

Staff Report of Investigation

Timber Road IV Wind Farm
Paulding Wind Farm IV LLC

Case No. 18-0091-EL-BGN

November 19, 2018



Power Siting
Board

John R. Kasich, Governor | Asim Z. Haque, Chairman

**In the Matter of the Application of Paulding Wind Farm)
IV LLC for a Certificate of Environmental)
Compatibility and Public Need to Construct a) Case No. 18-0091-EL-BGN
Wind-Powered Electric Generation Facility in Paulding)
County, Ohio)**

Staff Report of Investigation

Submitted to the
OHIO POWER SITING BOARD

BEFORE THE POWER SITING BOARD OF THE STATE OF OHIO

In the Matter of the Application of Paulding Wind Farm)
IV LLC for a Certificate of Environmental)
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Chairman, Public Utilities Commission	Director, Department of Natural Resources
Director, Department of Agriculture	Public Member
Director, Development Services Agency	Ohio House of Representatives
Director, Environmental Protection Agency	Ohio Senate
Director, Department of Health	

To the Honorable Power Siting Board:

In accordance with the Ohio Revised Code (R.C.) 4906.07(C) and rules of the Ohio Power Siting Board (Board), the staff of the Public Utilities Commission of Ohio (Staff) has completed its investigation in the above matter and submits its findings and recommendations in this Staff Report for consideration by the Board.

The findings and recommendations contained in this report are the result of Staff coordination with the following agencies that are members of the Board: Ohio Environmental Protection Agency, the Ohio Department of Health, the Ohio Development Services Agency, the Ohio Department of Natural Resources, and the Ohio Department of Agriculture. In addition, Staff coordinated with the Ohio Department of Transportation, the Ohio Historic Preservation Office, the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the U.S. Coast Guard.

In accordance with R.C. 4906.07(C) and 4906.12, copies of this Staff Report have been filed with the Docketing Division of the Public Utilities Commission of Ohio and served upon the Applicant or its authorized representative, the parties of record, and pursuant to Ohio Administrative Code 4906-3-06, the main public libraries of the political subdivisions in the project area.

The Staff Report presents the results of Staff's investigation conducted in accordance with R.C. 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,



Tamara S. Turkenton
Director, Rates and Analysis
Public Utilities Commission of Ohio

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I. POWERS AND DUTIES

OHIO POWER SITING BOARD

The authority of the Ohio Power Siting Board (Board) is prescribed by Ohio Revised Code (R.C.) Chapter 4906. R.C. 4906.03 authorizes the Board to issue certificates of environmental compatibility and public need for the construction, operation, and maintenance of major utility facilities defined in R.C. 4906.01. Included within this definition of major utility facilities 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 of 100 kilovolts (kV) or more; and gas pipelines greater than 500 feet in length and more than nine inches in outside diameter, and associated facilities, designed for transporting gas at a maximum allowable operating pressure in excess of 125 pounds per square inch. In addition, pursuant to R.C. 4906.20, the Board authority applies to economically significant wind farms, defined in R.C. 4906.13(A) 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 5 MW or greater but less than 50 MW.

Membership of the Board is specified in R.C. 4906.02(A). The voting members include: the Chairman of the Public Utilities Commission of Ohio (PUCO or Commission) who serves as Chairman of the Board; the directors of the Ohio Environmental Protection Agency (Ohio EPA), the Ohio Department of Health, the Ohio Development Services Agency, the Ohio Department of Agriculture, and the Ohio Department of Natural Resources (ODNR); 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. Ex-officio Board members include two members (with alternates) from each house of the Ohio General Assembly.

NATURE OF INVESTIGATION

The Board has promulgated rules and regulations, found in Ohio Administrative Code (Ohio Adm.Code) 4906:1-01 et seq., which establish application procedures for major utility facilities and economically significant wind farms.

Application Procedures

Any person that wishes to construct a major utility facility or economically significant wind farm in this state must first submit to the Board an application for a certificate of environmental compatibility and public need.¹ The application must include a description of the facility and its location, a summary of environmental studies, a statement explaining the need for the facility and how it fits into the Applicant's energy forecasts (for transmission projects), and any other information the Applicant or Board may consider relevant.²

Within 60 days of receiving an application, the Chairman must determine whether the application is sufficiently complete to begin an investigation.³ If an application is considered complete, the Board or an administrative law judge will cause a public hearing to be held 60 to 90 days after the

1. R.C. 4906.04 and 4906.20.

2. R.C. 4906.06(A) and 4906.20(B)(1).

3. Ohio Adm.Code 4906-3-06(A).

official filing date of the completed application.⁴ At the public hearing, any person may provide written or oral testimony and may be examined by the parties.⁵

Staff Investigation and Report

The Chairman will also cause each application to be investigated and a report published by the Board's Staff not less than 15 days prior to the public hearing.⁶ The report sets forth the nature of the investigation and contains the findings and conditions recommended by Staff.⁷ The Board's Staff, which consists of career professionals drawn from the staff of the PUCO and other member agencies of the Board, coordinates its investigation among the agencies represented on the Board and with other interested agencies such as the Ohio Department of Transportation (ODOT), the Ohio Historic Preservation Office (OHPO), and the U.S. Fish and Wildlife Service (USFWS).

The technical investigations and evaluations are conducted pursuant to Ohio Adm.Code 4906-1-01 et seq. The recommended findings resulting from Staff's investigation are described in the Staff Report pursuant to R.C. 4906.07(C). The report does not represent the views or opinions of the Board and is only one piece of evidence that the Board may consider when making its decision. Once published, the report becomes a part of the record, is served upon all parties to the proceeding and is made available to any person upon request.⁸ A record of the public hearings and all evidence, including the Staff Report, may be examined by the public at anytime.⁹

Board Decision

The Board may approve, modify and approve, or deny an application for a certificate of environmental compatibility and public need.¹⁰ If the Board approves, or modifies and approves an application, it will issue a certificate subject to conditions. The certificate is also conditioned upon the facility being in compliance with applicable standards and rules adopted under the Ohio Revised Code.¹¹

Upon rendering its decision, the Board must issue an opinion stating its reasons for approving, modifying and approving, or denying an application for a certificate of environmental compatibility and public need.¹² A copy of the Board's decision and its opinion is memorialized upon the record and must be served upon all parties to the proceeding.¹³ Any party to the proceeding that believes its issues were not adequately addressed by the Board may submit within 30 days an application for rehearing.¹⁴ An entry on rehearing will be issued by the Board within 30 days and may be appealed within 60 days to the Supreme Court of Ohio.¹⁵

4. R.C. 4906.07(A) and Ohio Adm.Code 4906-3-08.

5. R.C. 4906.08(C).

6. R.C. 4906.07.

7. Ohio Adm.Code 4906-3-06(C).

8. R.C. 4906.07(C) and 4906.10.

9. R.C. 4906.09 and 4906.12.

10. R.C. 4906.10(A).

11. R.C. 4906.10.

12. R.C. 4906.11.

13. R.C. 4906.10(C).

14. R.C. 4903.10 and 4906.12.

15. R.C. 4903.11, 4903.12, and 4906.12.

CRITERIA

Staff developed the recommendations and conditions in this *Staff Report of Investigation* pursuant to the criteria set forth in R.C. 4906.10(A), which 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 pipeline;
- (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 generating 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 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) to (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 alternative site; and
- (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.

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II. APPLICATION

APPLICANT

Paulding Wind Farm IV LLC (Applicant) would develop, build and operate the Timber Road IV Wind Farm. Paulding Wind Farm IV LLC is a Delaware limited liability company that is a wholly owned subsidiary of EDPR. EDPR is a renewable energy company focused on solar and wind development. EDPR's current operations take place in 12 countries. EDPR developments in the U.S. can be found in California, Illinois, Indiana, Iowa, Kansas, Minnesota, New York, Ohio, Oklahoma, Oregon, Texas, and Washington. EDPR is the second largest owner/operator of wind farms in Ohio, with 265 MWs of operating facilities located in Paulding and Hardin Counties.¹⁶

HISTORY OF THE APPLICATION

Prior to formally submitting its application, the Applicant consulted with the Staff and representatives of the Board, regarding application procedures.

On March 19, 2018, the Applicant filed a pre-application notification letter regarding the project.

On April 4, 2018, the Applicant held a public informational meeting for the project at the Black Swamp Nature Center in Paulding, Ohio.

On July 2, 2018, the Applicant filed the application for the Timber Road IV Wind Farm.

On July 27, 2018, the Applicant filed supplemental information including an Acoustic Assessment dated June 2018, and a Shadow Flicker Analysis dated June 2018.

On August 14, 2018, the Applicant filed supplemental information updating the Bat Acoustic Survey Final Report dated May 4, 2017 – July 15, 2018.

On August 31, 2018, the Director of Rates and Analysis, PUCO, issued a letter to the Applicant stating that the application had been found to comply with the requirements of Ohio Adm. Code 4906-01, et seq.

On September 18, 2018, the Administrative Law Judge issued an entry scheduling a local public hearing for this case to be held on Tuesday, December 4, 2018 at 6:00 p.m., at the Ohio State University Extension Building, 503 Fairground Drive, Paulding, Ohio 45879. The adjudicatory hearing will commence on Friday December 14, 2018, at 10:00 a.m., 11th floor, Hearing Room 11-D, at the offices of the Public Utilities Commission of Ohio, 180 E. Broad St., Columbus, Ohio 43215-3793.

On October 24, 2018, the Applicant filed supplemental information updating the application's the structure and property lease status table.

16. *In the Matter of the Application of Paulding Wind Farm IV LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Wind-Powered Electric Generation Facility in Paulding County, Ohio.*, Case No. 18-0091-EL-BGN, Application at pp. 5 (July 2, 2018 as supplemented July 27, 2018 and August 14, 2018)

On October 24, 2018, the Applicant filed a Response to First Set of Interrogatories from Staff of the Ohio Power Siting Board.

On October 31, 2018, the Ohio Farm Bureau Federation filed a motion to intervene.

On November 1, 2018, the Applicant filed a Response to Second Set of Interrogatories from Staff of the Ohio Power Siting Board.

On November 5, 2018, the Administrative Law Judge issued an entry granting the motion for intervention of the Ohio Farm Bureau Federation.

This summary of the history of the application does not include every filing in Case No. 18-0091-EL-BGN. The docketing record for this case, which lists all documents filed to date, can be found online at <http://dis.puc.state.oh.us>.

PROJECT DESCRIPTION

The Applicant proposes to construct and operate the Timber Road IV Wind Farm with up to 37 wind turbines for a total generating capacity of up to 125.1 megawatts (MW) in Paulding County, near the village of Payne.¹⁷

Project Area

The facility would be located in Crane, Harrison, Paulding, Blue Creek, and Benton Townships in Paulding County. The project area is comprised of approximately 20,400 acres of leased private lands involving approximately 100 landowners. The project area and proposed facilities are shown on the map in this report.

Wind Turbines

The Applicant proposes to use either Siemens Gamesa 126 (2.625 MW), Siemens Gamesa 132 (3.55 MW), Siemens Gamesa 145 (4.2 MW), Vesta 136 (3.6 MW), Vesta 150 (4.2 MW), Acciona 132 (3.465 MW), or Acciona 140 (3.0 MW). At the time of the submittal of the application, the Applicant had proposed 54 turbine locations and evaluated all locations within the studies presented in their application. Since the submittal of the application, the Applicant has removed turbine location 49 Alt2 as a potential location due to its proximity to a public road. The number of turbines constructed would depend on the output of chosen model, but would not exceed 37 turbines. The proposed structures would consist of a three-bladed horizontal axis turbine and nacelle on top of a white tubular conical steel tower. The total structural maximum height would be up to 591 feet with a maximum turbine hub height of 374 feet and a maximum rotor diameter of 492 feet.

The Applicant expects that the annual energy production for the Timber Road IV Wind Farm would be approximately 370,000 to 420,000 megawatt hours (MWh).

Turbine Foundations and Assembly

The Applicant would prepare a wind turbine assembly area by grading and removing vegetation within a maximum radius of 263 feet around each turbine location. The Applicant would adjust the turbine assembly area in order to avoid environmentally sensitive resources. The foundation construction process would generally proceed from hole excavation, mud mat installation, outer form setting, rebar and bolt cage assembly, casting and finishing of concrete, removal of forms, backfilling and compacting, and site restoration.

