

Staff Report of Investigation

Republic Wind Farm
Republic Wind, LLC

Case No. 17-2295-EL-BGN

July 25, 2019



Power Siting
Board

Mike DeWine, Governor | Sam Randazzo, Chairman

**In the Matter of the Application of Republic Wind, LLC)
for a Certificate of Environmental Compatibility and)
Public Need for a Wind-Powered Electric Generating) Case No. 17-2295-EL-BGN
Facility in Seneca and Sandusky Counties, 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 Republic Wind, LLC)
for a Certificate of Environmental Compatibility and)
Public Need for a Wind-Powered Electric Generating) Case No. 17-2295-EL-BGN
Facility in Seneca and Sandusky Counties, Ohio)**

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, and the U.S. Fish and Wildlife Service.

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

TABLE OF CONTENTS

I. POWERS AND DUTIES	1
Ohio Power Siting Board	1
Nature of Investigation.....	1
Criteria.....	3
II. APPLICATION.....	5
Applicant	5
History of the Application.....	5
Project Description	6
Project Maps.....	9
III. CONSIDERATIONS AND RECOMMENDED FINDINGS	21
Basis of Need	21
Nature of Probable Environmental Impact.....	22
Minimum Adverse Environmental Impact.....	44
Electric Grid	47
Air, Water, Solid Waste, and Aviation.....	50
Public Interest, Convenience, and Necessity	55
Agricultural Districts and Agricultural Land	57
Water Conservation Practice	59
IV. RECOMMENDED CONDITIONS OF CERTIFICATE.....	61
General Conditions.....	61
Socioeconomic Conditions.....	63
Ecological Conditions	63
Public Services, Facilities, and Safety Conditions	66
Air, Water, Solid Waste, and Aviation Conditions	68

This page intentionally left blank.

I. POWERS AND DUTIES

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 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

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).

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.

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

OHIO POWER SITING BOARD

The authority of the Ohio Power Siting Board (Board or OPSB) 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.

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.

This page intentionally left blank.

II. APPLICATION

APPLICANT

Republic Wind LLC (Applicant) would develop, build and operate the Republic Wind Farm. The Applicant is a limited liability company that is a wholly owned subsidiary of Apex Clean Energy (Apex). Apex is a renewable energy company focused on utility-scale solar and wind development. Apex's current operational facilities are located in Illinois, Oklahoma, Texas, and Colorado. Apex's leadership has amassed 19 years of experience and has developed 550 MW of utility-scale renewable generation.

HISTORY OF THE APPLICATION

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

On November 13, 2017, the Applicant filed a pre-application notification letter regarding the project.

On November 29, 2017, the Applicant held a public informational meeting for the project at the Veterans of Foreign Wars facility in Green Springs, Ohio.

On February 2, 2018, the Applicant filed the application for the Republic Wind Farm.

On March 27, 2018, the Applicant filed supplemental information correcting the description of turbine setbacks in the application.

On April 11, 2018, the Applicant withdrew the supplemental information submitted March 27, 2018 with the exception of modifications made to Section 4906-4-08(C)(2)(c) and (d).

On May 23, 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 July 18, 2018, the Administrative Law Judge issued an entry scheduling a local public hearing for this case to be held on Tuesday, October 2, 2018 at 6:00 p.m., at the Veterans of Foreign Wars facility, 5900 State Route 778, Green Springs, Ohio 44836. The adjudicatory hearing is scheduled for Monday, October 15, 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 August 29, 2018, the Applicant filed an unopposed motion to suspend the procedural schedule and stay discovery.

On September 9, 2018, the Administrative Law Judge granted the Applicant's motion to suspend the procedural schedule and stay discovery.

On December 11, 2018, the Applicant held a public informational meeting for the amended project at the Veterans of Foreign Wars facility in Green Springs, Ohio.

On December 26, 2018, the Applicant submitted an Amended Application for review by the Ohio Power Siting Board and a motion for the establishment of a procedural schedule.

On January 10, 2019, the Ohio Power Siting Board Staff filed a Memorandum Contra against the motion for the establishment of a procedural schedule.

On February 15, 2019, the Administrative Law Judge issued an entry granting in part and denying in part the Applicant's motion for the establishment of a procedural schedule. Dates were set in accordance with the determination, the Administrative Law Judge scheduled a local public hearing.

On March 13, 2019, the Administrative Law Judge issued an entry revising the procedural schedule moving the staff report due date to Monday, April 29, 2019.

On April 26, 2019 an unopposed motion to suspend the procedural schedule was filed to extend the deadline of the staff report by the Applicant. The Administrative Law Judge granted the motion, thus moving the staff report due date to July 25, 2019.

On June 28, 2019, the Applicant submitted a project modification and information update.

PROJECT DESCRIPTION

The Applicant proposes to construct and operate the Republic Wind Farm, with up to 47 wind turbines for a total generating capacity of up to 200 MW, in Seneca and Sandusky Counties, near the city of Bellevue and the village of Republic.

Project Area

The facility would be located in Adams, Pleasant, Reed, Scipio, and Thompson Townships in Seneca County and York Township in Sandusky County. The project area is comprised of approximately 19,000 acres of leased private lands involving approximately 440 properties. The project area and proposed facilities are shown on the map in this report.

Wind Turbines

The Applicant proposes to use either Vestas V136 (3.6 MW), Vestas V150 (4.2 MW), Siemens SG145 (4.5 MW), or Nordex N149 (4.5 MW) wind turbines. In addition, the Vestas V150 and the Nordex N149 have uprated models of 5.6MW and up to 5.7MW respectively. The Vestas V136 would be used at up to 10 sites. At the time of the submittal of the application, the Applicant had proposed 50 turbine locations and evaluated all locations within the studies presented in their application. The number of turbines constructed would depend on the output of chosen model but would not exceed 47 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 602 feet with a maximum turbine hub height of 357 feet and a maximum rotor diameter of 492 feet.

The Applicant expects that the annual energy production for the Republic Wind Farm would be approximately 560,000 to 665,000 MW 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 300 feet around each turbine location. The foundation construction process would generally proceed from hole excavation, outer form setting, rebar and bolt cage assembly, casting and finishing of concrete, removal of forms, backfilling and compacting, and

site restoration. The most likely type of turbine foundation would be a spread footing foundation. An alternative that could be used is a rock anchored pile-supported foundation.

