)	3.7 miles, 100-foot wide construction corridor; 75-foot wide permanent	45.1 acres	33.8 acres
Aboveground collection lines (115 kV)	6.0 miles, 100-foot wide construction corridor; 75-foot wide permanent	72.5 acres	54.4 acres
Southern 20-acre Parcel (see below)		20 acres all components	20 acres all components
Interconnection Substation	5 acres construction; 5 acres permanent (within 20-acre parcel on southern portion of Project area)	Within above calculation	Within above calculation
Project Collection Substation	5 acres construction; 5 acres permanent (within 20 acre parcel on southern portion of Project area)	Within above calculation	Within above calculation
Operations and Maintenance Building	Within 20-acre parcel on southern portion of Project area	Within above calculation	Within above calculation
Staging Area and Construction Laydown Area	Within 20-acre parcel on southern portion of Project area	Within above calculation	Within above calculation
Temporary Concrete Batch Plant	Within 20-acre parcel on southern portion of Project area	Within above calculation	Within above calculation
Collector Substation #1	5 acres construction; 5 acres permanent	5 acres	5 acres

TABLE 3-2
Anticipated Land Requirements for Construction and Operation of the Blue Creek Wind Farm

Facility Component	Assumptions	Total Area Disturbed During Construction (including temporary and permanent operational impacts)	Area of Permanent Disturbance
Collector Substation #2	5 acres construction; 5 acres permanent	5 acres	5 acres
Up to Two Permanent Met Tower	320 feet by 320 feet construction; 50 feet by 50 feet permanent	4.7 acres	0.11 acres
SODAR Facility	45 feet by 45 feet construction; 15 feet by 15 feet permanent	0.05 acres	0.005 acres
	Facility Total Impact	793.2 acres	236.7 acres

As depicted in Table 3-2, the total construction impact area (including turbine construction area, access roads, collection lines, substations, temporary staging and construction laydown areas, O&M building, a permanent met tower, a SODAR facility, and temporary concrete batch plant) would be 793.2 acres. The permanent impact of the Facility would be significantly less (approximately 236.7 acres).

(i) **Access Roads**

The facility would utilize 37.0 miles of access roads. The access road and adjacent cleared areas would be approximately 40 feet wide during construction of the Facility. The post-construction access road width would be up to 20 feet (including the access road and stormwater drainage). Figure 3-1 shows the location of the access roads. The access roads would connect each wind turbine to a local roadway and allow access to the wind turbine during construction and operation. The access roads would be constructed of gravel.

(ii) Temporary Staging and Construction Laydown Area

A temporary staging and construction laydown area would be required during construction of the Facility. This location would serve as an area to stage construction activities and store supplies and equipment. As Figure 3-1 shows, the temporary staging and construction laydown area would be located on a 20-acre parcel of land in the southern portion of the Project area, and on the same parcel of land that would house the O&M building, temporary concrete batch plant, project collection substation and interconnection substation. The temporary staging and construction laydown area would be fenced and consist of a gravel foundation.

(iii) Operation and Maintenance Building

A permanent O&M building would be constructed as part of the Facility and would be located on a 20-acre parcel in the southeastern portion of the Project area. The O&M building would be located on the same 20-acre parcel as the temporary staging and construction laydown area, the temporary concrete batch plant, the project collection substation and the Interconnection Substation. Approximately 20 acres of land would be temporarily disturbed during construction activities for these components; approximately 20 acres would be permanently impacted. The O&M building would be of sheet metal construction and be used to house equipment to operate and maintain the Facility. The O&M building would also include administrative offices, monitoring stations and storage for wind turbine parts and other small equipment. The O&M building is anticipated to be approximately 6,000 square feet of enclosed space and include an office and workshop area, parts warehouse, kitchen, bathroom, shower and utility sink. The O&M building is anticipated to be approximately 20 feet in height (to the roof peak). Appendix A provides a drawing and photo of a typical O&M facility.

(iv) Temporary Concrete Batch Plant

As part of the Facility, the Applicant is evaluating the option of constructing a temporary concrete batch plant for producing concrete required during construction. A temporary concrete batch plant would be constructed in the temporary staging and construction laydown area in order to provide the concrete necessary for the turbine foundations. An aboveground storage tank may also be constructed at this location to provide for storage of water that would be required for batch plant operations during construction of the Facility. After construction is complete, the temporary concrete batch plant and associated water storage tank would be disassembled and removed.

(2) Description of Equipment

The major equipment that would be used for the Facility are the wind turbines. Discussions of the electrical components of the Facility, including the electrical collection system (consisting of underground and aboveground collection lines), four substations, up to two permanent met towers, and a SODAR facility are discussed in Section 4906-17-03(A)(3), *Description of New Transmission Lines,* through Section 4906-17-03(A)(6), *Description of SODAR.*

(a) Wind Energy Turbines

At the time of this submittal, a specific turbine model has not been selected for the Facility for reasons given above. For the purpose of this Application, the G-90 turbine was selected as the representative turbine for the various analyses. The G-90 turbine would be a maximum of 328 feet (100 meters) tall at the turbine hub. With the nacelle and blades mounted, the total height of the G-90 blade tip would be a maximum of 475 feet (145 meters) in height. The footprint for each turbine would be 75 feet by 100 feet in size. Appendix B shows a typical wind turbine and tower. Table 3-1 shows the range of characteristics for the primary turbines being considered for this Facility. Each turbine listed should be considered a representative model for that size of turbine. For example, the Mitsubishi turbine is representative of all possible turbine models in the approximately 2.4 to 2.5 MW size.

The G-90 would begin to produce electricity when wind speeds reach 3 meters per second (m/s) (6.7 miles per hour [mph]) and would achieve maximum output at a wind speed of approximately 17 m/s (38.0 mph). The cut-out wind speed for the G-90 is 21 m/s (47.0 mph), where the wind turbine would automatically shut down. A discussion of the detailed components of the wind turbines is provided in Section 4906-17-05(C), *Equipment*.

(3) Description of New Transmission Lines

The Facility's electrical system would consist of an electrical collection system and associated substations. This section provides a description of each of these components.

Each wind turbine would generate power at 690 volts. The turbines would be arranged in strings or linear groups, connected by underground or aboveground collection lines. A transformer within each turbine nacelle would be used to convert the power to 34.5 kV. The power would then be transmitted down the tower into the underground 34.5 kV collection line. Where more than three parallel underground collection lines would be necessary, aboveground collection lines would be constructed instead. Aboveground collection lines minimize impact on farm drainage tile, provide more efficient transmission of electricity, and are more cost effective. Approximately 78.6 miles of underground collection lines and approximately 3.7 miles of aboveground 34.5 kV collection lines would be required for the Facility. A typical product data sheet for the underground collection line material is attached as Appendix C (document General Cable PC 189469). Figure 3-1 shows the location of these underground and aboveground collection lines. Where more than one set of aboveground 34.5 kV lines are needed, a small substation would be constructed to transform the electricity to 115 kV so that only one set of poles would be needed. Approximately 6.0 miles of aboveground collection lines at 115 kV would also be required. Typical drawings showing support structures for these aboveground lines are provided as Appendix D. Figure 3-1 shows the location of these lines.

(4) Description of New Substations

Four new substations would be required for the Facility. The first substation (the interconnection substation) would function to connect the generated power with AEP's existing 345 kV transmission line for delivery of the power to the PJM transmission grid system. This substation would consist of circuit breakers, switches, and associated bus work, cabling, and control and relaying systems. The area required for this substation would be approximately 5 acres (located within the 20-acre parcel at the southern portion of the Facility), and it is anticipated that AEP would eventually own this substation. Figure 3-1 shows the location of this substation.

Immediately adjacent to the interconnection substation is the project collection substation, which would gather the power from the turbines at 115 kV and transform it to 345 kV for interconnection. This substation would consist of circuit breakers, switches, voltage transformers (115 kV to 345 kV) and associated bus work, cabling, and control and relaying systems. The area required for this substation would be approximately 5 acres (located within the 20-acre parcel at the southern portion of the Facility).

The third substation (Collector Substation 1) would gather power from approximately half of the turbines (the turbines constructed during Phase I) and transform the voltage from 34.5 kV to 115 kV for delivery to the Interconnection Substation. Collector Substation 1 would consist of circuit breakers, switches, voltage transformers (34.5 kV to 115 kV) and associated bus work, cabling, and control and relaying systems. The area required for this substation would be approximately 5 acres. Figure 3-1 shows the planned location of this substation, but the final location would be determined as a part of final electrical design.

The fourth substation (Collector Substation 2) would gather power from the remaining turbines (the turbines constructed during Phase II) and transform the voltage from 34.5 kV to 115 kV for delivery to the Interconnection Substation. This substation would consist of circuit breakers, switches, voltage transformers (34.5 kV to 115 kV) and associated bus work, cabling, and control and relaying systems. The area of this substation would be approximately 5 acres. Figure 3-1 shows the planned location, but the final location would be determined as a part of final electrical design.

(5) Description of Met Tower

Up to two permanent met towers would be located within the Project area for the collection of meteorological data. The permanent met tower(s) would be freestanding (unguyed) structures. The tower(s) would be up to approximately 330 feet high with an equilateral triangle base, each side of which would be about 32 feet long. The met tower(s) foundation would consist of three steel-reinforced concrete piles, each at a corner of the tower base. The met tower(s) would be placed within a 50- by 50-foot fenced-in gravel area. Appendix E provides general design information for the met tower foundation(s). The location of the met tower(s) would be determined during the micro-siting process; however, its location would be within the Project area.

(6) Description of SODAR

The Facility would also include one SODAR unit that is typically located near one of the permanent met towers. SODAR systems are used to measure wind speed at various heights above the ground, and the thermodynamic structure of the lower layer of the atmosphere. SODAR systems are typically housed in a small trailer approximately 10 feet tall with an attached 20-foot wind sensor boom. Appendix F provides a general photo of a typical SODAR facility.

(B) DETAILED PROJECT SCHEDULE

(1) Project Schedule

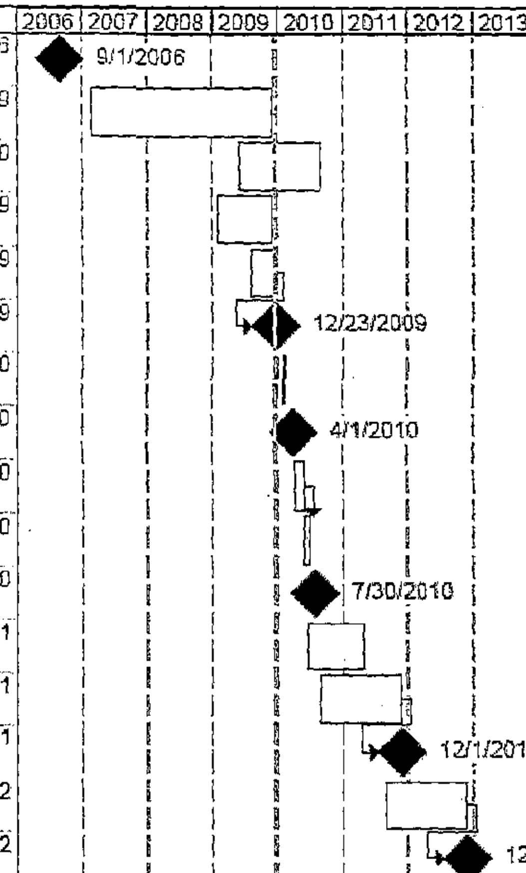
The Applicant began development of the Facility in Fall 2006. Due diligence of potential Facility environmental and regulatory constraints began in September 2008. Acquisition of land and land rights began in March 2007 and continued through November 2009. Wildlife surveys, including bird, bat, wetland, habitat, and vegetative surveys, began in

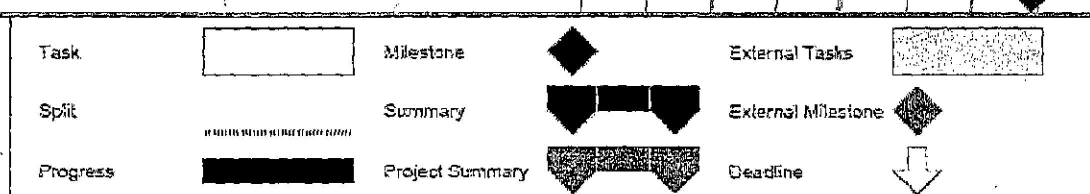
February 2009 and continued into November 2009. The acoustic bat survey data report will be submitted in early February 2010. Site-specific geotechnical studies will be conducted from April to May 2010, with the final geotechnical report to be submitted in June 2010. Additional studies associated with eight additional turbines (and associated equipment) will be completed in early 2010 and submitted to the OPSB by April 1, 2010. The Facility schedule anticipates that the Certificate would be issued by late July 2010. The final design drawings for the Facility would be prepared beginning in June 2010. Phase I of Facility construction is anticipated to begin in September 2010 and extend through November 2011. Phase I of the Facility would be placed into service in December 2011. Phase II of Facility construction is anticipated to begin in September 2011 and extend through November 2012. Phase II of the Facility would be placed into service in December 2012. Figure 2-2 shows the anticipated Facility schedule.

FIGURE 3-2
Blue Creek Project Schedule

Blue Creek Wind Farm

ID	Task Name	Start	Finish
1	Applicant Begins Development of the Facility	Fri 9/1/06	Fri 9/1/06
2	Land Acquisitions and Land Rights	Thu 3/1/07	Mon 11/30/09
3	Good Neighbor Agreements	Mon 6/1/09	Wed 9/1/10
4	Wildlife Studies/Surveys	Mon 2/2/09	Mon 11/30/09
5	OPSB Application Preparation	Mon 8/3/09	Fri 12/18/09
6	OPSB Application for Certificate Submittal	Wed 12/23/09	Wed 12/23/09
7	Acoustic Bat Survey Data Report	Mon 2/1/10	Fri 2/12/10
8	Additional Site Specific Information	Thu 4/1/10	Thu 4/1/10
9	Geotechnical Studies (Site Specific)	Thu 4/1/10	Mon 5/31/10
10	Geotechnical Report (Final)	Tue 6/1/10	Wed 6/30/10
11	Issuance of the OPSB Certificate	Fri 7/30/10	Fri 7/30/10
12	Preparation of Final Design	Tue 6/15/10	Fri 4/29/11
13	Facility Construction (Phase I)	Wed 9/1/10	Wed 11/30/11
14	Placement of Facility in Service (Phase I)	Thu 12/1/11	Thu 12/1/11
15	Facility Construction (Phase II)	Thu 9/1/11	Fri 11/30/12
16	Placement of Facility in Service (Phase II)	Mon 12/3/12	Mon 12/3/12





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(2) Delays

Any delays that would impact the in-service date beyond December 2011 would have a significant impact on the Facility and could result in the Facility being significantly delayed or cancelled. Based purely on lost revenue, a delay is expected to cost approximately $250,000 a day, $1.9 million a week, or $7.5 million on average per month. Delays that extend into winter months (January and February) are costlier, as these are typically high-wind months. Additionally, a delay in issuing a Certificate that would postpone the start of construction beyond 2010 would jeopardize the Facility's eligibility for the federal Investment Tax Credit (ITC). The ITC provides significant incentive to build renewable energy projects and would enhance the viability of this Facility, if it is eligible.

4906-17-04 Project Area Analyses

(A) SITE SELECTION STUDY

(1) General

Given the unique nature and constraints associated with the siting of wind energy facilities, the Applicant has requested a waiver from the requirement for a fully developed site alterative analysis,[1] but indicated that the Applicant would instead provide general information describing the relevant siting criteria used to identify the Facility location; this information is provided below.

(a) Siting Criteria

To develop a wind project, such as the Facility, that is both economically and technically feasible, IBR follows a step-wise siting process that evaluates specific siting criteria and alternatives – both at the level of general location and for micro-siting the specific layout.

Descriptions of the primary siting criteria used to identify general project locations are included in this section. The Project area must satisfy each of these criteria for a project to be technically and economically feasible.

(i) High Quality Wind Resource

Because large-scale wind energy facilities use wind as the fuel for generating electricity, their possible locations are constrained by the need for sufficient wind speeds on a regular basis throughout the year. The lack of a suitable wind resource would lead to a lower return on investment.

[1] The Applicant's waiver requests were filed with the OPSB on November 6, 2009, with clarification to motion for waivers received by OPSB November 24, 2009. OPSB Staff recommended that all of the Applicant's waiver requests be approved on November 27, 2009. These documents are provided in Appendix G.

The Applicant initially determined the Project area was suitable for wind development through an initial review of state wind resource maps and more detailed site-specific wind resource assessments.

(ii) Suitable Transmission

Any electricity generator must be located within a reasonable distance to an interconnection point on a transmission line having sufficient capacity for the economical delivery of power to customers on the transmission grid. A reasonable distance is determined in part by the capital cost of transmission line construction.

The Applicant determined the existing transmission infrastructure in the Project area was accessible. This determination was made through an initial, internal preliminary assessment and subsequent interconnection request filed with PJM (discussed in more detail in Section 4906-17-05(D), *Regional Electric Power Systems*). With the nearby presence of two AEP transmission lines, the Facility has excellent transmission access, both in terms of proximity and availability. The Facility would connect to the grid via a new 345 kV interconnection substation that would tie into the existing 345 kV AEP transmission line.

(iii) Available Land and Land Use

Land must be available for a large-scale wind energy project. Landowners also must be willing to negotiate lease agreements to allow the use of the land for wind turbines and associated facilities. Existing land uses must not conflict with wind energy facilities. Dense residential or urban lands, wilderness areas, wilderness study areas, national parks and monuments, and national conservation areas are examples of land uses that are not consistent with wind energy development.

Existing land use in the Project area is primarily agricultural. Wind energy is consistent with this land use, as siting of wind turbines in farm fields intensifies the use of the land. A wind lease can provide additional revenue for farmers while leaving the majority of their farm fields still available for their historical use: raising corn, soybeans, wheat, and other row crops. Additionally, landowners in the Project area have expressed interest and willingness in assisting in the development of the Facility as demonstrated by the success of the Applicant's lease program. Finally, the Project area includes an approximately 40,500-acre area of land that is potentially available – a large enough area for development of a large-scale wind energy project. The layout of the Facility would be located entirely on private land.