Suitable turbine foundation systems would be designed upon completion of the detailed geotechnical exploration, but the most likely type of foundation would be spread-foot. This is a commonly used foundation design for wind turbines and would likely be reasonable to use at this proposed facility.

Based on the preliminary geological assessment of the project area, the Applicant does not anticipate that blasting would be necessary for foundation construction. Pursuant to Ohio Administrative Code (Ohio Adm.Code) 4906-4-09, should site-specific conditions warrant

17. In the Matter of the Application of Paulding Wind Farm IV LLC for a Certificate of Environmental Compatibility and Public Need to Construct a Wind-Powered Electric Generation Facility in Paulding County, Ohio., Case No. 18-0091-EL-BGN, Application at pp. 3 (July 2, 2018).

blasting, the Applicant would be required to submit a blasting plan to OPSB Staff for review and acceptance in advance of any blasting.

Electric Collection System and Collection Switching Substations

A 34.5 kV underground electric collection system would be installed to transfer the power from each wind turbine location to a collection substations. The total length of the buried 34.5 kV collector lines carrying electricity to the collection substations would be up to 63 miles, and would be buried at a depth of four feet. Collection line installation would be done with the use of direct burial, horizontal directional drilling, or open trench.

The Applicant proposes to build a new collection substation on 4 acres of land at the intersection of Township Road 52 and Township Road 59 in Blue Creek Township. The proposed collection substation would step up voltage from 34.5 kV to 138 kV. In addition, an existing collection substation (currently utilized by the existing Paulding Wind Farm III facility) would be used for the project. The proposed substation would deliver electricity to the same interconnection as the existing substation. This would be accomplished by tapping into the existing Paulding Wind Farm III facility transmission line, which connects the existing substation to the Logtown point of interconnection switching station. Transmitting electricity from the proposed collection substation to the existing transmission line would require up to 3.8 miles of 138 kV transmission line. The transmission line is the subject of a separate filing before the Board in Case No. 18-1293-EL-BTX.

Operations & Maintenance Building

The proposed facility would use an existing operations and maintenance (O&M) facility located along State Route 49 in Paulding Township. The O&M facility was originally permitted and constructed as part of the Paulding Wind Farm II facility.

Permanent Meteorological Towers

Up to three 374-foot tall permanent meteorological towers would be installed. These towers would be galvanized steel structures equipped with wind velocity directional measuring instruments at three different elevations and a red aviation warning lighting mounted at the top. Each tower would be self-supporting, non-guyed, structures. The proposed sites for the meteorological towers are shown in the maps in this report.

Access Roads

Approximately 17 miles of access roads would be constructed to support the facility. The access roads would be up to 40 feet wide during construction. After construction, most access roads would be reduced to a width of 16 feet.

Construction Laydown Areas

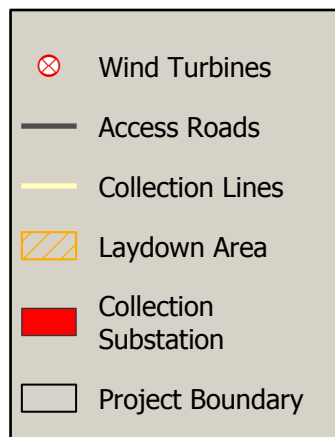
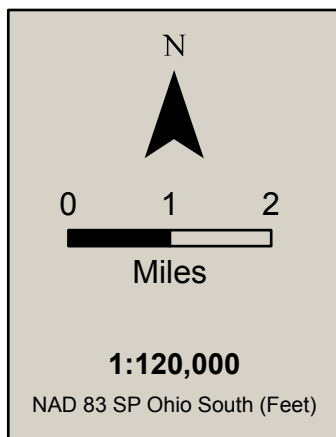
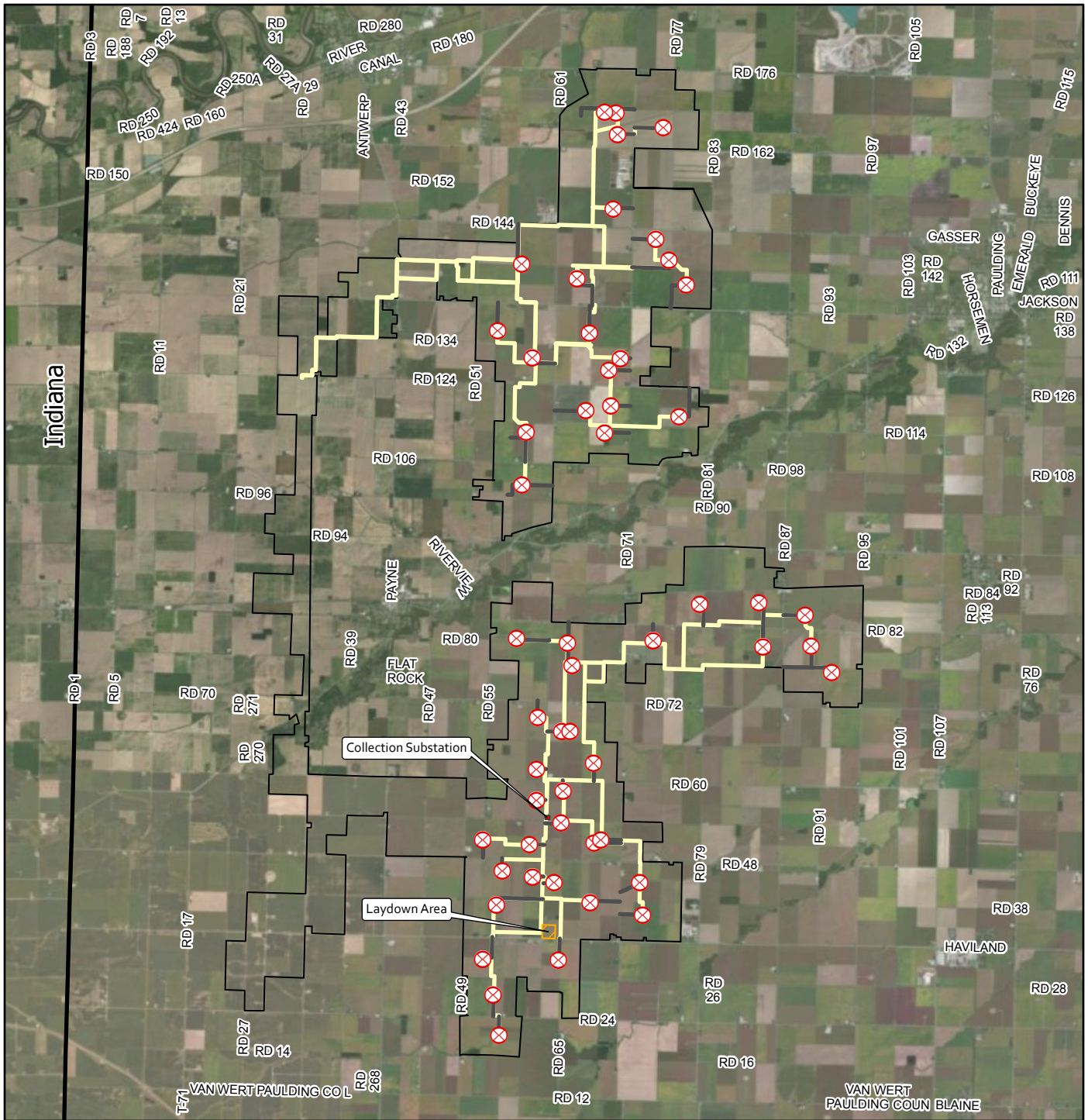
The Applicant generally intends to deliver materials directly to each turbine construction site, to the extent practicable. The Applicant also plans to use a temporary 18-acre laydown yard, to be located at the northeast corner of the intersection of State Route 114 and Township Hwy 59, for construction staging. This laydown yard would accommodate equipment/material storage, construction trailers, and construction worker parking. The proposed site for the temporary laydown area is shown in the maps in this report.

Concrete Batch Plant

To the extent possible, the Applicant would use local companies to supply concrete for the wind turbine foundations. In case local supplies are insufficient, the Applicant would construct a temporary on-site concrete batch plant. The Applicant is considering two potential sites for the concrete batch plant. Proposed sites include the existing operations and maintenance facility located on State Route 49 in the village of Payne, and at the proposed construction laydown yard.

Schedule

Construction is anticipated to begin in the second quarter of 2019, and to be completed within 7 to 9 months. The Applicant anticipates the facility would be placed in service in the fourth quarter of 2019.



Overview Map

18-0091-EL-BGN

Paulding Wind Farm IV

Maps 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 present by the Applicant in its certified application and supplemental materials.

III. CONSIDERATIONS AND RECOMMENDED FINDINGS

In the Matter of the Application of Paulding Wind Farm IV LLC for a Certificate to Construct a Wind-Powered Electric Generation Facility in Paulding County, Ohio, Staff submits the following considerations and recommended findings pursuant to R.C. 4906.07(C) and 4906.10(A).

Considerations for R.C. 4906.10(A)(1)

BASIS OF NEED

Pursuant to R.C. 4906.10(A)(1), the Board must determine the basis of the need for the facility only if the facility is an electric transmission line or gas pipeline. Staff's investigation in this case does not include the proposed 138 kV transmission line that is related to this project and is the subject of a separate filing before the Board in Case No. 18-1293-EL-BTX. Therefore, Staff has found an analysis of R.C. 4906.10(A)(1) to be inapplicable to the facility in question.

Recommended Findings

Staff recommends that the Board find that the basis of need as specified under R.C. 4906.10(A)(1) is not applicable to this facility, as the facility is neither an electric transmission line nor a gas pipeline.

Considerations for R.C. 4906.10(A)(2)

NATURE OF PROBABLE ENVIRONMENTAL IMPACT

Pursuant to R.C. 4906.10(A)(2), the Board must determine the nature of the probable environmental impact of the proposed facility. Staff has found the following with regard to the nature of the probable environmental impact.

Socioeconomic Impacts

Regional Planning and Development

The Applicant has studied comprehensive land use plans for communities within a five-mile radius of the proposed project. Key elements of compatibility with these developmental plans center on preservation of agricultural activities, job creation and economic opportunities. Wind turbine projects are consistent with farming practices and they provide a means of continued farmland preservation. Farming operations are able to resume shortly after temporary construction activities terminate. Agricultural activities are consistent with wind facility operations that typically require small footprints. Only a minimal amount of land is removed from agricultural production. This wind generation facility is expected to provide additional revenues and bolster jobs creation in the neighboring communities.

Demographics

The proposed facility is located entirely in Paulding County. In 2010, the population of Paulding County was approximately 19,600, and the population density was 47.1 persons per square mile.¹⁸ The 2010 population of Ohio was 11,536,730, and the population density was 282.3 persons per square mile. Further, the population of Paulding County is projected to decrease to approximately 19,000 between 2010 and 2020.¹⁹

Land Use

Land use in proximity to the proposed facility is predominately agricultural. Census data from the past two decades illustrates that the Ohio counties in the surrounding five-mile radius have experienced modest population declines, averaging approximately 2.6 percent. Allen County, Indiana, is located adjacent to the project area and included within the five-mile population study area. Allen County has experienced a modest growth of 6 percent over the last two decades. However, the short-term construction activities and long-term employment increases are not expected to significantly alter existing population trends in proximity to the project.

About 54 acres of agricultural land is expected to be permanently converted to wind farm use. No structures are expected to be removed or relocated for this facility's construction or operation. The Applicant stated that the facility would comply with required property line setbacks unless waived by cooperating property owners. Significant impacts to commercial, industrial, recreational and institutional land uses are not anticipated as these land uses are generally not present in any abundance.

18. United States Census Bureau, "State and County Quick Facts: Paulding County, OH," accessed October 09, 2018, <https://www.census.gov/quickfacts/fact/table/pauldintcountyohio,US/PST045217>.

19. Ohio Development Services Agency, "Population Characteristics and Projections: 2010 to 2040 Projected Population for Ohio Counties," accessed October 18, 2018, http://development.ohio.gov/reports/reports_pop_proj_map.htm.

Recreation

The Applicant has stated the proposed facility would be located entirely on leased private land. It is further stated by the Applicant that construction and operation of the facility would not physically impact any recreational areas. The Applicant also cited examples of wind turbines having negligible impacts to the behavior of game species.

The proposed facility would have the potential to cause visual impacts to recreational resources within the 10-mile study area.

Seven state-designated recreation areas are located within 10 miles of the proposed facility. The closest of these areas is the Maumee State Scenic and Recreational River, a public park and facility located approximately 2.2 miles north of the project. Due to the forested nature of these areas and their distance from the proposed project, minimal visual impacts are expected.

