Staff Report of Investigation

Hardin Wind Farm Case Number 09-0479-EL-BGN

December 21, 2009



Ted Strickland, Governor Alan R. Schriber, Chairman

In the Matter of an Application by Hardin Wind Energy,)	
LLC for a Certificate of Environmental Compatibility)	Case No. 09-0479-EL-BGN
and Public Need for the Hardin Wind Farm)	

Staff Report of Investigation

Submitted to the OHIO POWER SITING BOARD

STAFF LETTER	iii
ACRONYMS	iv
I. INTRODUCTION	1
Ohio Power Siting Board	
Applicant	
Project Description	2
Figure 1 (General Location Map)	4
II. HISTORY OF THE APPLICATION	5
III. CRITERIA	6
IV. NATURE OF INVESTIGATION	7
V. CONSIDERATIONS AND RECOMMENDED FINDINGS	
V. CONSIDERATIONS AND RECOMMENDED FINDINGS Basis of Need	
V. CONSIDERATIONS AND RECOMMENDED FINDINGS Basis of Need Nature of Probable Environmental Impact	
V. CONSIDERATIONS AND RECOMMENDED FINDINGS Basis of Need Nature of Probable Environmental Impact Minimum Adverse Environmental Impact	
V. CONSIDERATIONS AND RECOMMENDED FINDINGS Basis of Need Nature of Probable Environmental Impact Minimum Adverse Environmental Impact Electric Grid	
V. CONSIDERATIONS AND RECOMMENDED FINDINGS Basis of Need Nature of Probable Environmental Impact Minimum Adverse Environmental Impact Electric Grid Air, Water, Solid Waste, and Aviation	
V. CONSIDERATIONS AND RECOMMENDED FINDINGS Basis of Need Nature of Probable Environmental Impact Minimum Adverse Environmental Impact Electric Grid Air, Water, Solid Waste, and Aviation Public Interest, Convenience, and Necessity	
V. CONSIDERATIONS AND RECOMMENDED FINDINGS Basis of Need Nature of Probable Environmental Impact Minimum Adverse Environmental Impact Electric Grid Air, Water, Solid Waste, and Aviation Public Interest, Convenience, and Necessity Agricultural Districts	
V. CONSIDERATIONS AND RECOMMENDED FINDINGS Basis of Need Nature of Probable Environmental Impact Minimum Adverse Environmental Impact Electric Grid Air, Water, Solid Waste, and Aviation Public Interest, Convenience, and Necessity Agricultural Districts Water Conservation Practice	8 8 9 19 32 36 39
V. CONSIDERATIONS AND RECOMMENDED FINDINGS Basis of Need Nature of Probable Environmental Impact Minimum Adverse Environmental Impact Electric Grid Air, Water, Solid Waste, and Aviation Public Interest, Convenience, and Necessity Agricultural Districts Water Conservation Practice VI. RECOMMENDED CONDITIONS OF CERTIFICATE	8 8 9 19 32 36 39 45 46 47
V. CONSIDERATIONS AND RECOMMENDED FINDINGS Basis of Need Nature of Probable Environmental Impact Minimum Adverse Environmental Impact Electric Grid Air, Water, Solid Waste, and Aviation Public Interest, Convenience, and Necessity Agricultural Districts Water Conservation Practice VI. RECOMMENDED CONDITIONS OF CERTIFICATE	
V. CONSIDERATIONS AND RECOMMENDED FINDINGS	8 8 9 19 32 36 39 45 46 47 47 58 58

TABLE OF CONTENTS

BEFORE THE POWER SITING BOARD OF THE STATE OF OHIO

In the Matter of an Application by Hardin Wind Energy,)	
LLC for a Certificate of Environmental Compatibility)	Case No. 09-0479-EL-BGN
and Public Need for the Hardin Wind Farm)	

Members of the Board:

Alan R. Schriber, Chairman, PUCO Lisa Patt-McDaniel, Director, ODD Alvin Jackson, M.D., Director, ODH Robert Boggs, Director, ODA Christopher Korleski, Director, Ohio EPA Sean Logan, Director, ODNR Lorry Wagner, Ph.D., Public Member Louis W. Blessing, Jr., State Representative Timothy J. DeGeeter, State Representative Thomas Sawyer, State Senator VACANT, State Senator

To the Honorable Power Siting Board:

In accordance with provisions of the Ohio Revised Code (ORC) Section 4906.07(C), and the Commission's rules, the Staff has completed its investigation in the above matter and submits its findings and recommendations in this staff report for consideration by the Ohio Power Siting Board (Board).

The <u>Staff Report of Investigation</u> has been prepared by the Staff of the Public Utilities Commission of Ohio. The findings and recommendations contained in this report are the result of Staff coordination with the Ohio Environmental Protection Agency, the Ohio Department of Health, the Ohio Department of Development, the Ohio Department of Natural Resources, and the Ohio Department of Agriculture. In addition, the Staff coordinated with the Ohio Department of Transportation, the Ohio Historical Society, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the Federal Aviation Administration.

In accordance with ORC Sections 4906.07 and 4906.12, copies of this staff report have been filed with the Docketing Division of the Public Utilities Commission of Ohio on behalf of the Ohio Power Siting Board and served upon the Applicant or its authorized representative, the parties of record, and the main public libraries of the political subdivisions in the project area.

The staff report presents the results of the Staff's investigation conducted in accordance with ORC Chapter 4906 and the Rules of the Board, and does not purport to reflect the views of the Board nor should any party to the instant proceeding consider the Board in any manner constrained by the findings and recommendations set forth herein.

Respectfully submitted,

land and

Klaus Lambeck, Chief Facilities, Sitting, & Environmental Analysis Division

ACRONYMS

AEP	American Electric Power			
BMP	best management practices			
dBA	decibels (A-weighted)			
DNAP	Division of Natural Areas and Preserves			
DOW	Division of Wildlife			
FAA	Federal Aviation Administration			
GE	General Electric			
HDD	horizontal directional drill			
Hz	hertz			
kV	kilovolts			
MW	megawatts			
NERC	North American Electric Reliability Corporation			
NPDES	National Pollutant Discharge Elimination System			
NRHP	National Register of Historic Places			
O&M	operations and maintenance			
OAC	Ohio Administrative Code			
ODA	Ohio Department of Agriculture			
ODD	Ohio Department of Development			
ODH	Ohio Department of Health			
ODNR	Ohio Department of Natural Resources			
ODOT	Ohio Department of Transportation			
Ohio EPA	Ohio Environmental Protection Agency			
OPSB	Ohio Power Siting Board			
ORC	Ohio Revised Code			
PUCO	Public Utilities Commission of Ohio			
SWPPP	Storm Water Pollution Prevention Plan			
T/E	threatened or endangered (species)			
USACE	U.S. Army Corps of Engineers			
USFWS	U.S. Fish and Wildlife Service			

I. INTRODUCTION

Ohio Power Siting Board

The Ohio Power Siting Board (Board or OPSB) was created on November 15, 1981, by amended Substitute House Bill 694 as a separate entity within the Public Utilities Commission of Ohio (PUCO). The authority of the Board is outlined in Ohio Revised Code (ORC) Chapter 4906.

The Board is authorized to issue certificates of environmental compatibility and public need for the construction, operation, and maintenance of major utility facilities as defined in ORC Section 4906.01. Included within this definition are electric generating plants and associated facilities designed for or capable of operation at 50 megawatts (MW) or more, electric transmission lines and associated facilities of a design capacity greater than or equal to 125 kilovolts (kV), and gas and natural gas transmission lines and associated facilities designed for, or capable of, transporting gas or natural gas at pressures in excess of 125 pounds per square inch. In addition, per ORC Section 4906.20, the Board authority applies to economically significant wind farms, defined as wind turbines and associated facilities with a single interconnection to the electrical grid and designed for, or capable of, operation at an aggregate capacity of five MW or greater but less than 50 MW.

Membership of the Board is specified in ORC Section 4906.02(A). The voting members include: the Chairman of the PUCO who serves as Chairman of the Board; the directors of the Ohio Environmental Protection Agency, the Ohio Department of Health, the Ohio Department of Development, the Ohio Department of Agriculture, and the Ohio Department of Natural Resources; and a member of the public, specified as an engineer, appointed by the Governor from a list of three nominees provided by the Ohio Consumers' Counsel. Included as ex-officio members of the Board are two members (with alternates) from each house of the Ohio General Assembly.

The OPSB has promulgated rules and regulations, found in Chapter 4906 of the Ohio Administrative Code (OAC), which establish application procedures for major utility facilities and wind farms. Pursuant to ORC Section 4906.07(C) and these rules, the Board's Staff (Staff) evaluates and investigates applications and reports the results of such investigations, including recommended findings and recommended conditions for certification, in the <u>Staff Report of Investigation</u>.

Applicant

In this proceeding, Hardin Wind Energy, LLC (Hardin Wind or Applicant) is seeking authority to construct a wind-powered electric generating facility, or wind farm, in Hardin County. The wind farm would be owned and operated by Hardin Wind Energy, LLC. American Electric Power (AEP) would own and operate the interconnection substation included in this application.

Hardin Wind is a wholly-owned subsidiary of Invenergy, LLC. Invenergy is a Chicago-based developer, established in 2001, that focuses on the development of utility-grade wind projects. Invenergy has completed development and construction of 18 wind energy projects in North America and Europe, with approximately 2,000 MW of aggregate generating capacity. Another

400 MW of capacity are currently under construction and nearly 100 projects are in active development in the U.S., Canada, and Europe. The company's portfolio also includes conventional natural gas-fired facilities and thermal electricity generating facilities utilizing a variety of fuels.

Project Description

The proposed project involves the construction and operation of a wind farm comprised of up to 200 wind turbines with a nameplate capacity of 1.5 MW or 1.6 MW each. If the Applicant were to select the 1.6 MW model, 15 turbines would be removed from the project layout, but the locations of the remaining turbines would not change. The project would have an aggregate generating capacity of up to 300 MW. The Applicant plans to construct the facility in two phases, beginning in mid 2010. The first phase includes up to 156 of the 200 turbines. The second phase includes up to 47 turbines. The Applicant has proposed 203 turbine locations, but would only construct up to 200 turbines in the final layout.

Project Area

The project is located in Hardin County, west of the city of Kenton, and encompasses portions of the following townships: Cessna, Marion, Lynn, McDonald, Roundhead, and Taylor Creek. The entire project area includes approximately 36,000 acres of primarily agricultural land, of which the Applicant has leased about 20,000 acres for the facility.

The geology of the project area consists of glacial till ranging from 20 feet to 220 feet thick. The bedrock in this area consists of Silurian age dolomite and limestone as well as some gypsum anhydrite and shale. The project area is shown in Figure 1 and in detail in the Appendix.¹

Wind Turbines

The Applicant has proposed a General Electric (GE) 1.5xle wind turbine with a nameplate capacity of 1.5 MW, or 1.6 MW with additional technology updates. The structures consist of a three-bladed horizontal axis turbine and nacelle on top of a white monopole tubular steel tower. The hub height for the turbines, regardless of the nameplate capacity, would be 262 feet (80 meters) with a rotor diameter of 271 feet (82.5 meters). Total turbine height, assuming blade tip at its highest position, would be 398 feet (121.5 meters). The Applicant expects that the turbines would be operating for 85 percent of the year and would have an overall net capacity factor of 26 to 30 percent. Based on these assumptions, the annual energy production for the Hardin Wind Farm would be approximately 710,000 megawatt hours (MWh).

Turbine Foundations

Test borings for the site-specific geotechnical investigation are currently underway. Final turbine foundation design would be chosen upon the results of the full site-specific geotechnical investigation. The Applicant would most likely use a spread footing foundation, which is a typical design for wind turbine foundations.

¹ Figures are presented solely for the purpose of providing a visual representation of the project in the staff report, and are not intended to modify the project as presented by the Applicant in its certified application and supplemental materials.

The Applicant would prepare a wind turbine assembly area by grading and removing vegetation within a 200-foot radius or less around each turbine location. The foundation construction process would generally proceed from hole excavation, mud mat formation, rebar assembly, pouring and setting of the concrete, backfilling and compacting, through to site restoration.

Electric Collection System

An electric collection system would be installed to transfer the power from the wind turbines to the transformer substation and connection to the electric transmission grid. The 34.5 kilovolt (kV) collection system would consist of 98 miles of underground cable buried to a depth of four feet.

Electric Substations

The facility would include a two-acre transformer substation and a six-acre interconnection substation, to be located adjacent to each other. The transformer substation would be designed to step-up the electricity from the 34.5 kV electric collection system to 345 kV. This substation would consist of a step-up transformer, control house, and switchgear coming from the electric collection system. The interconnection substation would connect the transformer substation to the AEP East Lima-Marysville 345 kV transmission line located within the project area.

O&M Building

The operations and maintenance (O&M) building would be used to house personnel and replacement materials. The Applicant has stated that a typical O&M building is 6,000 square feet. The building would be located adjacent to the transformer substation.

Permanent Meteorological Towers

The Applicant may install up to three permanent meteorological towers to monitor wind resources during the operation of the wind farm. Each permanent meteorological tower would have a 30-foot wide access road. Potential sites for the permanent meteorological towers were included in the application and are shown on the maps in this report.

Access Roads

Approximately 30 miles of new or improved access roads are needed to support the facility. The access roads would be up to 67 feet wide during construction. After construction, most access roads would be reduced to 16 feet wide, and up to a maximum of 31 feet wide, including up to 23 feet of gravel roadway plus four feet of gravel shoulders on each side of the finished road.

Construction Staging Areas

The Applicant intends to deliver materials directly to each turbine construction site. The Applicant would use up to 10 acres adjacent to the substation site as a construction staging area, if needed, for minor material storage and construction trailers.



II. HISTORY OF THE APPLICATION

Application procedures and requirements for information are specified in Section 4906.06 of the ORC, and are detailed in the Rules and Regulations of the Board. Prior to formally submitting its application, the Applicant consulted with the Staff and representatives of the Board, including the Ohio Environmental Protection Agency (Ohio EPA), regarding application procedures. Additionally, the Applicant hosted an on-site meeting with the Staff regarding the proposed project and the surrounding area.

On June 5, 2009, the Applicant filed a Motion for waivers and notice of the pre-application informational meeting. The Applicant held the public informational meeting in Hardin County on June 23, 2009.

On July 10, 2009, the Applicant filed its application for a certificate to construct the proposed wind-powered electric generating facility in Hardin County, Ohio. In addition, the Applicant filed a Motion for protective order for certain financial documents.

On July 17, 2009, the Applicant's Motion for waivers was granted.

On August 27, 2009, the Applicant filed a Motion for waiver of the 60-day completeness review period so that additional information could be filed and reviewed by Staff. On September 18, 2009, the Applicant filed an amended application.

On October 9, 2009, the Chairman of the Board issued a letter to the Applicant stating that the application, as filed on July 10, 2009 and subsequently amended on September 18, 2009, had been found to comply with the requirements of Chapter 4906-01, et seq., OAC.

On October 13, 2009, the Administrative Law Judge issued an Entry scheduling a local public hearing for this case to take place on January 5, 2010, at 6:00 p.m., at the Hardin County Courthouse, One Courthouse Square, Kenton, Ohio, 43226. The adjudicatory hearing was scheduled to take place on January 12, 2010, at 10:00 a.m., in Hearing Room 11-F, at the offices of the PUCO, 180 East Broad Street, Columbus, Ohio, 43215.

On November 12, 2009, the Applicant filed information on ten additional turbine locations. On November 19, 2009, the Applicant filed information regarding a plan to construct the facility in two phases. A map of the two phases was filed on December 4, 2009.

The Applicant has filed supplemental information and responses to Staff data requests and interrogatories on several dates throughout the application review period.

This summary of the history of the application does not include every filing in case number 09-0479-EL-BGN. The docketing record for this case, which lists all documents filed to date, can be found in the Appendix to this report and online at http://dis.puc.state.oh.us.

III. CRITERIA

The recommendations and conditions in this <u>Staff Report of Investigation</u> were developed pursuant to the criteria set forth in ORC Section 4906.07(C), which requires, in part, that the staff report shall contain recommended findings with regard to ORC Section 4906.10(A).

Section 4906.10(A) of the ORC reads in part:

The Board shall not grant a certificate for the construction, operation, and maintenance of a major utility facility, either as proposed or as modified by the Board, unless it finds and determines all of the following:

- (1) The basis of the need for the facility if the facility is an electric transmission line or gas or natural gas transmission line;
- (2) The nature of the probable environmental impact;
- (3) That the facility represents the minimum adverse environmental impact, considering the state of available technology and the nature and economics of the various alternatives, and other pertinent considerations;
- (4) In the case of an electric transmission line or generation facility, that the facility is consistent with regional plans for expansion of the electric power grid of the electric systems serving this state and interconnected utility systems and that the facility will serve the interests of electric system economy and reliability;
- (5) That the facility will comply with Chapters 3704., 3734., and 6111. of the Revised Code and all rules and standards adopted under those chapters and under Sections 1501.33, 1501.34, and 4561.32 of the Revised Code. In determining whether the facility will comply with all rules and standards adopted under Section 4561.32 of the Revised Code, the Board shall consult with the ODOT Office of Aviation of the Division of Multi-Modal Planning and Programs of the Department of Transportation under Section 4561.341 of the Revised Code.
- (6) That the facility will serve the public interest, convenience, and necessity;
- (7) In addition to the provisions contained in divisions (A)(1) through (A)(6) of this section and rules adopted under those divisions, what its impact will be on the viability as agricultural land of any land in an existing agricultural district established under Chapter 929. of the Revised Code that is located within the site and alternative site of the proposed major utility facility. Rules adopted to evaluate impact under division (A)(7) of this section shall not require the compilation, creation, submission, or production of any information, document, or other data pertaining to land not located within the site and alternate site.
- (8) That the facility incorporates maximum feasible water conservation practices as determined by the Board, considering available technology and the nature and economics of the various alternatives.