(iv) Environmental or Ecological Considerations

Large-scale wind energy projects are ideally located in areas that avoid significant environmental issues such as major bird migration pathways, areas of particularly sensitive habitats, or conflicting activities (for example, airports).

In 2008, the Applicant performed a due diligence study to assess potential environmental constraints, such as avian and bat, threatened and endangered species, environmentally sensitive habitats, aviation and other features in the general Paulding and Van Wert County areas. The results of the due diligence study were incorporated into project development decisions, and the Project area was further refined to avoid and minimize potential impacts to environmentally sensitive issues and features.

In early 2009, the Applicant began ecological and environmental studies in the Project area to further evaluate potential environmental issues. The studies performed include avian and bat, wildlife, aviation, wetlands and waterbodies, cultural resources (historic architecture and archaeology), geotechnical, noise, and visual (including shadow flicker) studies. According to the USFWS, the ODNR and the OEPA, the Facility is expected to have minimal impact to ecological and environmental resources.

Once it was determined that the Project area was suitable for wind development, these same siting criteria were used to identify Facility constraints and to micro-site Facility components.

(b) Relevant Factors in the Site Selection Process

As described above, the relevant factors in the site selection process include areas with an adequate wind resource, suitable transmission in close proximity to the Project area, land availability, and minimal environmental or ecological constraints. Once the Project area was selected, the Applicant began to develop a layout within the boundaries of the Project area. Developing the layout is an iterative process, commonly referred to as micro-siting, and is dictated by detailed site-specific siting criteria/constraints. Micro-siting of the Facility continues throughout the entire development process and generally is completed once construction begins. The following discussion provides additional details considered during the development of this Facility, and includes some specific examples of the micro-siting conducted as part of the Facility development.

(i) Wind Resource

The Project area was identified in 2006 as having the potential for a productive wind resource by studying state overview maps. The Applicant began scientifically studying the wind resource by erecting met towers in September 2007 and additional towers in early 2009. Through the initial and more detailed wind resource assessments, the Applicant determined that the Project area is suitable for wind development.

The wind data collected from the installed met towers was used to predict electrical production from each potential turbine location utilizing a variety of turbine models. From a wind resource perspective, the final turbine layout was determined by overlaying the most energetic locations for turbines with the most constructible designs, while also taking into account the other site constraints described in this Application.

(ii) Available Land and Land Use Constraints

The Project area consists primarily of agricultural land situated amongst the communities of Van Wert, Scott, Cavett, Haviland, and Convoy. Once the Project area boundary was roughly defined, the process of obtaining landowner agreements began. Additional research of the Project area, including an aeronautical study; topographic constraints (e.g., slope); turbine engineering (such as spacing to avoid wake loss); landowner considerations; and environmental and ecological considerations, led to a continuous narrowing of the Project area. The Facility layout incorporates numerous setbacks to comply with the OPSB's requirements and to minimize impacts on residents in the Project area.

The land within the Project area is almost entirely agricultural. The Facility layout has been designed to minimize impacts to active agricultural land and to use existing roads and farm lanes when possible for access to the Project area.

(iii) Environmental or Ecological Considerations

In 2008, the Applicant performed a due diligence study to assess potential environmental issues, such as threatened and endangered species, environmentally sensitive habitats, and other features in the general Paulding and Van Wert County areas. Environmental and ecological studies performed for the Facility include avian and bat, wildlife, aviation, wetlands and waterbodies, vegetative, cultural resources (historic architecture and archaeology), geotechnical, as well as noise and visual (including shadow flicker).

The Applicant has also conducted multiple site visits and meetings with wildlife agencies, including the USACE, USFWS, OHPO, OEPA, ODNR, Paulding and Van Wert County Soil and Water Conservation Districts, Maumee Watershed Conservancy District, and the Audubon Society. A summary of public meetings and correspondence is provided in Section 4906-17-08(E), *Public Responsibility*. In addition, as detailed in Section 4906-17-08(B), *Ecological Impact*, ecological and environmental impacts have been minimized by avoidance of sensitive environmental areas and micro-siting.

The following provides an overview of potential environmental, ecological, and other primary constraints and how the Applicant incorporated these constraints into the Facility layout.

a) Avian and Wildlife

Because of concerns raised by the USFWS and ODNR for potential impacts to bats from the turbines, the Applicant has conducted bat acoustic monitoring within the Project area. The acoustic monitoring was conducted through mid-November 2009. A full report will be submitted in early February 2010.

Impacts due to the construction of the Facility are anticipated to be minimal and would likely be limited to incidental injury and mortality of sedentary or slow-moving species due to construction activity and increases in vehicular movement; habitat disturbance or loss associated with clearing and earth-moving activities; and displacement of wildlife due to increased noise and human activities. However, because most of the Facility is proposed to be sited in active agricultural land that provides limited wildlife habitat, and which currently (and historically) experiences frequent agricultural-related disturbances, incidental injury and mortality impacts are expected to be minor. In addition, soil disturbance and exposure would likely occur in areas previously subjected to regular plowing, tilling, and harvesting. The majority of the habitat and vegetation disturbance and loss would be temporary in nature.

The Applicant would mitigate short-term construction disturbance by restoring disturbed areas to similar vegetation types in accordance with an E&SCP that would be prepared for the Facility. The Applicant also plans to conduct post-construction monitoring for birds and bats in order to monitor and track impacts to these species. Based on Project area siting within ODNR's MRA, the potential for impacts are expected to be low. The Applicant would monitor impacts to avian species and bats in accordance with an Avian and Bat Protection Plan, presented in Appendix H.

b) Aeronautical Study

An aeronautical study conducted in late 2008 and early 2009 identified areas where wind turbine tower height would be limited by the Van Wert County Regional Airport and Fort Wayne International Airport. The Project area boundary was reduced in size to have no impacts on local airports. Appendix I provides the aeronautical study.

c) Communication/Electromagnetic Interference

As detailed in Section 4906-17-08(E), *Public Responsibility*, of the application, the Applicant evaluated potential interference with microwave, radio, television, cellular, and military/aviation communications. Summary discussions of findings are as follow:

- Microwave – Analysis identified 57 microwave paths that intersect the Project area; Applicant included the microwave paths in constraints mapping and developed the current layout to avoid impacts to microwave paths intersecting the Facility.

- Radio – After reviewing Applicant's plans for the Facility, National Telecommunications and Information Administration (NTIA) concluded that no impacts to radio (AM/FM) broadcast were identified.

- Television: No constraints regarding over-the-air television reception have been identified. Monitoring of television signal strength in the Project area is being performed to evaluate current reception quality near the Facility and to determine an area of potential degradation of reception. The Applicant expects no impact to cable or satellite television.

- Cellular: After reviewing Applicant's plans for the Facility, NTIA concluded that no impacts to cellular/personal communication systems were identified.

- Military and Aviation Radar: Applicant coordinated with Department of Defense regarding potential concerns on military communications, and received determination from the Department of the Navy on May 6, 2009 that the Marine Corps is willing to adjust their microwave systems facilities for the Applicant's proposed Facility to avoid future impacts. Applicant plans to coordinate final Facility layout with the Department of Navy. The Applicant also retained Aviation Systems, Inc. (ASI), which reviewed potential impacts to military radar. The findings indicated that development of the Facility would be unlikely to affect Air Defense and Homeland Security radars, as well minimal to no impact to weather radar operations.

d) Cultural Resources

The Applicant performed an archaeological survey and architectural survey in Fall 2009. An archeological survey was undertaken within the areas of potential direct effects of the Facility. Additional survey activity is anticipated to take place in the Spring of 2010 to supplement the current investigation and to reflect final Facility design. The results of the current investigation will be submitted to the OHPO, with a copy to OPSB staff, in early February 2010. A summary of this investigation is presented in Section 4906-17-08(D), *Cultural Impact.*

Sites that were not found to be historic properties will not represent landmarks of cultural significance, as defined by OPSB regulations, and no avoidance or further archeological investigation will be necessary. For nine sites, avoidance is planned. If avoidance is not possible, Phase II archeological evaluation will be undertaken assess if the sites represent historic properties, as defined in 36 CFR 800.16(l), and therefore landmarks of cultural significance, as defined by OPSB regulations. During construction, an unanticipated finds plan would be implemented in accordance with OHPO requirements, and discussions with OPSB staff.

A reconnaissance-level architectural survey was conducted within a 5-mile (8-km) radius of each wind turbine identified as of September 2009 (architectural reconnaissance survey area). The architectural reconnaissance survey area is identified and discussed in the architectural reconnaissance survey report (submitted to the OHPO on November 19, 2009 and is summarized in Section 4906-17-08(D), *Cultural Impact*. Additional survey activity is anticipated to take place in the Spring of 2010 to supplement the current investigation and to reflect final Facility design.

No direct impacts resulting from the physical removal or alteration of historic properties are anticipated. Visual impacts related to potential historic properties are anticipated in varying degrees within the architectural reconnaissance survey area. The Facility will introduce elements to the surrounding area that will affect the quality of setting, as defined by the National Register guidelines. It is anticipated that adverse visual impacts will be addressed through a formal mitigation plan designed to promote the preservation and continued meaningfulness of historic resources. Such a plan, developed in consultation with OHPO, OPSB Staff, and interested parties, such as the Van Wert County Historical Society, may be formalized through the negotiation of a formal Memorandum of Agreement that specifies mitigation measures, responsibilities, and implementation schedules.

e) Geotechnical

The Applicant performed a preliminary geotechnical investigation of the Project Area in order to determine soil and bedrock conditions, obtain geotechnical design data, and undertake a preliminary foundation design. This geotechnical investigation included hollow stem auger drilling, rock coring, cone penetration testing (CPT), a dilatometer sounding (DMT), and a preliminary karst risk evaluation. This investigation included both non-intrusive and intrusive investigation in limited areas to minimize pre-construction impacts. Section 4906-17-05(A)(4), *Geology and Seismology,* provides more detail of the investigation.

Final geotechnical investigations will be undertaken in advance of construction and will be focused on specific locations of the final design. These investigations will allow planning for any unusual foundations conditions.

f) Wetlands

The Applicant conducted a jurisdictional wetland and waterbody survey in Fall 2009. No wetlands or waterbodies were delineated near any of the proposed turbine locations; however, potential impacts to wetlands or waterbodies may occur during the installation of the electrical collection system and access roads. It is the intent of the Applicant to keep total wetland impacts less than 0.5 acres so the USACE Nationwide permit program can authorize the Facility.

The construction of the proposed access roads would require the installation of culverts across some ditches and would result in localized, permanent impacts to the wetlands or streams crossed. To the extent possible, access roads have been sited to avoid larger stream crossings and any impacts to woodlands, including wooded wetlands.

Must of the electrical collection system would be installed underground generally utilize an open-cut method. Where the electrical collection system crosses farmed or linear wetlands, the wetlands would be restored to their pre-construction conditions following installation, so that the impacts to wetlands would be temporary. At larger stream crossings, such as Blue Creek, Dry Creek, or Hagerman Creek, the underground collection lines would be installed using horizontal directional drilling to avoid impacts to these streams.

g) Noise

No existing national, state, or local regulations limit noise levels at wind energy facilities. Potential noise from the Facility was evaluated for 167 G-90 wind turbines on 328-foot (100-meter) tall towers and the associated electrical substations. The expected operational noise levels are anticipated to range between less than 30 dBA to 53 dBA. These noise levels are representative of the Facility noise levels. An overall reduction in Facility noise levels should be realized through the micro-siting process. Section 4907-17-03(A)(2), *Noise,* presents the findings of the noise assessment. Mitigation measures that may be utilized include:

- Using 1,200 feet for a minimum residential setback instead of the OPSB-mandated 750 feet;
- Turbine micro-siting to minimize projected impacts;
- Publishing a phone number for the Plant Manager so area residents can report excessive noise that might be caused by malfunctioning turbines; and
- Good Neighbor Agreements (GNAs) to offer compensation to affected residents.

h) Visual

The Applicant conducted a VIA in Fall 2009. To maximize the visual integration of the Facility into the overall pattern of the

Project area landscape, the Applicant would incorporate BMPs related to Facility appearance. These measures are presented in more detail in the VIA Report (Appendix J) and include use of turbines with uniform appearance, use of muted gray or white colors, and placement of as much of the Facility's electrical collection system underground, as practicable. These measures would be incorporated into Facility design to ensure an attractive appearance and good integration into its landscape setting.

A shadow flicker analysis was performed for 167 G-90 wind turbines on 328-foot (100-meter) tall towers to evaluate the extent of potential shadow flicker experienced at each residence and primary transportation corridors in the Project area. The Applicant plans to use a number of mitigation measures to reduce projected shadow flicker impacts to these affected residences (Appendix K). Mitigation measures that may be utilized include:

- Turbine micro-siting to minimize projected impacts;
- GNAs to offer compensation to affected residents; and
- Window blinds, window awnings, and vegetative plantings to be offered to affected residents, including those with and without GNAs.

(iv) Site Accessibility

The site is accessible using an existing network of public roads and is near the confluence of U.S. Highways 30, 127 and 224. Active rail lines are also present near the Project area. Access roads required within the Project area would be designed and constructed to avoid to the extent possible deep drainage ditches. Studies have been undertaken to plan and avoid to the extent possible impacts to waterways and bridges, and to maximize convenience for the Facility and landowners. The Applicant has coordinated with federal, state, and local permitting agencies, and will obtain the appropriate federal, state, and local permits.

(v) Community Support

The Applicant initiated lease discussions with private landowners in March 2007. In November 2008, the Applicant held a meeting with all engaged landowners and received a very favorable response to the Facility. In addition, the Applicant advertised for, and hosted, a public meeting in January 2009 to provide an overview of the proposed Facility. To date, several other meetings and presentations have taken place within the community. Based on these meetings that involved hundreds of local residents, the community appears to support the Facility, as demonstrated by the success of the Applicant's leasing program, strong positive comments toward the Facility at many of the public meetings (especially the 2009 Van Wert County Fair), and a complete absence of negative comments towards the Facility. The Applicant will continue to meet with various participating landowners to review the Facility layout and meet landowner considerations.

(2) Constraint Map

A Constraint Map showing setbacks from residences, property lines, and public rights-of-way is provided as Figure 4-1. Based on IBR's experience with 3,500 MW in 20 states, IBR has developed the following nationwide setbacks that will be implemented for the Facility:

- Setback from residences: 1,200 feet; and
- Setback from public roads and other public rights-of-way: 1.31 times the turbine height (476 feet) for a setback of 624 feet (assuming use of the G-90 turbine).

Additional setbacks may be considered because of site-specific noise and shadow flicker studies completed during the micro-siting process.

(B) SUMMARY TABLE OF EVALUATED SITES

The site analyses described in Section 4906-17-04(A), *Site Selection Study*, above provide a qualitative and quantitative assessment of the site selection process undertaken by the Applicant. In summary, the Applicant evaluated the wind resources in the Project area, availability of suitable transmission lines, land availability and land use, environmental and ecological considerations (for example, avian, wildlife, aviation, cultural, geotechnical, and wetlands), and community support.

4906-17-05 Technical Data

(A) PROJECT AREA SITE

The following sections provide information on the location, major features, and the topographic, geologic, and hydrogeologic suitability of the Project area.

(1) Geography and Topography

The topography of the Project area is characterized as a relatively flat lying area and ranges from approximately 725 to 775 feet mean sea level (msl). Figure 5-1 depicts the geographic and topographic features of the Project area, as well as those features within a surrounding 5-mile radius of the Project area. This mapping was developed from the following United States Geological Survey (USGS) 7.5 minute, 1:24,000 topographic quadrangles, which occur within 5 miles of the Project area boundary: Convoy, Dixon (Ohio and Indiana), Glenmore, Latty, Middle Point, Oakwood, Payne, Scott, Van Wert, Wetsel, Woodburn South (Ohio and Indiana), and Wren. Due to the scale of the mapping, the edges of the proximity map also incorporate portions of other quadrangles that do not fall within a 5-mile radius, including: Continental, Delphos, and Ottoville. Among other information, Figure 5-1 shows the following features:

- The proposed Facility;
- Major population centers and geographic boundaries;
- Major transportation routes and utility corridors;
- Bodies of water which may be directly affected by the proposed Facility;
- Topographic contours;
- Major institutions, parks, and recreational areas;
- Residential, commercial, and industrial buildings and installations, and
- Air transportation facilities, existing or proposed.

(2) Aerial Photography

Figure 5-2 provides an aerial photograph of the Project area and includes the proposed location of turbines, access roads, the collection system, and other Facility components, in relation to surface features within a 1-mile radius of the Project area boundary. This mapping was developed using aerial photographs, available geographic information system (GIS) data for states, counties, and airports from Environmental Systems Research Institute (ESRI), available GIS data from the Ohio Department of Transportation (ODOT) for counties, townships, roads, active railroads, and cities, and available GIS data for local roads from Ohio Geographically Referenced Information Program (OGRIP).

(3) Site Mapping

Figure 5-3 depicts the proposed Project area and is presented at a scale of 1:12,000. The following features are presented on this figure:

- Topographic contours;
- Existing vegetative cover;
- Land use and classifications;
- Individual structures and installations;
- Surface bodies of water;
- Water and gas wells, and
- Vegetative cover that may be removed during construction.

(4) Geology and Seismology

The Facility is located within the Huron-Erie Lake Plain Section of the Central Lowland Physiographic Province (ODNR, 2009a). The Huron-Erie Lake Plain Section is further delineated into regions and districts, of which the Facility is situated within the Maumee Lake Plains district. The Maumee Lake Plains district varies in elevation from approximately 725 feet above msl to 775 feet above msl and is indicative of a flat-lying lake basin comprised of clay flats along with beach ridges, bars, dunes, and deltas.

The regional geology is characterized by Pleistocene sedimentary deposits comprised of silt, clay, and wave-plane clayey till overlying Silurian-and Devonian age bedrock (ODNR, 2009a). Figure 5-4 presents a map depicting the glacial drift thickness of the Project area; Figure 5-5 presents the bedrock geology of the Project area.