Cultural, Archaeological, and Architectural Resources

The Applicant initially conducted a Phase I cultural resource survey to ascertain potential impacts to historical properties and archaeological sites. The survey included an analysis of National Register of Historic Places (NHRP) and sites that may be eligible for the NHRP. The Applicant's survey focused on a 10-mile radius of the project area. The Applicant's survey included archaeological resources and known sites, landmarks, historical structures, bridges, cemeteries and historic districts.

The Applicant consulted with the State Historic Preservation Office (SHPO) in preparation of their overall survey plan for the project area and the SHPO has approved the Applicant's design for ongoing archaeological and architectural field work. An evaluation of the Applicant's study results will be coordinated with the SHPO to determine specific measures to appropriately avoid or minimize any potentially adverse impacts to cultural resources. If potentially adverse impacts to cultural resources can not be avoided or minimized, then the Applicant has committed to achieving a memorandum of understanding with the SHPO to address and mitigate those impacts.

Aesthetics

Due to the inherent nature of wind farm facilities, especially the turbine heights, it is impractical to screen them from view. Aesthetic impacts and considerations are always measured against the surrounding land use features and potential viewers' subjective opinions. In this case, the proposed project features and location provides for significant mitigation of potential viewshed impacts. The turbines would be painted a neutral white color, per guidance from the Federal Aviation Authority. The locations of the turbines among existing agricultural fields and adjacent to farm features such as storage silos provides additional visual mitigation. The rural nature of the project vicinity limits and diminishes the potential number of viewers. Transportation corridors typically are smaller and much more lightly traveled, which again reduces viewing impacts. The prevalence of existing woodlots are able to offer additional natural screening of portions of the facility.

Economics

The Applicant stated that it intends to construct all structures associated with the facility. The Applicant also plans to own and operate all of the associated structures. Construction equipment would be rented or owned by a contractor retained by the Applicant.

The Applicant chose to file its estimated capital and intangible costs, estimated operation and maintenance expenses, and estimated delay costs, under seal, and filed a motion for protective order to keep the information confidential. Similar requests have been common practice in many, but not all, wind farm applications. As of the date of filing this Staff report, there has not been a ruling on the Applicant's motion. Therefore, Staff is treating the cost information that was filed under seal as confidential for purposes of this report.

The Applicant stated that installed costs of similar facilities compiled by the U.S. Department of Energy National Renewable Energy Laboratory (NREL) in August 2017 are in line with the proposed facility. The Applicant also stated that the costs of wind energy facilities recently completed by their affiliates in Ohio and Indiana were not substantially different than the estimated installed cost for the proposed facility. Staff verified that the estimated installed cost of the proposed facility is comparable.

The Applicant stated that O&M expenses for similar facilities installed since 2010 on average was \$27/kW per year. This information was compiled by the Berkeley National Laboratory. The Applicant's O&M expenses estimated for the proposed facility are consistent with the average.

The Applicant provided its estimates of the cost of delays in permitting and construction of the proposed facility, although the cost estimates were filed under seal. The Applicant characterized these costs as lost construction days and the costs associated with idle construction crew and idle equipment. There are also penalties associated with failing to meet a delivery deadline under a potential Power Purchase Agreement. Delays that would prevent the project from meeting federal Investment Tax Credit deadlines would result in the loss of those benefits to the Applicant. The Applicant's characterization of its estimated costs of delays appears reasonable to Staff.

EDR Environmental Services (EDR), on behalf of the Applicant, evaluated the potential economic impacts of the facility on the local region. EDR's report was included as Exhibit H in the application. EDR used the USDOE's Job and Economic Development Impact (JEDI) model to develop its estimates of potential economic impacts. Economic impacts identified by EDR include direct employment and payroll associated with construction and operation of the facility; turbine supply chain employment and payroll during construction; and, jobs induced from increased spending of household income. EDR's summary of quantified projected economic benefits of the project during construction includes a total of \$37.4 million in wages and a total of \$98.7 million in economic output. During operation, EDR estimates the total annual wage and economic output benefits to be \$1.4 million and \$4.2 million, respectively.

EDR additionally estimated revenue derived from lease payments and local tax revenue or payments in lieu of taxes (PILOT). Lease payment estimates include approximately \$375,000 per year associated with lands lease. PILOT payments would be between \$6,000 and \$8,000 per megawatt (MW) of nameplate capacity per year. These payments would provide a positive economic benefit to the region.

All Staff recommendations for the requirements discussed in this section of the *Staff Report of Investigation* are included under the **Socioeconomic Conditions** heading of the Recommended Conditions of Certificate section.

Ecological Impacts

Public and Private Water Supplies

The project area lies within a rural area of Paulding County. The residents within the project area rely upon private wells for their domestic water supply. The Applicant does not anticipate significant adverse impacts to public or private water supplies as a result of construction of the Paulding Wind Farm IV. The proposed wind turbines would be constructed and generate electricity without impacts to surface or groundwater.

Paulding County includes several areas designated as a Source Water Supply Area (SWPA), as defined and approved by the Ohio EPA for the protection of drinking water sources. The Ohio EPA and the Ohio Department of Commerce, Bureau of Underground Storage Regulations have adopted regulations that restrict specific activities within these designated areas. Restricted activities include concentrated animal feeding operations, sanitary, industrial, or residual waste landfills, land application of biosolids, and voluntary brownfield cleanups. The Applicant reviewed the programs associated with these SWPAs and concluded the construction of the proposed facility would not have any adverse effect to SWPAs associated with the project area.

The final design for the wind turbine foundation would be determined once the Applicant conducts its geotechnical investigation at each wind turbine locations. The final design for the wind turbines would take into account the proximity to private water supplies and depth to the water table.

Geology

The geology of the project area consists of glacial till ranging from 15 to 55 feet thick. The glacial till consists of a heterogeneous mixture of all sizes of soil consisting of clay, silt, sand, and gravel. It may also contain streaks, seams, layers, or lenses of sand and gravel, which may be water-bearing. The bedrock within the project area is the Salina Group, comprised of brown limestones and dolomites and is somewhat variable in character. There are no known or probable karst areas within the project area. The geology of the project area is not expected to preclude the construction of wind turbines.

Seismology

Paulding County does not have any recorded earthquake epicenters of note. The closest known structural feature is the Fort Wayne Rift, located 5 miles southwest of the project area boundary. Seismic activity has been recorded in north central Mercer County, approximately 20 miles southeast of the project area boundary. The epicenter of the highest magnitude earthquake recorded in Ohio to date occurred in 1937 near Anna, approximately 50 miles southeast of the project area boundary. It measured 5.4 on the Richter scale. The potential for earthquakes is not a limiting factor to the design and construction of the wind turbines in the project area.

Soils and Test Borings

The soils in the project area as characterized in the Soils Survey of Paulding County, Ohio generally consist of clays, silty clays and silty clay loams. The dominant soils series are Hoytville and Latty and a lesser amount of Paulding clay. These soils formed in till, and are very deep, nearly level, and somewhat poorly drained to very poorly drain.

The Hoytville Series is very deep and very poorly drained. The permeability is moderately slow in the upper part of the subsoil and slow in the lower part of the subsoil and in the substratum. The

parent material is till with the landform described as Lake Plains. The position on the landform is along flat area, depressions, and drainageways. The slopes are nearly flat lying ranging from 0 to 2 percent.

The Latty Series is also very deep and somewhat poorly drained soils. The permeability is slow. The parent material is till with the landform described as Lacustrine deposits positioned along extensive flat areas and slight rises. The slopes vary ranging from 0 to 6 percent.

The Paulding clay is a very deep, nearly level and gently sloping, very poorly drained and somewhat poorly drained soils formed in lacustrine deposits. The parent material is clay with the landform described as Lacustrine deposits positioned on extensive flat area, depressions, and drainageways.

Although all three soils are susceptible to ponding, none of the soils present conditions related to frequent flooding. As a result, none of these soils present any limiting factors to the design and construction of the wind farm.

The Applicant would be required to perform a detailed geotechnical investigation and soil testing at each turbine location, pursuant to Ohio Adm.Code 4906-4-09. The borings would extend to the proposed depth within the soil subsurface or to competent bedrock, whichever is encountered first. Various tests would be performed both in the field and inside a laboratory. The Applicant would provide Staff a report from the geotechnical engineer representative that documents the finding of the borings and laboratory testing, along with recommendations on constructions methods and foundation designs.

Surface Waters

Construction of the facility, considering all 54 turbine locations, would include 1.71 acre of temporary stream impacts, and 0.08 acre of permanent stream impact. Construction of the facility would include 0.1 acres of temporary impacts to wetland. A total of six wetlands were delineated within the project area. All wetlands are category 2 wetlands.

The majority of water resource impacts would be limited to man-made agricultural or roadside ditches. To minimize surface water impacts, the Applicant would install collection lines by horizontal directional drilling (HDD) where they would cross streams and wetlands. Due to the use of HDD, Staff would require the Applicant to submit a detailed frac-out contingency plan for Staff review and approval.

The Applicant would obtain a Nationwide Permit from the United States Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act if necessary. Additional measures to reduce water quality impacts would be taken through the development of a Stormwater Pollution Prevention Plan (SWPPP), as part of the Ohio Environmental Protection Agency's (Ohio EPA) National Pollutant Discharge Elimination System (NPDES) permit, to help control potential sedimentation, siltation, and run-off.

No ponds or lakes would be impacted by the facility during construction or operation. No proposed turbine locations, access roads or collection lines are within the 100-year floodplain.

All turbine locations have been sited in upland areas in order to avoid impacts to surface waters. The Applicant would use best management practices (BMP) to minimize impacts to surface

waters. Wetlands would be designated as “No equipment access areas” to prohibit the use of motorized equipment in unpermitted areas. A 50-foot buffer would be designated as a “restricted activity area” wherever facility construction traverses or comes in proximity to wetlands and streams. Restricted activities include: no deposition or accumulation of woody vegetation or construction debris, no herbicide applications, no degradation of stream banks, no equipment washing or refueling, and no storage of any petroleum or chemical material.

Threatened and Endangered Species

The Applicant requested information from the ODNR and the USFWS regarding state and federally listed threatened and endangered plant and animal species. Additional information was provided through field assessments and review of published ecological information. The following table of federal and state listed species known to occur in Paulding County reflects the results of the information requests, field assessments, and document review.

BIRDS				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
bald eagle	<i>Haliaeetus leucocephalus</i>	BGEPA & MBTA ²⁰	N/A	Known range, observed during Avian Use Surveys.
REPTILES & AMPHIBIANS				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
Blanding’s turtle	<i>Emydoidea blandingii</i>	N/A	Threatened	Habitat would be avoided. No impacts to this species are anticipated.
Kirtland’s snake	<i>Clonophis kirtlandii</i>	N/A	Threatened	Due to the location, the type of habitat present at the project site, no impacts to this species are anticipated.
MAMMALS				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
Indiana bat	<i>Myotis sodalis</i>	Endangered	Endangered	Known range, presence of the species has been established.
northern long-eared bat	<i>Myotis septentrionalis</i>	Threatened	Threatened	Known range, habitat includes woodlands.
FRESH WATER MUSSELS				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
clubshell	<i>Pleurobema clava</i>	Endangered	Endangered	Known range, Applicant conducted a mussel survey in 2016, no suitable habitat was found within the project area.

²⁰ Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act.

FRESH WATER MUSSELS				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
Pondhorn	Uniomereus tetralasmus	N/A	Threatened	Known range, Applicant conducted a mussel survey in 2016, no suitable habitat was found within the project area.

FISH				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
Greater redhorse	Moxostoma valenciennesi	N/A	Threatened	No in-water work from April 15 through June 30 in perennial streams.

The Applicant did not identify any listed plant species during field surveys. Further, the ODNr and the USFWS did not identify any concerns regarding impacts to listed plant species. In the unexpected event that the Applicant encounters listed plant or animal species during construction, Staff recommends that the Applicant contact Staff, the ODNr, and the USFWS, as applicable. Staff also recommends that if the Applicant encounters any listed plant or animal species prior to construction, the Applicant include the location and how impacts would be avoided in the final access plan to be provided to Staff.