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 substation. The total length of the buried 34.5 kV collector lines carrying electricity to the collection substations would be up to 83 circuit miles, and would be buried at a depth of three feet or greater. Collector line installation would be done by direct burial, horizontal directional drilling, or open trench.

The Applicant proposes to build a collection substation on a 5-acre parcel, south of Hoppes Road and west of Town Highway 175, in Adams Township in Seneca County. The proposed collection substation would step up voltage from 34.5 kV to 138 kV. Transmitting electricity from the proposed collection substation to the existing Fremont Center-Tiffin Center transmission line would require up to 7.1 miles of 138 kV transmission line. The transmission line would be the subject of a separate filing before the Board.

Operations and Maintenance Building

The proposed facility would retrofit an existing structure in the vicinity of the project to use for operations and maintenance activities. If a suitable structure cannot be located, a new structure would be built on an area no greater than 5 acres. Staff recommends the operations and maintenance facility be located inside an existing structure or at the locations indicated in the amended application.

Permanent Meteorological Towers

Three 295-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 a self-supporting, non-guyed, structure. The proposed sites for the meteorological towers are shown in the maps in this report.

Access Roads

Approximately 20 miles of gravel access roads would be constructed to support the facility. The access roads would be up to 36 feet wide during construction. After construction, most access roads would be reduced to a width of 16 feet.

Construction Laydown Areas

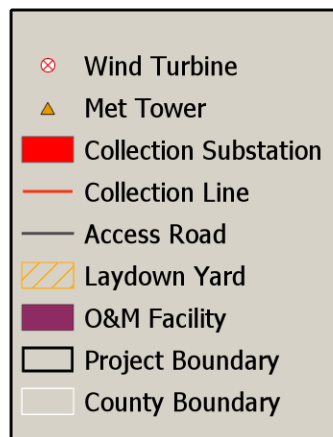
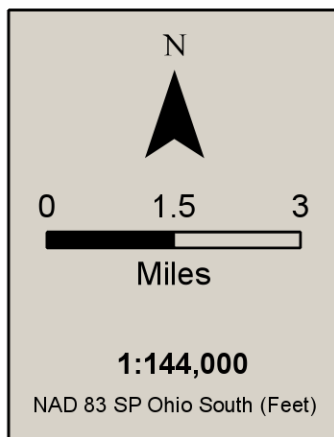
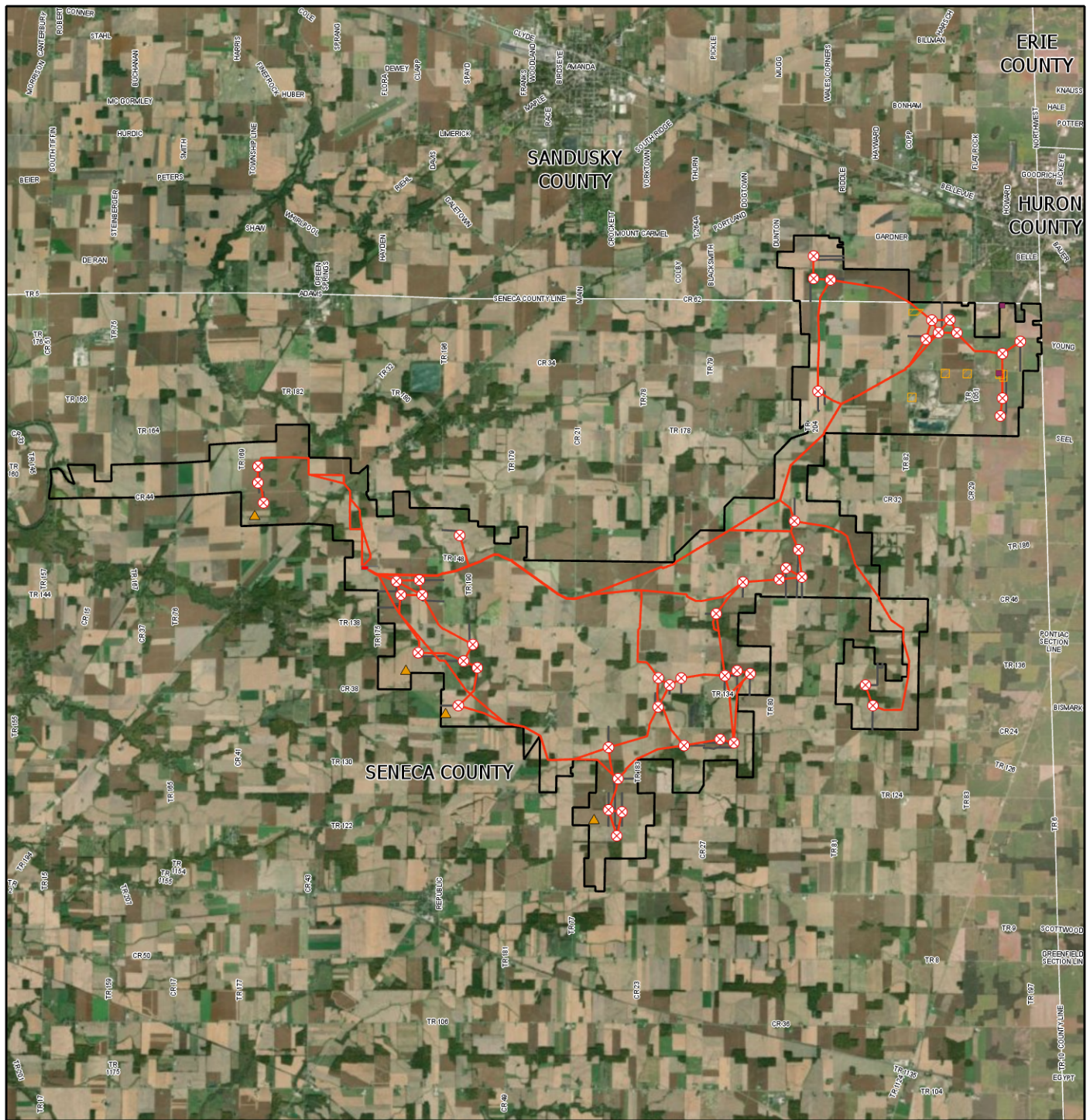
The Applicant generally intends to deliver materials directly to each turbine construction site, to the extent practicable. The Applicant also plans to use a temporary 12-acre laydown yard for construction staging. This laydown yard would accommodate equipment/material storage, construction trailers, and construction worker parking. The proposed site for the temporary laydown area is shown in the maps in this report.