Silurian age Salina Group bedrock is present beneath most of the site and consists of dolomite, anhydrite, gypsum, and shale (Barr Engineering Company [Barr], 2009). In the northwestern portion of the Project area, the Detroit River Group overlies the Salina Group and predominately consists of dolomite, sandstone, and shale (Barr, 2009). The Mesozoic and Cenozoic eras that followed this Paleozoic Era have been erased in Ohio's geologic record by the glacial events that occurred during the Pleistocene. The Wisconsinan glaciation was the most recent glacial event. This glaciation left two-thirds of Ohio covered with glacial tills and extensive ground moraines because of its several major advances and retreats. During the last glaciation, the Project area was covered by Glacial Lake Maumee, which resulted in the deposition of clay and silt. Near shore deposit of sand and silt bars formed due to wave action and water level fluctuations. In addition ground and end moraine deposit underlie glacial lake deposits in some areas (Barr, 2009). The impact of glaciation was further extended by glacial meltwater that deposited glaciofluvial deposits, such as sand and gravel deposits along major drainage channels. Dendritic drainage patterns were then re-cut as drainage was re-established (Schiefer, 2002).

(a) Site Geology

The Project area contains approximately 10 to 25 feet of unconsolidated glacial till and glaciofluvial deposits that overlie bedrock. The Applicant performed a preliminary geotechnical investigation of the Project area in order to determine soil and bedrock conditions, obtain geotechnical design data and undertake a preliminary foundation design. This geotechnical investigation included hollow stem auger drilling, rock coring, CPT, a DMT, and a preliminary karst risk evaluation. A copy of this report is presented in Appendix L.

Based on this investigation, the site geology was characterized as having less than 25 feet of unconsolidated deposits over lying bedrock. Approximately 2 feet of topsoil overlies glacially derived sediment. In the six hollow stem auger borings (T-22, T-42, T-71, T-103, T-120, and T-148), black topsoil was underlain by 0 to 5 feet of brown silt. A gray clay deposits ranging from 8 to 20 feet was present beneath the brown silt. Bedrock was encountered from 10 to 22 feet below ground surface (bgs) and was reported as a dolomite and dolomitic limestone in the boring logs. In order to evaluate rock quality, bedrock was cored from 9 to 12.5 feet in these boreholes. Shallow groundwater was encountered in all boreholes at depths ranging from 13 to 22 feet during drilling activities.

Near the proposed O&M building and batch plant area (in the southeastern portion of the Project area), borehole T-120 was advanced and encountered bedrock at 22 feet bgs. At this borehole location T-120, groundwater was encountered just above bedrock at 21 feet bgs.

Bedrock was shallower along the western side of the Project area. In borehole T-22 near Kilgore Road, bedrock was encountered at 10.5 feet bgs. During drilling, groundwater was encountered immediately above bedrock at 10 feet bgs. Shallow groundwater was encountered during site investigations and will need to be considered during foundation excavations. In addition, cone penetration tests (CPT) were performed at 12 locations at the Blue Creek site in order to obtain selected geotechnical engineering properties for soil in-situ. At turbine location 53, refusal was met at six feet while at other turbine locations refusal occurred at a deeper depth. (Barr, 2009)

Preliminary geotechnical design properties for soils were evaluated via laboratory testing that included grain size distribution with hydrometer analysis, moisture content, unconfined compressive strength, Atterberg Limit, Standard Proctor, and Thermal Resistivity and chemical analysis of soils (soluble chloride, soluble sulfate, and pH): Preliminary geotechnical parameters determined are identified in Table 5-1.

TABLE 5-1
Summary of Geotechnical Parameters for Foundation Design

Parameter	Value	Units
Undrained Soil Shear Strength (cohesive soil)	1,500	lb/ft^2
Soil Friction Angle (granular soil)	37	degrees
Min. Allowable Bearing Capacity, Normal Operating Load	3,100	lb/ft^2
Min. Allowable Bearing Capacity, Extreme Load	3,850	lb/ft^2
Min. Average Shear Wave Velocity	727	ft/s
Min. Design Small Strain Shear Modulus	2,235	$kips/ft^2$
Poisson Ratio	0.45	
Min. Foundation/Soil Friction Factor	0.4	
Backfill Density over Foundation (dry density = 95 pounds per cubic foot at moisture content = 12% minimum)	110	lb/ft^3
Frost Depth	40	Inches

Source: Barr, 2009.

The findings during the investigation indicate that the primary geological and soil suitability concerns include high groundwater table across the site and shallow bedrock in the western portion of the site. It is not anticipated that mitigation will be needed for geologic considerations based on the site conditions.

(b) Geologic Hazards

The potential geologic hazards examined in the Project area include potential hazards from landslides, seismicity, faults, soil liquefaction, and subsidence. Table 5-2 presents a summary of geological and geotechnical hazards as described in the geotechnical report.

TABLE 5-2
Geologic and Geotechnical Hazards Summary

Hazard	Present at Site?	Comment
Flooding/High groundwater	Yes	The site is relatively flat and poorly drained soils exist throughout much of the site and could be prone to localized flooding. Turbines 77-80 are located in a FEMA flood zone.
Slope failure	No	The site is relatively flat.
Subsidence – Pumping	Unlikely	Project area is underlain by bedrock with a framework capable of resisting subsidence due to production of oil, gas, or water.

TABLE 5-2
Geologic and Geotechnical Hazards Summary

Hazard	Present at Site?	Comment
Subsidence – Mining	No	Mining activity is limited to limestone quarry operation and no coal mining
Subsidence – Caves/Karst	Possibly	Bedrock is susceptible to dissolution, but no current karst hazards areas are presently known in the Project area.
Earthquake/Seismicity	Unlikely	The site is in a moderately low seismic area.
Swelling/shrinking soil	Yes	Lake origin (fat) clay soil is present throughout the site.
Corrosive soil	Possibly	Clay soils exist throughout the Project area, which are potentially corrosive to steel.
Made ground	Unlikely	No coal mining exists in the region and there does not appear to be any significant relief associated with raised grades. There is a small potential for filled areas associated with the low-lying swamp areas.
Collapsible soil	No	Collapsible soils are not known or likely to be present.
Volcanic activity	No	No current volcanic activity exists in the region.
Quick clay	No	Quick clay conditions are not known or likely to be present.

Source: Barr, 2009.

Due to these periods of glaciation, the Project area is relatively flat-lying with a relief of only about 50 feet across the Project area. Therefore, landslides are highly unlikely to occur within the Project area.

Ohio has experienced as many as 160 earthquakes since 1776, the majority of which have caused no injuries or property damage (Dart, 2008). According to the map *Earthquake Epicenters in Ohio and Adjacent Areas*, a cluster of earthquakes has occurred just southeast of the Project area (ODNR, 2009b). This area coincides with the largest earthquake on record in Ohio. This earthquake had an estimated magnitude of 5.4 and occurred on March 8, 1937 near Anna in Shelby County, Ohio (Dart, 2008). Two earthquakes of lesser intensity were felt in the area on March 2 and 3, 1937 (USGS, 2009a). The total felt area of the March 8, 1937 earthquake comprised approximately 150 square miles, encompassing all of Ohio and Indiana and parts of Illinois, Kentucky, Michigan, Missouri, Pennsylvania, West Virginia, Wisconsin, and Ontario, Canada (USGS, 2009a). In Anna, brick chimneys fell, and foundations were cracked (USGS, 2009b).

Approximately 7 miles south of Anna, in Sidney, damage was limited to a few fallen chimneys and cracked plaster walls. Productivity of oil and gas wells in the region was reduced after the event; alternately, flow from some water wells and springs was renewed or increased (USGS, 2009b). It is estimated that at least 40 earthquakes have been felt in this specific area since 1875 (Dart, 2008). A search was performed for historical earthquake epicenters and fault lines to determine if these geologic hazards pose any potential risks in the Project area. There are no known historic earthquake epicenters of quaternary faults within 5 miles of the Project area (Figure 5-6).

Soil liquefaction is a process whereby the strength and stiffness of a soil is reduced because of earthquake shaking or similar rapid loading (i.e., blasting) (Johannson, 2000). Liquefaction may occur in saturated soils (meaning soils in which soil pore space is completely filled with water) and sandy soils. Soil liquefaction is more likely to occur on areas of land reclamation. When liquefaction does occur, the strength of the soil decreases sharply, resulting in a reduced ability to support infrastructure such as foundations and similar structures. During liquefaction, these water-saturated soils essentially behave like fluids. The Facility possesses a low risk of a high intensity earthquake, and no land reclamation sites are within the Project area (ODNR, 2006). Additionally, sandy soils do not occur within the Project area (Figure 5-7). Therefore, soil liquefaction does not present a geologic hazard to this Facility.

Karst topography develops due to the dissolution of soluble limestone or dolomite bedrock layers. Subsidence may potentially result from the dissolution of this bedrock. The Project area is not situated in a probable karst area (ODNR, 2009c). In addition, the Applicant has performed a preliminary geotechnical evaluation (Appendix L) of the Project area and plans on conducting geotechnical investigations to evaluate foundations at each location in spring 2010. As part of this investigation, a karst evaluation of the site was performed and included a literature review; review of borehole rock cores and groundwater data; a visit and inspection of the Scott Quarry 9 (a dolomite and dolomitic limestone quarry) for karst features and communication with local geological experts. This evaluation concluded that the potential risk from karst feature was low due to the bedrock being dolomitic; the limited fluctuation of groundwater levels due to the flat topography; a stable potentiometric surface in the overburden; and no evidence of karst features were observed or identified in consultation with local experts. Subsidence can also occur due to subsurface mining; however, no subsurface mines are situated beneath the Project area (ODNR, 2006).

(c) Soil Suitability

Soils form over time as the local climate and other environmental factors work on the parent material. Ohio soils formed in a generally humid temperate climate with a deciduous forest cover, leading to the development of Alfisols throughout much of the state (Schiefer, 2002).

In *Basin Descriptions and Flow Characteristics of Ohio Streams*, the Project area is situated within Soil Region 1 (Schiefer, 2002). According to this region's description, the Project areas soils will have developed from calcareous lake-deposited clay and silt beneath elm-ash swamp forests. Generally, these soils seem to have slow permeability and drainage.

Approximately 45 different soil types occur within the Project area. The textures of the Project area's soil associations include loam, silty clay loam, silt loam, silty clay, and clay. Of the soil associations in the Project area, the Defiance silty clay loam and the Shoals silt loam are occasionally flooded, and the Wabasha silty clay loam is frequently flooded. Hydric soils and wetland sites are discussed in Section 4906-17-08(B)(1), *Project Site Information*, and the potential risks associated with construction on frequently flooded soils is addressed in Section 4906-17-05(A)(5), *Hydrology and Wind.*

Soils in the Project area were reviewed for other potential hazards that may present challenges during construction of the Facility. Such hazards include high compaction potential, low revegetation potential, and erodibility concerns.

Soils that demonstrate the potential for shallow bedrock or restrictive layers occur within the Project area at a frequency of less than approximately one percent of the total area. Therefore, the potential impacts of soil restrictive layers or shallow bedrock on the Facility are minimal. Soils were considered to demonstrate this potential if a restrictive layer or bedrock was found within 6.5 feet bgs.

High compaction potential was determined to be present within the Project area at a frequency of approximately less than one percent. Soils were determined to possess the potential for high compaction if the soil texture was fine, fine loamy, very fine, or coarse loamy. Soils with high compaction potential will be monitored during construction within active agricultural lands in order to minimize potential impacts to arable land. An agricultural mitigation plan will be developed as part of the Facility and is discussed in more detail in Section 4906-17-08(F)(2)(b), *Irrigation*.

Low revegetation potential was examined to determine areas where soil stabilization may require increased effort as part of the implementation of a Stormwater Pollution Prevention Plan (SWPPP). Appendix M provides the SWPPP. Temporary and permanent seeding of cleared areas will be one method employed to stabilize soils and minimize erosion. An area was determined to be of low revegetation potential if its land capability class was III or below. The land capability class consists of 8 classes (I through VIII), and the criteria for placing a given area in a particular class involve its use as cropland, landscape location, slope of the field, depth, texture, and reaction of the soil. Class I through IV represent arable land capable for use as cropland, where limitations of use and conservation management practices increase from I through IV, while Classes V though VIII represent land not suitable for use as cropland but suitable for other uses such as pasture, woodland, range, grazing, recreational, or aesthetic purposes. Soils within the Project area consist of land capability classes of I through III, and erosion and sedimentation control will be achieved through careful implementation of the SWPPP for the Facility.

Soils that possess the risk of high erodibility occur within the Project area represent approximately 0.6 percent of the total area. Therefore, there is minimal risk associated with highly erodible soils. An erosion control and sedimentation plan and SWPPP will be developed and implemented during construction in order to control stormwater and associated soil erosion and sedimentation during construction activities. The suitability of the Project area is discussed in more detail in the geotechnical investigation report (Appendix L). The geotechnical investigation report indicates that the site is suitable for construction of the Facility.

(5) Hydrology and Wind

(a) Water Budgets

(i) Surface Water Resources

The Facility is situated within the Maumee River Drainage Basin. The Maumee River is 105 miles in length and drains approximately 6,608 square miles (ODNR, 2001). The USGS maps the Facility within the Auglaize River Watershed, Hydrologic Unit Code (HUC) 041700004. The Auglaize River is approximately 102 miles in length and drains approximately 2,435 square miles (ODNR, 2001). The mapped perennial streams within the Project area include Blue Creek, Dry Creek, Hagerman Creek, Hoaglin Creek, Hog Run, Maddox Creek, Monkey Creek, Pottawatomie Creek, Prairie Creek, Town Creek, Middle Prairie Creek, and Upper Prairie Creek.

Average annual precipitation in vicinity of the Facility for the period 1931 to 1980 ranges from 33 to 37 inches (ODNR, 1992). No surface water gauges are located within the Project area. However, a USGS gauge (04191500) is installed on the Auglaize River near Defiance, Ohio downstream of the Project area. The period of flow record is from 1915 to 2008. The annual 7-day minimum flow between water years 1915 and 2008 is 1.1 cubic feet per second (cfs). The annual mean flow between water years 1915 and 2008 is 1,855 cfs (USGS, 2009c). Furthermore, using the U.S. Environmental Protection Agency (USEPA) model for low flow analysis DFLOW (USEPA, 2009a) and daily flow values from October 1, 1915 to September 30, 2008 at USGS gauge 04191500 (USGS, 2009c), the estimated lowest 7-day flow in 10 years (7Q10 value) is 13.3 cfs. Historical records of water tables during the past 10 years are not available for the Project area or at USGS gauge 04191500. The proposed Facility will consume and discharge only minimum amounts of water; therefore, the Facility is not anticipated to cause any measurable impact to water tables within the Project area.

According to the *Ohio 2008 Integrated Water Quality Monitoring and Assessment Report* (2008 Integrated Report), none of the streams within the Project area are listed on the impaired waters list pursuant to Sections 303(d), 305(b), and 314 of the federal Clean Water Act (OEPA, 2009a). Appendix K of the Integrated Report (OEPA, 2009a) shows that the watershed contains insufficient data to due to the lack of monitoring sites within the Project area's watershed. However, there are sufficient monitoring stations to analyze water quality downstream of the Project area. The Auglaize and Maumee Rivers, to which the Project area drains, contains detailed water quality assessment information in the 2008 Integrated Report. Table 5-3 provides relevant data for the Project area

TABLE 5-3
Relevant Water Quality Data for the Project Area

Large River Assessment Unit	River Miles				Aquatic Life Use Assessment			Fish Consumption Assessment		Recreation Use Assessment	
	Total Length / Total Monitored	Non-Attainment	Partial Attainment	Attainment	Designation	High Magnitude Impairment Cause	High Magnitude Impairment Source	Impairment	Pollutant	Subcategory of Use	Impairment
Auglaize River Mainstem (downstream Ottawa River to mouth)	33.26 / 23.73	5.37	4.10	14.26	Warm Water Habitat	Flow Alteration	• Flow Regulation / Modification • Channelization	Yes	Mercury	Primary Contact Recreation	Unknown
Prairie Creek *	*N/A*	*N/A*	*N/A*	*N/A*	*Modified Warm Water* Habitat – Channelized	*Unknown if impaired*	Unknown if impaired	Unknown	Unknown	Primary Contact Recreation	Unknown
Maumee River Mainstem (Indiana state border to Lake Erie)	107.87 / 95.67	45.35	25.72	23.60	Warm Water Habitat	• Flow Alteration • Habitat Alterations • Turbidity • Nutrients • Unionized Ammonia • Siltation • Total Toxics	• Non-irrigated Crop Production • Channelization • Combined Sewer Overflow • Major Municipal Point Source	Yes	Polychlorinated Biphenyls	Primary Contact Recreation	No

Source: OEPA, 2009a.

* Prairie Creek is listed as Category 3 in the Integrated Assessment Report, indicating the OEPA has insufficient data for the waterbody segment to determine whether any designated uses are met.

(ii) Groundwater Resources

The western portion of Ohio is underlain by carbonate aquifer systems (limestone or dolomite), and the principal aquifer in the Project area is comprised of limestone bedrock. Middle Devonian and Silurian limestone and dolomite reach a total thickness of 300 to 600 feet and are capable of yielding from 100 to over 500 gallons per minute (gpm) of water (OEPA, 2009a). According to the map "Ground-Water Resources of Van Wert County," a deep well within the Project area had an approximate yield 850 gpm at a depth of 258 feet (ODNR, 1982). This map also shows depth to bedrock is as little as 7 feet and as much as 28 feet within the Project area (ODNR, 1982; ODNR, 1986). Figure 5-8 provides a characterization of the carbonate aquifer systems within the Project area.

Unconsolidated aquifers in Project area generally consist of glacial till and yield less than 5 gpm (ODNR, 2009d; ODNR, 2009e). Domestic and agricultural supply wells typically access these unconsolidated aquifers and, in the Project area, generally range in depth from 40 to 90 feet bgs; yields are in the range of 5 to 15 gpm (ODNR, 1982; ODNR, 1986). Figure 5-8 illustrates unconsolidated aquifers in the Project area and the range of the aquifers' typical yield in gallons per minute.