The Applicant performed numerous bird and bat surveys. An avian use survey was conducted from March 2016 to February 2017. An additional avian use survey was conducted from November 2016 through October 2017 to assess current use of the project area by eagles and other bird species. Raptor nest surveys were completed in spring of 2017 and spring of 2018 in order to identify raptor nests in the vicinity of the project area. Bat acoustic surveys were conducted during the spring, summer, and fall of 2017 and the spring of 2018 in order to assess bat use and phenology in the project area. Bat mist-netting surveys were conducted in July 2017 to determine the presence or probable absence of listed bat species within the project area during the summer maternity season. Sandhill crane migration surveys were also conducted from November 1 through December 15, 2016. Survey methodologies were based on the ODNr Division of Wildlife's Cooperative Agreement titled "On-shore Bird and Bat Pre- and Post- Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio." The survey effort incorporated recommendations by the ODNr and the results were consideration for the recommendations of this report.

The proposed facility is within the range of the federal and state endangered Indiana bat, the federal and state threatened northern long-eared bat, federal and state endangered clubshell mussel, the federal protected bald eagle, state threatened pondhorn, state threatened greater redhorse, state threatened Blanding's turtle, and state threatened Kirtland's snake. Due to the avoidance of wetlands and perennial streams and a lack of suitable habitat, no impacts to the clubshell, pondhorn, greater redhorse, Blanding's turtle, and Kirtland's snake are anticipated.

The primary threat to the Indiana bat and northern long-eared bat would be during operation of the facility due to the risk of collision with an operational wind turbine. The Applicant has initiated formal consultation with the USFWS under provisions of Section 10 of the Endangered Species Act for potential take of federally listed species. Based on this consultation, the Applicant has

committed to submitting an application to the USFWS for an Incidental Take Permit (ITP) under Section 10(a)(1)(B) of the Endangered Species Act, which allows for incidental take of federally-listed species through implementation of a Habitat Conservation Plan. The Applicant has also committed to obtain a Technical Assistance Letter for Avoidance of Indiana and northern Long-eared Bat Take (TAL) for the Facility from USFWS and would implement operational measures to avoid take of Indiana and northern long eared bats until the ITP is obtained. Past TALs have recommended operational measures such as increased cut-in speed for all turbines of 6.9 meters/second from ½ hour before sunset to ½ hour after sunrise between March 15 and May 15 and between August 1 and October 15. Additionally, The Applicant has stated that turbines would be feathered below manufacturer's cut-in speed during the summer season from May 16 through July 31. The operational measures implemented both during the TAL and the ITP would protect Indiana bats, northern long-eared bats, and other non-listed bats. Staff recommends that the Applicant obtain the TAL prior to operation.

The Applicant has committed to implement a post-construction avian and bat fatality monitoring program in accordance with ODNR and USFWS guidelines. Staff recommends that the post-construction avian and bat fatality monitoring plan be submitted prior to operation for ODNR and Staff review.

As tree-roosting species, during the non-winter months, the Indiana bat and northern long-eared bat could also be negatively impacted by tree clearing associated with construction and maintenance of the facility. Presence of the Indiana bat has been established in the project area and therefore additional summer surveys would not constitute presence/absence in the area. Limiting tree-removal, particularly in areas identified as potential bat habitat, would help reduce potential impacts to this species. In order to reduce potential negative impacts to the Indiana bat and northern long-eared bat, the Applicant has committed to seasonal cutting dates of October 1 through March 31 for removal of suitable habitat trees, if avoidance measures cannot be achieved.

The Avian Use Surveys observed a total of 19 bald eagles. The study effort incorporated recommendations by the USFWS and was conducted in accordance with the USFWS Proposed Guidance for Eagle Conservation Plans. The purpose of the eagle use survey is to document bald eagle use of the project area. Bald eagles and active nests were both observed during the surveys. The Applicant has committed to continue to work with the ODNR and OPSB Staff, in consultation with USFWS to determine if additional action is needed. Avian surveys will continue in 2018 to assess the potential collision risk of bald eagles.

The Applicant has committed to contacting Staff, the ODNR, and the USFWS within 24 hours if state or federal threatened or endangered species are encountered during construction activities. Construction activities that could adversely impact the identified plants or animals would be halted until an appropriate course of action has been agreed upon by the Applicant, Staff, and the ODNR in coordination with the USFWS. Nothing in this commitment would preclude agencies having jurisdiction over the facility with respect to threatened or endangered species from exercising their legal authority over the facility consistent with law.

Vegetation

The following table reflects the different vegetative communities present in the project area and associated impact for the facility.

VEGETATION			
Vegetation Community Type	Total Disturbance (Acres)	Temporary Impacts (Acres)	Permanent Impacts (Acres)
Forestland	0.9	0.9	0.0
Agricultural Lands	516	462	54
Total	516.9	462.9	54

Facility construction would result in minimal temporary and permanent impacts to vegetative communities within the project area. Construction activities that may result in impacts to vegetation include site preparation, earth-moving, excavation, and backfilling activities associated with construction of the laydown area, access roads, crane paths, foundations, and underground collection system. These construction activities would result in cutting and clearing of vegetation and soil disturbance and exposure. No significant impacts are expected for any plant species as a result of this facility.

The recommends that the Applicant have a environmental specialist on site during construction activities that may affect sensitive areas, as mutually agreed upon between the Applicant and Staff, and as shown on the Applicant's final approved construction plan. Sensitive areas include but are not limited to areas of vegetation clearing, designated wetlands and streams, and locations of threatened or endangered species or their identified habitat. The environmental specialist would be familiar with water quality protection issues and potential threatened or endangered species of plants and animals that may be encountered during facility construction.

All Staff recommendations for the requirements discussed in this section of the *Staff Report of Investigation* are included under the **Ecological Conditions** heading of the Recommended Conditions of Certificate section.

Public Services, Facilities, and Safety

Setbacks

R.C. 4906.20(B)(2)(a) delineates how minimum setbacks for “economically significant wind farms” are to be determined. These minimum setback requirements are further codified in rule Ohio Adm.Code 4906-17-08(C)(2).

The wind turbine must be at least 1,125 feet in horizontal distance from the tip of the turbine's nearest blade at 90 degrees to the property line of the nearest adjacent property, including a state or federal highway, at the time of certification application. The maximum blade length proposed for this project is 246 feet. Using this blade length, the minimum setback calculates to 1,371 feet from the turbine base to nearest adjacent property.

Several turbines would require setback waivers in order to be constructed. However the exact number of required waivers would not be determined until the Applicant has selected which turbine locations would be constructed and which model would be implemented. The Applicant is in the process of working with property owners to obtain the necessary waivers and stated that it understands that it would only be able to construct turbines that either meet the statutory setback requirement or have the requisite setback waivers.

Pursuant to Ohio Adm.Code 4906-4-08, the distance from a wind turbine base to any electric transmission line, gas pipeline, gas distribution line, hazardous liquids pipeline, or public road shall be at least 1.1 times the total height of the turbine structure as measured from its tower's base

to the tip of the blade at its highest point. The maximum total height of the tallest proposed model is 591 feet. Therefore, setback to these facilities and roads for the proposed turbines would be 650.1 feet. Since submittal of the application, the Applicant determined that turbines 49 Alt 1 and 49 Alt 2, as proposed in the application, were within the setback to a public road. The Applicant has since elected to drop turbine 49 Alt 2 from its proposed potential turbine locations. Additionally, the Applicant has moved the proposed location of turbine 49 Alt1 225 feet to the west in order to comply with the setback. Also since submittal of the Application, the Applicant has determined that turbine 74 is within the setback to a gas pipeline and has elected to move this turbine location 85 feet to the west in order to comply with the setback. The movement of these proposed turbine locations is not expected to result in increased impacts in other areas of concern.

Roads and Bridges

During construction, local, township, county, and state roads would experience a temporary increase in truck traffic due to deliveries of equipment and materials. The Applicant's preliminary transportation study indicated that one primary route would be selected from the following alternatives: I-24 traveling south onto US Route 49 where traffic would disperse through the project area; or, I-30 traveling north onto US Route 49 where traffic would disperse through the project area.

Delivery of wind farm equipment and materials would likely impact local roads, both through heavy truck traffic and the need for upgrades prior to use. The existing pavement widths of the county and township roads in the project area vary from approximately 18 feet to 22 feet wide. Roadways outside the project area would be evaluated by the hauling company delivering the turbine components, after a hauling company has been selected.

The Applicant conducted a field review of local project area roads, in order to identify possible impacts to township and county roads from construction. The Applicant also reviewed issues including the pavement condition, bridge load capacity, and restricted turning radii for trucks delivering turbine components.

The Applicant expects some modifications to local roads, including the expansion of intersection turns to accommodate specialized turbine component delivery vehicles and conventional construction trucks. Other transportation infrastructure improvements include grading of the terrain, extension of drainage pipes and/or culverts to maintain drainage in the ditched areas, and relocation of utility poles, street signs and other appurtenances. Upon completion of the facility, the Applicant would return all roadways to their pre-construction conditions or better.

Prior to commencement of construction activities that require transportation permits, the Applicant would obtain all such permits. The Applicant would coordinate with the appropriate authority regarding any temporary or permanent road closures, lane closures, road access restrictions, and traffic control necessary for construction of the proposed facility. Coordination would include, but not be limited to, the county engineer, Ohio Department of Transportation, local law enforcement, and health and safety officials. This coordination would be detailed as part of a final engineering design submitted to Staff prior to the preconstruction conference for review and confirmation that it complies with this commitment. The Applicant would restrict public access to the facility with appropriately placed warning signs or other necessary measures.

The Applicant would provide the final delivery route plan and the results of any traffic studies to Staff and the county engineer(s) 30 days prior to the preconstruction conference. The Applicant would complete a study on the final equipment delivery route to determine what improvements would be needed in order to transport equipment to the wind turbine construction sites. The Applicant would make all improvements outlined in the final delivery route plan prior to equipment and wind turbine delivery. The Applicant's delivery route plan and subsequent road modifications would include, but not be limited to, the following: Performing a survey of the final delivery routes to determine the exact locations of vertical constraints where the roadway profile would exceed the allowable bump and dip specifications and outline steps to remedy vertical constraints; 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 must be raised; Identifies roads and bridges that are not able to support the projected loads from delivery of the wind turbines and other facility components and make all necessary upgrades; Identifies locations where wide turns would require modifications to the roadway and/or surrounding areas and make all necessary alterations. Any alterations for wide turns would be removed and the area restored to its preconstruction condition unless otherwise specified by the county engineer(s).

The Applicant has committed to repairing damage to government-maintained (public) roads and bridges caused by construction or maintenance activities. Any damaged public roads and bridges would be repaired promptly to their previous condition by the Applicant under the guidance of the appropriate regulatory agency. Any temporary improvements would be removed unless the county engineer(s) request that they remain. The Applicant would provide financial assurance to the counties that it would restore the public roads it uses to their condition prior to construction or maintenance.

The Applicant would enter into a Road Use Agreement with the county engineer(s) prior to construction and subject to Staff review and confirmation that it complies with this commitment. The Road Use Agreement would contain provisions for the following: A preconstruction survey of the conditions of the roads; a post-construction survey of the condition of the roads, an objective standard of repair that obligates the Applicant to restore the roads to the same or better condition as they were prior to construction; a timetable for posting of the construction road and bridge bond prior to the use or transport of heavy equipment on public roads or bridges.

Blade Shear

Blade shear occurs when a wind turbine blade, or segment, separates from the rotor and is thrown or dropped from the tower. The Applicant asserts that past incidences have generally been the result of design defects during manufacturing, poor maintenance, control system malfunction, or lightning strikes. Turbine design certification by the wind industry has led to reductions in blade failures. The turbines have the following safety features to address blade shear: two fully independent braking systems, a pitch control system, turbine shut down at excessive wind speeds and at excess blade vibration or stress. These safety features and the use of setbacks minimize the potential for blade shear impacts. The Applicant has incorporated a wind turbine layout with an adjacent property line setback minimum of 1,371 feet. Staff recommends that the certificate be conditioned to require that the Applicant notify Staff within 24 hours of a blade shear incident.

Ice Throw

Ice throw occurs when accumulated ice on the wind turbine blades separates from the blade and falls or is thrown from the blade. The proposed turbine models have ice detection equipment and safety features that would shut down a turbine if the buildup of ice were to cause excess vibrations or the speed to power ratio were to become too high. The Applicant conducted an ice throw study to determine the probability of a 1 kilogram piece of ice landing at the nearest public road and nearest non-participating property boundary. The Applicant's ice throw study reports the probability of a 1 kilogram piece of ice landing at the nearest public road to be 0.2 percent and probability of a 1 kilogram piece of ice landing at the nearest non-participating property boundary 0.02 percent. Staff recommends that the certificate to be conditioned to require that the Applicant notify staff within 24 hours of an ice throw incident that causes injury or ice that is thrown beyond the setback distance.