Concrete Batch Plants

The Applicant would use a temporary concrete plant located on or near the project site. This plant would serve as the source of concrete used in the construction of the turbine foundations. A local ready-mix concrete company would be sourced as an alternative, if one proves to be able to meet the project's needs.

Schedule

Final facility designs are anticipated to be completed in the summer or fall of 2019. Construction is anticipated to begin in the first or second quarter of 2020, and to be completed within 6 to 9 months.

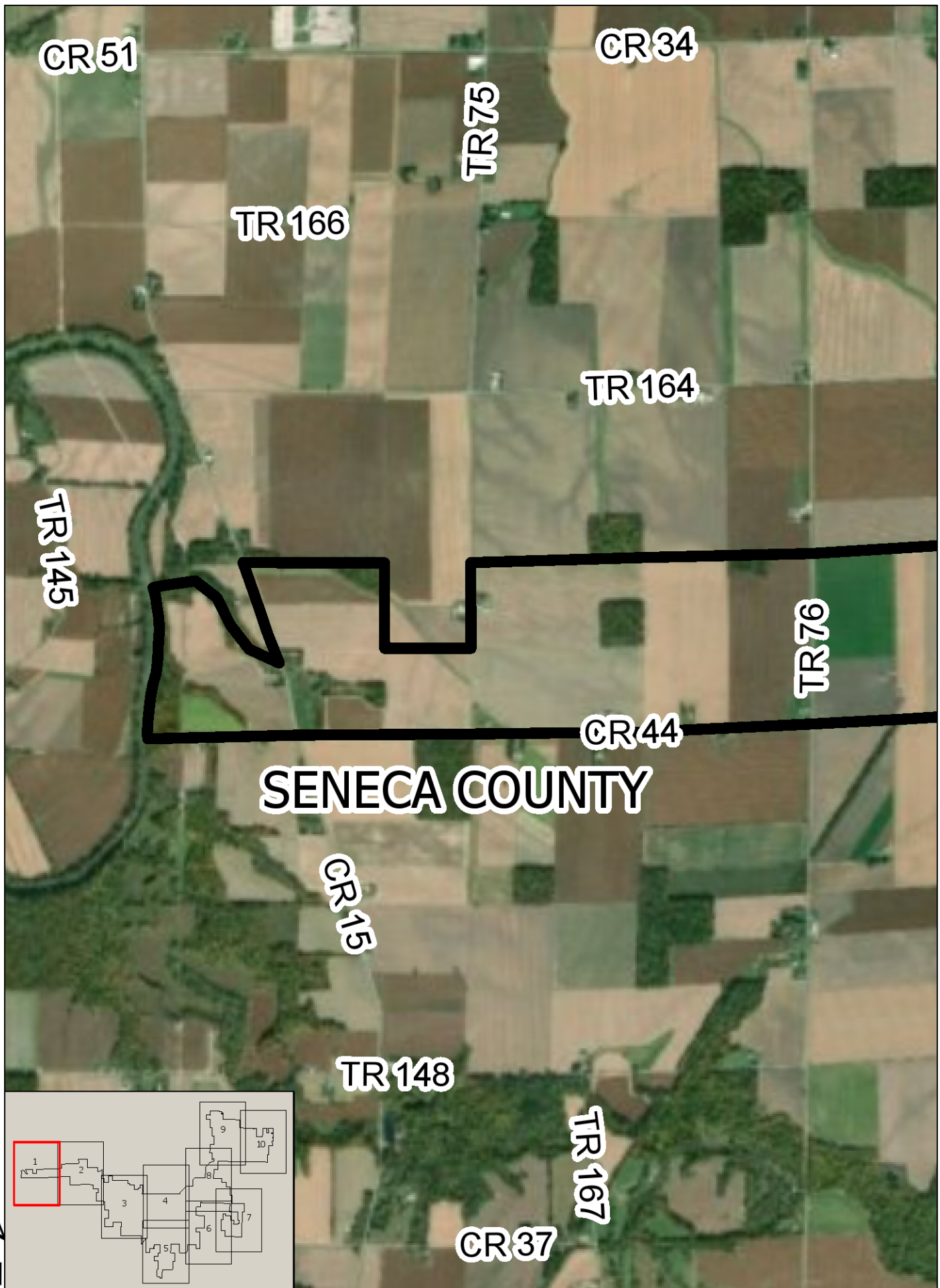


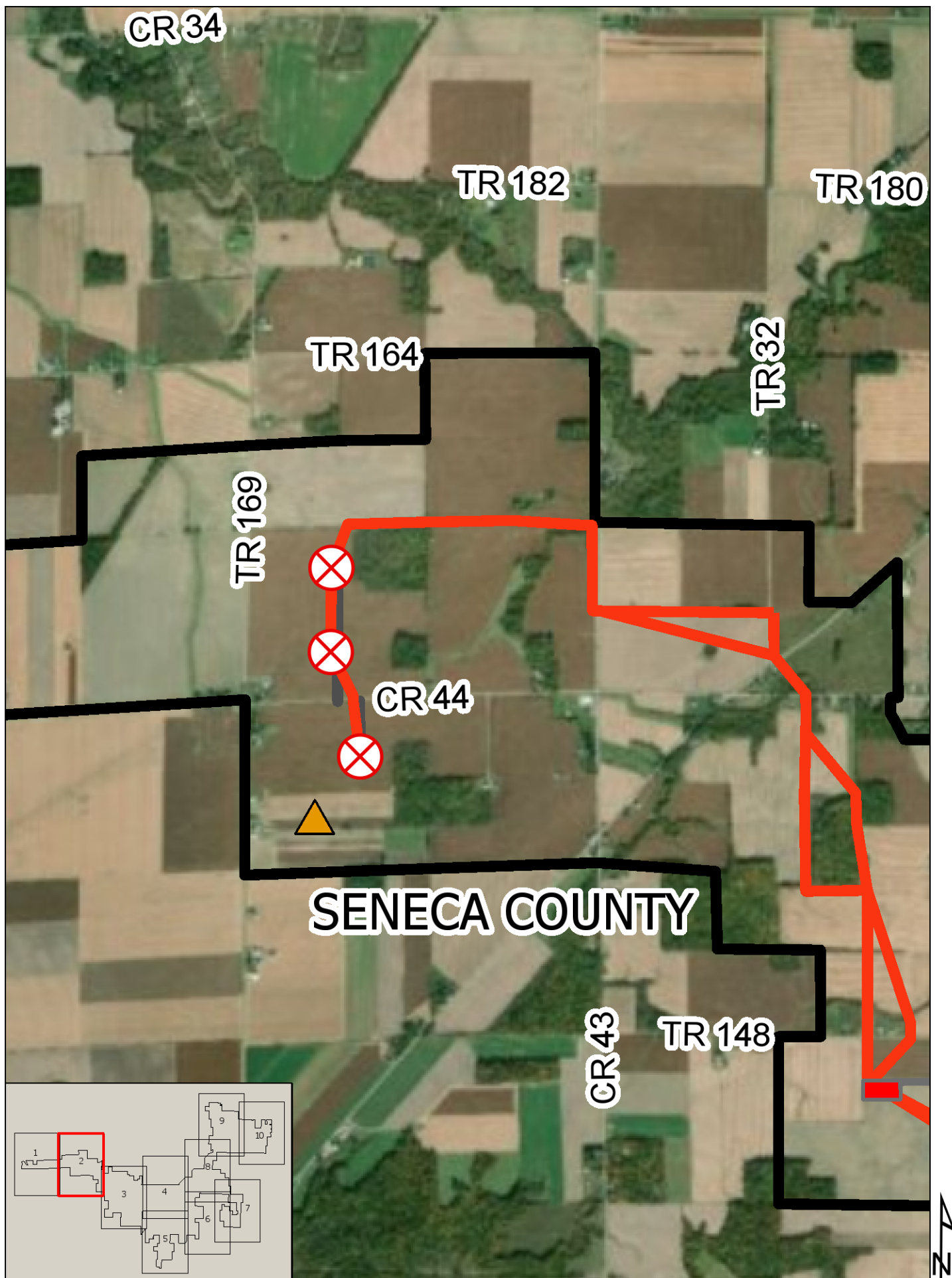
Overview Map

17-2295-EL-BGN