No sole source aquifers are located near the Project area. The Allen County Area Combined Aquifer System (ACACAS), situated approximately 8 miles to the southeast of the Facility, is the closest designated sole source aquifer by the USEPA. Observation well VW-1 is located approximately 3 miles south of the Project area in Van Wert County. For the period of record from 1957 to 2008, the maximum depth to groundwater was 33.2 feet bgs and the minimum depth was 18.4 feet bgs (ODNR, 2009f).

No adverse impacts are anticipated to the aquifer systems within the Project area, including the ACACAS. The Facility is not likely to pose any risk of contaminant release that will compromise the quality of the groundwater resources.

(iii) Construction Water Usage

Water use during construction of the Facility will entail such operations as temporary concrete batch plant operations and dust suppression.

The Applicant is evaluating the possibility of creating a temporary concrete batch plant for producing the concrete necessary during Facility construction. This plant will be located on a 20-acre property located in the southeastern portion of the Project area and will be the location of the future O&M building. It is estimated that the plant will operate 6 days a week and produce up to 1,500 cubic yards of concrete per day. Based on this production rate, the estimated water demand will be approximately 55,000 gallons per day (gpd) (about 115 gpm) and will be supplied from two onsite bedrock wells. These wells will be drilled and completed at a depth of several hundred feet. Available water well logs near this site indicate that the deepest local domestic well was 63 feet in depth and is completed in bedrock. If a batch plant is utilized, a production test well and associated observation wells will be installed in Spring 2010 and tested to determine the specific yield for the well. Depending on the production test well results, a water storage tank may be considered to reduce peak demand on the water supply wells. In addition to batch plant water use, water will be used for road watering. Construction water demands for the site will be temporary. Portable facilities will be used for construction workers; therefore, they will not require water.

(iv) Operation Water Usage

Operation of the wind farm will require minimal water usage, as wind turbines do not consume or use water for their operation. Water will be consumed as part of the regular potable water use for the O&M building and is estimated to be 1,000 gpd based on 20 full-time employees and an average per capita use of 50 gpd. Water discharges from the O&M building include both sanitary wastewater discharges from the O&M building and stormwater discharges. Sanitary wastewater from the O&M building will be discharged to a septic system constructed onsite in amounts similar to a residential structure.

The Facility entails construction of impervious surfaces, including turbine foundations and access roads; however, the additional impervious surface areas are insignificant when compared with the overall potential recharge zone. Therefore, the Facility is not anticipated to affect the water budget adversely within the Project area.

(b) Floods and High Winds

(i) Floods

According to ODNR, a floodplain is divided into two categories for regulatory purposes: the floodway and the flood fringe (ODNR, 2009g). The floodway contains the channel and the adjacent portion of the floodplain required to pass the 100-year flood with no increase in flood height, while the flood fringe contains the remainder of the floodplain outside of the floodway (ODNR, 2009g). Generally, the floodway contains the fastest moving water during flooding conditions. As development will block the free flow of water and potentially increase the water's depth and velocity, most floodplain development regulations are focused on preventing development that will hinder the free flow of water within the floodway. Development in the flood fringe is allowed under certain stipulations that may include construction of the structure above the base flood elevation or waterproofing the structure.

Figure 5-9 illustrates the 100-year floodplains that occur with the Project area, as mapped by the Federal Emergency Management Agency (FEMA). No turbines or access roads will be constructed within the mapped 100-year floodplain.

As currently proposed, underground collector lines will cross the 100-year floodplain associated with Blue Creek, Hoaglin Creek, and Prairie Creek, and an overhead collector line will cross the 100-year floodplain of Hoaglin Creek. The underground collector lines will have no permanent impacts on the 100-year floodplains of these waterbodies. Impacts within the floodplain will be temporary during construction activities, consisting of trenching for the collector lines and subsequent backfilling of the trenches. The topography within the floodplain will be restored to its pre-construction contours. Therefore, the flow pathway and the flood storage capacity within the floodplain will not be altered. Additionally, the overhead collector lines will have no permanent impacts on floodplains within the Project area, as foundations will be placed outside of the mapped 100-year floodplain resources. Foundations, if constructed within the floodplain, have the potential to alter flow depths and velocities by creating an obstruction to the free flow of water within the floodplain. The Applicant has minimized impact to floodplains to the greatest extent practicable, and according to the local floodplain managers, no permit is required for the construction of underground or overhead utilities within the floodplain.

(ii) Winds

Wind turbines are designed to withstand potential high winds and selected based on a turbine's capacity to tolerate a Project area's high wind force potential. The Facility is likely to employ the use of the G-90 turbine model. Per the manufacturer, the G-90 model is certified to Class IIIA winds. According to the International Electrotechnical Commission (IEC), Class IIIA-qualified turbines are specified to withstand winds to 83.9 mph at hub height for an extreme 10-minute average wind speed (once per 50 years), also known as the Reference Wind Speed (IEC, 1999). These specifications constitute the minimum design standards to be achieved by the turbine and do not necessarily indicate a point of certain failure. Wind resources in the Project area have been classified as Class 2 at 164 feet, with average wind speeds of 12.5 to 14.3 mph as estimated by the U.S. Department of Energy, National Renewable Energy Laboratory (NREL, 2004). WindNavigator® from AWS Truewind, LLC (AWS) estimates the average wind speed at 328 feet (the hub height for the proposed Facility) to be between 14.5 mph and 15.7 mph (AWS, 2009). Therefore, damage to structures from high winds is not anticipated.

Additionally, the Facility will comply with Heartland Wind's internal guidelines, and local regulations for setbacks of wind turbines from residential and other structures, property lines, and public roads in order to minimize property damage and public safety concerns in the unlikely event of a structural failure due to high wind force.

(c) Maps

Figure 5-8 shows the existing groundwater aquifers in the Project area.

(B) LAYOUT AND CONSTRUCTION

This section describes the layout and construction of the Facility.

(1) Project Area Site Activities

The Applicant will develop a site layout with an adequate wind resource, suitable transmission in close proximity, land availability, and minimal environmental or ecological constraints. This section discusses site preparation and reclamation operations anticipated as part of Facility development. Figure 5-10 presents a layout of the proposed Facility.

Several activities must be completed before the proposed commercial operation dates of December 2011 (Phase I) and December 2012 (Phase II). The majority of the activities relate to design and construction of the Facility. The list below summarizes the activities that will be completed in order to bring the Facility online.

- Final turbine micro-siting;
- Allocating wind turbine components, including towers, nacelles, and blades from IBR's standing order with its supplier;
- Ordering step-up transformers, circuit breakers, turbine switchgear, and other electrical equipment;
- Complete survey to establish locations of structures and roadways;
- Soil borings, testing, and analysis for proper foundation design and materials;
- Complete construction of access roads to be used for construction and maintenance;
- Installation of tower foundations;
- Installation of the underground collection system and aboveground 34.5 kV and 115 kV electrical lines;
- Tower placement and wind turbine setting;
- Install the substations;
- Install the O&M building;
- Install the met tower(s) and SODAR unit;

- Install the communication system, including supervisory control and data acquisition (SCADA) software and hardware, telephone and fiber optic cable;
- Acceptance testing of facility; and
- Commencement of commercial operation date.

Temporary disturbances during construction of the Facility include crane pads at each turbine site, temporary travel routes for the cranes, temporary laydown areas around each turbine, trenching for the underground electrical collection system, batch plant, construction offices, and storage/stockpile area. Details of the acreages of impacts for each of these components is discussed in Section 4906-17-03(A)(1)(b), *Land Area Requirements*.

During the construction phase, several types of light, medium, and heavy-duty construction vehicles will travel to and from the Project area, as well as private vehicles used by the construction personnel. The Applicant estimates the following will occur during peak construction periods when the majority of the foundation tower assembly is taking place:

- Approximately 20 large truck trips per day (delivering wind turbines and associated equipment);
- Up to 160 concrete trucks per day for related batch plant activities; and
- Up to 100 small vehicle (pickups and automobiles) trips per day within the Project area.

At the completion of the construction phase, this equipment will be removed from the site or reduced in number. Before construction, the Applicant will coordinate with state and local jurisdictions (counties and townships) in order to inspect the condition of local roads and bridges and to obtain the necessary road and driveway access and oversize vehicle permits.

The civil contractor will be the lead entity for site preparation and construction management of the Facility. The primary civil, erection and electrical contractors will use the services of local contractors, where possible, to assist in the construction of the Facility. The primary contractors, in coordination with local subcontractors, will undertake the following activities:

- Secure building, electrical, grading, road, and utility permits;
- Perform detailed civil, structural, and electrical engineering;
- Schedule execution of construction activities;
- Complete surveying and geotechnical investigations; and
- Forecast labor requirements and budgeting.

The primary contractors also serve as key contacts and interfaces for subcontractor coordination. The Applicant will have a site construction manager responsible for managing the overall coordination between contractors. The electrical contractor will oversee the installation of communication and electric collection lines as well as the substations. The civil contractor will oversee the installation of roads and foundations, as well as the coordination of aggregate and concrete materials receiving, inventory, and distribution. The construction consists of the following tasks:

- Site development, including roads;
- Foundation excavation;
- Concrete foundations;
- All electrical and communications installation;
- Substation construction;
- Tower assembly and machine erection; and
- System testing.

The construction team will be onsite to handle materials purchasing, deliveries, construction, and quality control. The primary contractors will select and manage their local subcontractors to complete all aspects of construction.

Throughout the construction phase, ongoing coordination occurs between the Applicant, Facility development, and the construction teams. The Applicant will have an onsite manager to coordinate all aspects of the Facility, including ongoing communication with local officials, citizens, and landowners. Even before the Facility becomes fully operational, O&M staff will be integrated into the construction phase of the Facility. The construction manager and the O&M staff manager work together to transition from construction through Facility commissioning and, finally, into operations.

Construction aspects or key Facility components are described below.

(a) Wind Turbine Foundation

The Facility will be constructed in groups of turbines. After access roads have been constructed for a particular group, vegetation will be removed for the crane pad and staging area. After the crane pad is constructed, a tower crane will be brought onsite. Delivery, storage, and assembly of turbine components will occur at each turbine staging area. Each turbine staging area will require a 150-foot radius during construction. This includes an approximately 40 foot by 60 foot area for the crane pad extending from the access road to the turbine foundation, and an area for component laydown and rotor assembly centered close to the turbine foundation.

The Applicant will contract with one or more construction companies to build the tower foundations and gravel aprons. An onsite batch plant is being considered and could provide concrete if the Applicant is not able to contract with local concrete suppliers. Appendix N provides a drawing of a typical batch plant. Figure 5-10 shows the location of the onsite batch plant.

Each turbine tower will be supported by a reinforced concrete foundation up to 65 feet wide. The foundation could be either a spread-foot or a caisson-type concrete foundation. The actual foundation design for each turbine will be determined based on site-specific geotechnical evaluations and structural loading requirements of the selected turbine model. The majority of the turbine foundation will be underground, and only a portion of it will be covered with gravel for fire protection, up to 10 feet of nonflammable groundcover around the towers on all sides, referred to as the gravel apron. The turbine pad will be located within the graveled area. In the event the GE turbine model is used, a pad-mounted transformer will be located within the graveled area. For all other proposed turbine models, the transformer will be located in the nacelle. The area permanently disturbed during operations will be approximately 75 feet by 100 feet. The dimensions for the G-90 turbine include a steel tower with a diameter at the base of 13.4 feet and surrounding gravel area with a width of up to 10 feet.

The portion of the foundation that is above 3 feet below grade is called the pedestal. The bottom of the pedestal will be 3 feet below grade and the top of the pedestal will be 0.5 foot above grade. The pedestal will be up to 18 feet in diameter and will be approximately 3 feet in depth. Below the pedestal is the remainder of the spread foundation. The estimated amount of concrete in the foundation is 700 cubic yards.

During turbine foundation construction, dewatering may be required. Dewatering activities will be in accordance with the National Pollutant Discharge Elimination System (NPDES) permit approved by the OEPA. Control measures for dewatering activities will be included in the SWPPP.

After the turbine foundation is built, a tower crane will be brought onsite. Sections of the tower will be installed followed by the nacelle at the top. The blades are then fixed to the hub to create the rotor and lifted by crane onto the nacelle.

(b) Underground Electric Collection System

The underground collection system will be installed through direct burial methods, typically using a trench machine. The 20-foot wide temporary right-of-way (ROW) will be buried at approximately 4 feet deep. In areas where the two or more sets of underground lines merge, pad-mounted junction boxes will be used to tie the lines together into larger feeder conductors. Junction box locations will be determined with farming operations in mind. Any excavated areas will be backfilled with native soil.

(c) Aboveground Collection Lines

Aboveground collection lines required for the Facility will include 34.5 kV and some 115 kV collection line. The 34.5 kV collection line will be supported by wood or steel monopole support structures, and will require the temporary disturbance of a 100-foot ROW. The structures will be buried to a depth of approximately 8.5 feet and will have a total height of approximately 56 feet above grade to the top of the poles. Construction of the aboveground collection line will require vegetation removal, assembly of the support structure, and stringing of the conductors. Permanent impacts will be limited to the support structure footings. Appendix D provides a drawing of a typical monopole support structure.

The 115 kV aboveground collection lines located between the collection substations and the Facility collection/interconnection substation will be approximate 6.0 miles in length and will require the temporary disturbance of a 100-foot ROW. The 115 kV line will be supported either by H-frame structures with two galvanized steel or wood poles; or by a galvanized steel or wood monopole structure. The structures will rise to a height of approximately 100 feet above grade. Construction of the aboveground electric line will require vegetation removal, assembly of the support structure, and stringing of the conductors. Permanent impacts will be limited to the support structure footings. Appendix D shows the dimensions of the 115 kV H-frame and monopole aboveground line support structure.

Overhead collector lines will be constructed in accordance with the recommendations of the Avian Power Line Interaction Committee (APLIC) for raptor protection on power lines. .

(d) Substations

Four new substations will be required for the Facility. Construction of the substations will require agricultural vegetation removal, assembly of the circuit breakers, switches, and associated bus work, cabling, and control and relaying systems. Approximately 5 acres will be required for each substation for construction and operation. Two of the substations (totaling approximately 10 acres) will be located within a 20-acre parcel in the southern portion of the Project area adjacent to the O&M building and temporary construction and staging area. Substations will most likely use concrete pier or slab foundations.

(e) O&M Building

A permanent O&M building will be constructed as part of the Facility and will be located on a 20-acre parcel in the southern portion of the Project area. The O&M building will be of sheet metal construction and be used to house equipment to operate and maintain the Facility. The O&M building will also include administrative offices, monitoring stations, and storage for wind turbine parts and other small equipment. The O&M building is anticipated to be approximately 6,000 square feet of enclosed space and include an office and workshop area, parts warehouse, kitchen, bathroom, shower and utility sink. The O&M building is anticipated to be approximately 20 feet high (to the roof peak). Construction of the building will require vegetation removal, pouring of the concrete foundation, assembly of the sheet metal exterior and interior walls, electrical and plumbing work, and other activities. The O&M building will most likely use a concrete slab foundation. Appendix A provides a drawing and photo of a typical O&M building.

(f) Test Borings and Cone Penetrating Test

A preliminary geotechnical investigation was performed by Barr to obtain information on the physical properties of the soil and rock within the Project area. A geotechnical engineer designed and conducted the geotechnical investigation to determine the suitability of the site for construction of the Facility. All test borings were completed in accordance with the American Society for Testing and Materials (ASTM) standards. Soil samples collected during the investigation were analyzed at a qualified laboratory for particle size, moisture content, and Atterberg limits.

The information gathered during this investigation will assist the Applicant with the foundation design for the wind turbines and will help to identify geologic hazards. Six soil borings were obtained and in representative locations within the Project area. The borings extended to the depth of bedrock that ranged from 26 to 34.5 feet. Approximately 10.5 to 22 feet of soil overburden were encountered, including a couple feet of topsoil underlain by a brown silt and/or gray clay.

Cone Penetration Tests (CPT) were performed at 12 locations at the Blue Creek site in accordance with ASTM D5778 – Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils. CPT is a method for obtaining selected geotechnical engineering properties for soil in-situ and involves pushing a cylindrical cone into the subsurface at a rate of 20 millimeters per second until the refusal for cone advancement was reached. During advancement, measurements of cone tip resistance, side friction and pore water pressure were obtained. At turbine location 53, refusal was met at six feet while at other turbine locations refusal occurred at a deeper depth. (Barr, 2009)

Appendix L provides a copy of a report summarizing the preliminary geological investigation. Turbine-specific final geotechnical studies will be conducted from April to May 2010, and the final geotechnical report submitted in June 2010.

(g) Removal of Vegetation

Construction of the Facility will require removal of vegetation at all turbine sites, access roads, collection system line routes, substations, temporary staging and construction laydown area, met tower(s) and SODAR facility, and O&M building locations. It is assumed that a 150-foot radius will be cleared for each turbine footprint, a 40-foot wide corridor for access roads, a 20-foot wide corridor for the underground collection system, and 100-foot wide corridor for the aboveground 34.5 kV and 115 kV collection lines. Two of the substations will require 5 acres each for construction. Two substations will be constructed within a 20-acre area that will include the temporary staging construction laydown area, O&M building, and temporary concrete batch plant.

It is anticipated that 787.1 acres of vegetation (782.0 acres of cultivated crops and 4.7 acres of deciduous forest) will be temporarily removed during construction of the Facility; and of that, 234.0 acres (230.5 acres of cultivated crops and 3.5 acres of deciduous forest) will be removed permanently. Temporarily disturbed areas will be re-seeded to blend in with existing vegetation as needed. To the extent practicable, disturbance of wetlands during construction and operation of the Facility will be avoided. Applicable permit approvals will be obtained for any impacts to jurisdictional wetlands.

The majority of the Project area is agricultural land. The Facility has been designed to avoid forested areas; therefore, limited tree clearing is expected. The Applicant will use BMPs during construction and operation of the Facility to protect topsoil and adjacent resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil and stabilizing restored material, and revegetating areas.