IV. NATURE OF INVESTIGATION

The Board's Staff has reviewed the application submitted by Hardin Wind Energy, LLC and other materials filed with the Board under case number 09-0479-EL-BGN. The application for certification of the proposed Hardin Wind Farm was prepared and submitted pursuant to the Board Rules and Regulations in OAC Chapter 4906. The Staff supplemented its review with site visits to the project area and discussions with employees and representatives of the Applicant. In response to Staff data requests and interrogatories, the Applicant filed additional information that was not included in the application.

The Board's Staff, which consists of career professionals drawn from the Staff of the PUCO and other member agencies of the OPSB, has the responsibility to evaluate, assess, and make recommendations on applications subject to Board jurisdiction. The investigation has been coordinated among the agencies represented on the Board and with other interested agencies such as the Ohio Department of Transportation, the Ohio Historical Society, and the U.S. Fish and Wildlife Service.

The recommended findings resulting from the Staff's investigation in this Report are made pursuant to ORC Section 4906.07(C). The technical investigations and evaluations were conducted under guidance of the Ohio Power Siting Board Rules and Regulations in OAC Chapter 4906.

V. CONSIDERATIONS AND RECOMMENDED FINDINGS

In the matter of the application of Hardin Wind Energy, LLC, the following considerations and recommended findings are submitted pursuant to ORC Section 4906.07(C) and ORC Section 4906.10(A).

Considerations for ORC Section 4906.10(A)(1)

Basis of Need

The basis of need as specified under ORC Section 4906.10(A)(1) is not applicable to this electric generating facility project.

Recommended Findings

Staff recommends that the Board find that 4906.10(A)(1) is not applicable to this electric generating facility project.

Considerations for ORC Section 4906.10(A)(2)

Nature of Probable Environmental Impact

Pursuant to ORC Section 4906.10(A)(2), the Board must determine the nature of the probable environmental impact of the proposed facility. The Staff has reviewed the environmental information contained in the record compiled to date in this proceeding and has supplemented its review with site visits to the project area, discussions with employees and representatives of the Applicant, and consultation with other public agencies. As a result, the Staff has found the following with regard to the nature of the probable environmental impact:

- (1) The proposed project involves the construction and operation of a wind farm comprised of up to 200 wind turbines in Hardin County. The project would have an aggregate generating capacity of up to 300 MW. The Applicant plans to construct the facility in two phases, beginning in mid 2010. The first phase includes up to 156 of the 200 turbines. The second phase includes up to 47 turbines. The Applicant has proposed 203 turbine locations, but would only construct up to 200 turbines in the final layout.
- (2) The Applicant plans to install GE 1.5xle wind turbines with a nameplate capacity of 1.5 MW, or 1.6 MW with additional technology updates. The Applicant has addressed safety with respect to individual wind turbines and the project as a whole. The turbines selected by the Applicant would have a supervisory control and data acquisition (SCADA) system, locked tower doors, and towers without external ladders. The project would include a substation with a locked security fence, operation and maintenance personnel, a lightning protection system, and would comply with OSHA requirements. The Applicant has provided a copy of the manufacturer's safety manual for Staff review.
- (3) The project area is sparsely populated and is expected to grow at a slow rate. The townships that contain the project area have a combined population density of 32 persons per square mile, compared to 68 persons per square mile in Hardin County and 280 persons per square mile across the entire state.² Population in the townships that contain the project area is expected to grow by less than one percent over the next 20 years, compared to 2.8 percent for the county and 8.5 percent for the state.³ The project is not expected to limit future population growth or have a noticeable effect on the demographics of the region.
- (4) Fourteen residences are located within 100 feet of access roads, collection lines, or the substation, and 208 residences are located within 1,000 feet. No residences are located within 1,000 feet of any proposed turbine locations.
- (5) Per 4906-17, OAC, a turbine's nearest blade tip at ninety degrees must be at least 750 feet in horizontal distance from the exterior of the nearest habitable residential structure on an adjacent property. This project would consist of turbines with blades that extend up to 135 feet from the turbine base; therefore, the turbine base can be no closer than 885 feet from a

² Ohio Department of Development. (July 2009). 2008 Population Estimates by County, City, Village and Township. Retrieved Nov. 30, 2009, from ODOD Web site:

http://www.development.ohio.gov/Research/files/P103000004.pdf

³ Ohio Department of Development. (July 2009). *Ohio County Indicators*. Retrieved Nov. 30, 2009, from ODOD Web site: http://www.development.ohio.gov/research/files/s101.pdf

residence on an adjacent property. The Applicant designed the turbine layout using a 1,000-foot setback from all residences, whether participating or not, which exceeds the statutory requirement.

- (6) Per 4906-17, OAC, the minimum property line setback is established at 1.1 times the height of the turbine from the turbine base to the blade tip. The height of the turbine under consideration for this facility is 398 feet, which yields a minimum property line setback of 438 feet. The Applicant designed the turbine layout using a 1.5 multiplier for the property line setback, which yields a setback of 597 feet and exceeds the statutory requirement.
- (7) Ice throw is the phenomenon where accumulated ice on the wind turbine blades separates from the blade and falls or is thrown from the tower. According to a commonly referenced ice throw study, ice fragments typically land within 328 feet of the wind turbine tower and the risk from ice throw is negligible beyond 754 feet, which is within the Applicant's residential setback of 1,000 feet.
- (8) Blade shear is the phenomenon where a rotating wind turbine blade or segment separates from the nacelle and is thrown from the tower. According to a commonly referenced blade shear study, the maximum calculated blade throw distance for a wind turbine with the same hub height as proposed for this project and larger rotor diameter is 500 feet, which is within the Applicant's residential setback of 1,000 feet.
- (9) The historical reference wind speed, or extreme ten-minute average, for the project area is 19.2 meters per second (m/s), or 43 miles per hour (mph). The 50-year return gust speed for the area is 26.9 m/s or 60 mph. The GE 1.5xle turbines are certified by the International Electrotechnical Commission as a Class 3B wind turbine and have been designed to withstand these potentialities.
- (10) The Applicant has stated that no turbines or access roads would be located within the Federal Emergency Management Authority 100-year floodplain. A small portion of the electric collection system would be constructed within the floodplain, but would not impact the floodway or increase the 100-year flood base elevation discharge.
- (11) No impacts to public or private water supplies are anticipated due to construction or operation of the Hardin Wind Farm. The Applicant would conduct unanticipated spill response training as needed to limit the potential for impact.
- (12) The Applicant identified five recreational use areas within five miles of the project area: Indian Lake State Park, three municipal parks, and the Colonial Golfers Club. Turbines would be visible from these recreational areas.
- (13) The project area contains or intersects 53 agricultural district parcels, 22 of which would be directly impacted by the placement of a turbine, collection line, or access road.
- (14) Roughly 95 percent (34,171 acres) of the project area is agricultural fields. The disturbance area for agricultural lands totals 955 acres, of which 777 acres would be temporarily disturbed during construction. The remaining 178 acres of disturbed agricultural land would be removed from agricultural production during operation of the wind farm for access roads, turbines, and other related facilities. The Applicant indicates that the electric

collection system would be buried deep enough so as to not interfere with agricultural activities.

- (15) Residential land use accounts for roughly three percent of the project area. All other non-agricultural land uses combined total 1.5 percent of the project area.
- (16) The introduction of wind turbines that are 398 feet tall from base to blade tip would have an aesthetic impact on this rural agricultural setting.
- (17) The project is not expected to conflict with known local or regional development projects or land use plans.
- (18) The project area is accessible through numerous highways, and state and local roads. These roads would experience an increase in truck traffic due to the delivery of turbine components, concrete, gravel, and heavy equipment to each turbine site. Workers commuting during construction would also increase traffic. Operation of the wind farm is not expected to noticeably increase local traffic. No other significant adverse impacts on local services are expected.
- (19) The Applicant has not identified any significant geotechnical constraints at the site for the operation of the wind farm. Geotechnical investigations are ongoing, and the information that is obtained through geologic impact assessments will be used to assess terrain stability and to determine areas of sufficient structural competency to support wind turbines.
- (20) The Applicant conducted baseline sound measurements at four points within the project area in order to estimate the actual ambient noise levels. Recorded ambient noise levels $(L_{EQ})^4$ ranged from 30.7 to 43.4 decibels (dBA) and the ambient $(L_{90})^5$ ranged from 27.5 to 36.8 dBA.
- (21) The Applicant states that operational sound output (L_{EQ}) for the project would be 20-47 dBA at residences within one mile of the project area. Certain atmospheric conditions can further propagate or amplify levels of generated noise.
- (22) Noise impacts from construction activities would include the operation of dozers, front end loaders, graders, excavators, pile driving equipment, concrete pumps, various trucks, and cranes. Impacts from construction noise would be temporary and would be restricted to daylight hours.
- (23) The Applicant conducted a literature review and preliminary field evaluation of cultural resource impacts in the project area. This review was based on background research compiled from records provided by the Ohio Historic Preservation Office. From the literature review, the Applicant identified four cultural resources listed on the National Register of Historic Places (NRHP) within a five-mile radius of the project area. None of these sites were located within one mile of the project area. The NRHP sites include two historic districts located in the city of Kenton, about five miles to the east of the project area, and a depot structure located in the village of Ada, roughly 4.7 miles north of the project area. The nearest NRHP site is the Zimmerman Kame, located on private property

 $^{^{4}}$ L_{EQ} refers to the equivalent continuous sound level, or average sound level, over a specific period of time.

 $^{^{5}}$ L₉₀ refers to the sound level that is exceeded 90 percent of the time.

off of Township Road 39, approximately 2.7 miles west of the project area. It is likely that some portion of the turbines would be visible from the four listed NRHP sites. Impacts to the NRHP sites are likely to be minimal due to the distance from the project area, and because the direct line of sight and noise associated with the turbines would be interrupted by changes in the terrain, buildings, and other infrastructure.

- (24) The Ohio Historic Inventory (OHI) revealed 19 residential properties and farm complexes within one mile of the project area, none of which are listed on the NRHP. Six historical bridges are listed in the OHI within one mile. Staff was able to verify in the field the presence of intact bridge structures at four of the historic bridge locations, while the other two had some structural block work remaining, but no decking.
- (25) The Applicant identified 40 previously documented archaeological sites within one mile of the project area. These sites are comprised of burials, camps, and scattered artifacts. The literature review revealed no known archaeological sites at the site-specific turbine locations. Additionally, the location of the construction staging area(s), access roads, and collection lines are not expected to directly impact known cultural resources.
- (26) The Applicant states in responses to data requests #4 and #5 (November 20, 2009) that a Phase I archaeology investigation and an historic architecture report are being performed for this project. Staff has not seen the results of either report, which should provide more detail beyond the literature review.
- (27) No structures or inhabited dwellings would need to be removed for this project.
- (28) Wind farm construction traffic is expected to impact local roads and bridges. The pavement condition of the state, county, and township roads along the regional delivery route could be impacted by construction and material delivery equipment. Truck loads heavier than the state legal limit might impact the existing state, county, and township bridges.
- (29) The large turning radius required for the transport of long wind turbine generator components would cause the truck and/or trailer to travel outside of the existing pavement at intersections. The wide turns would impact the features around most intersections where turns are required, including ditches, signs, and utility poles. In some locations where wide turns are required, temporary alterations to the intersection would be required, including installation of gravel fill outside of the pavement limits as a temporary surface for truck/trailer turns, installation of drainage pipes in these fill locations as an alternate means of drainage, and relocation of utility poles, signs, and other installations.
- (30) Post-construction and operational impacts to roads and bridges should be limited, as the roads would be able to handle any operational or maintenance requirements that the Applicant may need to perform on the wind turbine generator components.
- (31) The Applicant's shadow flicker simulation resulted in 26 non-participating receptors and 29 receptors overall that were anticipated to experience 30 hours or greater per year of shadow flicker. The maximum predicted shadow flicker impact at any receptor was approximately 57 hours per year.

- (32) Air emissions during construction could include nitrous oxides, sulfur dioxide, carbon dioxide, carbon monoxide, lead, particulate matter, and volatile organic compounds. Because of the relatively low volume of emissions and the temporary nature of construction activities, these emissions are not expected to cause significant adverse impacts within or beyond the site boundary. No significant air emissions would result from operation of the proposed facility.
- (33) The Applicant retained Tetra Tech EC, Inc. (Tetra Tech) to conduct the wetland reconnaissance of the project area. Tetra Tech determined 43 wetlands occur within the survey corridor⁶ of the project area. The wetlands are considered freshwater emergent, deciduous forest, and farmed wetlands. Of these wetlands, Tetra Tech considered 31 to be isolated⁷, while 12 would be considered connected to Traditionally Navigable Waters (TNWs)⁸. Vernal pools were observed in three forested wetlands (AWAR016, AWAR021, and AWAR023). The U.S. Army Corps of Engineers (USACE) has not verified the resources as either "waters of the U.S."⁹, isolated wetlands, or non-jurisdictional features. Many of the isolated wetlands are located within active agricultural fields. It was further determined that 15 of the wetlands would be located near proposed access roads or turbine locations. To avoid impacts to wetlands, the Applicant plans to locate access roads, buried utility lines, and turbines away from wetlands, wherever practical. Additionally, horizontal directional drilling (HDD) would be used for installing collection lines, and best management practices (BMPs) would be incorporated into construction activities.
- (34) A total of 59 streams were observed within the survey corridor during field investigations by Tetra Tech. Many of these watercourses are tributaries to the Scioto River, with a few draining to the Great Miami River. Tetra Tech determined that 11 streams have a perennial flow regime, while 32 have intermittent and eight ephemeral flow regimes, respectively. Tetra Tech was unable to determine the flow regime for eight additional streams. The proposed facility would directly impact 16 streams for a total of 568.6 linear feet (0.099 acres) from culverts for new access roads and temporary gravel roads. As previously stated, the USACE has not yet verified these resources as waters of the U.S. These streams may require culvert crossings or bridge rehabilitations below the ordinary high water mark

⁶ *Survey corridor* refers to the physical extent in which Tetra Tech conducted ground-level reconnaissance of wetlands and waters of the U.S. and waters of the state. The reconnaissance was conducted to verify the presence and approximate extent of such features within the area that could be directly disturbed for construction or operation of the project. The survey corridor is smaller than the project area, but larger than the area that would likely be disturbed during construction and operation of the facility.

⁷ *Isolated wetland* means a wetland that is not subject to regulation under the Federal Water Pollution Control Act. Resources determined to be isolated by the USACE are subject to Ohio EPA 401 permitting, if impacted, under the provisions of the Ohio Isolated Wetland Rules outlined in ORC 6111.02-.028.

⁸ Traditionally Navigable Waters (TNWs) are the same as "Navigable Waters of the United States", those waters that are subject to the ebb and flow of the tide and/or are presently used, have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the waterbody, and is not extinguished by later actions or events that impede or destroy navigable capacity (see 33 CFR 329).

⁹ Waters of the United States include those waters listed in §328.3(a). The lateral limits of jurisdiction in those waters may be divided into three categories, including the territorial seas, tidal waters, and non-tidal waters (see 33 CFR 328.4 (a), (b), and (c), respectively). Water resources considered by the USACE as waters of the U.S. are subject to USACE 404 permitting if impacted below OHWM.

(OHWM)¹⁰ of these streams. Potential temporary impacts include the loss of riparian habitat, erosion, and downstream sedimentation. All collection lines would be installed using HDD technology at stream crossings to avoid direct impacts to these resources.

- (35) Potential access roads have generally been located so as to avoid direct impacts to streams and wetlands. Existing stream crossing sites (e.g., farm lane culverts) would be used where avoidance is not possible. All temporary stream crossings would be removed following construction, though permanent crossings would remain at some locations for future access. Following construction, access roads would either be narrowed down to shorter widths or removed entirely and the surrounding area would be restored.
- (36) Approximately 1160 acres of land cover vegetation community types would be temporarily converted by this project, including cultivated crops; hay/pasture; developed, open space; deciduous forest; herbaceous; and developed, low density. Approximately 120 acres of these land cover vegetative types would be permanently converted. This disturbance would include clearing for construction of the substation, staging areas, access roads, electric collection system, and placement of the turbines. Vegetation would be cleared within a 200-foot radius or less around most turbine sites, and a 30-foot wide corridor would be cleared for portions of the electric collection system right of way. Since most of the facility is proposed to be located in agricultural fields or other areas lacking trees, only limited tree removal is expected. The Applicant estimates a total of 1.7 acres of deciduous forested area would be cleared to accommodate various project components. None of the trees proposed for removal exhibit suitable summer roosting or rearing habitat for Indiana bats (Myotis sodalis). The Applicant would have an environmental specialist on site at all times during construction, including during tree removal, in order to evaluate all trees proposed for removal and to ensure that summer roosting or rearing habitat trees for the Indiana bat are avoided. If such trees are encountered, the Applicant would relocate facilities rather than cut the trees. The potential impacts of tree removal include the loss of food and habitat for wildlife, increased potential for erosion and sedimentation, and aesthetic impacts. addition, impacts of tree clearing near streams may include an increase in water temperature and a decrease in dissolved oxygen.
- (37) The Applicant requested information from the U.S. Fish and Wildlife Service (USFWS), Ohio Ecological Field Office, and the ODNR-Division of Natural Areas and Preserves (DNAP) regarding state and federally listed plant and animal species on October 20, 2008. Additionally, during field assessments of the study area, the Applicant identified state listed species. The following are the results of the data requests and field assessments:
 - (a) Plants: The USFWS has indicated that this project does not lie within the known range of any federally listed plant species. The ODNR-DNAP did not find plant records in the Natural Heritage Database within one mile of the project area. However, the Applicant identified the presence of the state threatened short-fringed sedge (*Carex crinita var. brevicrinis*), the state endangered spike-rush (*Eleocharis sp.*), and knotroot bristle grass (*Setaria parviflora*). Knotroot bristle grass was recently added to the

¹⁰ The term *ordinary high water mark* (OHWM) refers to the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas (see 33 CFR 328.3 (e)).