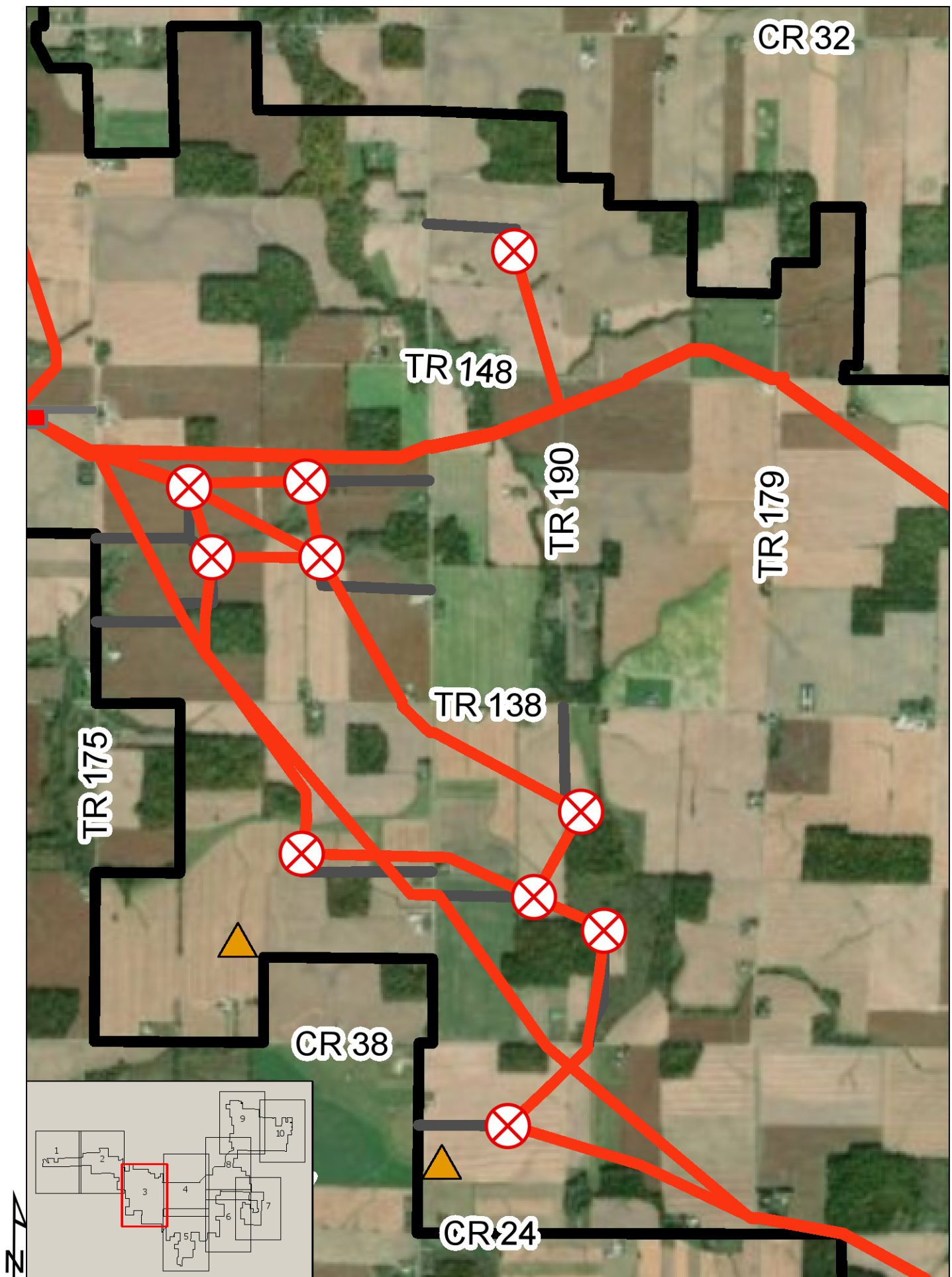
Republic Wind Farm

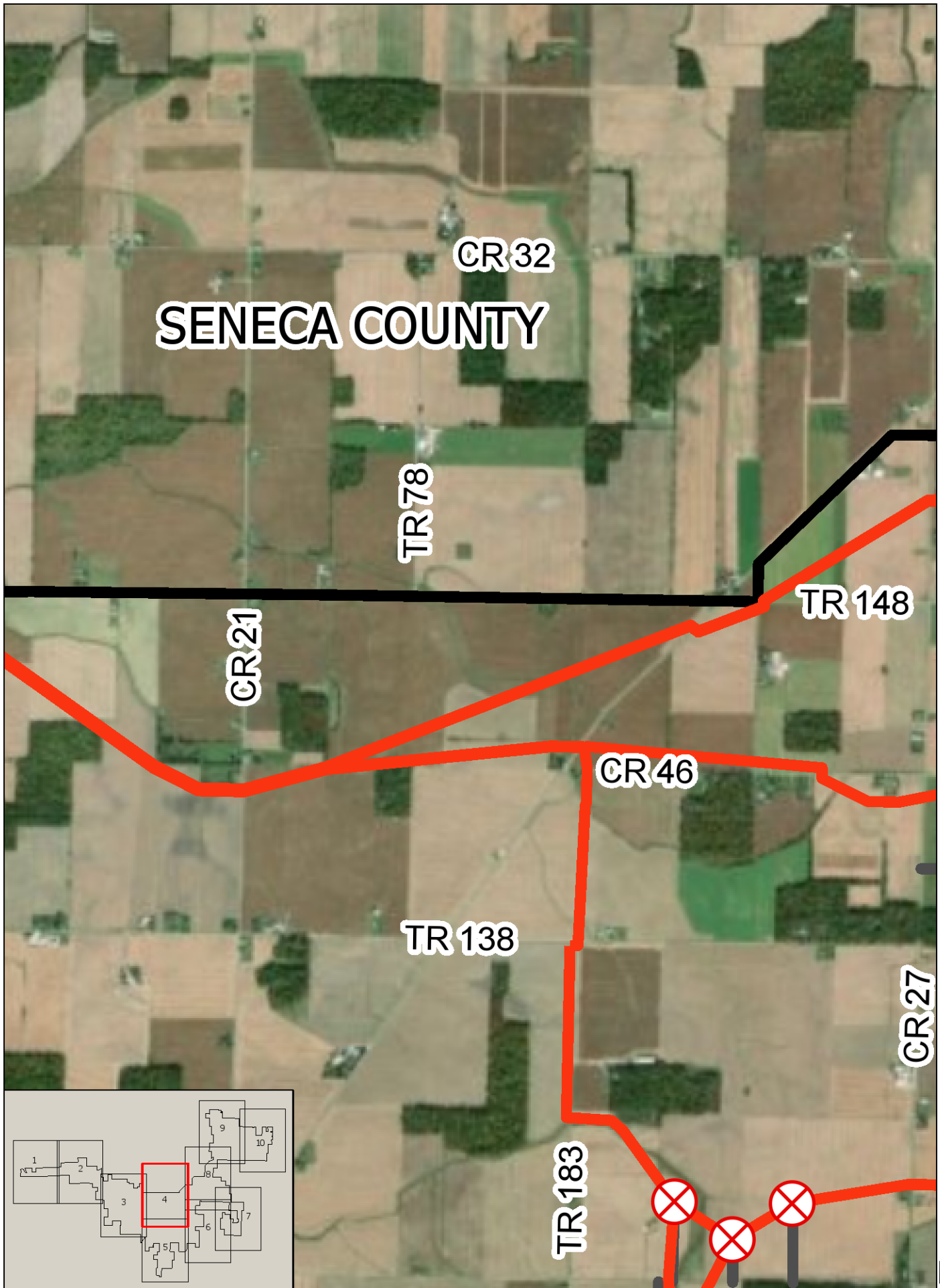
Maps are presented solely for the purpose of providing a visual representation of the project in the staff report, and are not intended to modify the project as present by the Applicant in its certified application and supplemental materials.