Construction Noise

Various activities associated with construction of the facility would have noticeable, but temporary, noise impacts. Noise impacts primarily would be associated with the operation of construction and delivery equipment, such as dozers, excavators, pumps, cranes, and trucks. The Applicant provided estimates of sound levels associated with operation of construction equipment. Many of the construction activities would generate significant noise levels. However, the adverse impact of construction noise would be minimal because construction activities are temporary and intermittent, construction activities would primarily occur away from most residential structures, and most construction activities would be limited to normal daytime working hours.

Operational Noise

The noise impact of the proposed wind farm is related to the existing ambient noise level of the project area. In order to determine the ambient noise level at which wind turbine noise would likely be most noticeable, the Applicant compared turbine-generated noise levels and average ambient nighttime noise levels at various wind speeds. In order to estimate the potential noise impact associated with the proposed facility, the model used the maximum sound power for Acciona AW132/3300 which has the highest sound power level of the turbine models under consideration. The Applicant modeled the facility noise output using DataKustic GmbH's Cadna/A® noise modeling software.

In order to characterize the existing ambient noise level an acoustic survey of the project area was conducted by the Applicant between January 30 and February 14, 2018. Four survey locations were sampled. Based on this study, the Applicant found that average ambient noise levels (LEQ) across the project area ranged from 39 to 47 dBA during the day and from 34 to 40 dBA at night. The Applicant states and Staff concurs that the critical wind speed is 6 m/s. The critical wind speed is the wind speed at which has the greatest differential between turbine sound levels and the ambient sound levels. The nighttime ambient LEQ at the critical wind speed was shown to be 39 dBA.

The Applicant used an operational sound output design goal of 44 dBA at all non-participating receptors. This design goal equates to the addition of 5 dBA to the average nighttime LEQ for the project area. In order to achieve the design goal limits, several turbines may need to operate in a noise reduction operation mode. The Applicant's analysis of non-cumulative noise impacts showed that 58 non-participating receptors have modeled sound impacts in excess of 44 dBA.

The Applicant also conducted an evaluation of cumulative noise impacts due to the operation of the adjacent Timber Road II, Timber Road III, Blue Creek Wind Farm, and Northwest Ohio Wind Farm. The Applicant's analysis showed that 71 non-participating receptors have modeled sound impacts in excess of 44 dBA.

Staff recommends that the certificate be conditioned to require that the Applicant demonstrate adherence to the design limit of 44 dBA, which is nighttime Leq plus 5 dBA, except when, during daytime operation, the facility may operate at the greater of nighttime Leq plus 5 dBA or the validly measured LEQ at the receptor plus 5 dBA. This requirement would apply also to any cumulative noise impact associated with Timber Road II, Timber Road III, Blue Creek Wind Farm, and Northwest Ohio Wind Farm. Based on Staff's review, the Applicant's proposed turbine layout and the Applicant's commitment to adherence of the design limit, the project is not likely to generate unacceptable levels of noise for non-participating residents. Staff is aware that this representation is based on model results, and actual sound output levels could be different when the wind farm is in operation. Staff recommends that the certificate be conditioned to require that the Applicant show through a noise study that cumulative nighttime sound levels will not exceed 44 dBA at any non-participating sensitive receptor.

Shadow Flicker

The Applicant used WindPRO, a software program used to design and model wind facilities, to calculate the yearly shadow flicker impact of receptors within approximately 1,500 meters of the wind turbines. The model included 358 receptors. WindPRO uses the following inputs to calculate shadow flicker impact: coordinates of proposed turbines, turbine specifications, shadow receptor coordinates, monthly sunshine probabilities, joint wind speed and direction frequency distribution, USGS digital elevation model (DEM - height contour data), and locations of existing turbines. The calculation of the potential shadow impact at a given receptor, defined as a one-meter square area located one meter above ground level, was evaluated with this model.

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, casts a shadow on a receptor at any time, then this step is registered as one minute of potential shadow impact. The model's calculations take into account the wind turbine location, elevation, and dimensions, and the receptor location and elevation. The 4.2 MW Vestas V150 turbine was used for the model as this turbine is considered to result in the greatest amount of shadow flicker. The model showed that 36 non-participating receptors would be exposed to more than 30 hours of shadow flicker per year by the facility. Once a turbine model is chosen and final turbine site locations are determined a pre-construction shadow-flicker analysis would be done to determine how many receptors would still be modeled to receive more than 30 hours of shadow flicker per year.

The Applicant further studied the cumulative impact of shadow flicker of both the Timber Road II, Timber Road III, Blue Creek Wind Farm, and Northwest Ohio Wind Farm. Based on this cumulative analysis, two new non-participating receptors, in addition to the 36 due to the facility alone, would be exposed to more than 30 hours of shadow flicker per year by the facility and adjacent facilities.

This representation is based on model results, and actual shadow flicker levels may be different when the wind farm is in operation. Therefore, Staff recommends that the certificate be conditioned

upon the requirement that the Applicant show through mitigation or modeling that will not impact any non-participating sensitive receptor with more than 30 hours of shadow flicker per year. This requirement would apply also to any cumulative shadow flicker associated with Timber Road II, Timber Road III, Blue Creek Wind Farm, and Northwest Ohio Wind Farm.

Shadow flicker frequency is related to the wind turbine's rotor blade speed and the number of blades on the rotor. Shadow flicker at certain frequencies may potentially affect persons with epilepsy. For about three percent of epileptics, exposure to flashing lights at certain intensities or to certain visual patterns may 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. Flashing lights most likely to trigger seizures are between the frequency of 5 to 30 flashes per second, or hertz (Hz).²¹ This project's maximum wind turbine rotor speed translates to a blade pass frequency of approximately 0.77 Hz²² and therefore would not be likely to trigger seizures.

High Winds

Wind turbines are designed to withstand high wind speeds. The wind turbines proposed for this project, are designed to meet the standards of the International Electrotechnical Commission (IEC)-61400 series. The IEC is an organization that prepares and publishes international standards for all electrical, electronic, and related technologies including wind turbines. The wind turbines would be designed to automatically shut down and stop producing energy at their cut-out speeds, which are less than or equal to 27 meters per second (m/s), or 60 miles per hour (mph). The Vestas, Acciona, and Siemens Gamesa 126 models are certified by the IEC as Class III wind turbines designed to withstand annual average wind speeds of up to 7.5 m/s (17 mph) and extreme 10-minute average wind speeds of up to 37.5 m/s (84 mph). The Siemens Gamesa 132 and 145 models are certified by the IEC as Class II wind turbines designed to withstand annual average wind speeds of up to 8.5 m/s (19 mph) and extreme 10-minute average wind speeds of up to 42.5 m/s (95 mph). These wind turbine designs also specify two levels of wind turbulence intensity, category A for higher intensity or category B for lower intensity. These IEC standards represent minimum design values.

The Applicant currently monitors meteorological conditions in the area and intends to take appropriate precautions for the events of extreme weather. The Applicant states that the turbines have the following safety features in the event of high winds: a supervisory control and data acquisition control system to monitor weather, anemometers on each turbine, two independent braking systems, and an automatic turbine shut down mechanism at excessive wind speeds or vibrations.²³ Installing and utilizing these safety control mechanisms minimizes potential impacts from high winds.

Safety

The Applicant is required to provide the generation equipment manufacturer's safety standards, such as a safety manual or similar document. Staff reviewed these documents for the Acciona, Siemens Gamesa, and Vestas turbines. The purpose of Staff's review of this safety information is to ensure safety requirements or recommendations would be upheld by the wind farm

21. Epilepsy Foundation of America, accessed Dec. 21, 2009, <http://www.epilepsyfoundation.org/about/photosensitivity>.

22. $15.3 \text{ RPM} = 0.255 \text{ Hz} \times 3 \text{ blades} = 0.77 \text{ Hz}$

23. Application, p. 60.

owner/operator and for inclusion in the wind farm operator's overall safety culture. In accordance with Ohio Administrative Code 4906-4-09(A)(2)(a), the Applicant would comply with the turbine manufacturer's most current safety manual and maintain a copy of that safety manual in the O&M building of the facility.

Public safety during construction of the facility would be maintained through several means. The Applicant stated that it intends to restrict public access to the facility. The applicant intends to install signs, and gates where necessary, at the intersections of public roads and access roads that identify the turbine and prohibit unauthorized entry. The project substation would be enclosed by a chain link fence.

The Applicant stated that turbines would have safety lighting to comply with FAA requirements.

Additionally, the Applicant clarified its restart procedures and protocols after an automatic shutdown occurs due to excess vibration, ice, lightning storms, high wind and temperature events. The Applicant indicates that these restart procedures and protocols are designed to ensure the safe return to operation/restart without the turbines being a danger to on-site personnel or the public.

The Applicant intends to require its contractors to implement its emergency action plan(s) and consult with all necessary local emergency services, including medical facilities. The Applicant also intends to provide proper equipment (R.C. 5727.75 (F)) to fire and emergency responders to enable them to respond to emergencies.

Communications

The Applicant expects the project to impact off-air²⁴ television signals. Specific impacts to television reception could include interference, reduced picture quality, and signal loss. If facility operation results in impacts to existing off-air television coverage, Staff concurs with the Applicant's recommendation to investigate methods of improving the television reception system, specifically a high-gain directional antenna oriented towards the signal origin. If improvements cannot be made, then the Applicant would resolve the issue through its complaint resolution process. The Applicant notes that cable service and direct satellite service would be unaffected by the presence of wind turbines. With this provision, all potential television reception impacts would be mitigated by the Applicant.

Potential problems with AM broadcast coverage can occur when stations with directive antennas are located within 1.9 miles of turbines or when stations with non-directive antennas are located within .19 mile. All AM stations are located well outside the project area, with the closest station located approximately 11.6 miles from the nearest proposed turbine site. No impact on AM coverage is expected.

The closest operational FM radio station, WKSD, is located more than 1.6 miles from the nearest proposed turbine location, a distance that the Applicant expects not to degrade/interfere with WKSD's coverage. No impact to FM broadcast stations are expected.

Microwave communication systems are wireless point-to-point links that communicate between two antennas and require clear line-of-sight conditions between each antenna. The Applicant identified 45 licensed microwave paths intersecting the project area. A Worst Case Fresnel Zone

24. Off-air TV stations broadcast signals from land-based facilities directly to TV receivers.

(WCFZ) was calculated for each of the microwave paths identified. The WCFZ represents the area or path in which a turbine or other structure might cause a deflection of microwave signals. None of the turbine locations would obstruct these paths. However, the study was limited to a database of licensed systems, using locations based on Federal Communications Commission (FCC) coordinates rather than as-built facilities. As a result, known microwave systems, including some that are critical to maintaining reliable electric service in the area, may not have been evaluated in the study. Staff recommends that the Applicant study potential impacts to all known microwave communication systems, using survey-quality data, and avoid or mitigate known impacts as outlined in the Recommended Conditions of Certificate.

Wind turbines can interfere with civilian and military radar in some scenarios. Potential interference is highly site-specific and depends on local features, the type of radar, and wind farm characteristics. The Applicant sent a notification letter to the National Telecommunications and Information Administration (NTIA) on March 22, 2018. Upon receipt of notification, the NTIA provided plans for the proposed facility to the federal agencies represented in the Interdepartment Radio Advisory Committee. This committee, in a letter dated May 29, 2018, did not identify any concerns regarding radio frequency blockage and had no issues with turbine placement in the project area.

No impacts to AM or FM radio, cable television, radar, or satellite systems are expected. Staff recommends that the Applicant be required to mitigate any impacts to these communication systems, if they are observed during operation of the facility, as outlined in the Recommended Conditions of Certificate.

Decommissioning

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

Decommissioning megawatt-scale wind turbines in a utility-scale project involves the reclamation and restoration of the project area's topography that existed prior to construction. Decommissioning activities include, but are not limited to, removal of turbine structures, flattening of turbine foundations, and removal of associated facility components. Additionally, the turbine foundation areas must be graded, top soiled, and re-seeded.

In accordance with Ohio Administrative Code 4906-4-09(I), the Applicant has committed to providing a decommissioning plan to Staff and the Paulding County engineer that includes the removal of the facility components and provides financial assurance to ensure that funds would be available to decommission the project.