ODNR-DNAP Rare Native Ohio Plants 2008-2009 Status List. Species designated as "added" have been recently included in the Division's rare plant inventory and sufficient information is not yet available to assign an endangerment status of endangered, threatened, or potentially threatened. The *Carex* and *Eleocharis* species were only found in wetlands. Because all wetlands would be avoided, there would not be an impact to these species. However, the *Setaria* species could be impacted by this project due to the presence of suitable habitat within the survey corridor of the project area. The Applicant would perform a survey within the survey corridor prior to construction to determine the presence of this species. All populations of this species would be marked for avoidance.

- (b) Birds: The USFWS indicated that this project lies within the known range of the bald eagle (Haliaeetus leucocephalus), a state endangered and federal species of concern. Due to the project type, location, and lack of nests within one mile of the project, no impacts to this species would be expected. The ODNR-DNAP did not find listed avian species records in the ODNR Natural Heritage Database within a mile of the project. To assess the potential for the project to impact avian species, the Applicant consulted with the ODNR-Division of Wildlife (DOW) and the USFWS to develop an adequate pre-construction avian surveying plan. The surveying plan included breeding bird, raptor nest, passerine migration, diurnal bird/raptor migration, and sandhill crane migration. These field surveys were subsequently conducted during 2008 and 2009. The Applicant identified, through limited sightings, the presence of two state endangered species, the northern harrier (Circus cyaneus) and sandhill crane (Grus canadensis). The short-eared owl (Asio flammeus), a state species of concern, was also observed during field investigation. The final findings of the avian surveys have been provided to the ODNR and the USFWS but have not been reviewed by OPSB Staff. As a result, it is not known if significant impacts would occur to bird species. The Staff will coordinate review of these surveys prior to construction.
- (c) Reptiles and Amphibians: The USFWS indicated that this project lies within the known range of the state endangered and federally threatened copperbelly watersnake (*Nerodia erythrogaster neglecta*) and the eastern massasauga rattlesnake (*Sistrurus catenatus*), a state endangered and federal candidate species. Due to the project type, location, and lack of suitable on-site habitat, these species would not be located within the project area, and no impacts to these species are expected.
- (d) Mammals: The USFWS indicated that this project lies within the known range of the state and federally endangered Indiana bat (*Myotis sodalis*). The Applicant has indicated that no suitable summer roosting or rearing habitat would be removed as a result of this project and no known or suspected hibernacula are located within 10 miles of the project. Based on this information, the USFWS has determined that "take"¹¹ would not occur on construction phase one pursuant to the Endangered

¹¹ Take is to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct [ESA §3(19)]. *Harm* is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. *Harass* is defined by the USFWS as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering [50 CFR §17.3] (USFWS, 1998).

Species Act Section 9 provisions. However, a positive capture record of a male Indiana bat occurred within five miles of construction phase two. The positive record indicates an increased likelihood that Indiana bats may occur within the project boundaries, and could be at risk from the project. To assess the level of take of the species, the Applicant consulted with the ODNR-DOW and the USFWS to develop an adequate pre-construction surveying plan. The surveying plan was conducted during 2008 and 2009 to assess the presence of Indiana bats. The survey included bat acoustic and mist-netting surveys. Based on the results of these surveys, the USFWS might conclude that the potential for "incidental take"¹² does exist due to the presence of the species within the surrounding area. This action would result in the Applicant initiating formal consultation under provisions of Section 7 or Section 10 of the Endangered Species Act with the USFWS for construction phase two. The USFWS would provide a Biological Opinion (BO) as a result of this action. The conditions set forth in the BO would be a recommended condition of construction phase two.

- (e) Aquatic Species: The USFWS has indicated that this project lies within the known range of the state and federally endangered clubshell mussel (Pleurobema clava) and the rayed bean mussel (Villosa fabalis), a state endangered and federal candidate species. The ODNR-DOW has determined that this project is within the known range of the state endangered purple lilliput (Toxolasma lividus) and the state threatened pondhorn (Uniomerus tetralasmus) mussel species. The Applicant has performed a cursory review at proposed culvert locations for threatened or endangered (T/E) freshwater mussel species. No T/E species were observed during field investigations. However, the Applicant did observe common species of mussels, both live and dead, at the culvert locations. The Applicant has not performed a presence/absence survey in stream segments where underground collection lines would be directionally bored. It is not known at this time if T/E and/or common species of freshwater mussels exist or would be impacted by this project due to culvert placement or potentially from any frac-out during directional boring. In an effort to avoid impacts to mussels, the Applicant plans to perform a presence/absence survey of the stream locations where culverts and collection system cables are crossing to evaluate the potential of impacts to all mussel species, including T/E and common species. If mussels are observed, mussels would either be relocated or components of the facilities would be moved to stream segments void of mussels to avoid impacts.
- (f) The project area is largely comprised of agricultural land and therefore provides limited unique and/or high quality wildlife habitat. However, segments of the project do contain habitats likely to support common reptilian, amphibian, avian, mammalian, and aquatic species. These species would likely be impacted, both directly and indirectly, during the construction, operation, and maintenance of the proposed facility. Faunal impacts would include the loss of habitat, increased habitat fragmentation, increased disturbance (i.e., noise, lighting, human activity), and temporary and permanent displacement. In addition, operational impacts are expected to include bird and bat

¹² *Incidental take* is the take of listed fish or wildlife species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by a Federal agency or applicant [50 CFR §402.02] (USFWS, 1998).

mortalities through direct strikes. Furthermore, mortality to bats may also occur from barotraumas¹³.

- (38) According to the Applicant's communications study, the television stations most likely to produce off-air coverage to Hardin County are those at a distance of 40 miles or less. The study identified 17 fully-operational stations within 40 miles. Specific impacts to TV reception could include noise generation at low channels in the very-high frequency (VHF) range within one-half mile of turbines, and reduced picture quality. However, the transition to digital signal has reduced the likelihood of these effects occurring.
- (39) The closest AM station antenna is approximately 17.70 miles from the planned center of the project area. The distance to the nearest wind turbine is greater than 2 miles. As such, no degradation of AM broadcast coverage due to the presence of the wind turbines is anticipated.
- (40) There are records of 61 FM stations within a 30-mile radius of the project area center point, of which 34 are licensed and operational. As they are located more than 2.5 miles from the wind farm, no impact is expected.
- (41) The Applicant identified eight microwave paths in the vicinity of the project area. Based upon the calculated worst-case scenario and subsequent analysis, it was determined that turbines 38 and 180 have the potential to interfere with microwave transmission.
- (42) Wireless telephone network communications should be unaffected by wind turbine presence and operation.
- (43) The Applicant submitted written notification to the National Telecommunications and Information Administration (NTIA) of the U.S. Department of Commerce on May 19, 2009. The Applicant received a response letter from NTIA on July 9, 2009. No concerns regarding blockage of communication systems were identified by the NTIA. However, the need to coordinate with the Federal Aviation Administration (FAA) by filing FAA Form 7460-1, "Notice of Proposed Construction or Alteration" was prescribed. The turbine layout and proposed turbine coordinates have changed since the May 19, 2009 NTIA submittal and as such, the Applicant would have to re-submit to the NTIA for review.
- (44) The proposed facility would be decommissioned once it is no longer operational. Decommissioning is generally a reversal of previous construction actions and includes the dismantling and removal of all towers, turbine generators, transformers, and overhead cables; removal of underground cables; removal of foundations, buildings, and ancillary equipment; removal of surface road material; and restoration of the roads and turbine sites to the same physical condition that existed immediately prior to erection of the commercial wind-powered electric generating facility. The Applicant has proposed the posting of a bond or equivalent financial security prior to any construction activities to ensure that funds are available to complete decommissioning. The Applicant further proposes that the

¹³ *Barotraumas* are any of several injuries arising from changes in pressure upon the body. Most body tissue is either solid or liquid and remains virtually unaffected by pressure changes; in certain cavities of the body, however, such as the ears, sinuses, lungs, and intestines, there are air pockets that either expand or contract in response to changes in pressure. Abrupt expansion or contraction of closed internal air spaces can injure or rupture surrounding tissues, such as the eardrum (Encyclopedia Britannica, 2009).

amount of the financial security will cover decommissioning costs less the salvage value or resale value of the wind turbines and related equipment.

- (45) The Applicant expects the overall capital cost of the project to be between \$1,800 and \$2,200 per kilowatt (kW) of installed capacity, or \$540 million to \$660 million for the proposed 300 MW project. The capital costs would all be incurred within 1-2 years of the start of construction and would include development costs, wind farm design, project planning, equipment procurement, and construction. The Applicant estimates that annual O&M costs for the wind farm would range from \$7 million to \$10 million, not including taxes, costs for land leases, and inflation increases.
- (46) The construction payroll is expected to range between \$173 million and \$211 million. The Hardin project would require an average of 150 construction workers over a nine to 12-month period, with peak construction employing 200 to 250 construction workers. The operations staff would consist of a site manager, an administrative assistant, and one technician for every 10 wind turbines.

Recommended Findings

The Staff recommends that the Board find that the nature of the probable environmental impact has been determined for the proposed facility, and therefore complies with the requirements specified in ORC Section 4906.10(A)(2), provided that any certificate issued by the Board for the proposed facility include the conditions specified in the section of this report entitled Recommended Conditions of Certificate.

Considerations for ORC Section 4906.10(A)(3)

Minimum Adverse Environmental Impact

Pursuant to ORC Section 4906.10(A)(3), the proposed facility must represent the minimum adverse environmental impact, considering the state of available technology and the nature and economics of the various alternatives, along with other pertinent considerations.

Site Selection

The Applicant received a waiver from providing a comprehensive site selection study due to the specific requirements of a wind-powered electric generating facility. As an alternative, the Applicant provided a general discussion that addressed the factors deemed necessary for a viable wind project. Statewide wind resource data from AWS Truewind was evaluated to determine areas with sufficient wind resources. The following additional factors were evaluated in order to identify possible development sites: transmission availability, compatible land use, and interest from land owners. The Applicant identified several potential sites through this process. The selected site was chosen as the result of receiving positive feedback from local landowners and community leaders. The project area appeared to have minimal environmental constraints, and positive results from initial transmission studies suggested that the project could be connected to the electric grid at the chosen site.

Additional considerations were incorporated in the siting of individual wind turbines within the proposed project area. The Applicant installed three meteorological towers, in June 2008, February 2009, and April 2009, to provide a more accurate measurement of the wind resources in the project area. The Applicant identified and implemented setback requirements for residences, property lines, public rights-of-way, and other features. Additionally, the Applicant evaluated construction and operational noise levels, visual effects, ice throw, blade shear, shadow flicker, impacts to local fauna, flora, and wetlands, as well as effects on local roads, cultural resources, and agricultural lands.

On November 6, 2009, the Applicant supplemented its application with OPSB. In this supplement, 10 wind turbine locations were added to the project layout and evaluated using the aforementioned criteria.

Ecological Impacts

Wetlands

The Applicant identified numerous wetlands in close proximity to proposed construction activities such as placement of access roads, buried collection lines, or turbines. To avoid direct impacts to these wetlands, to the maximum extent practicable, the Applicant would locate associated access roads, collection lines, and turbines away from all wetlands. Additionally, HDD and BMPs would be utilized during construction.

HDD would be utilized for installing the underground electric collection system under wetlands. Potential wetland impacts associated with HDD would include disturbances around the bore pits and impacts from potential frac-outs.¹⁴ In order to minimize impacts during HDD, the drilling equipment would be set up outside of each wetland's upland buffer areas and the drilling activity would be closely monitored for signs of frac-outs. The Applicant will also submit a detailed frac-out contingency plan for Staff review and approval.

The BMPs would include marking wetlands for avoidance in advance of construction to prevent material storage or vehicle traffic within wetlands, and installing erosion and sedimentation controls around wetlands to prevent disturbance, including sediment runoff, during construction. As a result of these avoidance measures, OPSB Staff believes that no wetlands will be directly impacted by the construction and operation of the proposed facility.

Streams

As previously discussed, the Applicant would directly impact 16 streams for a total of 568.6 linear feet (0.099 acres) from culverts for new access roads and temporary gravel roads in two construction phases. In consultation with the USACE, Huntington District, Energy Section, the Applicant will submit Pre-construction Notifications (PCNs) separately for two construction phases. These planned stream impacts would be authorized under provisions of the USACE 404 Nationwide Permitting Program (NWP#12-Utility Line Activities).

Vegetation would be removed from the banks of some streams in the project area, though riparian tree and shrub clearing at these locations would be minimized, where possible. Environmental impacts associated with vegetation clearing near streams include the loss of riparian habitat, erosion, and downstream sedimentation. BMPs such as installing silt fencing and/or straw bales around the work site would be utilized to minimize erosion and downstream sedimentation near impacted streams. Within areas cleared for construction near streams, tree stumps would be left in place to help maintain soil stability.

The Applicant would avoid and minimize direct impacts to all other streams located within the survey corridor to the maximum extent practicable by utilizing HDD technology for installation of buried collection lines and incorporating BMPs into construction and maintenance activities as described in the wetland section above.

Tree Removal

The proposed project area is largely agricultural, so tree removal would be minimal. The Applicant estimates a total of 1.7 acres of deciduous forested area would be cleared to accommodate various project components. Of the approximately 20,000 acres under lease, the 1.7 acres represents less than 0.01 percent. The Applicant's efforts in early stages of project development helped to minimize potential tree clearing associated with the project.

Wildlife

The project area is largely comprised of agriculture land cover, and therefore provides limited unique and/or high quality wildlife habitat. However, segments of the project area do contain habitats likely to support common reptilian, amphibian, avian, mammalian, and aquatic species.

¹⁴ Frac-outs occur when drilling lubricants used during the drilling process escape through fractures in the underlying material. The HDD procedure typically uses bentonite slurry, a non-toxic, fine clay material, as a drilling lubricant. Benthic invertebrates, aquatic plants, and fish and their eggs can be smothered by the fine particles if bentonite were discharged to waterways.

These species would likely be impacted, both directly and indirectly, during the construction, operation, and maintenance of the proposed facility. Faunal impacts would include the loss of habitat, increased habitat fragmentation, increased disturbance (i.e., noise, lighting, human activity), and temporary and permanent displacement. In addition, operational impacts are expected to include bird and bat mortalities through direct strikes. Furthermore, mortality to bats may also occur from barotraumas.

The Applicant conducted extensive bird and bat pre-construction surveys during 2008 and 2009 in coordination with the ODNR and the USFWS. The final findings of the avian surveys have been provided to the ODNR and the USFWS but have not been reviewed by OPSB Staff. As a result, it is not known if significant impacts would occur to bird species. The Staff will coordinate review of these surveys prior to construction and establish any necessary avoidance, minimization, and mitigation measures. With regard to the Indiana bat (*Myotis sodalis*), the Applicant has consulted with the USFWS and ODNR to determine the level of impact to this species. The USFWS has concluded that an "incidental take" may occur in phase two of this facility. As a result of all coordination efforts with the ODNR-DOW and the USFWS, impacts to all bat species would be minimized by the Applicant's efforts to locate the overall project footprint so as to avoid many of the more environmentally sensitive areas, including wooded areas, streams, and wetlands.

Any avoidance, minimization, and mitigation measures taken to address potential impacts to Indiana bats may also decrease the likelihood of impacts to other species of bats. Of the 20,000 leased acres for this project, approximately 120 acres of land disturbance would be permanent as a result of this project. Therefore, the vast majority of the project area would retain its current vegetative cover, helping to reduce the potential impact to the area's existing wildlife.

A cursory review for mussels within the survey corridor was performed. If mussels are present at locations of potential disturbance, they can be avoided by relocating the mussels or adjusting the location of access roads, collection lines, or turbines that could adversely impact the streams they inhabit.

Geology

Glacial till can be variable in composition, and this may lead to differential settlement of the foundation bases if not accommodated in the design. Due to the presence of glacial till and the possibility of karst formations in the project area, geotechnical investigations will be done to ensure structural capability to support the wind turbines.

The Applicant has reviewed the *Soil Survey of Hardin County* to evaluate the soil suitability of the project area for wind farm development. Based on the Applicant's review, these soils have specific limitations due to a shallow saturated zone, soils being clayey in nature, low strength, frost action, cutbanks caving, and shrink swell potential. The Applicant will take these soil limitations into account during final design to deal with moisture fluctuations.

The Applicant has reviewed the seismic map of the project area. A seismic zone around Anna, OH, is located approximately 30 miles SW of the project area. However, the region experiences infrequent earthquakes. Approximately 40 earthquakes have been recorded in this seismic zone since 1875. Moderately damaging earthquakes occur in this zone every two or three decades, and smaller earthquakes are felt two to three times each decade. Most of these events caused no

damage or injuries, although 15 of these resulted in property damage and some minor injuries. The Applicant will evaluate data from the seismographic monitor in Anna, OH, to ensure that the designs of the wind turbine foundations take into account potential risks from seismic events.

Socioeconomic Impacts

Land Use

The project is not expected to have any significant impact to existing land use within the project area. The facility is located in an agricultural area and all agricultural activities could continue upon completion of the facility. Impacts to farmland would be minimized by constructing access roads along crop edges and parallel to crop rows. The Applicant states that all damaged drainage tiles from construction activities would be repaired, all construction debris would be removed, and landowners would be compensated for lost crops. While there are five recreational areas within five miles of the project area, impacts would be limited to noise and aesthetics and would be minimal as the closest turbine to a recreational area is over one mile.