The Applicant will dispose of all vegetation that has to be removed. The topsoil will be stripped and stockpiled within the construction area for later use during restoration activities. Trees cleared from the Project area will be cut into logs and either left for the landowner or removed. Limbs and brush will be buried, chipped, or otherwise disposed of as directed by the landowner and as required under federal, state, and local regulations.

(h) Grading and Drainage

After the removal of vegetation, the construction area will be uniformly graded, compacted, and sloped to drain. Site grading will be compatible with the general topography and use of the adjacent properties. As part of the NPDES General Permit for the Facility, a SWPPP will be developed. The SWPPP will be implemented to prevent erosion, sedimentation, and other potential discharges of soil-bearing water runoff to waterbodies and wetlands. Erosion control devices such as hay bales, berms, silt fencing, and other measures will be installed. The location of these measures will be identified on the construction drawings and will be approved by the OEPA as part of the NPDES review. A qualified individual will inspect these and other erosion control features throughout construction to ensure they are installed correctly and functioning properly.

The Facility will be constructed in a manner that will not drastically change the current site drainage patterns. During final design, a drainage plan will be developed. Culverts of sufficient size will be installed in appropriate access road locations so that natural drainage patterns are not impeded. Subsurface drainage features such as tile drains will be avoided where possible. Drain tiles found during the construction will be marked with labeled with highly visible lathe to ensure temporary and permanent repairs are made in accordance with the Applicant's mitigation measures as discussed in Section 4906-17-08(F), *Agricultural District Impact.*

(i) Access Roads

Wherever possible, existing roads will be upgraded for use as an access road during construction and maintenance activities. Where an existing road is not available, new temporary and permanent access roads will be constructed. The roads have been sited in consultation with local landowners. The roads will facilitate both construction and ongoing operation and maintenance. Siting roads in areas with unstable soil will be avoided. All roads will include appropriate drainage and culverts while still allowing for the crossing of farm equipment. The applicant will select the location of these temporary and permanent access roads to minimize or avoid sensitive resources.

Private access roads will be built adjacent to the towers, allowing access to the turbine strings both during and after construction. During construction, the roads will be approximately 40 feet wide to accommodate safe crane movement, equipment delivery, and other construction vehicles. After construction is complete, permanent access roads will be utilized for maintenance activities. The 37.0 miles of access roads will be up to 20 feet wide (including the access road and drainage channels).

These roads will consist of graded dirt overlaid with geotechnical fabric (if needed) and covered with gravel. The roads will be prepared to support the size and weight of maintenance vehicles.

(j) Removal and Disposal of Debris

Facility construction will generate some solid waste, primarily consisting of packaging materials (i.e., plastic shrink wrap, wood and wooden pallets, cardboard, and metal packing), construction scrap (i.e., reinforcement bar scraps, excess concrete from washout stations, cable spools, and excess electrical cable), and general refuse (i.e., trailer office materials and debris from employees). The debris and solid waste generated will be collected from turbine sites and other Facility work areas and disposed of in dumpsters located at the construction staging area(s). A private contractor will then empty the dumpsters on an as-needed basis, and dispose of the refuse at a licensed solid waste disposal facility.

(k) Post-Construction Reclamation

After construction, Applicant will restore all temporary construction areas to preexisting contours and land use. Soil will be decompacted if needed and stockpiled topsoil will be spread where appropriate. All exposed soils will be stabilized by re-seeding, as agreed to by landowners. Section 4906-17-08(F), *Agricultural District Impacts,* provides further discussion of post-construction reclamation activities and mitigation.

(2) Layout

Figure 5-10 provides a map that shows the various elements of the Facility.

(a) Wind-Powered Electric Generation Turbines

Figure 5-10 provides the location of the proposed 167 G-90 wind-powered electric generating turbines at the scale of 1:12,000.

(b) Transformers and Collection Lines

The proposed Facility will require approximately 78.6 miles of underground and 3.7 miles of aboveground 34.5 kV collection system and approximately 6.0 miles of aboveground 115 kV collection line. Figure 5-10 provides the location of the collection lines. In the event the GE turbine model is used, a pad-mounted transformer will be located near the base of the turbine. For all other proposed turbine models, the transformer will be located in the nacelle.

(c) Construction Laydown Areas

The proposed Facility will require one temporary staging and construction laydown area that will be located within a 20-acre parcel in the southern portion of the Project area that contains several Facility features, as detailed in Section 4906-17-03(A)(1)(b), *Land Area Requirements*. Figure 5-10 provides the location of the temporary staging and construction laydown area.

(d) Transmission Lines

No transmission lines in excess of 125 kV will be required for the Facility. Collector lines planned for the Facility include 34.5 kV underground and aboveground collector lines and 115 kV aboveground collector lines.

(e) Substations

Four substations will be built for the Facility. Each substation is anticipated to require a total of 5 acres of land for construction and operational purposes. Two of the substations will be located within a 20-acre parcel in the southern portion of the Project area that contains several Facility features, as detailed in Section 4906-17-03(A)(1)(b), *Land Area Requirements.* Appendix O provides a rendering of a typical substation. Figure 5-10 shows the location of the substations.

(f) Transportation Facilities and Access Roads

A total of 37.0 miles of access roads will be required for the Facility. Figure 5-10 provides the location of the access roads used during construction and maintenance activities.

(g) Security Facilities

Security includes fencing around all substations.

(h) Grade Elevations

Currently grade elevations are not available for the Project area; however, final site civil engineering will begin in the Summer of 2010. This information will be provided once it is completed.

(i) Other Pertinent Installations

An O&M building will be built for the Facility. The O&M building is expected to be approximately 6,000 square feet in size. Appendix A provides a rendering of a typical O&M building. Figure 5-10 shows the location of the O&M building.

(3) Structures

This section describes the major proposed structures of the Facility.

(a) Estimated Overall Dimensions

As discussed in Section 4906-17-03, *Project Description and Schedule*, the Applicant has not yet selected the turbine vendor and size for the Facility. For the purpose of this Application, the Applicant selected a G-90 turbine as the representative turbine for the various analyses. Turbine towers throughout the Facility will be tubular structures up to 328 feet tall at the turbine hub. With the nacelle and blades mounted, the total height of the wind turbine will be up to approximately 476 feet, from the base of the turbine to the blade (also called rotor) tip. The towers will be smooth, hollow steel structures, up to 13.4 feet in diameter at the base. Each tower will be mounted on a reinforced concrete foundation ranging up to 65 feet in diameter, depending on the turbine vendor selected. Appendix B provides a schematic of the typical wind turbine and tower. Appendix P shows the shape and layout of a typical tower foundation.

The O&M building will be on a 20-acre parcel of land in the southern portion of the Project area, on which two of the four substations will also be located (5 acres required for each, including setbacks).

The O&M building will require about one acre of land that will include adjacent parking. The O&M building is anticipated to be approximately 6,000 square feet of enclosed space and include an office and workshop area, parts warehouse, kitchen, bathroom, shower, and utility sink. The O&M building is anticipated to be approximately 20 feet high and constructed of sheet metal.

(b) Construction Materials

All materials will meet engineering and design standards. The turbine tower will be a steel structure manufactured in five sections. It is anticipated that the turbine blades will be of pre-impregnated epoxy glass fiber and carbon fiber.

The O&M building will be of metal construction, will be used to house equipment to operate and maintain the wind energy facility, and will include administrative offices, monitoring stations, and storage for parts and other small equipment.

(c) Color and Texture of Facing Surfaces

The proposed wind turbines will be uniformly painted in a non-reflective and unobtrusive off-white color approved by the Federal Aviation Administration (FAA) for daylight marking.

(d) Photographic Interpretation or Artist's Pictorial Sketches

A VIA has been prepared for the Facility that describes the Facility location, viewpoint selection process, assessment methodology and results, proposed visual mitigation measures, and photosimulations for views from eight viewpoints is included in Appendix J.

The viewpoints utilized for the VIA were selected through a process that included review of area maps on which the proposed locations of the turbines and other Facility features had been plotted, review of Google Earth air photos, and field investigations. A total of eight viewpoints were selected to provide for a range of views at different viewing distances and in a range of representative viewing contexts. Views located approximately 5 miles from the edge of the Project area demonstrate the range of potential turbine visibility in these more distant views. In mid-range views, the turbines will be visible along the horizon in places where they partially extend above the tree line located in the middle ground. In closer views, the turbines will become more visually prominent, and will have more of an effect on the character and composition of the landscape.

To maximize the visual integration of the Facility into the overall pattern of the Project area landscape, the Applicant will incorporate BMPs related to Facility appearance. These measures are presented in more detail in the VIA and include use of turbines with uniform appearance, use of muted gray or white colors, and placement of as much of the Facility's electrical collection system underground, as practicable. These measures will be incorporated into Facility design to ensure an attractive appearance and good integration into its landscape setting.

(e) Unusual Features

No unusual features are expected as part of the Facility. Facility components will be consistent with a typical wind energy facility.

(4) Plans for Construction

It is anticipated that construction of the Facility will begin in September 2010. Construction activities will commence with the development of the staging area and construction laydown yard located on Fife Road near U.S. Route 127. At this same time, the site the civil construction contractors will begin mobilizing construction equipment to the staging area and construction laydown yard. Temporary construction trailers will be built and equipped as necessary to support workers during construction activities.

Following development of the staging area and construction laydown yard, the civil construction contractors will start general clearing and construction of turbine access roads, consisting of layers of various aggregate sizes and a geofabric. Once access roads are completed, excavation for the turbine foundations will begin. These construction activities will be performed in a series; once one area is compete, the construction team will move to the next area of the Facility. Road construction will continue through the fall until weather begins to prohibit work.

Turbine foundation excavation will be to a depth of approximately 8 feet below final grade. Some subsurface modification may be necessary to support the foundations, depending on final site-specific geotechnical investigations that will be completed in Spring 2011. Methods of foundation modification may include over-excavation and replacement with suitable fill, or use of Rammed Aggregate Pier® Systems (Geopier® System). Once the foundation excavation is complete, an approximate 2-inch layer of concrete will be poured for a working base. The turbine bolt cage will be assembled and placed in the center of the foundation pit. Steel reinforcement bar will be constructed into a cage surrounding the bolt cage and conduit will be placed to house the electrical cables that run through the foundation. Concrete forms will then be set and concrete poured for the base of the turbine. After the base is poured, the concrete pedestal will be poured. After the concrete cures, the foundation will be backfilled and the soil compacted around the pedestal. Foundation work will continue through the fall until weather begins to prohibit work.

In Spring 2011, when weather permits, road and foundation work will begin again. The electrical contractors will mobilize and begin grading and other civil activities at the substation sites. Substation installation work will continue throughout the summer 2011. Collection system installation contractors will also begin trenching cable in spring and summer 2011. Tile repair crews will also mobilize and work alongside the collection system installers to repair drainage tile.

In early summer 2011, turbine components will begin to arrive. Turbine components will most likely be delivered directly to the location where they are to be installed. Turbines will be built throughout Summer and into Fall 2011. Once the turbines are erected, installation and commissioning teams will build the internal components of the turbine; testing of the turbines will follow.

After the substations are complete and are interconnected into the existing 345 kV transmission line, the substation will be energized and the electrical and mechanical systems will be tested. After these checks are complete, the turbines will be able to start producing electricity.

(5) Future Plans

The proposed Facility will likely be built in phases, with an initial project of approximately 190 MW to be put online in 2011 and a second set of approximately 160 MW to be put online in 2012 or later. Immediately to the north of the Facility is Heartland Wind's 200 MW Prairie Creek project and immediately to the south and east of Blue Creek is Heartland Wind's 300 MW Dog Creek project. Leasing continues on both projects, but key factors such as wind resource, transmission access, harmony with aviation, low wildlife risk, and community support are shared with Blue Creek. Depending on the progress of leasing, economic factors, and other important factors, Prairie Creek and Dog Creek could be ready for permitting in 2010 or 2011 and could be ready for operation in 2012 to 2014.

(C) EQUIPMENT

As previously discussed, the equipment to be used for the Project area will include the following.

- 175 wind turbine generators[1];
- An electrical collection system using 34.5 kV underground and aboveground collection lines;
- Some 115 kV aboveground collection lines;
- Three intra-project collection substations;
- An interconnection substation;
- Up to two permanent met towers and a SODAR facility;
- A temporary concrete batch plant; and
- An O&M building.

The following sections provide a description for each Facility component.

(1) Wind Powered Generation Equipment

(a) Wind Energy Turbines

At the time of this submittal, the Applicant has not selected a specific turbine model for the Facility. For the purpose of this Application, specifics of the G-90 turbine are discussed. The G-90 is the most likely turbine to be used because of the Applicant's experience with this machine in other Midwestern sites and a

[1] The proposed Facility will have up to 175 turbines for a maximum potential output of 350 MW. Within this Application, specific locations for 167 turbines and other related Facility components are identified. An additional eight turbines will be located in an area along the eastern portion of the Project area boundary. The Applicant will provide the locations of the eight turbines in the shaded areas on an updated map (Updated Figure 3-1) by March 15, 2010 and appropriate site-specific information by April 1, 2010 in sufficient time for the OPSB Staff to consider the information in the Staff Report.

large-scale purchase commitment with Gamesa for the next few years. The turbines would be up to approximately 328 feet tall at the turbine hub. Depending on the selected turbine for this Facility, with the nacelle and blades mounted, the total height of the wind turbine to the turbine-blade tip would be up to approximately 476 feet. Appendix B shows a typical configuration for a wind turbine and tower. Appendix Q provides a brochure for the G-90 turbine.

The turbines utilized in this Facility will be new turbines and will not be used, experimental, or prototype equipment. Each wind turbine consists of four major components: the nacelle, the rotors, the tower, and foundation. Descriptions of the major turbine components are provided below.

(i) Nacelle

At the top of the tower section is the nacelle. The exterior is typically made of fiberglass with a structural steel frame to hold the internal components. The nacelle contains the generator, gearbox, transformer (except for the GE turbine model), electronic controls, and other components. Some of the nacelles will be furnished with lights visible to aircraft. The number of turbines that will be lit at night and the type of lighting will be determined in consultation with the FAA and is expected to be approximately 50 percent of the total number of turbines.

(ii) Rotors

The rotor diameter of the G-90 will be 295 feet. The rotor assembly consists of three blades and hub or nose cone that is mounted on a drive shaft. The shaft is connected to the gearbox and generator contained within the nacelle. All turbine rotors will rotate in the same direction and configured to rotate clockwise.

(iii) Tower

The proposed wind turbine will have a hub height of up to 328 feet. The towers used for this Facility are tubular steel structures manufactured in five sections that are bolted together using internal flanges. Each tower will have a locked access door at the base, internal lighting, control cabinets, and an internal ladder providing access to the nacelle for turbine maintenance. The towers will be uniformly painted in a non-reflective and unobtrusive off-white color approved by the FAA for daylight marking. No appurtenances will be connected to the outside of any of the wind towers.

(iv) Foundation

Turbines will be attached to a reinforced concrete spread footing type foundation with an approximate 65-foot diameter. A portion of the foundation will be covered with gravel for fire protection and weed control (approximately 10 feet of non-flammable groundcover around the towers on all sides). Appendix P shows a typical foundation design.

(b) Electrical Components

The Facility's electrical system will consist of an underground collection system, aboveground collection lines, and four substations. The sections below describe each component.

(i) 34.5 kV Electric Collection System

The turbines will be arranged in strings or linear groups, connected by an underground or aboveground collection cable system. Each wind turbine will generate power at 690 volts. A transformer within each turbine nacelle (except for the GE turbine model) will be used to convert the power to 34.5 kV. The power will then be transmitted down the tower into the underground 34.5 kV collection system. Where more than three parallel underground collector lines will be necessary, aboveground collector lines will be constructed instead. Aboveground collector lines minimize impact on farm drainage tile, provide more efficient transmission of electricity, and are more cost effective. Approximately 78.6 miles of underground collector lines and approximately 3.7 miles of aboveground 34.5 kV collector lines will be required for the Facility. Appendix C provides a typical product data sheet for the underground line material.

The underground collection system will be buried in a trench approximately 10 inches wide and 4 feet deep.

All electrical components will conform to applicable local, state, and national codes, and relevant national and international standards.

(ii) 115 kV Electric Line

In locations where more than one set of aboveground 34.5 kV lines are needed, a small substation will be constructed to transform the electricity to 115 kV. By doing so, this will allow the use of only one set of poles. Approximately 6.0 miles of aboveground collection lines at 115 kV will be required. Appendix D provides typical drawings showing support structures for these aboveground lines.

(iii) Substations

Four new substations will be required for the Facility including an interconnection substation, project collection substation, collector station 1, and collector station 2.

The interconnection substation will function to connect the generated power with AEP's existing 345 kV transmission line for delivery of the power to the PJM transmission grid system. This substation will consist of circuit breakers, switches, and associated bus work, cabling, and control and relaying systems.

Immediately adjacent to the interconnection substation is the project collection substation, which will gather the power from the turbines at 115 kV and transform it to 345 kV for interconnection. This substation will consist of circuit breakers, switches, voltage transformers (115 kV to 345 kV) and associated bus work, cabling, and control and relaying systems.

Collector substation 1 will gather power from approximately half of the turbines (the turbines constructed during Phase I) and transform the voltage from 34.5 kV to 115 kV for delivery to the interconnection substation. Collector substation 2 will consist of circuit breakers, switches, voltage transformers (34.5 kV to 115 kV) and associated bus work, cabling, and control and relaying systems.

Collector substation 2 will gather power from the remaining turbines (the turbines constructed during Phase II) and transform the voltage from 34.5 kV to 115 kV for delivery to the interconnection substation. This substation will consist of circuit breakers, switches, voltage transformers (34.5 kV to 115 kV) and associated bus work, cabling, and control and relaying systems.

Figure 5-10 depicts the location of these substations.

(2) Safety Equipment

The following section describes the proposed major public safety equipment in place during construction and operation of the Facility. The reliability of the equipment is discussed below. A copy of the confidential turbine manufacturer's safety standards will be made available at the offices of Bricker & Eckler LLP for OPSB staff review.