At the end of the wind farm or turbine's useful life, or if the project has not generated electricity for a continuous period of twelve months, the Applicant would decommission the project by removing all physical materials from the project area. This plan would include the Applicant's intent to excavate the turbine foundations to a depth of 36 inches below grade and remove any other facility components buried at a depth of less than 36 inches.²⁵ The Applicant intends to

25. The Applicant would not remove underground collection and utility lines below the ground, if buried deeper than three feet below the surface.

remove all access roads and any other improvements, unless a landowner requests that those components remain in place and provided that allowing those facilities to remain does not violate any permit or legal requirement regulating the Applicant.²⁶

Also, in accordance with Ohio Administrative Code 4906-4-09(I) and to ensure that these decommissioning activities take place, the Applicant would post financial assurance. This total amount would be calculated by an independent, registered Ohio professional engineer, and reflect an aggregate cost of removing all turbines and associated facilities constructed and would not include the salvage value of the equipment. Further, the Applicant proposes that the decommissioning costs would be recalculated every five years. Also, the financial assurance would be a performance bond that is routinely updated and adjusted.

All Staff recommendations for the requirements discussed in this section of the *Staff Report of Investigation* are included under the **Public Services, Facilities, and Safety Conditions** heading of the Recommended Conditions of Certificate section.

Recommended Findings

Staff recommends that the Board find that the Applicant has determined the nature of the probable environmental impact for the proposed facility, and therefore complies with the requirements specified in R.C. 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 *Staff Report of Investigation* entitled Recommended Conditions of Certificate.

26. Application, p. 45.

Considerations for R.C. 4906.10(A)(3)

MINIMUM ADVERSE ENVIRONMENTAL IMPACT

Pursuant to R.C. 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 determined the best location for a wind power production facility would be in northwest Ohio based on its consideration of various factors, including: adequate wind resource; nearby access to adequate transmission infrastructure; willing land lease participants and communities; site accessibility; low-density population; appropriate geological conditions; compatible land use; and limited sensitive ecological and cultural resources.

The Applicant determined western Paulding County fit the criteria well enough to invest in planning a wind power generation project. Paulding County possesses some of the best terrestrial wind resources in the State of Ohio, adequate power transmission and transportation infrastructure, and land that is sparsely populated and used for agriculture. Also, the county and its residents are generally receptive to utility-scale wind projects

The project layout was determined through geographic information system tools, assistance from consultants, state wind power siting laws, and willing land owner participation. The Applicant followed a reasonable process for site selection and its determination of a proposed layout for the facility.

Minimizing Impacts

The Applicant has sited and designed the Timber Road IV Wind Farm to minimize potential impacts. Of the 20,400 acres of leased land, 54 acres would be permanently converted into built facilities. Agricultural land accounts for over 97 percent of all land that would be impacted by the proposed facility. The Applicant has no plans to remove any existing structures during construction of the facility.

The proposed facility aligns with regional development plans in and around the project area. Comprehensive plans center on preservation of agricultural activities, job creation and economic opportunities. The installation of a wind facility would coincide with agricultural production and provide additional revenues and bolster jobs creation in the local communities.

In order to avoid potential impacts to cultural resources within the project area, the Applicant consulted with the SHPO in preparation of their overall survey plan for the project area and the SHPO has approved the Applicant's design for ongoing archaeological and architectural field work. Staff has recommended a condition to assure appropriate protection of cultural resources in the project area.

The proposed facility would have an overall positive impact on the local economy due to the increase in construction spending, wages, purchasing of goods and services, annual lease payments to the local landowners, and local tax revenues. PILOT payments would be between \$6,000 and \$8,000 per megawatt (MW) of nameplate capacity per year. These payments would provide a positive economic benefit to the region.

To minimize impacts to wetlands and streams, the Applicant has committed to using HDD to install the underground electric collection cable under all streams and wetlands as an avoidance measure, where possible. To minimize impacts related to frac-out, Staff recommends the Applicant be required to provide a frac-out contingency plan. Construction of the facility would not require work within mapped 100-year floodplains.

The Applicant has acknowledged that operation of the facility may result in incidental take of listed bats. The Applicant has coordinated with the USFWS and the ODNR on wildlife protocols and study expectations. The Applicant will continue to coordinate with the USFWS and the ODNR on minimizing wildlife impacts. The Applicant is working with USFWS to apply for an ITP and would operate under a TAL from the USFWS that would stay in effect until an ITP is obtained. If tree clearing would be necessary, the Applicant would adhere to seasonal cutting dates of October 1 through March 31.

Many of the proposed turbine locations are within the minimum property line setbacks. The Applicant is currently pursuing waivers of the minimum setback with landowners and states that it understands that a turbine may not be constructed at a location which does not meet the minimum setback unless a waiver has been obtained.

The Applicant has indicated that various safety control technologies would be utilized to minimize the potential for blade shear and ice throw impacts. Staff has recommended conditions that the Applicant not render inoperative any wind farm safety control system, and set parameters for notification of blade shear and certain ice throw occurrences.

Based on Staff's review, the Applicant's proposed turbine layout and the Applicant's commitment to adherence of the dBA limit, and Staff's recommend conditions, the project is not likely to generate unacceptable levels of noise for non-participating residents. The Applicant modeled shadow flicker impacts with respect to the proposed facility. The model results showed that, without mitigation, thirty-eight non-participating receptors would be exposed to more than 30 hours of shadow flicker per year by the facility. Staff has recommended a condition that the Applicant be required to provide mitigating measures to these 38 non-participating residents so that they receive no more than 30 hours of exposure to shadow flicker. Providing the mitigating measures to these non-participating residents would minimize adverse shadow flicker impact.

During the construction period, local, state, and county roads would experience a temporary increase in truck traffic due to deliveries of equipment and materials. A final delivery route plan would be developed through discussions with the Paulding County Engineer and implemented in conjunction with the ODOT special hauling permit process

No impacts to AM or FM radio, cable television, radar, or satellite systems are expected. Possible impacts to off-air television signals would be remediated through a high-gain directional antenna oriented towards the signal origin or through the complaint resolution process. Further study is recommended for potential impacts to microwave communication systems and mobile phones.

Because the project impacts such a large area, it is imperative that the Applicant secure a financial instrument that best assures the ability to completely decommission the facility. Because the project would not generate revenue until it is operational, it is necessary that the decommissioning funds be available at the start of construction. The decommissioning requirements outlined in Ohio

Adm.Code 4906-4-09 would ensure that the potential for adverse environmental impact would be minimized.

Conclusion

Staff concludes that the proposed project would result in both temporary and permanent impacts to the project area and surrounding areas. Due to the low potential to impact land use, cultural resources, streams, wetlands, wildlife, communications, non-participating residents, and due to Staff's recommended conditions to mitigate these impacts, Staff concludes that the project represents the minimum adverse environmental impact.

Recommended Findings

Staff recommends that the Board find that the proposed facility represents the minimum adverse environmental impact, and therefore complies with the requirements specified in R.C. 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 *Staff Report of Investigation* entitled Recommended Conditions of Certificate.

CONSIDERATIONS FOR R.C. 4906.10(A)(4)

ELECTRIC GRID

Pursuant to R.C. 4906.10(A)(4), the Board must determine that the proposed electric facilities are 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 facilities will serve the interests of electric system economy and reliability. The purpose of this section is to evaluate the impact of integrating the proposed facility into the bulk power system (BPS).

The facility proposed by the Applicant is a wind generating facility located in Paulding County, capable of producing up to 125.1 megawatts (MW). The proposed facility would interconnect to AEP's existing Logtown 138 kilovolt (kV) switching station.

NERC Planning Criteria

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 BPS. As an owner, operator, and/or user of the BPS, the Applicant is subject to compliance with various NERC reliability standards. NERC reliability standards are included as part of the system evaluations conducted by PJM.²⁷

PJM

The Applicant is utilizing generation interconnection queue positions AC1-173 and T-131. Queue position AC1-173 was submitted to PJM Interconnection, LLC (PJM) on October 31, 2016 for 75.9 MW. The System Impact Study (SIS) was released in May 2017. Queue position T131 was submitted to PJM on January 9, 2008 for 150 MW. PJM released the SIS in October 2015 and the Facilities Study in February 2016. An Interconnection Service Agreement for T-131 was executed on February 18, 2016. The proposed facility would total 125.1 MW's, 75.9 MW's from AC1-173 and 49.2 MW's from T-131. The remaining 100.8 MW in T-131 would be used for the Board approved Paulding Wind Farm III. Construction of the facility shall not commence until the ISA is executed for queue position AC1-173.^{28, 29, 30}

PJM studied the interconnection as an injection into AEP's existing Logtown 138 kV switching station. The Applicant requested a maximum facility interconnection of 125.1 MW, of which 16.3 MW would be capacity. Capacity represents the need for adequate generating resources to ensure that the demand for electricity can be met at all times. In PJM's case, that means that a utility or

27. PJM Interconnection, LLC is the regional transmission organization charged with planning for upgrades and administering the generation queue for the regional transmission system in Ohio. 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. The interconnection process provides for the construction of expansions and upgrades of the PJM transmission system, as needed to maintain compliance with reliability criteria with the addition of generation in its footprint.

28. PJM Interconnection, LLC, "System Impact Study, Queue Number AC1-173," accessed October 26, 2018, <https://pjm.com/planning/services-requests/interconnection-queues.aspx>.

29. PJM Interconnection, LLC, "Interconnection Service Agreement, Queue Number T-131," accessed October 26, 2018, <https://pjm.com/planning/services-requests/interconnection-queues.aspx>.

30. *In the Matter of the Application of Paulding Wind Farm LLC for a Certificate to Construct a Wind-Powered Electric Generation Facility in Paulding County, Ohio.*, Case No. 09-0980-EL-BGN, (Entry)(February 22, 2016)

other electricity supplier is required to have the resources to meet its customers' demand plus a reserve amount. Suppliers can meet that requirement with generating capacity they own, with capacity purchased from others under contract, or with capacity obtained through PJM's capacity market auctions.

PJM Network Impacts

PJM analyzed the bulk electric system with the proposed facility interconnected to the BPS via AEP's Logtown 138 kV switching station. Only queue position AC1-173 was analyzed with respect to this specific wind farm application. Previously, queue position T-131 was analyzed, and an ISA was issued, and all required system upgrades were completed. A 2020 summer peak power flow model was used to evaluate the regional reliability impacts. The studies revealed no reliability problems. The below chart displays the results of the PJM SIS for the PJM regional footprint.^{31, 32}

PJM REGIONAL SYSTEM IMPACTS	
Generator Deliverability - System Normal & Single Contingency Outage	
<i>Plant Output: Capacity Level – 9.9 MW</i>	No problems identified
Category C and D - Multiple Contingency Outages	
<i>Plant Output: Full Energy Level – 75.9 MW</i>	No problems identified

Contribution to Previously Identified Overloads - Network Impacts

PJM studied overloading where the proposed facility may affect earlier projects in the PJM queue. The results identified no network impacts.

Delivery of Energy Portion of Interconnection Request

PJM studied the deliverability of the energy portion of the facility. Issues uncovered during this study could result in operational restrictions. The Applicant could proceed with network upgrades by submitting a request to PJM. No such upgrades were found to be required. The results identified no issues.

Short Circuit Analysis

The short circuit analysis study, which is part of the SIS, evaluates the interrupting capabilities of circuit breakers that would be impacted by the proposed generation addition. The results identified no circuit breaker problems.

Stability Analysis

Stability analysis, which is part of the SIS, is conducted on the BPS to ensure that the planned system can withstand NERC criteria disturbances and maintain stable operation throughout the PJM planning horizon. The results identified no stability problems.

31. PJM Interconnection, LLC, "System Impact Study, Queue Number AC1-173," accessed October 26, 2018, <https://pjm.com/planning/services-requests/interconnection-queues.aspx>.

32. PJM Interconnection, LLC, "Interconnection Service Agreement, Queue Number T-131," accessed October 26, 2018, <https://pjm.com/planning/services-requests/interconnection-queues.aspx>.

Conclusion

PJM analyzed the bulk electric system, with the facility interconnected to the BPS, for compliance with NERC reliability standards and PJM reliability criteria. The PJM system studies indicated that no reliability violations would occur during single and multiple contingencies. In addition, no potential violations were found during the short circuit analysis.

The facility would provide additional electrical generation to the regional transmission grid, would be consistent with plans for expansion of the regional power system, and would serve the interests of electric system economy and reliability.