ORC Section 4906.20(B)(2) established minimum setbacks for "economically significant wind farms". The Board incorporated these minimum setback requirements in rule (OAC Section 4906-17-08(C)(1)(c)), and indicated that such minimum setbacks would be applied to all wind projects under its jurisdiction.

The minimum distance from the turbine's base to the property line of the wind farm property must be at least 1.1 times the total height of the turbine as measured from its base to the tip of the blade at its highest point. Assuming a maximum turbine height of 398 feet as proposed in the application, this property line setback equates to a distance of 438 feet. The Applicant designed the turbine layout using a 1.5 multiplier for the property line setback, which yields a setback of 597 feet and exceeds the statutory requirement.

The minimum distance from a wind turbine to the exterior of the nearest habitable residential structure located on an adjacent property at the time of the certification application must be no less than 750 feet in horizontal distance from the tip of the turbine's nearest blade at ninety degrees to the structure. Using maximum blade lengths of 135 feet as presented in the application, this minimum setback calculates to 885 feet. The Applicant designed the turbine layout using a 1,000-foot setback from all residences, whether participating or not, which exceeds the statutory requirement.

The Applicant designed the wind farm layout using greater setbacks than the minimums required by rule. In addition, the Applicant's setbacks meet or exceed all of the turbine manufacturer's setback guidelines. The Applicant's setbacks, along with other avoidance and mitigation measures, help to minimize the impacts of this project.

Cultural and Archaeological Resources

The Applicant included an assessment of impacts to known cultural resources within five miles of the project area. To date, the Applicant has limited its assessment of impacts to cultural resources to a database or literature review of previously recorded elements. The Applicant did preliminary field investigation and sensitivity modeling of the project area. This modeling analyzed soil types, environmental zones, and prior archaeological studies. Based on this modeling, the Applicant states that areas around the village of McGuffey have potential for the presence of undocumented archaeological resources. The Applicant also suggests from this modeling that an area of potential effect (APE) should be established and further impact studies for this project should be performed based on the defined APE.

The Applicant asserts that proposed turbine locations, access roads, and collection lines were designed to minimize construction impacts on potential historic sites. To date, Staff is not aware of any results from additional archaeological testing beyond the literature review performed by the Applicant.

The Applicant identified 72 schools within five miles of the project. Roughly 80 percent of those school resources were further identified as "historical". Staff recommends that any additional archaeological and architectural survey work conducted by the Applicant include an analysis specifically dedicated to this structure type.

Staff agrees that the proposed placement of the turbines, access roads, and collection lines seems to avoid previously recorded cultural resources. Staff concurs with the Applicant's assessment that, prior to the commencement of construction, further survey work is needed to address the potential presence of cultural resources in areas that have not been previously surveyed. Specifically, a shovel testing program should be developed for further archaeological testing at turbine locations, the substation site, construction staging area(s), access roads, and collection lines. An architectural survey program also should be designed for the project area, and should include historical school locations as identified in the application. The Applicant has indicated that both a Phase I archaeology study and a historic architecture report for this project were ongoing, but as of yet are inconclusive.

Public Services

The Applicant states that existing roads should be adequate to handle the increase in traffic during construction. Some traffic management may be necessary during construction. However, the Applicant does not anticipate the need for road closures or detours. The Applicant would obtain all necessary permits from the Ohio Department of Transportation (ODOT) and the Hardin County Engineer prior to construction.

Because local emergency responders would likely be unfamiliar with addressing emergencies related to wind turbines, the Applicant would coordinate and develop a fire protection and medical emergency response plan in consultation with the fire department that has jurisdiction over the project area.

The electric collection system for the wind farm would be buried underground at a depth of four feet. By law, anyone with underground facilities must be a member of a one-call system such as the Ohio Utilities Protection Service (OUPS). The OUPS establishes a communication link between the wind farm owner and individuals planning any digging activity. The owner of the buried facilities is required to mark underground lines before any digging or excavation work begins.

Public and Private Water Supplies

The Applicant has stated that no impacts to public or private water supplies are anticipated due to construction of the Hardin Wind Farm. The Applicant would conduct spill response training as needed to limit potential for impact. The Applicant would also use prudent design including, but

not limited to, the use of containment structures for oil and chemicals used during construction and operation. Staff also recommends compliance with any drinking water source protection plans if these have been developed by the villages of Alger or McGuffey. Compliance with these control mechanisms minimizes the potential impact to public and private water supplies.

Roads and Bridges

Two preliminary regional delivery routes have been developed for the transportation of wind turbine generator components to the project area. One is by vehicle using Interstate 75 to the west of the project area to State Route 309 to the northern vicinity of the project area. The second consists of using the Hardin Rail Logistics Center near Dunkirk, OH, to the north of the project area, then using Township Road 125 to State Route 701 to County Road 95 or to State Route 195, County Road 95, Township Road 95, and County Road 10.

Most of the pavement on the county and township roads is in good condition. However, approximately half of the area lies within the Scioto Marsh, a former wetland area that was drained in the 1800's to allow for farming. According to the Hardin County Engineer, it is difficult to keep a stabilized pavement due to poor support from the high organic muck soil in the area.

The Applicant, working with the Hardin County Engineer, will prepare analyses that show whether the existing pavement on the county and township roads have the capacity to support any permit loads, or loads heavier that the state legal loads. The County will require the developer to obtain roadway pavement cores and perform an engineering analysis to determine the allowable load capacity of the road, and to determine the required road capacity based on the permit loads. This analysis will have to be approved by the County.

According to the Hardin County Engineer, six bridges are currently posted for allowable loads less than the state legal loads. The County will be reviewing the allowable loads of some of their bridges after the annual bridge inspections are completed this year.

Along the regional routes, the wide turns required for equipment delivery would impact the features around most intersections where turns are required. The features that would be impacted include ditches, signs, and utility poles. In some locations where wide turns are required, temporary alteration of the intersections would be required, including installation of gravel fill outside of the pavement limits as a temporary surface for truck/trailer turns, installation of drainage pipes in these fill locations as an alternate means of drainage, and relocation of utility poles, signs, and other installations. These alterations would be removed and the areas around the intersections would be restored to previous conditions after construction.

Some local roads also have bumps, hills, and dips that may cause vertical interference with the transport of some of the wind turbine components. These grade variations may exceed the turbine manufacturer's requirement that no more than a 6-inch bump or dip in 50-feet of pavement is allowable for access roads.¹⁵ The Applicant will perform a survey of the local delivery routes to determine the locations of bumps, crests, and dips that would interfere with the transport of wind turbine generator components and either re-route the components or modify the roadway so that the vertical interference is eliminated.

¹⁵ GE Energy. Commercial Documentation, Wind Turbine Generator Systems, GE 2.5xl, American Units Only.

Construction Noise

Noise impacts from construction activities would include the operation of dozers, front end loaders, graders, excavators, pile driving equipment, concrete pumps, various trucks, and cranes. Prior to conducting particularly noisy construction activities such as blasting, if necessary, the Applicant intends to provide advance notice to affected landowners. The Applicant has made conservative estimates of sound levels associated with operation of this construction equipment, and included those estimates in its application. Although the Applicant intends to use BMPs for noise abatement during construction, many of the construction activities would generate significant noise levels. However, Staff believes that the adverse impact of this noise would be minimal because of the transient nature of the construction activities, the distance of the activities from most residential structures, and the limitation of most construction activities to normal daytime working hours.

Operational Noise

The Applicant retained Acentech, Inc. to conduct noise studies of potential impacts from operation of the facility. Acentech utilized CadnaA computer noise modeling software to perform acoustic modeling. CadnaA performs calculations using international standards ISO 9613-1 and ISO 9613-2 for industrial sources. Acentech analyzed octave bands with the standard center frequencies of 31.5, 63, 125, 250, 500, 1000, 2000, 4000, and 8000 hertz (Hz) to develop the wind turbine sound estimates.

The Applicant states that operational sound output (L_{EQ}) for the project would be 20-47 dBA at residences within one mile of the project area. However, as indicated by the Applicant in a response to data requests, with lower temperatures (zero degrees Celsius) and a lower ground absorption coefficient (0.0, or frozen ground), the sound level of the project may actually exceed 47 dBA, possibly reaching 50 dBA at some residences. As the ground does freeze in Ohio, this is a possible scenario and a conservative approach would be to take the 50 dBA maximum output as realistic.

Some atmospheric conditions can also further propagate or amplify sound. Two examples are wind shear and temperature inversions. Wind shear occurs when the winds aloft near the top of the wind turbine are moving faster or in a different direction than the wind near the ground. Wind turbulence, or wakes from adjacent turbines, can also create wind shear. This shear can result in aerodynamic modulation, a rhythmic noise pattern, or pulsing, which occurs as each blade passes through areas of different wind speed/direction.

A temperature inversion occurs when the coolest temperatures are next to the ground and increase with height. Temperature inversions most often happen when the ground cools off quickly, while the air above the ground remains warm. As the temperature increases with height, the speed of sound also increases with height. This means that for a sound wave traveling close to the ground, the part of the wave closest to the ground is traveling the slowest, and the part of the wave farthest above the ground is traveling the fastest. As a result, the wave changes direction and bends downwards. This downward refraction of sound helps to further propagate otherwise attenuated sound.

The noise impact of the wind farm also depends on the existing ambient noise level of the project area. The Applicant conducted baseline sound measurements at four points from November 10 to December 1, 2009, in order to estimate the actual ambient noise levels in the project area.

Fifteen percent of the data was excluded from the results due to precipitation events. All noise measurements were taken with a calibrated real-time sound analyzer fitted with a windscreen. The results indicate a daytime ambient noise level (L_{EQ}) range of 39.9 dBA in calm wind conditions to 43.4 dBA with winds at eight meters per second (m/s) at hub height. The measured night L_{EQ} ranged from 30.7 dBA in calm wind conditions to 38.4 dBA with winds at eight m/s. The measured ambient L_{90} ranged from 30.9 to 36.8 dBA during the day and 27.5 to 33.5 dBA at night.

A 2001 New York State Department of Environmental Conservation (NYSDEC) document¹⁶ notes that, in non-industrial settings, the ambient noise level at any given receptor should probably not be exceeded by more than 6 dBA, and an increase of 6 dBA may cause complaints. The NYSDEC recommends that, while it may be acceptable in some non-industrial settings, an increase in ambient noise levels of greater than 6 dBA warrants further study of potential impacts.

The Applicant has proposed to establish a hotline to receive and formally document all noise complaints, which would then be investigated by on-site project staff. The investigation would include a review of equipment performance to determine if sound levels fall outside the normal tolerances. Appropriate mitigation efforts would be undertaken, including the potential shut down of wind turbines that were found to cause excessive noise levels until an adequate solution could be reached.

Aesthetics

The project is expected to have a long-term aesthetic impact on residences near the facility. The project would be visible from many of the residences in the project area. All of the turbines in the project area are outside of the minimum residential setback of 885 feet and the minimum property line setback of 438 feet, as calculated from statutory requirements. The Applicant has increased the property line setback to 1,000 feet, which would help to minimize the aesthetic impact. Screening the turbines from view is not a practical mitigation measure in most cases and visual impacts would be unavoidable.

Shadow Flicker

The Applicant hired Tetra Tech to conduct a shadow flicker analysis. Tetra Tech used WindPRO to calculate how often and in which intervals a specific receptor could be affected by shadows generated by one or more wind turbines. The calculation of the potential shadow impact at a given shadow receptor, defined as a one-meter² area located one meter above ground level, is carried out by simulating the environment near the wind turbines and shadow receptors. The position of the sun relative to the turbine rotor disk and the resulting shadow is calculated in time steps of one minute throughout a complete year. If the shadow of the rotor disk, which in the calculation is assumed solid, at any time casts a shadow on a receptor, then this step will be registered as one minute of potential shadow impact. These calculations took into account the wind turbine location, elevation, and dimensions, and the receptor location and elevation.

A wind turbine's total height and rotor diameter were included in the WindPRO shadow flicker models submitted by Tetra Tech. The higher the turbine, the more likely shadow flicker could

¹⁶ NYSDEC. (February 2, 2001). Assessing and Mitigating Noise Impacts. Albany, New York. Retrieved from the NYSDEC Web site: http://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf

have an effect on the local receptors, as the ability to clear obstacles such as trees or hills is greater. The larger the rotor diameter, the more area on the ground could be affected by shadow flicker. Dimensions for the wind turbine models proposed for the Hardin Wind Project, and used for this study, are shown below.

<u>Turbine Model</u>	Rated Capacity (MW)	<u>Hub Height (M)</u>	<u>Rotor Diameter (M)</u>	<u>Blade Tip Height (M)</u>
General Electric XLE	1.5 / 1.6	80	82.5	121.5

Reductions based on turbine operational time, operational turbine direction, and sunshine probabilities were then used to calculate a realistic amount of shadow flicker to be expected at each shadow receptor. Additional screening factors were considered for receptors expected to receive greater than 30 hours of shadow flicker exposure. No state or national standards exist for frequency or duration of shadow flicker from wind turbine projects. However, international studies and guidelines from Germany and Australia have suggested 30 hours of shadow flicker per year as the threshold of significant impact, or the point at which shadow flicker is commonly perceived as an annoyance. This 30-hour standard is used in at least four other states, including Michigan, New York, Minnesota, and New Hampshire.

The Applicant simulated shadow flicker from the proposed turbines out to 1,500 meters. Shadow flicker beyond one kilometer from a turbine in northern latitudes such as Ohio can occur seasonally at sunrise and sunset when lower sun elevation angles occur. The Applicant states that any shadow flicker beyond one kilometer would be low-intensity shadow flicker.

The Applicant identified 964 sensitive receptors for shadow flicker within 1,500 meters of a turbine. The shadow simulation resulted in 26 non-participating receptors and 29 receptors overall which were anticipated to experience 30 hours or greater per year of shadow flicker. The maximum predicted shadow flicker impact at any receptor was approximately 57 hours per year. Staff recommends requiring a similar shadow flicker simulation out to 1,000 meters, and avoidance of greater than 30 hours of annual exposure at all receptors within 1,000 meters. If complete avoidance is not practicable, mitigation measures should be taken to minimize the impact to affected receptors.

Shadow flicker frequency is related to the wind turbine's rotor blade speed and the number of blades on the rotor. The British Epilepsy Foundation has recommended that wind turbine frequency be limited to 3 Hz as to avoid possibly triggering seizures. Epilepsy affects more than three million Americans. For about 3 percent of them, exposure to flashing lights at certain intensities or to certain visual patterns can trigger seizures. This condition is known as photosensitive epilepsy. The frequency or speed of flashing light that is most likely to cause seizures varies from person to person, but flashing lights most likely to trigger seizures are between the frequency of 5 to 30 Hz.¹⁷ This project's nominal rotor speed translates to a blade pass frequency of approximately 0.90 Hz, and therefore would not be likely to trigger seizures.

¹⁷ Epilepsy Foundation of America. Retrieved Dec. 21, 2009, from Epilepsy Foundation Web site: http://www.epilepsyfoundation.org/about/photosensitivity/

Communication Interference

The television reception analysis identified all off-air television stations within a 100-mile radius of the approximate center point of the proposed facility. Off-air television stations transmit broadcast signals from terrestrial facilities. The signals can be received directly by a television receiver or house-mounted antenna. The Applicant states that the television stations most likely to produce off-air coverage to Hardin County are those at a distance of 40 miles or less.

Of the 45 licensed stations identified within 40 miles of the project area, 17 are fully-operational stations which provide television programming to the area. Channels in nearby communities may suffer degradation of off-air television signal reception if the wind turbines are installed. This degradation would be the result of television signal attenuation or reflection caused by one or more of the wind turbines. This affect is due to the relative location of the off-air television broadcast antenna, the wind turbines, and the point of reception.

Some communities may not be affected at all, while others may have multiple channels affected. The Applicant states that based on the location of the proposed project area and the TV stations servicing the area, it does not appear that there would be many communities where a total loss of TV coverage would occur. The Applicant's contractor, Comsearch, has listed two possible mitigation options if an area does suffer from a total loss of TV coverage. The Applicant could offer television hookups, where a cable system is available, or direct broadcast satellite TV reception systems.

Within a 30-mile radius as measured from the approximate center of the project area, there are eight database records representing four AM stations licensed to operate at two transmit power levels. Due to the distance between the stations and the project area, no degradation of AM broadcast coverage is anticipated.

The Applicant states that FM station coverage is not subject to degradation when they are at distances greater than 2.5 miles from wind turbines. All of the stations are located outside of the project area, with the closest station being 9.5 miles from the center of the project.

Microwave telecommunication systems are wireless point-to-point links that communicate between two antennas and require clear line-of-sight conditions between each antenna. Comsearch identified potential microwave interference from turbines 38 and 180. The Applicant has proposed that the location for turbines 38 and 180 be shifted slightly to avoid interference, and states that they are in the process of working with the involved parties to mitigate this impact.

Signal blockage caused by the wind turbines would not degrade the wireless telephone network because of the way these systems are designed to operate. If the signal cannot reach one cell, the network design allows it to be able to reach one or more other cells in the system. As such, local obstacles are not normally an issue for these telephone systems.

In summary, a potential exists for a reduction of television reception and for microwave transmission interference. The Applicant has proposed mitigation measures for both potential impacts.

Local and Long Range Radar Interference

Wind turbines can interfere with civilian and military radar in some scenarios. The potential interference occurs when wind turbines reflect radar waves and cause ghosting (false returns) or shadowing (dead zones) on receiving monitors. Radar interference thus raises national security and safety concerns. Although there exist limited options to completely prevent the degradation of any performance of air defense radar systems, the U.S. Department of Energy believes that practical solutions to radar interference are achievable. In the majority of cases, the U.S. Department of Defense finds that the interference is either not present, is not deemed significant, or can be readily mitigated. Potential interference is highly site-specific and depends on local features, type of radar, and wind farm characteristics. In most cases, radar interference can be corrected with software that deletes radar signals from stationary targets.