(a) Proposed Major Public Safety Equipment

All construction general contractors are required to meet strict safety qualifications. IBR has a very good environmental health and safety (EHS) record over the last 8 years that includes supporting EHS training programs, and a safety culture that is captured by the title of their EHS Policy: "People & the Environment First." Through 2008, IBR and its predecessor PPM Energy, Inc. (PPM) have had one employee lost time accident for all company operations in the United States and Canada for 8 years. IBR's Company Safety Director has also served as the Vice Chairman of the American Wind Energy Association (AWEA) Safety Committee for three years, and has presented numerous times at conferences on safety in the wind industry, including emergency preparedness and public safety. He recently received the AWEA Operations Award at the National Wind Power Conference for his leadership for safety in the wind industry.

IBR trains its wind technicians on technical qualifications for their jobs and for emergencies. IBR also trains its technicians in tower rescue, first aid, and CPR. Crews are equipped with tower rescue equipment, first aid kits, automatic external defibrillators, and fire extinguishers on company vehicles. IBR enjoys having excellent relations with local emergency services, and plans to meet periodically with them to be proactive on safety and inform them about the wind business and safety hazards associated with electricity.

Applicant will construct and operate the Facility consistent with IBR's corporate commitment to meeting all applicable state and U.S Occupational Safety and Health Administration safety regulations. Each turbine and all electrical equipment will be inspected under rigorous commissioning procedures, as well as by the utilities (for grid and system safety), before being brought online. Once turbines are commissioned, qualified personnel will routinely inspect and repair them as necessary pursuant to preventive maintenance schedules.

Major public safety concerns can be grouped into issues that can arise during construction and operation activities. Each subsection below addressed these concerns.

(i) Construction

Public safety concerns primarily include issues associated with hazards during construction including moving construction vehicles, partially constructed wind turbines, storage areas, and other items. The items below summarize the safety equipment used during construction activities.

a) Fencing

During construction, there is a potential for the public to be exposed to construction hazards if individuals trespass into the construction area. During construction activities, temporary, highly visible plastic mesh fencing will be erected where construction obstacles are present.

b) Signage

Applicant will use signs to warn the public of potential dangers and provide emergency numbers, operator contact information, and instructions for emergency personnel. Unauthorized access will also be mitigated by fencing and signage where access roads and public roads meet. The signs will clearly inform the public that access is forbidden for the public and that access is only allowed for construction staff and personnel. The Applicant will work with the local county office to obtain 911 addresses for each wind turbine. These 911 addresses will be displayed outside turbine access roads prior to beginning construction to maximize safety during construction. Signs will be posted at the substation warning of high voltage.

(ii) Operation

Safety equipment utilized during the operation of the Facility is described below. Safety concerns regarding ice throw and blade shear are discussed in Section 4906-17-08(A)(4), *Ice Throw,* and Section 4906-17-08(A)(5), *Blade Shear*, respectively.

a) Gamesa Monitoring System

The turbines will be continuously monitored through the Gamesa monitoring system, a remote monitoring and control system with Web access. This system allows real-time operation and remote control of the wind turbines. In addition, the Gamesa turbines include the SMP Predictive Maintenance System for the early detection of potential deterioration or malfunctions in the wind turbines' main components, which is integrated within the control system. The Applicant will have an on-call local technician who can respond quickly in the event of emergency notification or critical outage. In addition to local staff, IBR has a control center located in Portland, Oregon that is staffed 24 hours a day, 7 days a week (the IBR Operations Center). Along with IBR's other projects located throughout the country, the IBR Operations Center will continuously monitor and control the proposed Facility.

b) Braking System

All turbines include control systems and brakes that are controlled with a process logic controller (PLC) system. The PLC system manages normal operations and can detect and control over-speed conditions via a redundant pitch/brake control system. The redundant pitch/brake system includes an aerodynamic variable pitch system where the wind turbine blades change angle (pitches) and operates as a brake, as well as mechanical brakes operated in a fail-safe mode.

The wind turbines proposed for the Facility will be equipped with two independent braking systems that will automatically shut down the turbine blade at wind speeds over the manufacturers recommended threshold. The rotor speed ranges from 9.0 to 19.0 revolutions per minute (rpm). The cut-out wind speed for the G-90 is 21 m/s (47 mph), where the wind turbine would automatically shut down.

c) Lightning Protection

Each turbine will also use the "total lightning protection" system in accordance with standard IEC 61024-1. This system conducts lightning to the grounding system located in the foundation of each turbine.

d) Fire Prevention

The likelihood of turbine fires is very low. Before operation, each turbine and all electrical equipment will be inspected under rigorous commissioning procedures, as well as by the utilities (for grid connection and protection system safety). During operations, qualified personnel will routinely inspect equipment in accordance with preventive maintenance schedules. Built-in safety and design systems minimize the chance of fire occurring in the turbines or electrical equipment. For example, turbines have high temperature sensors and automatically shut down if they begin to overheat.

Although an extremely unlikely event, if a fire were to occur inside the nacelle, the SMP Predictive Maintenance System will detect it, the turbine will automatically shut down, and the problem will be reported to both the O&M building and the IBR Operations Center. Facility maintenance personnel will immediately notify local officials and respond as appropriate. Power to the section of the wind farm with the turbine fire will be disconnected. IBR will provide training to local fire departments on electrical fires to ensure the safety of both firefighters and the public.

In instances where fires have broken out near IBR wind farms, the Facility access roads have served both as access to remote areas where firefighters could address the flames closer to the source. Additionally they have served as firebreaks saving additional land from the flames. In the rare situations when fires have broken out near wind farms, IBR employees have responded immediately and worked in tandem with the local departments to save lives and homes from destruction by fire.

A portion of the foundation around the towers will be covered with gravel for fire protection. This cleared area is approximately 10 feet of non-flammable groundcover around the towers on all sides. In addition, twistable cables (also known as triplexing) will be utilized on all underground power cables. This arrangement lends additional safety to the electrical system.

IBR will work with local fire departments and fire protection districts to notify them of construction plans, the location of and access to Facility components, and mutual assistance in the case of fire in or around the Project area. IBR will cooperate with the local fire department to develop the fire department's emergency response plan. Other applicable fire laws and regulations will be followed in accordance with state and local requirements.

e) Aeronautical

The turbines will be uniformly painted in a non-reflective and unobtrusive off-white color approved by the FAA for daylight marking. Some of the towers for this Facility will be furnished with lights visible to aircraft at night. The number of turbines that will be lit at night and the type of lighting will be determined in consultation with the FAA. The Applicant's consultant has already performed an aeronautical study, and the Project area boundary was reduced in size to have no impacts on local airports.

f) Fencing and Access Control

Permanent fencing will surround the substation, and may surround the O&M building. Signage indicating no trespassing will warn the public of potential dangers.

At the base of each turbine tower is a door to allow maintenance workers to access the nacelle and various components. This door will be locked to restrict unauthorized access.

g) Signage

Applicant will post signs at the substation warning of high voltage. Signs will also be placed at the turbine tower access door indicating no unauthorized access.

(b) Reliability of Equipment

The turbines will conform to all applicable industry standards, including the AWEA standards for wind turbine design, and applicable standards of the American National Standards Institute (ANSI), the Uniform Building Code, and Germanischer Lloyd (GL), the internationally recognized standards body for wind turbines. After the Applicant selects turbines for the Facility, and before construction, IBR's quality control team will confirm that the wind turbines have been manufactured in compliance with these industry standards.

An Ohio-licensed professional engineer will design and certify the electrical system. Furthermore, the contractor will certify the mechanical and electrical completion of the turbine. Then, the turbine manufacturer will commission the turbines and certify that the turbines are complete and ready to operate.

A structural engineer, licensed in Ohio, will design the foundation and certify that it meets the turbine manufacturer's design requirements and is installed in soils that can support the turbine. Applicant or its contractors will inspect all components regularly to provide safe and reliable operation. All turbines will receive regular maintenance, including proper lubrication of key components to increase system reliability.

(c) Turbine Manufacturer's Safety Standards

The turbine manufacturer's confidential safety standards will be available at the offices of Bricker & Eckler LLP for OPSB staff review once the Applicant selects the final turbine for the Facility.

(3) Any Other Major Equipment

Other major equipment required for the Facility is described below.

(a) O&M Building

A permanent O&M building will be constructed as part of a joint substation and O&M facility and will be located on a 20-acre parcel of land in the southern portion of the Project area. The O&M building will be of metal construction, will be used to house equipment to operate and maintain the wind energy facility, and will include administrative offices, monitoring stations, and storage for parts and other small equipment. It will have approximately 6,000 square feet of enclosed space, including office and workshop areas, a kitchen, bathroom, shower, and utility sink. A graveled parking area for employees, visitors, and equipment will be located adjacent to the building. Appendix A provides a drawing and photo of a typical O&M building.

(b) Met Tower(s)

Up to two permanent met towers will be located within the Project area for the collection of meteorological data. Permanent met towers will be freestanding (unguyed) structures and will be lighted as necessary to comply with FAA guidelines. The towers will be up to approximately 330 feet high with an equilateral triangle base, each side of which will be approximately 32 feet long. The met tower foundations will consist of three steel-reinforced concrete piles, each at a corner of the tower base.

(c) SODAR Unit

The Facility will include a SODAR unit located near a permanent met tower. A SODAR is a device that is used to measure wind speed and direction. The SODAR unit will be housed in a small trailer approximately 10 feet tall with an attached 20-foot wind sensor boom. The purpose of the unit is to remotely measure the vertical turbulence structure and wind profile up to 328 feet (100 meters). Appendix F shows a typical SODAR unit.

(d) Temporary Concrete Batch Plant

The Applicant is evaluating the option of constructing a temporary concrete batch plant for producing concrete required during construction. This temporary batch plant will be located in the southern portion of the Project area, adjacent to the future O&M building site. An aboveground storage tank may also be constructed at this location to provide for storage of water that will be required for batch plant operations during construction of the Facility. After construction is complete, the temporary concrete batch plant and associated water storage tank will be disassembled and removed.

(D) REGIONAL ELECTRIC POWER SYSTEMS

The following section provides details about the interconnection of the Facility to the regional power grid.

(1) Interconnection Queue

The Applicant submitted an Interconnection Request to PJM. PJM is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of 13 states and the District of Columbia (PJM, 2009).

(a) Name of the Queue

The name of the queue is Robison Park-Convoy 345 kV.

(b) Web Link of the Queue

Information about the status of the Applicant's Interconnection Request can be obtained through the following website:
http://www.pjm.com/planning/generation-interconnection/generation-queue-active.aspx

(c) Queue Number

The Applicant's Interconnection Request is identified as queue #R60.

(d) Queue Date

The Interconnection Request was submitted on January 8, 2007 (PJM, 2009).

(2) System Studies

Studies were performed by PJM in order to assess the impacts of the Facility on the regional power grid. The Applicant requested that PJM study the impacts of adding 350 MW of wind energy generation onto the AEP transmission system. Of the total megawatts for the Facility, 70 MW was identified as a capacity resource with the remaining megawatts as an energy resource per PJM standards.

The Facility will connect to the grid via a new 345 kV interconnection substation onto the existing Convoy-Robison Park 345 kV AEP transmission line. The following sections summarize the results of the feasibility study and impact study prepared for the Applicant's interconnection request.

(a) Feasibility Study

The intent of the feasibility study is to determine estimated costs and construction timelines to connect to the network and to determine a plan for the interconnection. Appendix R provides the results of the feasibility study.

The proposed Facility was evaluated for compliance with reliability criteria for summer peak conditions in 2011. The feasibility study did not identify any potential network impacts.

(b) System Impact Study

The intent of the system impact study is to identify system reinforcements required in order to add the proposed new generation into the transmission system. The impact study also assesses the associated costs and construction time estimates to facilitate the addition.

The proposed Facility was evaluated for compliance with reliability criteria for summer peak conditions in 2012. The impact study did not identify any potential network impacts. Appendix S provides a copy of the impact study.

(c) Facilities Study

The facilities study began in January 2009 and is ongoing. Subsequent to the completion of the feasibility and system impact studies, the Applicant declared to PJM its intention to interconnect at a point approximately 8 miles east of the Convoy substation, on the Convoy-East Lima segment of the transmission line.

PJM agreed in January 2009 that this change would not be a material modification to the Applicant's interconnection request.

4906-17-06 Financial Data

(A) OWNERSHIP

IBR is the sole member and manager of the Applicant. IBR is the largest owner and operator of wind generating assets with more than 10,000 MW of wind power capacity in operation globally. In the United States, IBR owns and operates approximately 3,500 MW of wind facilities and employs more than 800 people. IBR currently operates wind farms in 20 states and constructed five new projects in 2009. The Applicant and its parent company, IBR, are well capitalized and committed to providing the necessary financial resources to develop and build the Facility.

Applicant currently owns all leases and other Facility assets. Before construction, a Facility-specific entity, for example Blue Creek Wind Farm, LLC, would be created and own all assets of the Facility, including leases, permits, wind turbines and related facilities, and other assets. Electricity generated by the Facility would be integrated into the existing transmission 345 kV transmission line system for delivery of the power to the PJM transmission grid system.

The majority of the land to be used in the construction and operation of the Facility is privately owned by approximately 140 participating landowners. The Applicant has entered into voluntary lease agreements with the landowners under the Applicant's standard Wind Energy Lease Agreement to construct and operate the Facility. These lease agreements are long-term leases that could extend for up to 60 years, if all lease agreement extensions are exercised. The lease agreements allow the Applicant to capture the flow of wind across the property and install the facilities necessary to do so, among other privileges. The landowners are paid an annual fee per acre plus a portion of the production of the wind turbines. This type of lease agreements represents approximately 99 percent of the agreements for total leased area.

The Applicant also has Good Neighbor Agreements (GNAs) that allow for reduced property line setbacks and other rights. Some of the GNAs are for relatively large (greater than 20-acre) parcels where construction of wind turbines would be feasible; however, most of the GNAs are for small parcels within the Project area where construction of wind power facilities is impracticable. The purpose of these agreements is to allow all landowners in the Project area to be a part of the Facility and share in the financial gain. The GNAs are fundamentally about communication, giving owners of small parcels a direct line to IBR to better address any issues that come up during development, construction, and operations. A signed GNA also demonstrates that the neighboring landowner understands the implications of having a large wind energy generating facility in their neighborhood, and they accept any possible inconveniences, such as sound, shadow flicker, and television interference.

At the time of application submission, the Applicant estimates that greater than 99 percent of the land agreements that would be necessary to construct the Facility have been obtained. No changes in current landownership patterns are anticipated. Gaps in ownership and other details of land title would be discovered during the ALTA® survey, expected to be performed in Spring 2010. At that time, any additional agreements would be entered into, as necessary, to allow for the construction of the Facility.

A model wind energy lease agreement and GNA, which the Applicant considers to be proprietary and a trade secret, will be provided for OPSB staff inspection at the offices of Bricker & Eckler, LLP.

Before construction, the Applicant would exercise multiple land purchase options to acquire ownership of the land where the substations would be located. It is expected that eventually the transmission operator, AEP, would own the land under the interconnection substation.

(B) CAPITAL AND INTANGIBLE COSTS

(1) Capital and Intangible Cost Estimates

IBR's business model requires each project site nationwide to demonstrate that it is cost competitive. While the Applicant is not presently able to provide cost comparisons for other sites within the state of Ohio, IBR will consider this Facility against other projects around the country. The Facility would need to demonstrate a competitive return in order to be constructed. In relative terms, the Project area has a low wind resource. Because of the lower average wind speed, a move to taller towers and larger rotor diameters can yield more power production. The tradeoff for increased power production is that these taller and larger turbines are more expensive to build than other turbine models that have recently been constructed by IBR at other Midwestern projects.

In addition, property taxes in Ohio are dramatically higher than in other states. The combination of high construction costs and high operating costs would require a certain power price to meet IBR's target for economic viability. Moreover, if operating costs can be lowered by reducing property taxes, the Facility's power can be sold at a competitive rate to Ohio utilities that will make it more likely the Facility will be built. Because of the cost cap in the Ohio alternative energy portfolio standard, and costs to generate wind energy in other states within the PJM market, a reduction in these taxes is necessary to make the Facility viable.

Based on the Applicant's experience constructing utility scale wind facilities in 20 different states in the past few years, it expects the overall capital cost of the Facility would be in excess of $2,200 per kilowatt (kW) of installed capacity. Full construction and installation cost of the Facility is estimated to be in excess of $700 million, including intangible costs, such as costs associated with project management, insurance, permitting costs, and financing.

Final costs would depend on final wind turbine pricing, material costs, design details, and contractor bids.

A more detailed breakdown of the Applicant's highly confidential and trade secret estimate of construction costs will be made available for inspection by OPSB staff at the offices of Bricker & Eckler, LLP.

(2) Cost Comparison

The largest component of the cost to build a wind farm is the cost of the wind turbines themselves. If the Applicant elects to build wind turbines with higher towers, for example 328-foot (100-meter) tower height instead of a more traditional 256-foot (78-meter) height, construction costs increase due to larger foundations, taller turbine towers, and increased transportation and construction costs. More specific construction cost estimates for the Facility are available to the OPSB Staff as indicated above, but clearly show higher construction costs for this site than others around the Country.

IBR has recently received federal grants from the United States Treasury Department for eight different projects in six different states as part of the American Recovery and Reinvestment Act, commonly known as the Stimulus Bill. Excluding the operations and maintenance buildings and fixtures, transmission lines and interconnection upgrades, intangible and development costs, spare equipment, and land purchases, the average cost to construct these projects in Texas, Pennsylvania, Minnesota, Iowa, and Missouri was $1,931/kW. If the Applicant added in the excluded facility components listed above, the total construction cost would increase by approximately 10 percent. IBR's two facilities in Oregon are excluded from this number because they were eligible for additional state tax credits that lowered their cost. Table 6-1 provides the details of these projects.