Recommended Findings

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, Staff recommends that the Board find that the facility complies with the requirements specified in R.C. 4906.10(A)(4), provided that any certificate issued by the Board for the proposed facilities include the conditions specified in the section of this *Staff Report of Investigation* entitled Recommended Conditions of Certificate.

Considerations for R.C. 4906.10(A)(5)

AIR, WATER, SOLID WASTE, AND AVIATION

Pursuant to R.C. 4906.10(A)(5), the facility must comply with Ohio law regarding air and water pollution control, withdrawal of waters of the state, solid and hazardous wastes, and air navigation.

Air

The operation of the facility would not produce air pollution; therefore, there are no applicable air quality limitations or air permits required for the operation of facility.

The Applicant would comply with fugitive dust rules by the use of water spray or other appropriate dust suppressant measures whenever necessary.

Construction and operation of the facility, as described in the application and data request responses and in accordance with the conditions included in this *Staff Report of Investigation*, would be in compliance with air emission regulations in R.C. Chapter 3704, and the rules and laws adopted under this chapter.

Water

Neither construction nor operation of the proposed facility would require the use of significant amounts of water, thus requirements under R.C. 1501.33 and 1501.34 are not applicable to this project. The Applicant has indicated that applicable permits would be limited to:

- Ohio National Pollutant Discharge Elimination System (NPDES) construction storm water general permit, Ohio EPA Permit No. OHC000004
- Nationwide Permit 51 under Section 404 of the Clean Water Act
- Ohio Isolated Wetland Permit

In order to obtain the NPDES, an Ohio EPA Notice of Intent (NOI) application would be submitted 21 days before construction. Included with the NOI would be a Storm Water Pollution Prevention Plan (SWPPP).

Impacted areas would be restored to preconstruction conditions in compliance with the NPDES permit(s) obtained for the project and the approved SWPPP created for this project.

Construction of all 54 sites would require Ohio EPA isolated wetland and US Army Corps of Engineers Nationwide permits to cover temporary wetland impacts and temporary and permanent stream impacts. However, the construction of the final 37 locations would reduce proposed impacts to surface water resources and may negate the need for certain permits. The Applicant would continue coordination with Ohio EPA isolated wetland and US Army Corps of Engineers Nationwide to obtain the appropriate permits.

With these measures, construction and operation of this facility would comply with requirements of R.C. Chapter 6111, and the rules and laws adopted under this chapter.

Solid Waste

The Applicant is unaware of any waste removal necessary prior to construction. Waste generated during construction would consist of plastic, wood, cardboard, and metal packing/package materials, construction debris, and general refuse. The solid waste generated during the construction or operation of the facility would be secured and removed from the project area and disposed of at a licensed disposal facility. The operation and maintenance facilities would utilize local solid waste recycling and disposal services. With these measures, the Applicant's solid waste disposal plans comply with solid waste disposal requirements in R.C. Chapter 3734, and the rules and laws adopted under this chapter.

Aviation

The tip height for the wind turbines range from 482 to 591 feet tall, depending on the model selected. Additionally, cranes would be used during the construction of the proposed facility. The specific height and type of the construction cranes has yet to be finalized but would necessarily be higher than the nacelle height of the wind turbines. A separate temporary construction permit would need to be obtained from the Federal Aviation Administration (FAA), which would detail the height, operating conditions, and duration of the crane work.

The Applicant found that there are no known public airports or helicopter pads within 5 miles of the project area. The nearest public use airport is the Van Wert County Airport, located over 9 miles southeast of the wind farm. The Applicant did find three private airports within 5 miles of the project area. These are the Basting, Buehler, and Steinman airports located within 1.8 to 5 miles from the project area. The Applicant provided notice of the proposed wind farm size, and its estimated construction start date to these private airports.

The FAA administers a regulatory program to evaluate and authorize certain obstructions near airports and provide airport airspace analysis. The Applicant submitted a request for review by the FAA for the wind turbines. The FAA issued a Determination of No Hazard (DNH) to air navigation for 23 wind turbines, and 28 are still under review as of the issuance of this Staff report.

Staff contacted the Ohio Department of Transportation Office of Aviation during the review of this application (in accordance with R.C. 4906.10(A)(5) and 4561.32) to coordinate review of potential impacts of the facility on airspace navigation

The ODOT Office of Aviation provided its recommendations to address airspace navigation issues in a letter to Staff dated November 8, 2018. The ODOT Office of Aviation found that the location and height of all 51 wind turbine structures would exceed 499 feet above ground level and would constitute an obstruction to air navigation by exceeding the 14 C.F.R. Part 77.17(a)(1) surface by approximately 100 feet. The ODOT Office of Aviation noted that 16 of the 23 structures that have received DNH from FAA impact either the minimum obstacle clearance altitude or minimum vectoring altitude of various en route airways or arrival procedures, all of which are 14 C.F.R. Part 77.17(a)(3) impacts. The ODOT Office of Aviation and FAA solicited input from the affected stakeholders during the FAA's public comment process; no objections to these impacts was received and therefore the FAA issued a DNH for those wind turbines.

The ODOT Office of Aviation has determined that the wind farm will constitute an obstruction to air navigation; however, compliance with obstruction standards may be waived if the wind farm complies with all the conditions of the FAA determination of no hazard letter.

Staff recommends several conditions designed to address these airspace navigation concerns.

All Staff recommendations for the requirements discussed in this section can be found under the **Air, Water, Solid Waste, and Aviation Conditions** heading of the Recommended Conditions of Certificate.

Recommended Findings

Staff recommends that the Board find that the proposed facility complies with the requirements specified in R.C. 4906.10(A)(5), provided that any certificate issued by the Board for the proposed facility include the conditions specified in the section of this *Staff Report of Investigation* entitled Recommended Conditions of Certificate.

Considerations for R.C. 4906.10(A)(6)

PUBLIC INTEREST, CONVENIENCE, AND NECESSITY

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

Public Interaction

The Applicant hosted a public informational open house for this project on April 4, 2018. Attendees were provided the opportunity to speak with representatives of the Applicant about the proposed project and to provide feedback. The Applicant operates two other wind farms in the county and stated that it will continue to provide community members, elected officials, and the local media with information about the project. The Applicant provides information about the project online at <http://timberroadwindfarm.com>.

The Applicant indicated that it served copies of the complete application on officials representing Paulding County; Benton, Blue Creek, Crane, Harrison, and Paulding townships, the villages of Antwerp, Paulding, and Payne. The Applicant indicated that it also sent copies of the complete application to the Paulding County Carnegie Library and the Payne Public Library. Additionally, copies of the complete application are available for public inspection at the offices of the PUCO and online at <http://opsb.ohio.gov>.

During the construction and operation of the project, the Applicant has committed to implementing the complaint resolution plan described in Exhibit V of the application. According to the plan, residents with complaints may call a toll-free number or visit the operations and maintenance building for the wind farm to register a complaint. The Applicant stated that it will log all complaints and will notify the OPSB, within 48 hours, of any complaints that are a direct result of the wind farm. The Applicant stated that it will also send quarterly complaint reports to the OPSB staff.

The Applicant has committed to provide notice to any affected property owners and tenants about construction activities and complaint resolution at least seven days prior to the start of construction.

The Administrative Law Judge issued an entry on September 18, 2018 scheduling a local public hearing and an adjudicatory hearing for this proceeding. The local public hearing, at which the Board will accept written or oral testimony from any person, is scheduled for December 4, 2018 at 6:00 p.m., at the Ohio State University Extension Building, located at 503 Fairground Dr. in Paulding, Ohio 45879. The adjudicatory hearing is scheduled to begin at 10:00 a.m. on December 14, 2018, at the offices of the PUCO, located at 180 E. Broad St., Hearing Room 11-C in Columbus, Ohio 43215. As of the date of this report, the OPSB has not received any public comments related to this case. On October 31, 2018, the farm Bureau Federation filed a motion to intervene.

Land Leases

The collector lines associated with the facility would be located primarily on privately-owned land leased by the Applicant, but also in public road right-of-ways. All other facility components, with the exception of the collection substation, for which land may be purchased by the Applicant,

would be located entirely on privately-owned leased land. The Applicant stated that it will have leases with approximately 100 landowners.³³

Liability Insurance

According to the Applicant, it will maintain an insurance policy for the term of the facility to cover any personal injury, death, or property damage associated with the operation of the facility. This insurance policy will insure against claims of \$1,000,000 per occurrence and \$2,000,000 in the aggregate. The Applicant will also maintain, through construction and operation, umbrella coverage against personal injury, death, and property damage arising from the operation of the facility. This excess liability insurance will insure against claims of \$10,000,000 per occurrence and \$10,000,000 in the aggregate.

Renewable Portfolio Standard

The renewable portfolio standard (RPS) contained within R.C. 4928.64 requires a portion of the electricity sold to retail customers in Ohio to come from renewable energy resources. This requirement, which began in 2009, includes annually increasing renewable benchmarks through 2026. Renewable energy resources, as defined by statute, include wind-generating technologies. Electric distribution utilities or competitive retail electric service companies have several options for demonstrating compliance with the RPS, including entering into renewable power supply agreement or through the use of renewable energy credits (RECs).

To be eligible for use towards a renewable benchmark, RECs must originate from a renewable energy resources facility certified by the PUCO as an eligible energy generating facility. The proposed facility would likely qualify as a renewable energy resource under the RPS, and therefore, it could contribute to assisting affected entities' compliance with statutory requirements under the RPS.

All Staff recommendations for the requirements discussed in this section of the *Staff Report of Investigation* are included under the Recommended Conditions of Certificate section.

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 R.C. 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 *Staff Report of Investigation* entitled Recommended Conditions of Certificate.

33. Response to First Set of Interrogatories from Staff of the Ohio Power Siting Board, Paulding Wind Farm IV LLC, October 24, 2018, case number 18-0091-EL-BGN.

Considerations for R.C. 4906.10(A)(7)

AGRICULTURAL DISTRICTS AND AGRICULTURAL LAND

Pursuant to R.C. 4906.10(A)(7), the Board must determine the facility's impact on the agricultural viability of any land in an existing agricultural district within the project area of the proposed facility. The agricultural district program was established under R.C. Chapter 929. Agricultural district land is exempt from sewer, water, or electrical service tax assessments.

Agricultural land can be classified as an agricultural district through an application and approval process that is administered through local county auditors' offices. Eligible land must be devoted exclusively to agricultural production or be qualified for compensation under a land conservation program for the preceding three calendar years. Furthermore, eligible land must be at least ten acres or produce a minimum average gross annual income of \$2,500.

The construction, operation, and maintenance for the Paulding Wind Farm IV would occur mainly on land currently used for agricultural purposes. According to the Applicant, 54 acres of farmland would be permanently disturbed, 367 acres of soil would be temporarily disturbed, and 461 acres of vegetation would be temporarily disturbed.

Wind turbines, access roads, meteorological towers, and the collection substation would account for almost all of the permanent agricultural land lost to the project. Laydown yards and cable burying activities would account for a temporary loss of agricultural land use. Of the total agricultural land lost due to the project, approximately 2 acres of agricultural district land would be permanently impacted. The viability of the agricultural district lands would not be compromised by the proposed project.

Up to 63 miles of electric collection cable would be installed at a minimum depth of 48 inches. Most of this installation would take place either across or adjacent to agricultural fields. Installation would be by directional drilling and, to a lesser extent, open trenching. Trenching activities would create temporary disturbance as collection line is installed. Excavated top soil would be segregated and stockpiled, and would be restored to original conditions unless otherwise specified by the affected landowners.

Permanent access roads would be 16 feet wide, and topsoil would be placed in windrows paralleling the access roads to prevent construction equipment from driving over undisturbed ground.

The Applicant would take the following measures to minimize impacts to agricultural land that would occur as a result of construction, operation, and maintenance of the proposed project:

- The Applicant would host a local meeting prior to the start of construction with the aim of informing farmers, and others, of the planned transportation routes and equipment expected to be encountered.
- The Applicant has stated that mitigation procedures and compensation for damage to crops and the compaction of soils are outlined in the individual easement agreements.

- Any soils compacted by construction activity would be de-compacted during restoration.
- The Applicant has committed to coordinate with landowners to avoid long-term impacts to field irrigation systems.
- The Applicant designed the project to avoid, where possible, known field drainage systems, and has committed to conduct reviews of public records and coordinate with land owners to locate and avoid additional subsurface drainage infrastructure. Further, the Applicant has committed to document and coordinate repair of any damaged system in a timely manner.
- The Applicant stated that it does not plan to impact any agricultural structures during construction or operation of the facility.