Ice Throw

Ice throw is the phenomenon where accumulated ice on the wind turbine blades separates from the blade and falls or is thrown from the tower. The GE xle-series Safety Manual states that GE Energy recommends the use of an ice detector if people or objects are within 150 percent of the sum of the hub height and rotor diameter. For the proposed turbine model, the GE 1.5xle, this distance is 800 feet. The Applicant states that the turbines would have the following safety features that address ice throw: two independent braking systems, a pitch system alarm, ice detection software for the wind turbine controller, automatic turbine shut down at excessive wind speeds, and an ice sensor alarm that triggers an automatic shutdown.

Staff concludes that the Applicant's plan to install the safety control mechanisms and restrict access to authorized personnel, in addition to adhering to minimum setback distances, would sufficiently address the issue of ice throw. Staff would also recommend that public access be restricted with appropriately placed warning signs and that the Applicant would instruct workers of potential hazards of ice conditions.

Blade Shear

Blade shear is the phenomenon where a rotating wind turbine blade, or segment, separates from the nacelle and is thrown a distance from the tower. The Applicant asserts that past incidences of blade shear have generally been the results of human error. Staff has also found that past incidences can be attributed to design defects during manufacturing, poor maintenance, control system malfunction, or lightning strikes. The GE 1.5xle turbines are certified to the Germanischer Lloyd international engineering standards. The specific models under consideration have some technology upgrades and are expected to receive certification in the first half of 2010. Staff has found that the Germanischer Lloyd certification incorporates material safety factors into the blade design. The turbines have the following safety features: two independent braking systems, a lightning protection system, and turbine shut down at excessive wind speeds and at excess blade pitch or stress. Installing and utilizing these safety control mechanisms minimizes the potential for blade shear and associated impacts.

High Winds

Ten years of meteorological data from the Allen County Airport in Lima, OH were compared to 30 years of wind data from the Findlay Airport in Findlay, OH, to determine the maximum average wind speed (the extreme 10-minute average, also referred to as the reference wind

speed), and the 50-year return gust speed (1.4 times the reference wind speed) for the project area. The Applicant analyzed the data, which indicated a reference wind speed of 19.2 meters per second (m/s) or 43 miles per hour (mph), and a 50-year return gust speed of 26.9 m/s or 60 mph. The GE 1.5xle wind turbine is certified by the International Electrotechnical Commission as a Class 3B wind turbine. The Class 3B wind turbine is designed to withstand a reference wind speed of 37.5 m/s or 84 mph, and a 50-year return gust speed of 52.5 m/s or 117 mph, well within the expected maximum wind speeds in the project area.

The Applicant states that the turbines have the following safety features in case of high winds: two independent braking systems, a pitch system alarm, and automatic turbine shut down at excessive wind speeds. The Applicant also designed the wind turbine layout with a residential setback distance of 1,000 feet. Installing and utilizing these safety control mechanisms minimizes the potential impacts from high winds.

Turbine Safety Manual

The GE turbine safety manual covers the following topics: general safety principles, marks, signs and symbols, operator information, signs to be attached by the operator/owner, safety equipment, safety devices, residual risk, safety information for individual plant components, conduct in emergency situations, remaining in and on the wind turbine generator system, information on maintenance and trouble shooting, and power disconnection and isolation procedures. The Applicant has provided a copy of the manufacturer's safety manual for Staff review.

Decommissioning

Megawatt-scale wind turbine generators typically have a life expectancy of 20-25 years. The current trend has been to upgrade older turbines with more efficient ones while retaining existing tower structures. If not upgraded, turbines go into a period of non-operation, where no expectation of re-operation exists, and are generally decommissioned at such time.

Upon decommissioning, the site must be restored and reclaimed to the same general topography that existed prior to the beginning of the construction of the commercial facility, with topsoil re-spread over the disturbed areas at a depth similar to that in existence prior to the disturbance. Areas disturbed by the construction of the facility and decommissioning activities must be graded and re-seeded according to Natural Resource Conservation Service technical guide recommendations and other agency recommendations.

Financial assurance is required for decommissioning. Staff researched approaches in other states, including Minnesota, North Dakota, Pennsylvania, Texas, West Virginia, and Wyoming, and found that all require a performance bond, surety bond, letter of credit, escrow account, corporate guarantee, or other form of financial assurance in order to cover the anticipated costs of decommissioning. This financial assurance is not always required to be in place at the onset of construction. Some states allow five to ten years of operation before financial assurance must be secured for decommissioning, while others require it prior to construction. All states require a third-party engineer, free from financial gain of said projects, to survey and assess decommissioning costs. These engineers are also required to re-assess decommissioning costs at regular intervals. Based on the engineer's report, the company is then required to adjust security amounts accordingly.

All states researched have a set time limit on non-operation. After this specified time limit has elapsed, the company is then required to begin decommissioning. This time limit varies state to state, but is generally 12 to 18 months. If the owner or operator of the commercial wind energy facility does not initiate decommissioning, the state may take necessary action to begin decommissioning, including requiring forfeiture of the financial security. Pennsylvania included a clause that requires the state to approve decommissioning and land reclamation prior to bond release.

The Applicant has proposed the posting of a bond or equivalent financial security prior to the commencement of construction to ensure funds are available to complete decommissioning. The Applicant further proposes that the amount of the financial security will cover decommissioning costs less the salvage value or resale value of the wind turbines and related equipment.

Economics

A project of this type would have a direct and indirect economic benefit to the region during construction and operation of the project, including purchases of construction materials from local vendors and the use of goods and services by facility personnel. The proposed wind farm would positively impact and generate revenue from construction spending, permanent employment, and local/state taxes. This project would also provide a significant impact to the community through lease payments, which would provide an additional revenue source for the participating landowner. This supplementary source of income has the potential to assist the local community through increased spending from the landowners.

Depending on the availability of qualified persons, workers may be from regional labor sources and would include electricians, laborers, engineers, carpenters, cement finishers, iron workers, construction management, and operating staff. A warranty maintenance team, hired by the turbine vendor, would consist of technicians and a site manager. Typically the Applicant's warranty maintenance team and lead technician positions would be filled by individuals with experience in managing wind farms and would likely be hired from outside of Ohio. All other positions typically are filled from the local area.

Conclusion

Staff concludes that the project, as proposed, would result in both temporary and permanent impacts to the project area and surrounding areas. Staff has recommended several conditions in order to address and minimize these impacts. With the recommended conditions, Staff concludes that minimum adverse environmental impacts would be realized.

Recommended Findings

The Staff recommends that the Board find that the proposed facility represents the minimum adverse environmental impact, and therefore complies with the requirements specified in ORC Section 4906.10(A)(3), provided that any certificate issued by the Board for the proposed facility include the conditions specified in the section of this report entitled <u>Recommended Conditions of Certificate</u>.
Considerations for ORC Section 4906.10(A)(4)

Electric Grid

Pursuant to ORC Section 4906.10(A)(4), the Board must determine that the proposed electric generation facility is consistent with regional plans for expansion of the electric power grid of the electric systems serving this state and interconnected utility systems, and that the facility will serve the interests of electric system economy and reliability.

The purpose of this section is to evaluate the impact of interconnecting the proposed 300 MW Hardin Wind Farm into the existing regional electric transmission system. The Applicant plans to use a 34.5 kV collection system to connect the wind turbines to a proposed interconnect transmission substation. The proposed substation, which would be located in the AEP zone of the PJM Interconnection (PJM), would interconnect to the local and regional grid via a new three breaker ring bus on the East Lima-Marysville 345 kV circuit.

PJM Interconnection Analysis

The Applicant proposes to construct a new interconnect transmission substation on AEP's East Lima-Marysville 345 kV transmission line. This line is part of the regional bulk electric transmission system operated by PJM. PJM is charged with the operation of the regional transmission system and administers the interconnection process of new generation to the system. Generators wanting to interconnect to the bulk electric transmission system located in the PJM control area are required to submit an interconnection application for review of system impacts. Hardin Wind Energy, LLC, submitted the proposed project to PJM on June 13, 2008. The application along with the new substation on the East Lima-Marysville 345 kV line was given a queue number of U2-041 by PJM.

PJM has completed the Feasibility Study and System Impact Study, which includes local and regional impacts and stability and short circuit analysis. These studies looked at the impacts of adding the proposed facility to the regional bulk power system and identified any transmission system upgrades that would be required to maintain the reliability of the regional transmission system. As of December 10, 2009, the only study that has not been released is the Facilities Study, which identifies engineering design work necessary to begin construction, an estimate of costs that the Applicant will be charged for attachment facilities, local upgrades, network upgrades, and a timeline for design and construction of facilities and upgrades. Hardin Wind Energy, LLC, has not yet signed a Construction Service Agreement for the upgrades identified in the studies or an Interconnection Service Agreement with PJM for the proposed facility. Signature on the Interconnect the proposed facility to the bulk electric transmission system.

Staff reviewed the System Impact Study report as prepared by PJM. The study summarized network impacts that may occur for summer peak conditions in 2013 when the proposed facility is connected to the bulk power system. The project was analyzed as an energy resource with 39 MW of the 300 MW studied as an eligible capacity resource for the summer peak condition. An energy resource means it does not receive deliverability analysis, is only permitted to participate in the energy market, and the energy may not be used by a load-serving entity to meet its capacity obligations.

North American Electric Reliability Corporation Standard Requirements

The North American Electric Reliability Corporation (NERC) is responsible for the development and enforcement of the federal government's approved reliability standards, which are applicable to all owners, operators, and users of the bulk power system. NERC requires planners of the bulk electric transmission system to meet Reliability Standards¹⁸ TPL-001-0.1 through TPL-004-0 under transmission outage conditions for categories A, B, C, and D contingencies. According to NERC, a contingency is an unexpected failure or outage of a system component, such as a generator, transmission line, circuit breaker, switch, or other electrical element.

Under category A (no contingencies, normal system conditions) and category B (single contingency outage), the planning authority and transmission planner shall demonstrate that the interconnected transmission system can operate to supply projected customer demands and firm transmission service at all demand levels over the range of forecast system demand. Under category C (multiple contingency outages), the planning authority shall demonstrate that the interconnected transmission system can operate to supply projected customer demands and firm transmission service at all demand levels over the range of forecast system demand and may rely upon the controlled interruption of customers or curtailment of firm transmission service. Finally, under category D (extreme events resulting in multiple contingencies), the planning authority shall demonstrate that its portion of the interconnected transmission system is evaluated for the risks and consequences of a number of each of the extreme contingencies that are listed in the standard. PJM analyzed the bulk electric system for all of the above categories with the proposed new facility interconnected to the bulk power system.

A 2013 summer peak power flow model was used to evaluate the regional reliability impacts and stability and reactive power requirements. A 2012 summer model was used to evaluate local AEP reliability impacts. The local study revealed no problems in the local system. The regional study revealed that some previously identified overloads may become overloaded with the addition of the new generating facility connected to the system. The results of the PJM System Impact Study for the local AEP zone and the regional PJM footprint are as follows:

Generator Deliverability (Capacity Portion)

Category A & Category B: No Contingencies and Single Contingencies

- Studied for the capacity portion only (39 MW)
- No problems identified on the local AEP system or PJM region

Multiple Contingencies

Category C and Category D

- Studied for the full energy output (300 MW)
- No problems identified on the local AEP system or PJM region

¹⁸ North American Electric Reliability Corporation. (Sep. 2009). *Reliability Standards for the Bulk Electric Systems of North America*, TPL-001-0.1-TPL-004-0, 953-984.

Short Circuit Analysis

The short circuit analysis study evaluates the interrupting capabilities of circuit breakers located at the proposed plant site and other circuit breakers impacted by the proposed generation addition. No problems were identified on the local AEP system or PJM region.

Stability and Reactive Power Requirement

This study evaluates the stability and low voltage ride-through criteria (LVRT) capability. The stability analysis evaluates the ability of the power system to withstand disturbances or contingencies and maintain stable operation of the bulk electric grid. The LVRT tests the ability to the wind farm generator to maintain operation and interconnection with the system during events that cause extremely low voltage transients as measured at the high side of the transformer that steps up the wind farm's voltage to the transmission system (high side of the wind farm Generator Step-Up transformer). The study was run at 2013 summer peak conditions for the full energy output (300 MW). The range of contingencies was evaluated to meet NERC criteria. No problems were identified.

Previously Identified Overloads

The PJM study for this project was evaluated for its contribution to other previously indentified overloads identified for earlier generation and transmission projects in the PJM Queue. Two were identified:

- Sammis-Wylie Ridge 345 kV line overloaded. The proposed project contributes 22.24 MW to the overload.
- Belmont 765/500 kV Transformer overloaded for an outage of Kammer-South Canton 765 kV, Kammer 765/500 kV transformer, and South Canton 765/345 kV transformer #3, Kammer-502 Junction line, and South Canton 345/138 kV transformer #4 for the breaker failure at Kammer 765 kV station. The proposed project contributes 37.70 MW to the overload.

Previously Identified System Reinforcements

PJM studied overloads initially caused by prior Queue positions with additional contribution to overloading by this project. The proposed project will be allocated a portion of the cost to alleviate overloading found in the "Previously Identified Overloads" section. Hardin Wind Energy will be responsible for approximately \$2.6 million of the cost for these upgrades.

- Sammis-Wylie Ridge 345 kV overload: Allegheny Power and FirstEnergy will be commencing separate upgrade projects to prevent these overloads, including re-conductoring several miles of the Sammis-Wylie Ridge 345 kV, replacing line traps, replacing back-up line relaying and metering.
- Belmont 765/500 kV transformer overload: Allegheny Power will be installing a second transformer at the Belmont substation.

Generator Deliverability (Energy Portion)

PJM studied the capability of the proposed generator to deliver the full 300 MW as an energy resource. Two overload elements were identified. These overloads may result in operational restrictions that would not allow the unit to operate at full capacity. These are not required reliability upgrades and Hardin Wind Energy may proceed with these upgrades at its discretion.

Conclusion

The Applicant provided PJM's generation interconnection analysis to Staff for review of the impacts of connecting the Hardin Wind Farm to the local and regional transmission grid. These studies were performed by PJM and comply with NERC standards for adding new facilities. The studies indicated that there would be no upgrades required on the local AEP system and no new reliability problems on the regional level with capacity deliverability, multiple contingencies, short circuits, stability, and reactive power requirements. A few issues were recognized on previously identified overloads. The proposed project would add to these previously identified overloads and therefore will be allocated a portion of the costs to resolve these problems. In addition, two issues were found with the delivery of the energy portion, which may reduce the capacity the unit can feed to the grid. These are not reliability upgrades and Hardin Wind Energy may choose to complete these upgrades at its discretion.

The proposed facility is consistent with plans for expansion of the regional power system, and serves the interests of electric system economy and reliability. The facility would serve the public interest, convenience, and necessity by providing additional electrical generation to the regional transmission grid. In addition, Ohio Senate Bill Number 221 requires electric distribution utilities to provide alternative energy resources. Staff believes this facility may help meet this requirement.

Recommended Findings

The Staff recommends that the Board find that the proposed facility is consistent with regional plans for expansion of the electric power grid of the electric systems serving this state and interconnected utility systems, and that the facility would serve the interests of electric system economy and reliability. Therefore, the facility complies with the requirements specified in ORC Section 4906.10(A)(4), provided that any certificate issued by the Board for the proposed facility include the conditions specified in the section of this report entitled Recommended Conditions of Certificate.

Considerations for ORC Section 4906.10(A)(5)

Air, Water, Solid Waste, and Aviation

Pursuant to ORC Section 4906.10(A)(5), the facility must comply with specific sections of the ORC regarding air and water pollution control, withdrawal of waters of the state, solid and hazardous wastes, and air navigation.

Air

The Applicant has provided ambient air quality data for the proposed project area. There are no air monitoring stations in Hardin County. The air monitoring stations in surrounding counties show the regional air quality meets the standards established to protect human health and welfare. The EPA lists Hardin County as in attainment or unclassified with the National Ambient Air Quality Standards (NAAQS).

The operation of the wind turbine facility would not produce air pollution, therefore there are no applicable air quality limitations, NAAQS, prevention of significant deterioration increments, or the need for permits to install and operate an air pollution source. However, fugitive dust rules adopted pursuant to the requirements of ORC Chapter 3704 may be applicable to the proposed facility. A permit-to-install (PTI) or permit-to-install and operate (PTIO) may be required for access roads or for a concrete batch plant, if one is needed.

The Applicant plans to minimize emissions during site clearing and construction by maintaining equipment in good working order, through adequate planning that would use the construction equipment as efficiently as possible, and by watering dirt and gravel roads during dry periods as necessary to reduce fugitive dust.

Staff believes that construction and operation of the facility, as described by the Applicant and in accordance with the conditions included in this staff report, would be in compliance with air emission regulations in ORC Chapter 3704, and the rules and laws adopted under this chapter.

Water

The Applicant has indicated that it will apply for the following permits:

- USACE 404 Nationwide Permit #12 (4th quarter 2009)
- USACE Notice of Navigation in Section 10 Streams
- Ohio EPA 401 Water Quality Certification (4th quarter 2009)
- Ohio EPA Notice of Intent (NOI) (2nd quarter 2010)
- Ohio EPA National Pollutant Discharge Elimination System (NPDES) General Storm Water Discharge from Small and Large Construction Activities (2nd quarter 2010)
- Storm Water Pollution Prevention Plan (SWPPP) (2nd quarter 2010)

The Applicant would mitigate run-off and siltation by employing the use of silt fences, conducting temporary and permanent seeding, and installing water bars as applicable. Proper sequencing of construction activities would be followed to mitigate changes in flow patterns and erosion. The Applicant will obtain an approved SWPPP and Erosion and Sedimentation Plan as part of its NPDES General Storm Water Discharge from Small and Large Construction Activities

from the Ohio EPA. The Applicant would control storm water runoff from the wind farm with swales, level spreaders, and other storm water control measures installed as applicable. Any streams which are crossed by access roads would be culverted, so as to not impact flow patterns in the project area.