TABLE 6-1
Cost Comparisons for Other IBR Projects

Project	Location	Size (MW)	Turbine	ITC Qualifying Cost per kW	Reason Different than Blue Creek
Penascal	Kenedy County, Texas	202	MHI MWT92/2.4	$1,882	A
Locust Ridge II	Schuylkill County, Pennsylvania	102	Gamesa G87	$1,933	A
Hay Canyon	Sherman County, Oregon	101	Suzlon S88	$1,554	A, B
Pebble Springs	Gilliam County, Oregon	99	Suzlon S88	$1,567	A, B
Moraine II	Murray County, Minnesota	50	GE 1.5SLE	$1,868	A
Barton Windpower	Worth County, Iowa	160	Gamesa G87	$1,946	A
Farmers City	Atchison County, Missouri	146	Gamesa G87	$1,940	A
Barton Chapel	Jack County, Texas	120	Gamesa G87	$2,016	A

A Project's wind resource makes it economically feasible with 256- or 262-foot (78 or 80 meter) hub height, which lowers construction costs substantially vs. the planned 328-foot (100-meter) hub height for the Facility.

B Project is in Oregon. It also gets a state tax credit, Business Energy Tax Credit that is not reflected in the ITC Qualifying Cost.

This cost is consistent with the U.S. Department of Energy (DOE) Lawrence Berkeley National Laboratory data, which indicates that the average installed costs for wind facilities ranges from $1,240 to $2,600/kW, with an average cost of $1,710/kW (DOE, 2007). Accounting for larger turbine towers, the capital costs per kilowatt for the proposed Facility are consistent with the capital expenditures of other wind facilities that IBR has constructed in other states.

(3) Tabulation of Present Worth and Annualized Capital Costs

Capital costs would include development costs, wind farm design, project planning, equipment procurement, construction, and maintenance for the first two years of operation. These costs would be incurred within one to two years of the start of construction. As such, the present value of these costs is essentially the same as the costs presented in Section 4906-17-06(B)(l), *Capital and Intangible Cost Estimates.* Capital cost calculations are limited to this wind farm.

(C) OPERATION AND MAINTENANCE EXPENSES

(1) Estimate of Annual Operation and Maintenance Costs

Based on the Applicant's experience operating and maintaining its other wind farms in the U.S., the Applicant estimates that annual O&M costs for the Facility would average about $10 million per year. A more detailed breakdown of the Applicant's highly proprietary and trade secret estimated operating costs will be made available at the offices of Bricker & Eckler, LLP for inspection by OPSB staff.

(2) Cost Comparison

Based on the Applicant's experience, O&M costs for the wind farm, not including costs for taxes or land leases, should not be substantially different from O&M costs for other U.S. wind farms.

(3) Present Worth and Annualized Capital Costs

The estimated annual O&M cost is shown above. Assuming a 10 percent discount rate, over the 20-year lifespan of the wind farm, the present worth of the O&M costs is approximately $71 million.

(D) DELAYS

Costs for delays can vary widely based on the timing of the delay and the duration of the delay. Any delays that would affect the in-service date beyond December 2011 would have a significant impact on the Facility and could result in the Facility being significantly delayed or cancelled.

Based purely on lost revenue, a delay is expected to cost approximately $250,000 a day, $1.9 million a week, or $7.5 million a month. Delays that extend into winter months (January and February) are costlier, as these are typically high-wind months. Additionally, a delay in issuing a Certificate that would postpone the start of construction beyond 2010 would jeopardize the Facility's eligibility for the federal ITC. The ITC provides significant incentive to build renewable energy projects and would enhance the viability of this Facility if it were eligible.

4906-17-07 Environmental Data

(A) GENERAL

This section provides environmental data regarding air, water, and solid waste in terms of site conditions, potential impacts from the Facility and proposed mitigation measures. Unlike traditional power plants that combust fossil fuel to generate electricity, the proposed Facility will not emit air pollutants, require water for cooling purposes, or require process wastewater to be discharged from the Facility. In addition, the Facility will not produce any solid combustion wastes as a by-product of its energy production process. Therefore, the Applicant's proposed Facility will avoid major impacts associated with decreased air quality, water consumption, thermal pollution and ash landfills.

As part of the Facility, the Applicant is evaluating the option of constructing a temporary concrete batch plant for producing concrete required during construction. The temporary batch plant would be located in the southern portion of the Project area, adjacent to the O&M building.

(B) AIR

This Facility will generate renewable energy with wind turbines in Van Wert and Paulding counties in northwest Ohio. The Facility will work by converting the kinetic energy in wind to electricity; thereby helping to meet electrical demand without the air pollutants associated with power generated by burning fossil fuels. Coal-fired or natural gas-fired power plants use fossil fuels for combustion to drive the turbine-generators, producing air pollutant emissions. Section 4906-17-07(B)(3), *Operation*, provides a summary of air emissions avoided by operation of this renewable energy Facility.

A temporary central ready mix concrete batch plant might be installed at the Facility to be used during the construction of the foundations for the wind turbines. The batch plant will be dedicated for use during the Facility's construction period, with a 25-month anticipated construction duration. The potential emissions associated with the concrete batch plant and its associated unpaved roadways have also been considered as part of this Application.

(1) Preconstruction

(a) Ambient Air Quality

Both Paulding County and Van Wert County are in attainment for all criteria pollutants regulated by USEPA's National Ambient Air Quality Standards (NAAQS) (OEPA, 2009b). There are no Mandatory Federal Class I Areas in Ohio or in the neighboring state of Indiana (USEPA, 2009b).

Ambient air monitoring data is not available for Paulding County or Van Wert County. Table 7-1 provides 2008 ambient air monitoring data for the Ohio counties closest to the Facility.

TABLE 7-1
Ambient Air Monitoring Data near Van Wert and Paulding Counties

Pollutant	Averaging Period	NAAQS Value	Highest Monitoring Value Reported	Reference County
PM_{10}	Annual (µg/m3)	Not applicable	19	Allen
	24-hour (µg/m3)	150	30	
$PM_{2.5}$	Annual (µg/m3)	15.0	12.3	Lucas
	24-Hour (µg/m3)	35	32.3	
Sulfur Dioxide (SO_2)	Annual (ppm)	0.03	0.002	Allen
	24-Hour (ppm)	0.14	0.008	
	3-Hour (ppm)	0.5	0.021	
Carbon Monoxide (CO)	8-Hour (ppm)	9	1.5	Montgomery
	1-Hour (ppm)	35	2.3	
Nitrogen oxide (NO_2)	Annual (ppm)	0.053	0.016	Hamilton
Ozone (O_3)	1-Hour (ppm)	0.12	0.078	Allen
	8-Hour (ppm)	0.075	0.067	

Source: OEPA, 2009c.
PM_{10} = particulate matter less than 10 micrometers in aerodynamic diameter
$PM_{2.5}$ = particulate matter less than 2.5 micrometers in aerodynamic diameter
ppm = parts per million
µg/m^3 = micrograms per cubic meter

As indicated in Table 7-1, NAAQS standards in the area surrounding Van Wert County and Paulding County were not exceeded in 2008.

(b) Applicable State/Federal Air Quality Regulations

The wind turbines are not a source of air emissions, and therefore there are no applicable federal and/or Ohio new source performance standards, applicable air quality limitations, applicable national ambient air quality standards, or applicable prevention of significant deterioration (PSD) increments.

The temporary concrete batch plant and its associated unpaved roads will be subject to General Permit requirements, as described below. The temporary concrete batch plant that will be installed at the Facility will be a source of particulate matter (PM), also referred to as particulate emissions (PE), and an OEPA *General Permit for a Central Mix Ready Mix Concrete Batch Plant 4.2*) (General Permit for concrete batch plant) will be obtained for this source. The emission limits required by this General Permit are listed in Table 7-2. Additional control, monitoring and recordkeeping requirements are listed in the General Permit, and those requirements are described in the Compliance Plan (below).

TABLE 7-2
Emission Limits Required by General Permit 4.2 for Central Ready Mix Concrete Batch Plants

Process	Emission Limit Required
Transfer of Sand and Aggregate to Elevated Bins	PE will not exceed 3.42 tpy.
	Visible emissions of fugitive dust will not exceed 10 percent opacity as a 3-minute average.
Portland Cement, Fly Ash, and Slag Storage	PE will not exceed 0.21 tpy.
	Each fabric filter(s) serving a silo will achieve an outlet emission rate of not greater than 0.030 grain of PE/SCF of exhaust gases or there will be no visible PE from the outlet.
Weigh Hopper Loading of Cement, Fly Ash, Slag, and possibly Sand and Aggregate	PE will not exceed 1.22 tpy.
	The fabric filter serving the weigh hopper will achieve an outlet emission rate of not greater than 0.030 grain of PE/SCF of exhaust gases or there will be no visible PE from the outlet.
Truck Loading of Aggregate, Sand, Cement and Cement Supplement	PE will not exceed 0.46 tpy.
	The fabric filter serving the central mix drum will achieve an outlet emission rate of not greater than 0.030 grain of PE/SCF of exhaust gases or there will be no visible PE from the outlet.

tpy = tons per year

Emission estimates were made for the concrete batch plant using the plant design and the emission factors required by section 1) f) of the General Permit. These predicted emissions are all equal to or less than the General Permit limits specified above.

There are no additional applicable federal or Ohio new source performance standards for the planned concrete batch plant. Based on the emission estimates, the plant will be a minor source (potential emissions less than major source levels); therefore, PSD requirements are not applicable. Through the establishment of the General Permit process, OEPA has demonstrated that sources that meet the qualifying criteria of the General Permit have acceptable air quality impact and will not cause a violation of the NAAQS.

The unpaved roadways associated with the concrete batch plant will also be a source of PE and an OEPA *General Permit for Unpaved Roadways and Parking Areas, with a maximum of 120,000 Vehicle Miles Traveled per Year 5.1* (General Permit for Unpaved Roads) will be obtained for this source. The emission limits required by this General Permit for Unpaved Roads are listed in Table 7-3. Additional control, monitoring and recordkeeping requirements are listed in the General Permit for Unpaved Roads, and those requirements are described in the Compliance Plan (section d below).

TABLE 7-3
Emission Limits Required by General Permit 5.1 for Unpaved Roadways

Process	Emission Limit Required
Unpaved Roadways and Parking Areas	PM_{10} will not exceed 7.4 tpy
	PE will not exceed 25.2 tpy
	No visible PE except for 3 minutes during any 60-minute period.

Emission estimates were made for the unpaved roadways using the batch plant design and the emission equation required by section 1)f)(1) of the General Permit for Unpaved Roads. These emission predictions were all equal to or less than the General Permit for Unpaved Roads limits specified above.

There are no additional applicable federal or Ohio new source performance standards for the unpaved roadways and parking areas. Based on the emission estimates, the batch plant will be a minor source, and the PSD requirements are not applicable. Through the establishment of the General Permit process, OEPA has demonstrated that sources that meet the qualifying criteria of the General Permit have acceptable air quality impact and will not cause a violation of the NAAQS.

(c) List of Required Permits

OEPA General Permits will be obtained for both the concrete batch plant and associated unpaved roadways. The concrete batch plant meets the requirements to qualify for the OEPA *General Permit for a Central Mix Ready Mix Concrete Batch Plant (General Permit 4.2)*. The unpaved roadways and parking areas meet the requirements to qualify for the OEPA *General Permit for Unpaved Roadways and Parking Areas, with a Maximum of 120,000 Vehicle Miles Traveled per Year (General Permit 5.1)*.

(d) Compliance Plans

The Facility will achieve compliance with the air requirements for the permits listed above by following the compliance requirements of the General Permits for the concrete batch plant and the unpaved roads and parking areas, as described below.

(i) (d)(1) Concrete Batch Plant Compliance

The General Permit for the concrete batch plant establishes three general areas of compliance requirements: operating restrictions, emission limits and visible emission restrictions. Compliance with these requirements will be achieved by a combination of plant design, air pollution control equipment, and operating procedures to reduce fugitive emissions.

a) Operational Restrictions

(1) The maximum hourly production rate for this central mix concrete facility will not exceed 300 cubic yards of concrete (600 tons) per hour.

(2) The maximum annual production rate for this central mix concrete facility will not exceed 300,000 cubic yards of concrete (600,000 tons) per year.

b) Compliance with Operational Restrictions- Plant Design

(1) The plant capacity is 300 cubic yards of concrete (600 tons) per hour. The plant is planned to typically operate at an average of 90 percent of design capacity, or 270 yards of concrete (540 tons) per hour. This will yield sufficient concrete to meet or exceed the planned construction schedule.

(2) Based on the wind farm design, the Facility will need approximately 122,500 cubic yards of concrete (245,000 tons), which will be produced over an estimated 25-month period. The planned plant operation will be less than the half of the annual permit limit of 300,000 cubic yards (600,000 tons) per year. The Applicant will maintain annual records of the cubic yards or tons of concrete produced at this facility to demonstrate compliance with the annual limit.

c) Emission Limits

(Transfer of Sand and Aggregate to Elevated Bins) - PE will not exceed 3.42 tons/year.

(Portland Cement, Fly Ash and Slag Silos) - PE will not exceed 0.21 ton/year.

(Weigh Hopper Loading of Cement, Fly Ash, Slag, and possibly Sand and Aggregate) - PE will not exceed 1.22 tons/year.

(Central Mix Drum Loading of Aggregate, Sand, Cement and Cement Supplement) - PE will not exceed 0.46 ton/year.

Emission Limit for all controlled sources - The fabric filters serving these sources will achieve an outlet emission rate of not greater than 0.030 grain of PE per dry standard cubic foot of exhaust gases.

d) Compliance with Emission Limits – Plant Design and Air Pollution Control Equipment

The emission limits above are based on a standard plant design and source emission factors included in the General Permit. As indicated above, the plant will be operated within the design production capacity, with the control equipment required by the General Permit. As such, source emissions will be less than or equal to the limits specified above. The Applicant will calculate emissions using the standard emission factors in the General Permit to demonstrate compliance with the annual limit.

If required, the Applicant will demonstrate compliance with the grain loading limit by emission testing in accordance with the procedures specified in 40 CFR Part 60, Appendix A, Methods 1 through 5 and the procedures specified in Ohio Administrative Code (OAC) Rule 3745-17-03(B)(10).

e) Visible Emissions Requirements

During the transfer of sand and aggregate to the elevated bins, visible emissions of fugitive dust will not exceed 10 percent opacity as a 3-minute average.

The pneumatic system used to transfer cement and cement supplement to the cement and cement supplement silos will be adequately enclosed so as to minimize or eliminate visible emissions of fugitive dust at all times.

The transfer of cement, cement supplement, sand, and/or aggregate to the concrete batching weigh hoppers and the weight hoppers will be enclosed and vented to a fabric filter. The enclosure will be sufficient to minimize or eliminate visible emissions of fugitive dust at all times.

The central mix drum will be adequately enclosed and vented to a fabric filter. The enclosure will be sufficient to minimize or eliminate visible emissions of fugitive dust at all times.

There will be no visible PE from the outlets of the fabric filters serving these sources.

f) Compliance with Visible Emission Requirements – Plant Design and Operating Procedures

At all times during the transfer of sand and aggregate, the drop height of the front-end bucket will be minimized to the extent possible. Sand and aggregate loaded into the elevated bins will, at all times, have inherent moisture content sufficient to minimize or eliminate visible emissions of fugitive dust.

Cement and cement supplement will be transferred pneumatically to the cement and cement supplement silos. Any visible emissions of cement and/or cement supplement dust emanating from the delivery vehicle during transfer will be cause for the immediate halt of the unloading process and the refusal of the cement and/or cement supplement load until the situation is corrected.

The weigh hoppers will be sufficiently enclosed to minimize or eliminate at all times visible emissions of fugitive dust. The transfer of cement, cement supplement, sand, and/or aggregate to the concrete batching weigh hoppers will be enclosed and vented to a fabric filter.

The central mix drum will be adequately enclosed and vented to a fabric filter.

g) Compliance Monitoring and Testing

When the emissions unit is in operation, and when the weather conditions allow, the Applicant will perform weekly checks for any visible PE from the fabric filters serving these emissions units. No inspections are required on days the material handling operations are not in operation. The presence or absence of any visible PE will be recorded electronically or in an operations log.

If visible PE is observed, the Applicant will note the following in the operations log:

- Whether the emissions are representative of normal operations;
- If the emissions are not representative of normal operations, the cause of the visible emissions;
- The total duration of any visible emission incident; and
- Any corrective actions taken to eliminate the visible emissions.

The information above will be kept separately for each fabric filter serving these sources.

If required, compliance with the visible emission limitation for the material handling operation(s) identified above will be determined in accordance with Test Method 22 set forth in "Appendix on Test methods" in 40 CFR, Part 60 ("Standards of Performance for New Stationary Sources"), as such appendix existed on July 1, 1997.

(e) **Batch Plant Monitoring, Recordkeeping, and Reporting**

The Applicant will maintain the following recordkeeping and reporting pursuant to the requirements of the General Permit for the batch plant:

- Annual records of cubic yards or tone of concrete produced;
- Records of weekly visible emissions inspections (when weather conditions allow) for fabric filters;
- Records of weekly visible emissions inspections (when weather conditions allow) for sand/aggregate transfer points; and
- Completion of Annual Permit Evaluation Report (PER) as requested by OEPA.

(i) **(d)(2) Unpaved Roadways and Parking Areas Compliance**

The General permit for the unpaved roadways and parking areas establishes two general compliance requirements: emission limits and visible emission restrictions. Compliance with these requirements will be achieved by operating procedures to reduce fugitive emissions.

a) Emission Limits

Emissions will not exceed 25.2 tons/yr of PE, and 7.4 tons per year of particulate matter less than 10 micrometers in aerodynamic diameter (PM_{10}).

b) Compliance with Emission Limits – Plant Design

The emission limits above are based on anticipated vehicle miles traveled (VMT) of 120,000 miles per year as specified in the qualifications for the General Permit. Based on the wind farm design, the Applicant has estimated less than 10,000 VMT per year during construction. As such, source emissions will be less than the limits specified above. The Applicant will calculate emissions using the standard emission factors in the General Permit to demonstrate compliance with the annual limit.

c) Visible Emissions Requirements

There will be no visible PE except for 3 minutes during any 60-minute period.

d) Compliance with Visible Emission Requirements – Operating Procedures

The Applicant will treat the unpaved roadways and parking areas by application of chemical stabilization/dust suppressants and/or watering at sufficient treatment frequencies to maintain compliance. The needed frequencies of implementation of the control measures will be determined by the inspections discussed below.