Recommended Findings

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 R.C. 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 *Staff Report of Investigation* entitled Recommended Conditions of Certificate.

Considerations for R.C. 4906.10(A)(8)

WATER CONSERVATION PRACTICE

Pursuant to R.C. 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.

Wind-powered electric generating facilities do not utilize water in the process of electricity production. Therefore, water consumption associated with the proposed electric generation equipment does not warrant specific conservation efforts. A potable water supply would be provided to the O&M building for project and personal needs of the employees using the facility, but the amount of water consumed for these purposes 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 R.C. 4906(A)(8). Further, the Staff recommends that any certificate issued by the Board for the certification of the proposed facility include the conditions specified in the section of this *Staff Report of Investigation* entitled Recommended Conditions of Certificate.

IV. RECOMMENDED CONDITIONS OF CERTIFICATE

Following a review of the application filed by the Applicant, and the record compiled to date in this proceeding, 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 the issuance of this report. At this time, Staff recommends the following conditions:

GENERAL CONDITIONS

Staff recommends the following conditions to ensure conformance with the proposed plans and procedures as outlined in the case record to date, and to ensure compliance with all conditions listed in this Staff Report:

- (1) The Applicant shall install the facility, utilize equipment and construction practices, and implement mitigation measures as described in the application and as modified and/or clarified in supplemental filings, replies to data requests, and recommendations in this *Staff Report of Investigation*.
- (2) The Applicant shall comply with the requirements established by the Ohio Administrative Code chapter 4906-4-09 Regulations associated with wind farms.
- (3) The Applicant shall conduct a preconstruction conference prior to the start of any construction activities. Staff, the Applicant, and representatives of the primary contractor and all subcontractors for the project shall attend the preconstruction conference. The conference shall include a presentation of the measures to be taken by the Applicant and contractors to ensure compliance with all conditions of the certificate, and discussion of the procedures for on-site investigations by Staff during construction. Prior to the conference, the Applicant shall provide a proposed conference agenda for Staff review. The Applicant may conduct separate preconstruction conferences for each stage of construction.
- (4) Within 60 days after the commencement of commercial operation, the Applicant shall submit to Staff a copy of the as-built specifications for the entire facility. If the Applicant demonstrates that good cause prevents it from submitting a copy of the as-built specifications for the entire facility within 60 days after commencement of commercial operation, it may request an extension of time for the filing of such as-built specifications. The Applicant shall use reasonable efforts to provide as-built drawings in both hard copy and as geographically referenced electronic data.
- (5) The certificate shall become invalid if the Applicant has not commenced a continuous course of construction of the proposed facility within five years of the date of journalization of the certificate.
- (6) As the information becomes known, the Applicant shall file in this proceeding the date on which construction will begin, the date on which construction was completed, and the date on which the facility begins commercial operation.
- (7) Prior to the commencement of construction activities in areas that require permits or authorizations by federal or state laws and regulations, the Applicant shall obtain and

comply with such permits or authorizations. The Applicant shall provide copies of permits and authorizations, including all supporting documentation, to Staff within seven days of issuance or receipt by the Applicant. The Applicant shall provide a schedule of construction activities and acquisition of corresponding permits for each activity at the preconstruction conference.

- (8) At least 30 days prior to the preconstruction conference, the Applicant shall submit to Staff, for review and acceptance, one set of detailed engineering drawings of the final project design, including the facility, construction staging areas, and any other associated facilities and access points, so that Staff can determine that the final project design is in compliance with the terms of the certificate. The final project layout shall be provided in hard copy and as geographically referenced electronic data. The final design shall incorporate all conditions of the certificate and references at the locations where the Applicant and/or its contractors must adhere to a specific condition in order to comply with the certificate.

SOCIOECONOMIC CONDITIONS

Staff recommends the following conditions to address the impacts discussed in the **Socioeconomic Impacts** section of the Nature of Probable Environmental Impact:

- (9) Prior to the commencement of construction, the Applicant shall finalize coordination of the assessment of potential effects of the proposed facility on cultural resources, if any, with Staff and the Ohio Historic Preservation Office (OHPO). If the resulting coordination discloses a find of cultural or archaeological significance, or a site that could be eligible for inclusion in the National Register of Historic Places, then the Applicant shall submit a modification or mitigation plan to Staff. Any such mitigation effort, if needed, shall be developed in coordination with the OHPO and submitted to Staff for review that it complies with this condition.
- (10) At least seven days prior to construction, the Applicant shall provide Staff, affected property owners and tenants, Paulding County officials, municipal and township officials, emergency responders, surrounding airports, and libraries with written notice regarding the start of construction and the complaint resolution process outlined in Exhibit V of the application. The notice shall include a description of the nature of the project, contact information for the project, and the proposed timeframe for project construction and restoration activities. A copy of the notice shall be filed on the docket in this case.
- (11) During the construction and operation of the project, the Applicant shall notify the Staff, within 48 hours, of any complaints that are a direct result of the wind farm and send to staff a quarterly complaint report by the fifteenth day of January, April, July, and October of each year.
- (12) The Applicant shall restore all disturbed field drainage systems, irrigation systems, and temporarily impacted farmland to its previous or better condition unless otherwise specified by the affected land owner.

ECOLOGICAL CONDITIONS

Staff recommends the following conditions to address the impacts discussed in the **Ecological Impacts** section of the Nature of Probable Environmental Impact:

- (13) Sixty days prior to the first turbine becoming operational, the Applicant shall submit a post-construction avian and bat monitoring plan for Ohio Department of Natural Resources (ODNR) Division of Wildlife (DOW) and Staff review and confirmation that it complies with this condition. The Applicant's plan shall be consistent with Ohio ODNR-approved, standardized protocol, as outlined in ODNR's *On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio*. This includes having a sample of turbines that are searched daily. Collectors of bird and bat carcasses for the purpose of post-construction monitoring shall obtain the appropriate carcass collection permits. The post-construction monitoring shall begin within two weeks of operation of the first turbine and be conducted for a minimum of two seasons (April 1 to November 15), which may be split between calendar years. If monitoring is initiated after April 1 and before November 15, then portions of the first season of monitoring shall extend into the second calendar year (e.g., start monitoring on July 1, 2019 and continue to November 15, 2019; resume monitoring April 1, 2020 and continue to June 30, 2020). The second monitoring season may be waived at the discretion of ODNR and Staff. The monitoring start date and reporting deadlines will be provided in the DOW approval letter. If it is determined that significant mortality, as defined in ODNR's approved, standardized protocols, has occurred to birds and/or bats, or a state-listed species is killed, then the DOW and Staff will require the Applicant to develop and implement a mitigation plan. If required, the Applicant shall submit a mitigation plan to the DOW and OPSB Staff for review and approval within 30 days from the date reflected on ODNR letterhead, in coordination with Staff, in which the DOW is requiring the Applicant to mitigate for significant mortality to birds and/or bats. Mitigation initiation timeframes shall be outlined in the DOW approval letter.
- (14) The Applicant shall adhere to seasonal cutting dates of October 1 through March 31 for removal of any trees greater than or equal to three inches in diameter, unless coordination efforts with the ODNR and the U.S. Fish and Wildlife Service (USFWS) allows a different course of action.
- (15) The Applicant shall provide to Staff for review a frac-out contingency plan detailing monitoring, environmental specialist presence, containment measures, clean-up, and restoration prior to construction in areas where horizontal directional drilling will occur.
- (16) Should construction be delayed beyond five years of the date of the certificate, certain wildlife surveys shall be updated as determined by the ODNR.
- (17) At least 60 days prior to the first turbine becoming operational, the Applicant shall obtain a technical assistance letter for Avoidance of Indiana and Northern Long-eared Bat Take from the USFWS. The technical assistance letter shall include feathering of turbines during low wind speed conditions at night during migratory seasons. The Applicant shall comply with the operational measures detailed within the technical assistance letter until an incidental take permit has been obtained for the project.

- (18) The Applicant shall have an environmental specialist on site during construction activities that may affect sensitive areas, as mutually agreed upon between the Applicant and Staff, and as shown on the Applicant's final approved construction plan. Sensitive areas include, but are not limited to, areas of vegetation clearing, designated wetlands and streams, and locations of threatened or endangered species or their identified habitat. The environmental specialist shall be familiar with water quality protection issues and potential threatened or endangered species of plants and animals that may be encountered during project construction.

PUBLIC SERVICES, FACILITIES, AND SAFETY CONDITIONS

Staff recommends the following conditions to address the impacts discussed in the **Public Services, Facilities, and Safety** section of the Nature of Probable Environmental Impact:

- (19) At least 30 days prior to construction, a noise study shall be submitted showing that cumulative nighttime sound levels will not exceed 44 dBA at any non-participating sensitive receptor.
- (20) At least 30 days prior to construction, a shadow flicker study shall be submitted showing that cumulative shadow flicker impacts will not exceed 30 hours per year at any non-participating sensitive receptor.
- (21) The Applicant shall notify the OPSB Staff at (866) 270-6772 or contactOPSB@puco.ohio.gov within 24 hours of an occurrence of any extraordinary event. Extraordinary events include, but are not limited to: tower collapse, turbine failure, thrown blade or hub, collector or feeder line failure, injury to any person, or nacelle fire. A written report shall be submitted to staff within 30 days detailing the incident and corrective actions to be taken to avoid, prevent, mitigate, or minimize a recurrence. Where additional related information is obtained after the 30-day written report is submitted, the Applicant shall make a supplemental report as soon as practicable.
- (22) The Applicant shall not render inoperative any wind farm safety control system.
- (23) The Applicant shall monitor the microwave paths to ensure there are no adverse impacts. At least 30 days prior to the preconstruction conference, the Applicant shall conduct a microwave path study that identifies all existing microwave paths that intersect the wind farm project, and a worst-case Fresnel zone analysis for each path. A copy of this study shall be provided to the path licensee(s), for review, and to Staff for review and confirmation that the Applicant is complying with this condition. The assessment shall conform to the following requirements:
- (a) An independent and registered surveyor, licensed to survey within the state of Ohio, shall determine the exact locations and worst-case Fresnel zone dimensions of all known microwave paths or communication systems operating within the project area, including all paths and systems identified by the electric service providers that operate within the project area. In addition, the surveyor shall determine the center point of all turbines within 1,000 feet of the worst-case Fresnel zone of each system, using the same survey equipment.

- (b) Provide the distance in feet between the nearest rotor blade tip of each surveyed turbine identified within section (a) above and the surveyed worst-case Fresnel zone of each microwave system path.
 - (c) Provide a map of the surveyed microwave paths, center points, and boundaries at a legible scale.
 - (d) Describe the specific, expected impacts of the project on all paths and systems considered in the assessment.
- (24) All existing licensed microwave paths, and licensed communication systems shall be subject to avoidance or mitigation. The Applicant shall complete avoidance or mitigation measures prior to commencement of construction for impacts that can be predicted in sufficient detail to implement appropriate and reasonable avoidance and mitigation measures. After construction, the Applicant shall mitigate all observed impacts of the project to microwave paths, and licensed communication systems within seven days or within a longer time period acceptable to Staff. Avoidance and mitigation for any known point-to-point microwave paths, and licensed communication systems shall consist of measures acceptable to Staff, the Applicant, and the affected path owner, operator, or licensee. If interference with an omni-directional or multi-point system is observed after construction, mitigation would be required only for affected receptors.

AIR, WATER, SOLID WASTE, AND AVIATION CONDITIONS

Staff recommends the following conditions to address the requirements discussed in Air, Water, Solid Waste, and Aviation:

- (25) The Applicant shall meet all recommended and prescribed Federal Aviation Administration (FAA) and Ohio Department of Transportation (ODOT) Office of Aviation requirements to construct an object that may affect navigable airspace. This includes submitting coordinates and heights for all towers exceeding 199 feet AGL for ODOT Office of Aviation and FAA review prior to construction, and the non-penetration of any FAA Part 77 surfaces.
- (26) At least 30 days prior to the preconstruction conference, the Applicant shall file in this docket a copy of the FAA Determination of No Hazard letter for the wind turbines and permanent meteorological towers, at the locations as shown in the application, and the FAA temporary construction permit for any work activity involving construction cranes.



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Summary: Staff Report of Investigation electronically filed by Mr. Matt Butler on behalf of Staff of OPSB