The Applicant claims that it would not be impacting any wetlands. The Applicant anticipates 16 streams would need to be crossed by construction equipment or electrical collection lines. However, the Applicant intends to cross streams using methods that do not disturb the streambeds wherever possible. In addition to avoiding or minimizing direct impacts to streams and wetlands, the Applicant intends to avoid indirect impacts through the implementation of a SWPPP. The SWPPP would be developed in association with the Applicant's NPDES permits for construction of the facility. However, the Applicant has indicated that, because of its planned avoidance and minimization of direct impacts to streams and wetlands, compliance with Clean Water Act section 401 or 404 requirements will be achieved under nationwide permits. Staff believes that construction and operation of this facility would comply with requirements of ORC Chapter 6111, and the rules and laws adopted under this chapter.

Solid Waste

The Applicant is not aware of existing solid or hazardous waste in the project area. The Applicant asserts that, during construction, approximately four tons of solid waste per wind turbine would be generated. Solid waste would consist of mostly packaging of various sorts, the majority of which is made up of heavy-duty rolls for geotextile fabric, spools for underground cable, and used silt fence. The Applicant asserts that it will take all commercially reasonable steps to reuse and recycle as much of the material as possible. The Applicant does not anticipate generating any hazardous waste. The Applicant asserts that, during operation of the wind farm, solid waste of the type and amount comparable to a small office would be the only solid waste generated. The solid waste would be disposed of in dumpsters and then taken to a solid waste facility operated by a licensed contractor.

The Applicant plans to develop and follow Spill Prevention Containment and Countermeasure (SPCC) procedures to prevent the release of hazardous substances, such as petroleum products, into the environment during construction. Any spills of hazardous substances should be reported pursuant to Ohio EPA and ODNR procedures. Waste oils generated during operation of the facility will be disposed of in accordance with state and local regulations. Staff believes that the Applicant's solid waste disposal plans would comply with solid waste disposal requirements in ORC Chapter 3734, and the rules and laws adopted under this chapter.

Aviation

Four commercial service airports exist within the greater vicinity (70 miles) of the proposed facility (Port Columbus, Rickenbacker, Dayton-Cox, and Toledo Express). Three airfields are within ten miles of the project area and are as follows:

• Hardin County Airport (FAA Identifier I95), three miles ENE of the nearest turbine. This airport is a public use, municipal airport that maintains one active runway. Runway 1 has an asphalt surface and is 4,801 feet in length by 75 feet wide, with approach and departure vectors of 041° and 221° (magnetic).

- Ada Airport (FAA Identifier 0D7), six miles north of the nearest turbine. This airport is a privately owned, public use airport that maintains one active runway. Runway 1 has a turf or grass surface and is 1,955 in length by 110 feet wide.
- Lima-Allen County Airport (FAA Identifier AOH), nine miles WNW of nearest turbine. This airport is a public use, municipal airport that maintains two active runways. Runway 1 has an asphalt surface and is 5,149 feet in length by 150 feet wide, with approach and departure vectors of 094° and 274° (magnetic). Runway 2 has a turf or grass surface and is 2,500 feet in length by 100 feet wide, with approach and departure vectors of 139° and 319° (magnetic).

In accordance with FAA Advisory Circular 70/7460.2k, "Proposed Construction or Alteration of Objects That May Affect the Navigable Airspace", the Applicant is required to file FAA Form 7460-1, "Notice of Proposed Construction or Alteration", for all turbine locations. As of the date of preparation of this report, turbine locations that have been previously submitted for FAA review do not match the current layout presented in the application to the Board. As such, the Applicant has proposed to re-submit the correct turbine locations to the FAA and the ODOT Office of Aviation for review and approval prior to any construction.

Any structure that the FAA deems to be an impact to air travel and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities will receive a *presumed hazard* designation. A *presumed hazard* designation is effectively a disapproval of a structure's construction as submitted. As of the date of preparation of this report, not all locations have received FAA determinations.

If a disapproved structure is built, the FAA would require adjustments at any affected airport. Such adjustments may include raising an airport's Minimum Descent Altitude, or MDA. The MDA is the lowest altitude, in feet above mean sea level, to which descent is authorized on final approach during a non-precision instrument (Instrument Flight Rules or IFR) landing. IFR landings are conducted at an airport during times of low visibility, or if inclement weather prohibits a pilot from making a visual, or Visual Flight Rules (VFR), landing. Raising an airport's MDA may create a sharp glide slope/angle at which a plane must land in bad weather (IFR) conditions and reduces the percentage of time that an aircraft can land in IFR conditions. This effectively reduces the amount of air traffic an airport receives relative to the amount of time the airport is under IFR conditions. A steep glide path, coupled with bad weather, creates a less safe landing scenario.

In accordance with ORC Section 4561.32, Staff contacted the ODOT Office of Aviation during review of this application in order to coordinate review of potential impacts the facility might have on local airports. When creating the recommended conditions for the certificate, Staff implemented FAA and/or ODOT Office of Aviation recommendations where deemed justified through conversation and exchange with subject matter experts.

Recommended Findings

The Staff finds that the proposed facility complies with the requirements specified in ORC Section 4906.10(A)(5), provided that any certificate issued by the Board for the certification of the proposed facility include the conditions specified in the section of this report entitled <u>Recommended Conditions of Certificate</u>.

Considerations for ORC Section 4906.10(A)(6)

Public Interest, Convenience, and Necessity

Pursuant to ORC Section 4906.10(A)(6), the Board must determine that the facility will serve the public interest, convenience, and necessity.

Public Participation

Any person that wishes to construct a wind farm in Ohio with a generating capacity of five MW or greater must first obtain a certificate of environmental compatibility and public need.¹⁹ Such person must submit an application for a certificate to the OPSB and notify the public prior to the planned beginning of construction.²⁰ The Applicant must hold a public informational meeting in the area of the project prior to submitting an application. The application must include a description of the Applicant's public interaction programs.²¹

After receiving the complete application, the Board sets a date for a public hearing where any person can provide written or oral testimony and may be examined by the parties.²² Parties include the Applicant, the chief executive officer of each municipal corporation and county, the head of each public agency charged with protecting the environment or with planning the use of land in the areas affected by the project, or any other person who has been granted a motion of leave for intervention.²³ A record of the public hearing and all evidence may be examined by the public at anytime.²⁴

On June 23, 2009, the Applicant held its public informational meeting in Kenton, OH. On September 18, 2009, Hardin Wind Energy filed an amended application for a certificate of environmental compatibility and public need. On October 9, 2009, the Applicant sent notice of the application to the mayors of the city of Kenton and the villages of Ada, Alger, and McGuffy; the township trustees of Lynn, Cessna, Marion, Roundhead, McDonald, and Taylor Creek; and the Hardin County Commissioners, Regional Planner, and Engineer. The Applicant sent a copy of the application to public libraries in Kenton, Alger, and Ada, and to the USFWS, ODOT, the FAA, the USACE, and the Hardin County Chamber and Business Alliance.

In the application, the company provided a description of its public interaction programs. According to the Applicant, the company has been meeting with landowners and others for two years and has recently opened a field office in downtown Kenton to help facilitate public interaction. The Applicant also joined the Hardin County Chamber and Business Alliance and plans to meet with community leaders, media, and businesses. The Applicant plans to further inform the public through newsletter publications, event sponsorships, and educational programs.

A local public hearing in this case is scheduled for January 5, 2010, at 6:00 p.m. at the Hardin County Courthouse at One County Courthouse Square, Kenton, Ohio, 43226. An adjudicatory

¹⁹ ORC Sections 4906.20, 4906.01, OAC 4906.13, and OAC Chapters 4906-1, 4906-5, 4906-17

²⁰ ORC Sections 4906.06 (A) and (C)

²¹ OAC Chapter 4906-17-08(E)(1)

²² ORC Section 4906.07

²³ ORC Section 4906.08 (A)

²⁴ ORC Sections 4906.09 and 4906.12

hearing is scheduled for January 12, 2010, at 10:00 a.m. at 180 East Broad Street, Columbus, Ohio, 43215. Notice of both hearings was published in the *Kenton Times* on October 17, 2009, and in the *Ada Herald* on October 22, 2009.

To date only one party, the Ohio Farm Bureau Federation, has filed a motion to intervene in this case. No letters of support or opposition have been filed by the public with the OPSB at the time this report was printed.

Liability Insurance

The Applicant is required to describe in the application any insurance or corporate programs for providing liability compensation for damages to the public resulting from construction or operation of the proposed facility.²⁵ The Applicant states that the terms of the leases entered into with landowners require the Applicant to provide insurance for all wind farm components and to indemnify the landowners and other third-parties from liability claims resulting from the wind farm's construction and operation.

The Applicant has consulted with Willis of Illinois, Inc., on the possible impacts of construction and operation of the proposed wind farm. Based on these discussions, the Applicant has decided to carry certain limits of liability insurance during the development, construction, operation, and decommissioning of the wind farm that would ensure proper indemnification for third parties and the Applicant. In addition, the Applicant will undertake a risk management plan that will meet the needs of all wind farm stakeholders.

The Applicant plans to carry the following insurance policies: commercial general, business automobile, workers' compensation, and umbrella liability. Commercial general liability insurance will protect the Applicant from liability claims for bodily injury and property damage arising out of premises, operations, products, complete operations, and advertising and personal injury liability. Business automobile insurance protects the Applicant from financial loss because of legal liability for automobile-related injuries or property damage caused by an auto. Workers compensation and employers liability insurance provides coverage under statutory liabilities under workers compensation laws and work-related injuries that do not fall under workers compensation statute. The umbrella policy is designed to provide protection against catastrophic losses and to provide excess limits when limits of the other policies are exhausted.

Leases

The proposed wind farm would be located upon approximately 20,000 acres of leased private land, and in one case land owned by a local school system. The Applicant states that it has met with over 100 landowners since the second quarter of 2007. Although enough land has been secured through lease agreements, additional leases are currently being negotiated as "fill-in" leases in case additional land is needed due to layout adjustments.

According to the Applicant, landowners will receive compensation for the use of their land during the development, construction, and operation of the wind farm. During the development phase, landowners will be compensated for access to and the use of their property to conduct environmental and other studies. During construction, the Applicant will compensate

²⁵ OAC Chapter 4906-17-08(E)(2)

landowners for crops lost or damaged by the company. During operations, landowners that host turbines on their property will be compensated approximately \$10,000 per turbine per year. Participating landowners that do not host a turbine will be compensated on a per-acre basis for participating in the wind farm. In addition, the Applicant will pay all taxes, assessments, and other governmental charges that may be levied by reason of the Applicant's use of the property.

In exchange for the sole and exclusive right to convert wind energy into electricity and collecting and transmitting the electrical energy so converted on their property, the landowners guarantee not to interfere with or disturb the wind flowing over, across, and through their property or with the wind facilities themselves. The landowner, however, does retain the right to develop the leased land for any purpose other than wind energy purposes.

Lease agreements typically last about 40 years, but can be terminated by the Applicant at any time without cause upon 90-days written notice to the landowner. If the lease is terminated after wind facilities are placed into service, the Applicant would pay the landowner a termination fee and would re-grade and restore the affected land within 12 months. The landowner can terminate the lease if the Applicant has not commenced construction within five years and if the Applicant fails to perform an obligation under the lease agreement.

Public Policy

Amended Substitute Senate Bill Number 221 (SB 221) of the 127th General Assembly requires that a portion of the electricity sold to retail customers in Ohio come from renewable energy resources beginning in 2009. Renewable energy resources include solar photovoltaic, wind, hydroelectric, geothermal, biomass, and fuel cell technologies. At least 50 percent of the requirement must be satisfied with resources located within the state of Ohio.²⁶

Electric distribution utilities or electric services companies may at their discretion obtain renewable energy resources through an electricity supply contract. They may also use renewable energy credits to comply with all or part of the renewable and solar energy benchmark requirements. To be eligible for use towards a benchmark, the renewable energy credit must originate from a renewable energy resource facility certified by the PUCO. Facility certification does not guarantee compliance with annual benchmark requirements or recovery of costs. Further, the electric distribution utility or services company must be a registered member of PJM's generation attribute tracking system, MISO's renewable energy tracking system, or another credible tracking system approved by the PUCO.²⁷

Although the Applicant is not subject to the alternative energy portfolio standards in SB 221, Staff believes that the Applicant may play an important role in helping electric distribution utilities and electric services companies in Ohio meet their requirements under the law. The proposed wind farm would likely qualify as an in-state renewable energy resource under SB 221.²⁸ If the facility is certified by the PUCO as a qualified resource, electric distribution utilities and services companies may choose to fulfill a portion of their portfolio standard requirements by entering into an electric supply contract with the owner of the wind farm. The

²⁶ ORC Section 4928.64(B)

²⁷ ORC Section 4928.64(B)

²⁸ ORC Section 4928.64 (B)(3)

Applicant may alternately choose to sell any or all certified renewable energy credits to one or more electric distribution utility or services company in Ohio, or on the open market.

Taxation

Under current state law, electric utilities must pay personal property tax on equipment used to produce electricity. Taxable personal property includes all tangible property that, on the thirty-first day of December of the previous year, was located within this state and was owned or leased by the utility in a sale-leaseback arrangement.²⁹ Taxable personal property does not include tangible property installed during plant or facility construction or tangible property that is meant to control air, water, or noise pollution, so long as a pollution control certificate is in force.³⁰

The taxable true value of all equipment used to produce electricity that was placed in service on or before October 5, 1999, by an electric company is the equipment's cost as capitalized on the company's books less a 50 percent allowance for depreciation and obsolescence.³¹ If the production equipment was placed in service after October 5, 1999, the true value is calculated using the purchase price as capitalized on the electric utility's books less a composite annual allowance prescribed by the tax commissioner.³² Production equipment includes all taxable steam, nuclear, hydraulic, and other production plant equipment used to generate electricity.³³

The Applicant claims that the methodology used to calculate property tax on production equipment in Ohio would result in an annual tax burden in excess of \$41,000 per MW of installed capacity. The Applicant further claims that the annual tax burden in neighboring states is in the range of \$6,000 to \$10,000 per MW. This disparity, according to the Applicant, renders Ohio wind farms uncompetitive in the marketplace and reduces the likelihood that a significant number of new alternative energy electric generators will choose to locate in Ohio.

Staff believes that it is difficult to compare the annual tax burden in Ohio with that in neighboring states for at least three reasons. First, public utility personal property tax is not assessed on a per-MW basis in Ohio and may not be in neighboring states. As indicated above, public utility property tax in Ohio is assessed on the true value of the production equipment less a composite annual allowance. Second, it is unlikely that the annual tax burden would remain constant over the useful life of the project. As the annual composite allowance increases over time, the annual tax burden would decrease. For the annual tax burden to remain constant, the Applicant would have to invest an amount in new equipment equal to the annual composite allowance each year. Third, it is unlikely that the tax structure in neighboring states is exactly like the tax structure in Ohio. Taxes may be assessed at different rates on different types of equipment or assets in surrounding states. It is therefore difficult to compare the annual tax burden in Ohio with that in other states.

The Applicant suggests that the annual tax burden in Ohio would be reduced if certain revisions to the tax code were adopted by the state legislature. These changes, according to the Applicant,

²⁹ ORC Section 5727.06(A)

³⁰ ORC Section 5727.01(E)

³¹ ORC Section 5727.11(D)(1)

³² ORC Section 5727.11(A)

³³ ORC Section 5727.01(J)

were proposed by the American Wind Energy Association (AWEA). The Applicant states that these revisions would exclude alternative electricity generators from the definition of "electric company" and would charge a graduated "wind energy conversion system" tax based upon the number of kilowatt hours of electricity produced in the previous year. Although alternative electricity generators would still be required to pay tax on real property, according to the Applicant, they would not be required to pay tax on personal property. This tax system, according to the Applicant, would reduce the annual tax burden to approximately \$6,000 per MW. According to the Applicant, the State could also eliminate the annual allowance deduction for depreciation and reduce the tax on all electric generation equipment to 12 percent of the equipment's cost. This, according to the Applicant, would reduce the annual tax burden to approximately \$20,000 per MW of installed capacity. A proposal similar to the one discussed by the Applicant is currently under consideration by the Ways and Means Committee in the Ohio House of Representatives.³⁴ As introduced, House Bill Number 218 (HB 218) would eliminate the deduction of composite annual allowances for property used to produce electricity from renewable resources.³⁵ It would also reduce the assessment rate on taxable property of each electric company to 85 percent for taxable transmission and distribution property; 12 percent for taxable property used to generate electricity from a renewable resource; and 24 percent for all other taxable property beginning in 2010.³⁶ For purposes of taxation, a renewable resource means solar photovoltaic, solar thermal, or wind energy.³⁷

Staff believes that in the short-run a reduction in the assessment rate on equipment used to produce electricity from renewable resources could result in a reduction in added tax revenue to local jurisdictions in which such equipment is installed. Under current law, for example, local jurisdictions could expect to collect about \$18,082 in personal property tax for every \$1 million of renewable energy production equipment placed into service in the first year, assuming a weighted average gross millage rate of 75.34 mills and an assessment rate of 24 percent. If the assessment rate is reduced from 24 percent to 12 percent, as proposed in HB 218, local jurisdictions could expect to collect about \$9,041 in property tax for every \$1 million of renewable energy production equipment placed into service in the first year. The difference, about \$9,041, represents a potential reduction in added tax revenue in the short-run to local jurisdictions that may host renewable energy facilities. In the long-run this potential reduction in total gains from renewable energy installations may be offset by the elimination of composite annual allowance deductions in the computation of the true value of renewable electricity production equipment. Eliminating these deductions would effectively increase the taxable value of personal property used to generate renewable electricity. Whether this offset occurs, and at what point, depends largely on the useful life of the production equipment in question. On a long enough timeline, the elimination of annual allowance deductions could eventually outweigh the reduction in the tax assessment rate and result in a greater net revenue gain than under current tax law for local jurisdictions.³⁸

³⁴ Ohio Legislative Services Commission. House Bill Status Report of Legislation. HB 218. 128th General Assembly. Retrieved on December 4, 2009, from the Ohio Legislative Services Commission Web site.