Implementation of the control measures will not be necessary for unpaved roadways and parking areas that are covered with snow and/or ice or if precipitation has occurred that is sufficient for that day to maintain compliance with the above-mentioned applicable requirements. Implementation of any control measure may be suspended if unsafe or hazardous driving conditions would be created by its use.

The Applicant will remove in a timely manner earth and/or other material from paved streets onto which such material has been deposited by its trucking or earth-moving equipment or Facility-related erosion by water or other means.

Open-bodied vehicles transporting materials likely to become airborne will cover such materials if the control measure is necessary for the type of material being transported. This requirement does not apply to the cement trucks.

Implementation of the above-mentioned control measures in accordance with the terms and conditions of the General Permit are appropriate and sufficient to satisfy the best available technology requirements of OAC rule 3745-31-05.

e) Compliance Monitoring and Testing

Except as otherwise provided in this section, the Applicant will perform inspections of each of the roadway segments and parking areas on a daily basis.

The purpose of the inspections is to determine the need for implementing the above mentioned control measures. The inspections will be performed only on days the concrete batch plant is in operation, and during representative, normal traffic conditions. No inspection will be necessary for a roadway or parking area that is covered with snow and/or ice or if precipitation has occurred that is sufficient for that day to maintain compliance with the applicable requirements. Any required inspection that is not performed due to any of the above-identified events will be performed as soon as such event(s) has (have) ended.

If required, compliance with the visible emission limitation for the unpaved roadways identified above will be determined in accordance with Test Method 22 (Visual Determination of Fugitive Emissions From Material Sources and Smoke Emissions From Flares) set forth in 40 CFR, Part 60 (Standards of Performance for New Stationary Sources).

(ii) Unpaved Roads Monitoring, Recordkeeping, and Reporting

The Applicant will perform the following monitoring, recordkeeping, and reporting pursuant to the requirements of the General Permit for unpaved roads:

- Daily inspections of unpaved roads and parking areas, unless not required because of snow/ice cover or precipitation that served as control measure;
- Records of inspection and dates control measures implemented, and summary on calendar quarter basis of total number of days control measures implemented and total days snow/ice cover or precipitation served as control measures; and
- Completion of Annual PER as requested by OEPA.

(2) Construction

In addition to the emissions discussed above, temporary emissions from construction activities may result in minor air quality impacts. These impacts are expected to occur from vehicle exhaust and fugitive dust from earth moving activities. The increase in PE is not expected to be of a magnitude or duration to significantly impact local air quality.

Best management practices (BMPs), including those required by the General Permit for unpaved roadways, will be implemented during construction activities to reduce fugitive PE. Some of these BMPs include watering unpaved roadways and open soil surfaces during periods of dry and/or warm weather periodic clean up of tracked dirt onto paved roadways, and placing covers on soil piles to prevent erosion during high wind events. Finally, vehicle speeds will be controlled to further reduce fugitive dust emissions from unpaved roadways.

(3) Operation

Federal and state laws exist to reduce air pollution to levels that research has shown will protect human health and reduce overall impacts to ecosystems. The implementation of these laws begins with the setting of air quality standards, which are used to describe the existing air environment in a particular area. The USEPA currently sets NAAQS to regulate the emissions of six "criteria" air pollutants: carbon monoxide (CO), nitrogen oxide (NO_2), ozone (O_3), lead, particulates (PM_{10} and $PM_{2.5}$) and sulfur dioxide (SO_2). These criteria pollutants are regulated because they have been found to have the most adverse impact on public health and the environment. By controlling or eliminating these pollutants, while also producing the electric power that is needed, the overall environment is benefitted.

CO, NO_2, and SO_2 are common products of combustion of fossil fuels, such as coal. Particulates can be emitted by combustion or created by chemical processes in the atmosphere after emission. SO_2 and nitrogen oxides (NOx) can combine to form fine particulates. They can also combine with moisture in the atmosphere and return to the earth as acidic precipitation, commonly called "acid rain." NOx and volatile organic compounds (VOCs) can combine in sunlight to form O3. In addition, fossil fuel combustion processes can emit pollutants classified as "hazardous air pollutants" such as inorganic acid-gases (like hydrochloric acid), inorganic solids (like arsenic), or metallic compounds (like compounds of mercury). They also emit greenhouse gases (GHGs), such as carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), which contribute to global warming and climate change. CH_4 is also a component of natural gas, which can be released in the course of production, transportation, and use of that fuel.

An estimate of the air emissions avoided (annually and over a 20-year period) from operation of the Facility rather than a 350 MW power plant in the general Ohio generation fleet (with a similar capacity factor) is presented in Table 7-4. These air emissions are based on the eGRIDweb database (USEPA, 2009c) for the existing generation fleet in Ohio, and for pollutants not included in the eGRIDweb database, on AP-42 emission factors.

TABLE 7-4
Air Emissions Potentially Avoided by Operation of the Facility (assuming Ohio existing generation fleet)[A]

Pollutant	Tons Per Year (Range)[B]	Tons per 20 Years Operation [C, D]
SO_2	14 - 7185	135,900
NO_x	429 - 1964	32,600
PM_{10}	27 - 3973	40,000
VOC	2 - 9	100
CO	62 - 86	1,500
CO_2e (Metric Tonnes)	469,512 - 1,068,649	17,267,300

A To provide a reasonable worst case estimate of the emissions avoided, it was assumed that a power plant in Ohio would be taken off-line when the Facility began operation. Emission factors derived from AP-42 (AP-42, Fifth Edition, Volume 1, January 1995) were used in this analysis.

B 1 ton = 2,000 lbs

C Tons per 20 years of operation have been calculated by using the mean of the ton per year range for each pollutant.

D Numbers have been rounded to the nearest hundred.

An estimate of the air emissions avoided (annually and over a 20-year period) from operation of the Facility rather than a 350 MW coal -fired power plant in Ohio (with a similar capacity factor) is presented in Table 7-5. These air emissions are based on the eGRID (eGRID2007 V1.1) database for the existing generation fleet in Ohio, and for pollutants not included in the eGRIDweb database, on AP-42 emission factors.

TABLE 7-5
Air Emissions Potentially Avoided by Operation of the Facility (assuming coal-fired power generation)[A]

Pollutant	Tons Per Year[B]	Tons per 20 Years Operation[C]
SO_2	7,919	158,380
NO_x	1,965	39,300
PM_{10} (filter)	3,973	79,460
VOC	2	40
CO	86	1,720
CO_2e (metric tonnes)	1,068,600	21,372,000

A To provide a reasonable worst case estimate of the emissions avoided, it was assumed that a coal-fired plant would be taken off-line when the Facility began operation. Emission factors derived from AP-42 (AP-42, Fifth Edition, Volume 1, January 1995) were used in this analysis.

B 1 ton = 2,000 lbs

C Numbers have been rounded.

An estimate of the air emissions avoided (annually and over a 20-year period) from operation of the Facility rather than a 350 MW natural gas-fired power plant in Ohio (with a similar capacity factor) is presented in Table 7-6. These air emissions are based on the eGRID (eGRID2007 V1.1) database for the existing generation fleet in Ohio, and for pollutants not included in the eGRIDweb database, on AP-42 emission factors.

TABLE 7-6
Air Emissions Potentially Avoided by Operation of the Facility (assuming natural gas-fired power generation)[A]

Pollutant	Tons Per Year[B]	Tons per 20 Years Operation[C]
SO_2	14	280
NO_x	429	8,580
PM_{10} (total)	27	540
VOC	9	180
CO	62	1,240
CO_2e (metric tonnes)	469,500	9,390,000

A To provide a reasonable worst case estimate of the emissions avoided, it was assumed that a natural gas-fired plant would be taken off-line when the Facility began operation. Emission factors derived from AP-42 (AP-42, Fifth Edition, Volume 1, January 1995) were used in this analysis.

B 1 ton = 2,000 lbs

C Numbers have been rounded.

A more detailed breakdown of the Applicant's highly proprietary and trade secret estimated air emissions avoided will be made available at the offices of Bricker & Eckler, LLP for inspection by OPSB staff.

(C) WATER

This section discusses environmental impacts to both surface and ground water and provides an overview of existing Facility site conditions as an introduction prior to preconstruction, construction and operation discussions. The Facility would provide electricity without the consumption of cooling and process water that is typically required for coal-fired or natural gas-fired power plants. Section 4906-17-07(C)(5), *Operation*, provides a brief discussion of the water savings anticipated as a result of the operation of this renewable energy Facility.

(1) Surface Water

The Project area is located just north of the Lake Erie-Ohio River drainage divide and is situated within the Maumee River Drainage Basin (HUC 04100007) (ODNR, 2001, ODNR 2009n). The Maumee River is designated as a traditional navigable water (TNW) by the USACE from the mouth of the river near Toledo, Ohio at Lake Erie, to Hosey Dam near Fort Wayne, Indiana. The Project area is within the Auglaize River Watershed (HUC 04100007-080). The Auglaize River, a tributary to the Maumee River, is approximately 102 miles in length and drains approximately 2,435 square miles (ODNR, 2001, ODNR 2009n).

Neither the Auglaize River, the Maumee River, nor any other navigable waterway is located within the Project area; however, several named tributaries to the Auglaize River are present (Geology.com, 2009; TerraServer-USA, 2009). The USGS-mapped streams within the Project area include Blue Creek, Dry Creek, Hagerman Creek, Hoaglin Creek, Hog Run, Maddox Creek, Pottawatomie Creek, Prairie Creek, Middle Creek, Town Creek, and Upper Prairie Creek. These tributaries flow into the Auglaize River approximately 9 miles northeast of the Project area.

None of the streams within the Project area, as listed above, is designated as "high quality waters" by the OAC, Chapter 3745-1 *Water Quality Standards*. The reach of the Auglaize River receiving flow from the Project area is designated a "state resource water" per the *Water Quality Standards* (OAC, 2009). The reach of the Maumee River receiving flow from the Auglaize River is designated "outstanding state water" based on recreational values.

According to the *Ohio 2008 Integrated Water Quality Monitoring and Assessment Report* (Integrated Report), none of the streams within the Project area is listed on the impaired waters list under Sections 303(d), 305(b), and 314 of the Federal Clean Water Act (OEPA, 2008).

Average annual precipitation near the Facility for the period of 1931 to 1980 ranges from 33 to 37 inches (ODNR, 1992). No surface water gauges are located within the Project area. However, a USGS gauge (04191500) is installed on the Auglaize River near Defiance, Ohio, and downstream of the Project area. The period of record is from 1915 to 2008. The annual 7-day minimum flow between water years 1915 and 2008 is 1.1 cfs. The annual mean flow between water years 1915 and 2008 is 1,855 cfs (USGS, 2009c).

(2) Groundwater

In western Ohio, groundwater is available from two water-bearing units: unconsolidated glacial drift deposits, and bedrock. In the Project area, unconsolidated deposits generally consist of glacial drift that ranges from 0 to 50 feet (Ohio Division of Geological Survey, 2003). Yields from wells in these deposits typically range from less than 5 gpm to 25 gpm (ODNR, 1980; ODNR, 1985, ODNR, 1982; ODNR, 1986; ODNR, 2009d; ODNR, 2009e).

Beneath these unconsolidated deposits, Silurian and Devonian age bedrock consisting of the Salina and Detroit Groups is present. The Salina Group is present under most of the Project area, except the northwest portion, and is predominantly dolomite with lesser amounts of anhydrite, gypsum, salt, and shale (Figure 5-5). The Detroit River Group, situated just to the northwest of the Project area, consists of dolomite, sandstone, and shale. Silurian bedrock can reach a total thickness of 300 to 600 feet and is capable of yielding up to 750 gpm of water (ODNR, 1980; ODNR, 1985; ODNR 1982).

(3) Preconstruction

Table 7-7 shows the permits that the Applicant would obtain before beginning construction of the Facility. Preconstruction activities for the Facility (including construction of a temporary batch plant) are not expected to cause measurable impacts on the water supply and water quality within the Project area. The Applicant will design the Facility to avoid wetland and waterbody impacts to the greatest extent possible.

TABLE 7-7
Water-Related Permits to be Obtained

Name of Permit	Issuing Agency	Comments
Ohio National Pollutant Discharge Elimination System Permit for Stormwater Discharges Associated with Construction Activities (Permit Number OHC000003)	Ohio Environmental Protection Agency	Covers discharges composed entirely of stormwater discharges associated with construction activity that enter surface waters of Ohio or a storm drain leading to surface waters of Ohio.
Clean Water Act Section 404 Permit	U.S. Army Corps of Engineers – District	Obtain as applicable. Required to discharge dredged or fill material into Waters of the U.S. (jurisdictional wetland and waterbody sites)
Clean Water Act Section 401 Water Quality Certification	Ohio Environmental Protection Agency	Obtain as applicable. Required, before issuance of the Section 404 Permit, to discharge dredged or fill material into Waters of the U.S. (jurisdictional wetland and waterbody sites)
Isolated Wetland Permit	Ohio Environmental Protection Agency	Obtain as applicable. Required to discharge dredged or fill material into an isolated wetland site that is not connected to other surface waters
Onsite Sewage Treatment System (OSTS) Permit		Obtain as applicable. A Permit to Install (PTI) is needed for any installation or modification of wastewater treatment, conveyance or disposal system, except as exempted by rule. OSTS permit approval would be needed for the O&M building.

(4) Construction

Construction of the Facility includes site preparation activities (e.g., clearing and grading within construction areas and installing erosion control measures), followed by (not necessarily in chronological order) the installation of access roads, collection and transmission systems, foundations, and turbines. Post-construction activities involve site restoration and reclamation.

(a) Permits

A NPDES Permit for Stormwater Discharges from Construction Activities will be obtained for Facility construction. The NPDES Permit is required for sites where greater than one acre would be disturbed in order to maintain compliance with the

Federal Water Pollution Control Act (as amended), and the Ohio Water Pollution Control Act. The USEPA has designated to OEPA the authority to issue NPDES permits.

A complete and accurate Notice of Intent to discharge will be submitted to the OEPA at least 21 days before beginning Construction Activities, as specified in Section II.A of Permit Number OHC000003. A Draft SWPPP has been developed as part of this application to demonstrate the BMPs that would be implemented during construction to minimize impacts to surface waters. Appendix M provides the Applicant's draft SWPP. A final version will be provided to OPSB staff when it is submitted to OEPA.

The Applicant is evaluating the option of constructing a temporary concrete batch plant in the Project area to produce concrete required for construction. Water discharge from the batch plant would be handled by one of three methods that include the following:

- Reuse in concrete production with no discharge;
- Discharge to a holding tank for subsequent transport and disposal as an approved discharge to a publicly owned treatment works (POTW); and
- Discharge to a local surface water body under an OEPA NPDES approved discharge permit.

The options for reuse and discharge to a POTW are preferred. The use of a holding tank and discharge to a POTW would require the POTW approval for receipt of the wastewater under the POTW NPDES permit. If a discharge to a local surface waterbody is selected, a general NPDES permit for industrial wastewater will be required. Details on the use of a batch plant and the preferred option for handling wastewater will be provided by April 1, 2010.

(b) Aquatic Discharges

As stated in the previous section, BMPs will be implemented during construction to minimize impacts to surface waters from erosion and sedimentation. During construction, approximately 793 acres will be disturbed in the total 40,500-acre Project area. Minimizing the amount of exposed soils will reduce erosion and provide for filtration of potentially sediment-laden water before any discharges offsite.

Construction of the Facility would slightly increase the amount of impervious surface within the Project area; however, this increase is not anticipated to alter the quantity or quality of surface water discharges from the Facility. When constructed, approximately 237 acres of impervious surface will be covered by the Facility, including turbine foundations, access roads, substations, and an O&M building footprint.

Temporary impacts to aquatic resources may occur during construction to complete trench dewatering activities or complete drainage swale or ditch embankment clearing and grading for access road installation. Temporary impacts potentially include increased turbidity and sedimentation within waterbodies, introduction of nutrients or chemicals into the water column, and elevated water temperatures due to decreased shade.

Construction of the Facility may increase the possibility of introducing groundwater contamination if oil spills or other chemical spills occur during transportation and construction activities. Spill prevention measures during construction are discussed in the following section.

A temporary concrete batch plant is being evaluated for Facility construction. It is anticipated that the wastewater discharge would be minimal and be handled via reuse in the concrete production process; stored in a onsite holding tank for disposal at a POTW; or discharged to a local surface waterway under an OEPA NPDES approved discharge permit. Any permitted discharge to a surface waterbody would be compliant with water quality standards for the protection of aquatic life as defined by OAC Chapter 3745-1 (2009).

(c) Mitigation Plans

While aquatic discharges during Facility construction are not expected to be significant, the Applicant will implement several mitigation measures to ensure surface water quality.

Wetland and waterbody sites will be avoided to the greatest extent practicable. Furthermore, existing crossings will be utilized wherever possible to minimize impacts to aquatic resources. Waterbody crossings will be selected in a location where minimal clearing of riparian corridors would be required and where the crossing angle would be perpendicular to the stream channel. These measures would assist in stabilizing banks, thereby minimizing impacts to aquatic resources.

In accordance with the General NPDES Permit for Stormwater Discharges from Construction Activities, a draft SWPPP has been developed, and will be finalized for implementation during construction based on the detailed engineering design. A final version will be provided to OPSB staff when it is filed with the OEPA. The SWPPP will outline the BMPs to implement both temporarily during construction and permanently after construction to reduce potential impacts to water quality in the Project area. The SWPPP will also cover preventive measures to reduce discharges to wetlands, surface waters, and ground water sources, including such techniques as prohibiting the refueling and storage of hazardous materials within 200 feet of all private wells, and employing a 100-foot setback from wetland or waterbody sites for storage of hazardous waste materials, chemicals, fuels, and lubricating oils

Midway through construction, the Applicant will develop and implement a Spill Prevention, Control, and Countermeasures Plan (SPCC) for operation of the Facility and will provide it to OPSB Staff. The SPCC plan identifies preventative