³⁵ Section 5727.11 (D)(3) of HB 218 as introduced in the House

³⁶ Section 5727.111(E) of HB 218 as introduced in the House

³⁷ Section 5727.01(N) of HB 218 as introduced in the House

³⁸ Ohio Legislative Service Commission. (June 24, 2009). Fiscal Note and Impact Statement, H.B. 218 of the 128th General Assembly.

ARRA

Earlier this year, the President signed into law the American Recovery and Reinvestment Act of 2009, which is commonly referred to as the Stimulus Bill. The Stimulus Bill, among other things, directed \$16.8 billion towards the U.S. energy industry with the intent of increasing investment in energy efficiency, electricity grid modernization, and renewable energy technology research and development.³⁹ It also made available until January 1, 2013, for wind facilities and until January 1, 2014, for other qualified renewable facilities, a renewable energy production credit (Section 45 credit) and until January 1, 2017, a renewable energy investment credit (Section 48 credit). It established a cash grant available to any person who places qualified energy facilities into service before the end of 2010 (Section 1603 grant) as well. Qualified energy facilities include wind, closed and open loop biomass, geothermal, solar, and some hydropower facilities. Subject to certain limitations, any person may take advantage of any one of these incentives.⁴⁰

The Applicant has indicated an interest in taking advantage of the cash grant option and states that not only would construction of the wind farm begin before the end of 2010, but would be completed for a large portion of the project. The Applicant notes, however, that project delays could threaten eligibility for the cash grant, and consequently the viability of the project.

Recommended Findings

Staff recommends that the Board find that the proposed facility would serve the public interest, convenience, and necessity, and therefore complies with the requirements specified in ORC Section 4906.10(A)(6), provided that any certificate issued by the Board for the proposed facility include the conditions specified in the section of this report entitled <u>Recommended Conditions of Certificate</u>.

³⁹ American Recovery and Reinvestment Act, 2009. Division A, Title IV of P.L. 111-5. Enacted on February 17, 2009.

⁴⁰ American Recovery and Reinvestment Act, 2009. Division B, Title I, Subtitle B, Part I and Division B, Title I, Subtitle G, Section 1603 of P.L. 111-5. Enacted on February 17, 2009. See also, Internal Revenue Service Bulletin: 2009-25. (June 22, 2009). Election of Investment Tax Credit In Lieu of Production Tax Credit; Coordination with Department of Treasury Grants for Specified Energy Property in Lieu of Tax Credits.

Considerations for ORC Section 4906.10(A)(7)

Agricultural Districts

Pursuant to ORC Section 4906.10(A)(7), the Board must determine the facility's impact on the viability as agricultural land of any land in an existing agricultural district within the site of the proposed utility facility.

The agricultural district program was established under ORC Chapter 929. Agricultural land is classified as an agricultural district through an application and approval process that is administered through local county auditors' offices. Based upon parcel information obtained from Hardin County Auditor records, 53 Agricultural District parcels are located within the project area. The project facilities would directly impact 22 of the 53 Agricultural District parcels in the project area. However, Staff confirmed with the Applicant and the County Auditor's office that impacts would not affect the Agricultural District status of these parcels.

Construction-related activities such as vehicle traffic and materials storage could lead to temporary reductions in farm productivity caused by direct crop damage, soil compaction, broken drainage tiles, and reduction of space available for planting. However, the Applicant intends to take steps in order to address such potential impacts to farmland, including repairing or replacing damaged drainage tiles to the landowner's satisfaction, and subsoil de-compaction and rock picking prior to re-spreading of topsoil in disturbed areas. Additionally, the value of any crops damaged by construction activities or by soil compaction would be reimbursed by the Applicant to the landowner. After construction, only the agricultural land associated with the turbine locations and access roads would be removed from production.

Recommended Findings

The Staff recommends that the Board find that the impact of the proposed facility on the viability of existing agricultural land in an agricultural district has been determined, and therefore complies with the requirements specified in ORC Section 4906.10(A)(7), provided that any certificate issued by the Board for the proposed facility include the conditions specified in the section of this report entitled <u>Recommended Conditions of Certificate</u>.

Considerations for ORC Section 4906.10(A)(8)

Water Conservation Practice

Pursuant to ORC Section 4906.10(A)(8), the proposed facility must incorporate maximum feasible water conservation practices, considering available technology and the nature and economics of the various alternatives.

The Staff has reviewed the information pertaining to the consumptive use of water for the operation of the proposed facility. Wind-powered electric generating facilities do not utilize water in their process of electricity production. Therefore, water consumption associated with the proposed electric generation equipment does not warrant specific conservation efforts. Potable water would be needed for personal use by employees at the planned O&M building, but these needs would be minimal.

Recommended Findings

The Staff recommends that the Board find that the proposed facility would incorporate maximum feasible water conservation practices, and therefore complies with the requirements specified in ORC Section 4906.10(A)(8).

VI. RECOMMENDED CONDITIONS OF CERTIFICATE

Following a review of the application filed by Hardin Wind Energy, LLC and the record compiled to date in this proceeding, the Staff recommends that a number of conditions become part of any certificate issued for the proposed facility. These recommended conditions may be modified as a result of public or other input received subsequent to issuance of this report. At this time the Staff recommends the following conditions:

- (1) That the facility be installed at the Applicant's proposed site as presented in the amended application filed on September 18, 2009, and as modified and/or clarified by the Applicant's supplemental filings.
- (2) That the Applicant shall utilize the equipment and construction practices as described in the amended application and as modified and/or clarified in supplemental filings, replies to data requests, and recommendations Staff has included in this <u>Staff Report of Investigation</u>.
- (3) That the Applicant shall implement the mitigative measures as described in the amended application and as modified and/or clarified in supplemental filings, replies to data requests, and recommendations Staff has included in this <u>Staff Report of Investigation</u>.
- (4) That the Applicant shall conduct a pre-construction conference prior to the start of any construction activities, which the Staff shall attend, to discuss how environmental concerns will be satisfactorily addressed.
- (5) That the Applicant shall properly install and maintain erosion and sedimentation control measures at the project site in accordance with the following requirements:
 - (a) During construction of the facility, seed all disturbed soil, except within actively cultivated agricultural fields, within seven (7) days of final grading with a seed mixture acceptable to the appropriate County Cooperative Extension Service. Denuded areas, including spoils piles, shall be seeded and stabilized within seven (7) days, if they will be undisturbed for more than twenty-one (21) days. Reseeding shall be done within seven (7) days of emergence of seedlings as necessary until sufficient vegetation in all areas has been established.
 - (b) Inspect and repair all erosion control measures after each rainfall event of one-half of an inch or greater over a twenty-four (24) hour period, and maintain controls until permanent vegetative cover has been established on disturbed areas.
 - (c) Obtain NPDES permits for storm water discharges during construction of the facility. A copy of each permit or authorization, including terms and conditions, shall be provided to the Staff within seven (7) days of receipt.
- (6) That the Applicant shall employ the following construction methods in proximity to any watercourses:
 - (a) All watercourses, including wetlands, shall be delineated by fencing, flagging, or other prominent means.

- (b) All construction equipment shall avoid watercourses, including wetlands, except at specific locations where Staff has approved construction.
- (c) Storage, stockpiling, and/or disposal of equipment and materials in these sensitive areas shall be prohibited.
- (d) Structures shall be located outside of identified watercourses, including wetlands, except at specific locations where Staff has approved construction.
- (e) All storm water runoff is to be diverted away from fill slopes and other exposed surfaces to the greatest extent possible, and directed instead to appropriate catchment structures, sediment ponds, etc., using diversion berms, temporary ditches, check dams, or similar measures.
- (7) That the Applicant shall employ best management practices when working near environmentally sensitive areas. This includes, but is not limited to, the installation of silt fencing or a similarly effective tool prior to initiating construction near streams and wetlands. The installation shall be done in accordance with generally accepted construction methods and shall be inspected regularly.
- (8) That the Applicant shall have an environmental specialist on site at all times that construction, including vegetation clearing, is being performed in or near a sensitive area such as a designated wetland, stream, river, or in the vicinity of identified threatened and endangered species or their identified habitat. The environmental specialist shall be familiar with water quality protection issues, and able to field-identify potential threatened and endangered species of plants and animals that may be encountered during project construction.
- (9) That, prior to construction, the Applicant shall conduct a presence/absence mussel survey within streams that will be impacted by culverts and potentially from frac-out during HDD. All findings from this survey shall be submitted to Staff for review, comment, and establishment of avoidance, minimization, and mitigation measures. If a mussel survey/relocation is necessary, then a plan must first be submitted and approved by Staff before mussels are moved. As part of this plan, the Applicant shall provide survey/relocation methods, details on the survey area(s) and relocation site(s), and establish post-relocation monitoring protocols. All surveys/relocations shall be conducted by an ODNR-approved malacologist. The post-relocation monitoring shall be for two consecutive years at the recipient relocation site(s) to determine survivorship. A survivorship report shall be submitted to Staff by December 31 of each consecutive year for review. If Staff determines that a significant adverse impact has occurred to mussels, additional mitigation measures will be prescribed to the Applicant by Staff.
- (10) That the Applicant shall not work in the types of streams listed below during fish spawning restricted periods (April 15 to June 30), unless a waiver is issued by the ODNR-DOW and approved by OPSB Staff releasing the Applicant from a portion of, or the entire restriction period.
 - (a) Class 3 primary headwater streams (watershed \leq one mi²)
 - (b) Exceptional Warm Water Habitat (EWH)

- (c) Cold Water Habitat (CWH)
- (d) Warm Water Habitat (WWH)
- (e) Streams potentially supporting threatened and endangered species
- (11) That the Applicant shall adhere to all avoidance, minimization, and mitigation measures established by OPSB Staff, in coordination with the ODNR and the USFWS, as a result of review of the final avian and bat surveys.
- (12) That prior to construction, the Applicant shall develop a post-construction avian and bat mortality survey plan for Staff review and approval. The plan shall be implemented at the commencement of operation of the facility.
- (13) That the Applicant shall initiate formal consultation with the USFWS under provisions of Section 7 or Section 10 of the Endangered Species Act. A copy of the USFWS Biological Opinion shall be provided to Staff prior to construction of phase two of this project. All conditions set forth in the Biological Opinion shall be adhered to during construction and post construction of phase two of this project. If required as a result of the formal consultation process, the Applicant shall develop a Habitat Conservation Plan and obtain the associated Incidental Take Permit from the USFWS regarding the potential take of Indiana bats for construction phase two. All avoidance, minimization, and mitigation measures to protect the Indiana bat that are identified in a Habitat Conservation Plan and Incidental Take Permit shall be implemented as described in said documents for construction phase two.
- (14) That the Applicant shall perform a plant survey within the study area prior to construction to determine the presence of the state listed *Setaria parviflora*. The results of this survey shall be provided to Staff prior to start of construction. All populations found shall be marked for avoidance.
- (15) That the Applicant shall adhere to seasonal cutting dates of October 1 through March 31 for removal of suitable Indiana bat habitat trees.
- (16) That OPSB Staff, the ODNR, and the USFWS shall be immediately contacted if threatened or endangered species are encountered during construction activities. Activities that could adversely impact the identified plants or animals will be halted until an appropriate course of action has been agreed upon by the Applicant and OPSB Staff.
- (17) That the Applicant shall assure compliance with fugitive dust rules by the use of water spray or other appropriate dust suppressant measures whenever necessary.
- (18) That the Applicant shall coordinate with the appropriate authority regarding any vehicular lane closures due to construction.
- (19) That the Applicant conform to any drinking water source protection plan, if it exists, for turbines located within the drinking water source protection areas of the villages of Alger or McGuffey.

- (20) That the Applicant shall become a member of the Ohio Utilities Protection Service prior to commencement of operation of the facility. Notification of membership shall be provided to Staff.
- (21) That the Applicant shall complete a full geotechnical investigation to confirm that there are no issues to preclude development of the wind farm. The geotechnical investigation shall include borings at each turbine location to provide subsurface soil properties and recommendations needed for the final design and construction of each wind turbine foundation, as well as the final location of the transformer substation and interconnection substation. All boreholes must be filled and borehole abandonment must comply with state and local regulations. The Applicant shall provide copies of all geotechnical boring logs to Staff and to the ODNR Division of Geological Survey.
- (22) That at least sixty (60) days before the pre-construction conference, the Applicant shall submit to the Staff, for review and approval, the final turbine foundation design for each turbine location.
- (23) That the Applicant shall provide the final delivery route plan and the results of any traffic studies to Staff and to the Hardin County Engineer thirty (30) days prior to the pre-construction conference. The Applicant shall complete a study on the final equipment delivery route to determine what improvements will be needed in order to transport equipment to the wind turbine construction sites. The Applicant's study and delivery route plan shall consider, but not be limited to, the following:
 - (a) Perform a survey of the final delivery routes to determine the exact locations of vertical constraints where the roadway profile will exceed the allowable bump and dip specifications.
 - (b) Identify locations along the final delivery routes where overhead utility lines may not be high enough for over-height permit loads and coordinate with the appropriate utility company if lines are required to be raised.
 - (c) Identify upgrades to any roads and bridges that are not able to support the projected loads from delivery of the wind turbines and other facility components.
 - (d) Describe the restoration of locations where wide turns may impact the road facilities and surrounding areas, and where any roads or bridges are damaged, to their original condition.
- (24) That the Applicant shall obtain all required Hardin County transportation permits and all necessary permits from ODOT. Any temporary or permanent road closures necessary for construction and operation of the proposed facility shall be coordinated with the appropriate entities including, but not limited to, the Hardin County Engineer, ODOT, local law enforcement, and health and safety officials.
- (25) That the Applicant post a surety bond to cover any damages to Interstate roads and all state, county, and township roads and bridges that may occur while transporting wind turbines and other facility components to and from the wind farm site and during all construction activities. At its expense, the Applicant shall promptly repair all impacted roads and

bridges following construction to at least their condition prior to the initiation of construction activities.

- (26) That prior to construction, the Applicant shall prepare a Phase I cultural resources survey program for archaeological work at turbine locations, access roads, construction staging areas, and collection lines acceptable to Staff. If the resulting survey work discloses a find of cultural or archaeological significance, or a site that could be eligible for inclusion on the National Register of Historic Places, then the Applicant shall submit an amendment, modification, or mitigation plan for Staff's acceptance. Any such mitigation effort shall be developed in coordination with the Ohio Historic Preservation Office, with input from the Hardin County Historical Society, and submitted to Staff for review and acceptance.
- (27) That prior to the commencement of construction, the Applicant shall conduct an architectural survey of the project area. The Applicant shall submit to Staff a work program that outlines areas to be studied, with the focus starting in and around the villages of Alger, McGuffey, and Foraker, and the locations of the numerous schoolhouses identified in the application. If the architectural survey discloses a find of cultural or architectural significance, or a structure that could be eligible for inclusion on the National Register of Historic Places, then the Applicant shall submit an amendment, modification, or mitigation plan for Staff's acceptance. Any such mitigation effort shall be developed in coordination with the Ohio Historic Preservation Office, with input from the Hardin County Historical Society, and submitted to Staff for review and acceptance.
- (28) That the Applicant shall avoid, where possible, or minimize to the maximum extent practicable, any damage to field drainage systems resulting from construction, maintenance, and operation of the facility. Damaged field tile systems shall be repaired to at least original conditions at Applicant's expense. Excavated topsoil shall be segregated and restored upon backfilling. Severely compacted soils shall be plowed or otherwise de-compacted, if necessary, to restore them to original conditions.
- (29) That the Applicant shall remove all temporary gravel and other construction staging area and access road materials within ten (10) days of completing construction activities, and restore the impacted areas to pre-construction conditions.
- (30) That the Applicant shall not dispose of gravel or any other construction material during or following construction of the facility by spreading such material on agricultural land. All construction debris and all contaminated soil shall be promptly removed and properly disposed of in accordance with Ohio EPA regulations.
- (31) That no commercial signage or advertisements shall be located on any turbine, tower, or related infrastructure. If vandalism should occur, the Applicant shall remove or abate the damage immediately to preserve the aesthetics of the project. Any abatement is subject to approval by Staff.
- (32) That at least thirty (30) days prior to the pre-construction conference, the Applicant shall model shadow flicker within 1,000 meters, in the same manner as presented in the application, and in subsequent data requests and interrogatories, for Staff review and approval.

- (33) That any turbine forecasted prior to construction to create in excess of 30 hours per year of shadow flicker at a non-participating receptor within 1,000 meters shall be subject to mitigation prior to construction. Mitigation shall consist of either reducing the turbine's forecasted impact to 30 hours per year, or other measures acceptable to Staff and the affected receptor(s).
- (34) That immediately after one year of operation, the Applicant shall provide Staff with the actual shadow flicker amounts generated by each turbine for that year of operation. Actual shadow flicker should be measured at each receptor within 1,000 meters using each turbine's operational statistics, actual wind speed and direction values, and solar data for the year.
- (35) That after construction, any turbine measured to create in excess of 30 hours per year of shadow flicker at a non-participating receptor within 1,000 meters shall be subject to mitigation. Mitigation shall consist of either reducing the turbine's impact to 30 hours per year, or other measures acceptable to Staff and the affected receptor(s).
- (36) That any turbine forecasted prior to construction to exceed the ambient L_{90} by greater than 6 dBA under any operating conditions at any non-participating residence within one mile of the project area shall be subject to further study of potential impact and possible mitigation prior to construction. Mitigation, if required, shall consist of either reducing the impact so that the ambient L_{90} is not exceeded by greater than 6 dBA, or other measures acceptable to Staff and the affected receptor(s).
- (37) That after construction, any turbine measured to exceed the ambient L_{90} by greater than 6 dBA under any operating conditions at any non-participating residence within one mile of the project area shall be subject to further review of the impact and possible mitigation. Mitigation, if required, shall consist of either reducing the impact so that the ambient L_{EQ} is not exceeded by greater than 6 dBA, or other measures acceptable to Staff and the affected receptor(s).
- (38) That general construction activities shall be limited to daylight hours. Impact pile driving and blasting operations, if needed, shall be limited to the hours between 8:00 a.m. to 5:00 a.m., Monday through Friday. Construction activities that do not involve noise increases above ambient levels at sensitive receptors are permitted when necessary.
- (39) That at least thirty (30) days prior to the pre-construction conference and subject to Staff review and approval, the Applicant shall create and implement a complaint resolution procedure in order to address potential operational concerns experienced by the public. The Applicant shall work to mitigate and resolve any issues with those who file a complaint. Any complaint submitted must be immediately forwarded to the Staff.
- (40) That the Applicant must meet all recommended and prescribed FAA and ODOT Office of Aviation requirements to construct an object that may affect navigable airspace. This includes submitting all final turbine locations for ODOT Office of Aviation and FAA review prior to construction, and the non-penetration of any FAA *Part* 77 surfaces.
- (41) That 90 days prior to any construction, the Applicant notify, in writing, any airport owner, whether public or private, whose operations, operating thresholds/minimums,

landing/approach procedures and/or vectors are altered, or are expected to be altered by the siting, operation, maintenance, or decommissioning of a wind generation facility.

- (42) That all structures be lit in accordance with FAA circular 70/7460-1 K Change 2, *Obstruction Marking and Lighting;* Chapters 4, 12, and 13 (Turbines); or as otherwise prescribed by the FAA.
- (43) That the Applicant must meet all recommended and prescribed FAA and federal agency requirements to construct an object that may affect local and/or long-range radar, and mitigate any effects or degradation caused by wind turbine operation, up to and including removal of afflicting turbine(s).
- (44) That the Applicant shall provide all real-time meteorological data observed by instruments on the facility's turbines or meteorological towers to the National Weather Service offices in Cleveland and Wilmington, OH, to offset any possible Nexrad weather radar interference the wind farm may cause.
- (45) That, prior to construction, the Applicant shall submit the final layout and turbine locations to the National Telecommunications and Information Administration for review and approval.
- (46) That the Applicant must meet all recommended and prescribed Federal Communications Commission and other federal agency requirements to construct an object that may affect communications and, subject to Staff approval, mitigate any effects or degradation caused by wind turbine operation. For any residence that is shown to experience a total loss of TV reception due to the facility operation, the Applicant shall provide, at its own expense, cable or direct broadcast satellite TV service.
- (47) That the Applicant conduct an in-depth vertical Fresnel-Zone analysis to determine if turbines 38 and 180 will cause microwave interference. Pursuant to Staff review and approval, the Applicant shall shift the location of, or eliminate, turbines 38 and 180, based on the results of the aforementioned study.
- (48) That the Applicant shall comply with the turbine manufacturer's safety manual and shall maintain a copy of the safety manual in the O&M building of the facility.
- (49) That the Applicant shall restrict public access to the site with appropriately placed warning signs or other necessary measures.
- (50) That the Applicant shall instruct workers on potential hazards of ice conditions on wind turbines.
- (51) That the Applicant shall comply with the following conditions regarding decommissioning:
 - (a) That pursuant to OAC 4906-17-08 (E)(6), the Applicant shall provide a final draft of a decommissioning plan to Staff and the Hardin County Engineer for review and for OPSB Staff approval at least thirty (30) days prior to the pre-construction conference. In this plan, the Applicant shall:
 - (i) Identify lands in the application that a reconnaissance inspection suggests may be *Prime Farmlands*, a soil survey shall be made or obtained according to standards

established by the Secretary of the United States Department of Agriculture and/or Ohio Department of Agriculture in order to confirm the exact location of the *Prime Farmlands*, if any. The results of this study shall be submitted to Staff for review and approval. Any confirmed *Prime Farmlands* should be reclaimed to such standards after site decommissioning.

- (ii) Indicate the future use that is proposed to be made of the land following reclamation.
- (iii) Describe the engineering techniques proposed to be used in decommissioning and reclamation and a description of the major equipment; a plan for the control of surface water drainage and of water accumulation; a plan, where appropriate, for backfilling, soil stabilization, compacting and grading. This plan shall be subject to review and approval by Staff.
- (iv) That prior to construction, a determination of the probable hydrologic consequences of the decommissioning and reclamation operations, both on and off the project area, with respect to the hydrologic regime shall be conducted. This determination shall provide information on the quantity and quality of the water in surface and groundwater systems including the dissolved and suspended solids under seasonal flow conditions. The collection of sufficient data for the site(s) and surrounding areas shall be provided to Staff for review and approval; so the cumulative impacts of all actions upon the hydrology of the area, and particularly upon water availability, can be calculated. This determination shall be required in addition to the hydrologic information of the general area prior to construction.
- (v) Provide a detailed timetable for the accomplishment of each major step in the decommissioning plan; the steps to be taken to comply with applicable air and water quality laws and regulations and any applicable health and safety standards; and a description of the degree to which the decommissioning plan is consistent with the local physical, environmental, and climatological conditions. This timetable shall be subject to Staff review and approval.
- (b) That the facility owner and/or operator shall, at its expense, complete decommissioning of the wind-powered electric generating facility, or individual wind turbines, within (12) twelve months after the end of the useful life of the facility or individual wind turbines. If no electricity is generated for a continuous period of twelve (12) months, or if the OPSB deems the facility or turbine to be in a state of disrepair warranting decommissioning, the wind energy facility or individual wind turbine will be presumed to have reached the end of its useful life.
- (c) That decommissioning shall include the removal of all physical material pertaining to the wind energy facility to a depth of at least thirty-six (36) inches beneath the soil surface and restoration of the disturbed area to substantially the same physical condition that existed before erection of the facility. The foundation for each wind turbine shall be removed to the greater depth of sixty (60) inches. Decommissioning shall include the restoration of roads and bridges to substantially the same physical condition that existed before decommissioning; the removal and transportation of the wind turbines off-site; and removal of buildings, cabling, electrical components, access

roads, and any other associated facilities. Disturbed earth shall be re-graded, re-seeded, and restored to substantially the same physical condition that existed immediately before erection of the facility. Damaged field tile systems shall be repaired to at least original conditions.

- (d) That if the owner of the proposed wind-powered electric generating facility does not complete decommissioning within the period prescribed in these conditions, the OPSB may require forfeiture of financial securities. The entry into a participating landowner agreement constitutes agreement and consent of the parties to the agreement, their respective heirs, successors and assigns, that the Board may take action that may be necessary to implement the decommissioning plan, including the exercise by the Board, Board Staff, and contractors, of the right of ingress and egress for the purpose of decommissioning the wind-powered electric generating facility.
- (e) That the escrow agent shall release the decommissioning funds when the facility owner has demonstrated, and the Board concurs, that decommissioning has been satisfactorily completed; or upon written approval of the Board in order to implement the decommissioning plan.
- (f) That during decommissioning, all recyclable materials salvaged and non-salvaged shall be recycled to the furthest extent possible. All other non-recyclable waste materials shall be disposed of in accordance with state and federal law.
- (g) That the Applicant shall leave intact any improvements made to the electrical infrastructure, pending approval by the concerned utility.
- (h) That subject to approval by Board Staff, an independent and registered Professional Engineer, licensed to practice engineering in the State of Ohio, shall be retained by the wind generation facility owner to estimate the total cost of decommissioning in current dollars (Decommissioning Costs), without regard to salvage value of the equipment, and the cost of decommissioning net salvage value of the equipment (Net Decommissioning Costs). Said estimate shall include: (1) an analysis of the physical activities necessary to implement the approved reclamation plan, with physical construction and demolition costs based on ODOT's Procedure for Budget Estimating and RS Means material and labor cost indices; (2) the number of units required to perform each of the activities; (3) an amount to cover contingency costs, not to exceed 10 percent of the above calculated reclamation cost. Said estimate should be on a per-turbine basis and shall be submitted for Staff review and approval prior to construction, after one year of facility operation, and every fifth year thereafter. Pursuant to the Applicant's response to Staff interrogatory #51, the owner shall post and maintain decommissioning funds prior to construction in an amount equal to Net Decommissioning Costs, provided that at no point shall the Net Decommissioning Funds be less than twenty-five (25) percent of Decommissioning Costs. The decommissioning funds shall be payable to the Board and conditioned on the faithful performance of all requirements and conditions of this application's approved decommissioning and reclamation plan. Decommissioning funds shall be in a form approved by Staff.

- (52) That prior to the commencement of construction, the Applicant shall obtain and comply with all applicable permits and authorizations as required by federal and state laws and regulations for any activities where such permit or authorization is required. Copies of permits and authorizations, including all supporting documentation, shall be provided to Staff within seven (7) days of issuance or receipt by the Applicant.
- (53) That the Applicant shall not commence construction of the facility until it has a signed Interconnection Service Agreement with PJM, which includes construction, operation, and maintenance of system upgrades necessary to reliably and safely integrate the proposed generating facility into the regional transmission system. The Applicant shall provide a letter stating that the Agreement has been signed or a copy of the signed Interconnection Service Agreement to the Board Staff.
- (54) That at least seven (7) days before the pre-construction conference, the Applicant shall submit to the Staff a copy of its Storm Water Pollution Prevention Plan (SWPPP), Spill Prevention Containment and Countermeasure (SPCC) procedures, and its erosion and sediment control plan for review and approval. Any soil issues must be addressed through proper design and adherence to the Ohio Environmental Protection Agency best management practices related to erosion and sedimentation control.
- (55) That at least thirty (30) days before the pre-construction conference, the Applicant shall submit to the Staff, for review, a fire protection and medical emergency plan, to be developed in consultation with the fire department having jurisdiction over the area.
- (56) That at least thirty (30) days before the pre-construction conference, the Applicant shall submit to the Staff, for review and approval, the following documents:
 - (a) One set of detailed engineering drawings of the final project design, including all turbine locations, collection lines, access roads, permanent meteorological towers, substations, construction staging areas, and any other associated facilities and access points, so that the Staff can determine that the final project design is in compliance with the terms of the certificate. The final plan shall include both temporary and permanent access routes, as well as the measures to be used for restoring the area around all temporary sections, and a description of any long-term stabilization required along permanent access routes. The plan shall consider the location of streams, wetlands, wooded areas, and sensitive plant species as identified by the ODNR-DNAP, and explain how impacts to all sensitive resources will be avoided or minimized during construction, operation, and maintenance.
 - (b) A stream crossing plan including details on specific streams to be crossed, either by construction vehicles and/or facility components (i.e., access roads, electric collection lines), as well as specific discussion of proposed crossing methodology for each stream crossing and post-construction site restoration. The stream crossing plan shall be based on final plans for the access roads and electric collection system.
 - (c) A detailed frac-out contingency plan for stream and wetland crossings that are expected to be completed via HDD. Such contingency plan can be incorporated within the required stream crossing plan.

- (d) A tree clearing plan describing how trees and shrubs around turbines, along access routes, in electric collection line corridors, at construction staging areas, and in proximity to any other project facilities will be protected from damage during construction, and, where clearing cannot be avoided, how such clearing work will be done so as to minimize removal of woody vegetation. Priority should be given to protecting mature trees throughout the project area, and all woody vegetation in wetlands and riparian areas, both during construction and during subsequent operation and maintenance of all facilities.
- (57) That within thirty (30) days after completion of construction, the Applicant shall submit to the Staff a copy of the as-built specifications for the entire facility.
- (58) That the certificate shall become invalid if the Applicant has not commenced a continuous course of construction of the proposed facility within five (5) years of the date of journalization of the certificate.
- (59) That the Applicant shall provide to the Staff the following information as it becomes known:
 - (a) The date on which construction will begin;
 - (b) The date on which construction was completed;
 - (c) The date on which the facility began commercial operation.

APPENDIX

1. Docketing Record

CASE NUMBER: 09-0479-EL-BGN

DESCRIPTION: HARDIN WIND ENERGY LLC

FILINGS AS OF: 12/21/2009

12/11/2009 Response continued. (Part 4 of 4) 12/11/2009 Response continued. (Part 3 of 4) 12/11/2009 Response continued. (Part 2 of 4) Responses to data requests and interrogatories filed by S. Bloomfield on behalf of Hardin Wind 12/11/2009 Energy LLC. (Part 1 of 4) Hardin Wind Energy LLC's responses to Staff's data request and interrogatories request Nos. 31 with 12/11/2009 attachment 54 and 56 with attachment filed by S. Bloomfield. 12/04/2009 Map depicting facility filed on behalf of Hardin Wind Energy LLC by S. Bloomfield. Response to Staff's data requests and interrogatories filed by M. Warnock on behalf of Hardin Wind 12/04/2009 Energy LLC. Hardin Wind Energy, LLC's additional response to Staff's data requests and interrogatories request 11/24/2009 No. 48 filed by S. Bloomfield. Responses to data requests and interrogatories Nos. 38 and 39 filed by S. Bloomfield on behalf of 11/23/2009 Hardin Wind Energy, LLC. Response to Staff's data requests and interrogatories submitted on November 10, 2009 filed on behalf 11/20/2009 of Hardin Wind Energy LLC by S. Bloomfield. Supplemental information of Hardin Wind Energy, LLC regarding construction phasing for Harding 11/19/2009 Wind Farm and request for staff consideration of two-phased construction filed by S. Bloomfield. Update to the Hardin Wind Energy LLC amended application filed by S. Bloomfield. 11/12/2009 11/12/2009 Impact study filed by S. Bloomfield on behalf of Hardin Wind Energy LLC. Proof of publication for Hardin County filed by S. Bloomfield on behalf of Hardin Wind Energy, 10/26/2009 LLC. 10/15/2009 Service notice. 10/13/2009 Service Notice Entry ordering that the hearings in this matter be scheduled for January 5, 2010, at 6:00 p.m., at Hardin County Courthouse, Veterans Hall, One Courthouse Square, Kenton, Ohio 43226; the 10/13/2009 adjudicatory hearing will commence on January 12, 2010, at 10:00 a.m. in Hearing Room 11-F, at the offices of the Commission, 180 East Broad Street, Columbus, Ohio 43215-3793; notices of the application and hearing be published by applicant. (GP) Proof of service of application on local public officials and libraries filed by S. Bloomfield on behalf 10/09/2009 of Hardin Wind Energy LLC. Correspondence letter stating that sufficient information has been received to review the application 10/09/2009 in this case filed by Chairman A. Schriber on behalf of the Public Utilities Commission of Ohio. Updated maps for amended application filed by M. Warnock on behalf of Hardin Wind Energy LLC. 10/06/2009 (Part 2 of 2) Updated maps for amended application filed by M. Warnock on behalf of Hardin Wind Energy LLC. 10/06/2009 (Part 1 of 2) 09/18/2009 Amended application filed by S. Bloomfield on behalf of Hardin Wind Energy LLC. (Part 4 of 4) 09/18/2009 Amended application filed by S. Bloomfield on behalf of Hardin Wind Energy LLC. (Part 3 of 4)

09/18/2009	Amended application filed by S. Bloomfield on behalf of Hardin Wind Energy LLC. (Part 2 of 4)
09/18/2009	Amended application filed by S. Bloomfield on behalf of Hardin Wind Energy LLC. (Part 1 of 4)
08/31/2009	Correspondence letter stating that the Ohio Farm Bureau has no objections to the motion for extension of time filed by Hardin Wind Energy LLC, filed by S. Bloomfield on behalf the Ohio Farm Bureau.
08/27/2009	Motion for a waiver of Ohio Administrative Code Rule 4906-5-05 and memorandum in support filed by S. Bloomfield on behalf of Hardin Wind Energy LLC.
07/17/2009	Service Notice.
07/17/2009	Entry ordering that the motion for waivers filed by the applicant be granted. (GP)
07/14/2009	Motion to intervene and memorandum in support filed by L Gearhardt on behalf of the Ohio Farm Bureau Federation.
07/10/2009	Confidential document: Estimate Capital and Intangible Costs filed by S. Bloomfield on behalf of Hardin Wind Energy LLC.
07/10/2009	Application continued. (Part 3 of 3)
07/10/2009	Application continued. (Part 2 of 3)
07/10/2009	Application of Hardin Wind Energy LLC for a certificate to site a wind-powered electric generation facility in Hardin County, OH filed by S. Bloomfield.
07/10/2009	Motion for protective order and memorandum in support filed by S. Bloomfield on behalf Hardin Wind Energy, LLC.
07/07/2009	Memorandum regarding the Applicant's Motion for Waivers, electronically filed by Tim Burgener on behalf of Mr. Klaus Lambeck.
06/23/2009	Proof of publication. (Hardin County)
06/05/2009	Motion for waiver and memorandum in support filed by S. Bloomfield on behalf of Hardin Wind Energy LLC.
06/05/2009	In the matter of the application of Hardin Wind Energy LLC for a certificate to site a wind-powered electric generation facility in Hardin County, Ohio.

2. Project Maps













Ń
















ψ

























ψ



NJ



An Equal Opportunity Employer and Service Provider

www.OPSB.ohio.gov (866) 270-OPSB (6772)

180 E. Broad Street Columbus, Ohio 43215-3793 This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

12/21/2009 1:30:06 PM

in

Case No(s). 09-0479-EL-BGN

Summary: Report electronically filed by Tim Burgener on behalf of Staff of the Ohio Power Siting Board