1 inch = 2,000 feet





CR 32

SENECA COUNTY

TR 78

CR 21

TR 148

CR 46

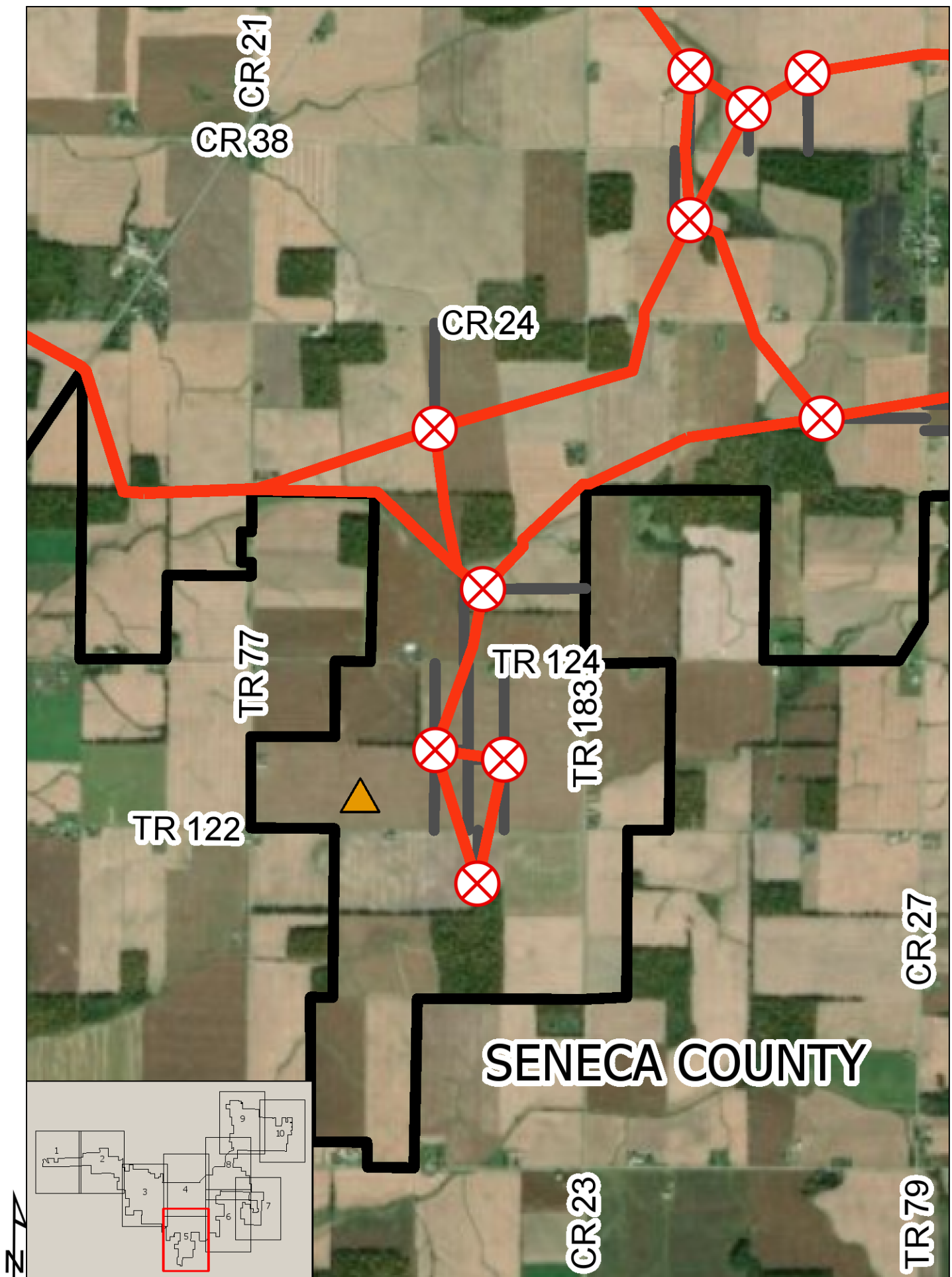
TR 138

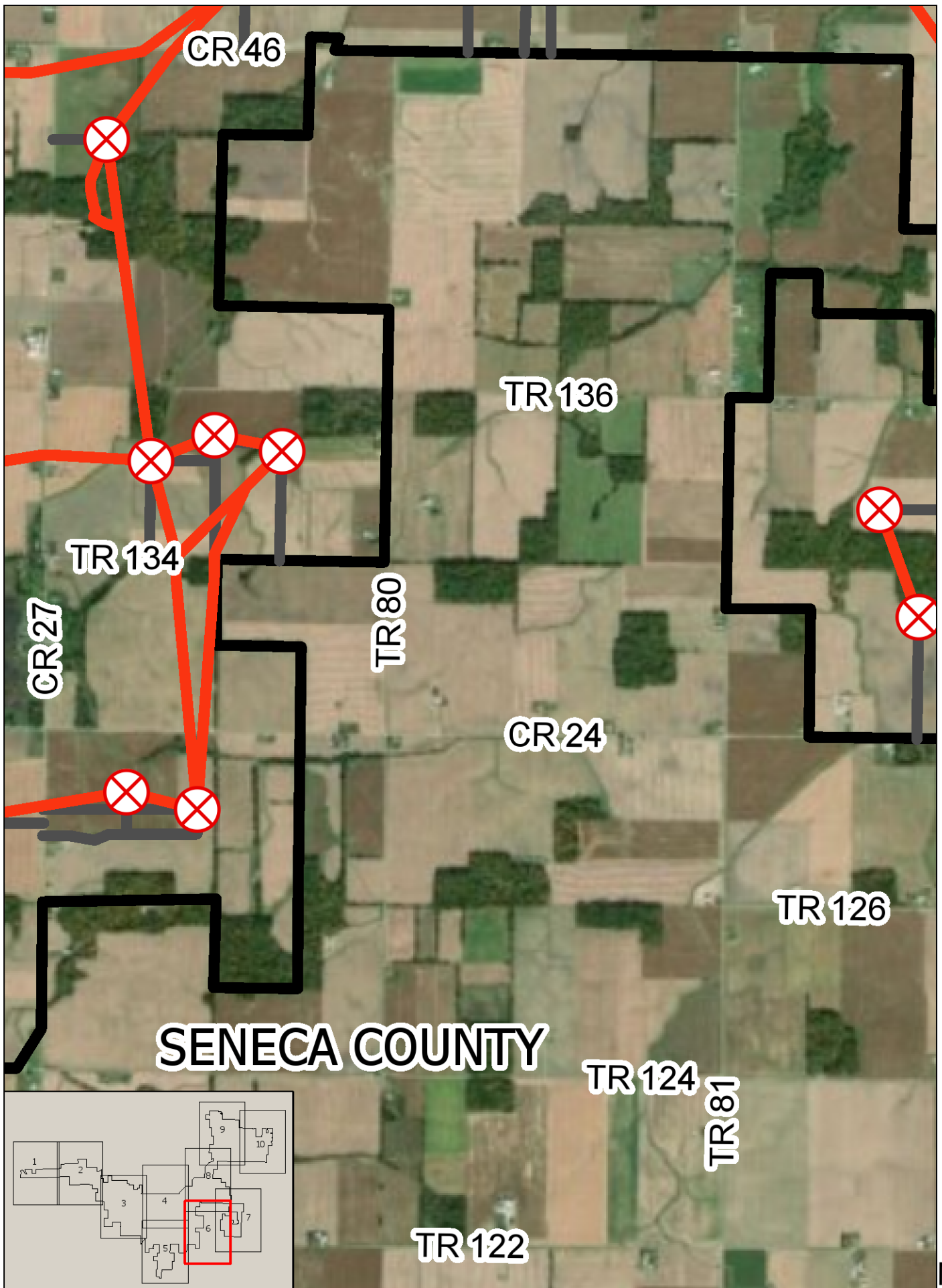
CR 27

TR 183

1 inch = 2,000 feet

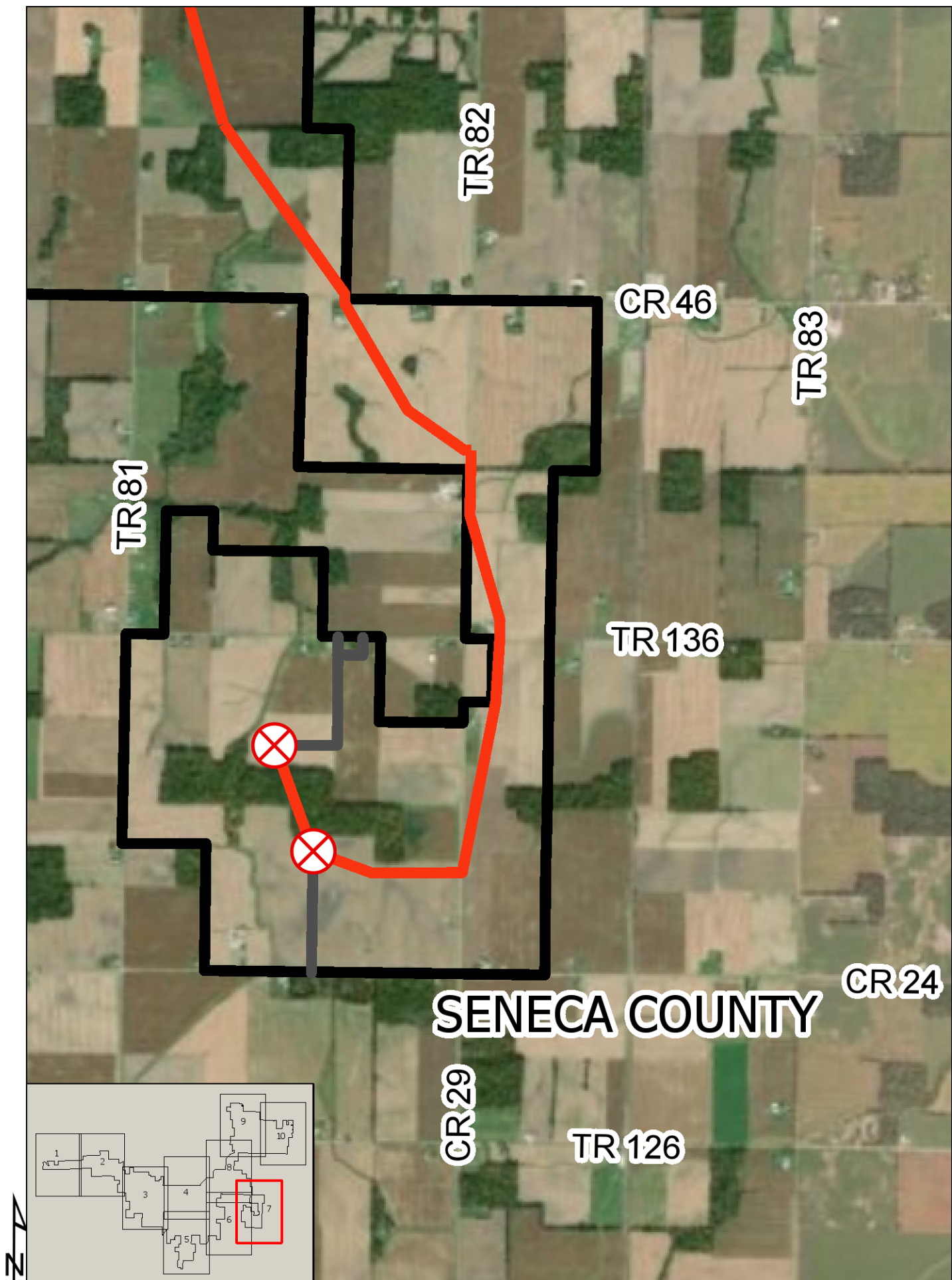
Map Page 4





1 inch = 2,000 feet

Map Page 6



SENECA COUNTY

TR 79

TR 178

TR 204

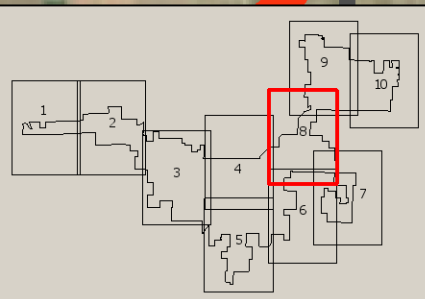
TR 81

CR 32

TR 80

TR 148

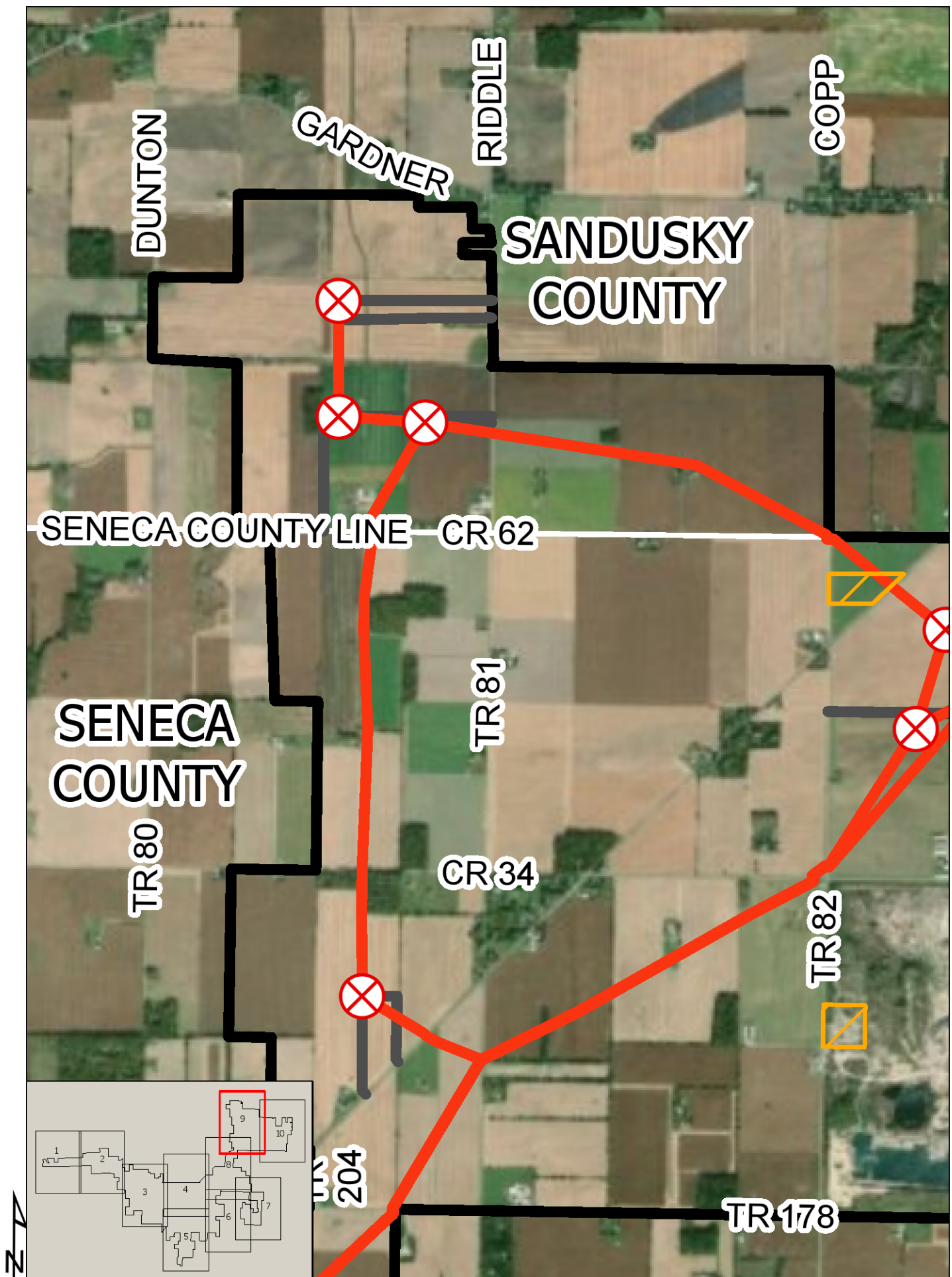
CR 27

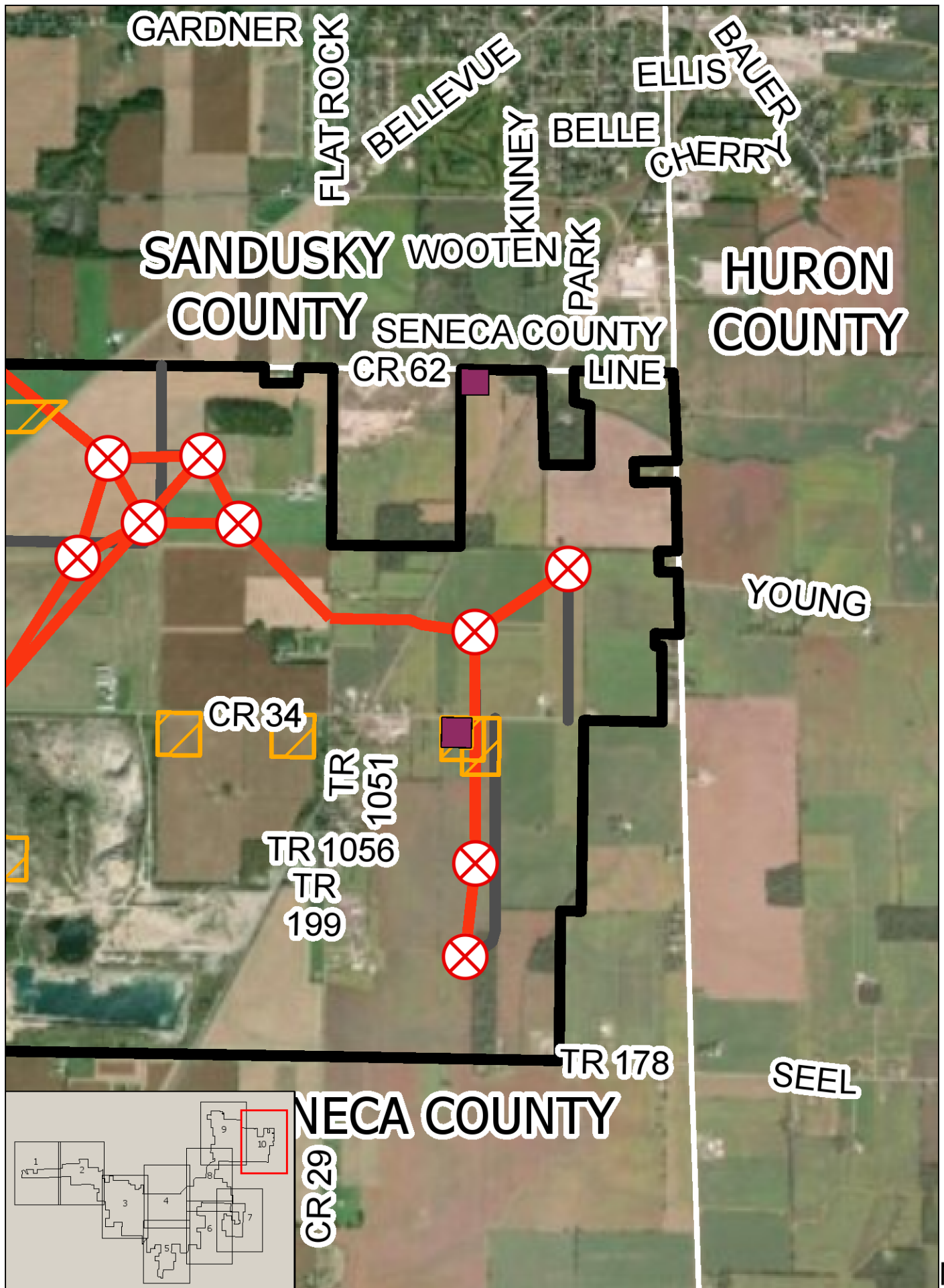


1 inch = 2,000 feet

Map Page 8







This page intentionally left blank.

III. CONSIDERATIONS AND RECOMMENDED FINDINGS

In the Matter of the Application of Republic Wind, LLC for a Certificate of Environmental Compatibility and Public Need for a Wind-Powered Electric Generating Facility in Seneca and Sandusky Counties, 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 transmission line that is related to this project and will be the subject of a separate filing. 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

The Applicant has studied land use plans for communities within a five-mile radius of the proposed project. Staff's review of these plans concurs that key elements of compatibility with developmental plans from Sandusky and Seneca counties center on preservation of agricultural activities, job creation and economic opportunities. Agricultural activities are consistent with wind facility operations that typically require small footprints, as farming operations are allowed to continue around the turbine sites.

Demographics

The proposed facility is located in Seneca and Sandusky counties. According to U.S. Census data, in 2010 the population of Seneca County was 56,745 and the population of Sandusky County was 60,944. The population of Seneca County decreased by approximately five percent, and the population of Sandusky County decreased by approximately two percent between 1990 and 2010. Staff's analysis indicates that the population of both Seneca and Sandusky counties are projected to continue to decrease over the next 10 years. This project would not be expected to significantly alter existing population trends in either county.

Land Use

Land use in proximity to the proposed facility is approximately 97 percent agricultural use. Approximately 630 acres of agricultural land would experience temporary disturbances, resulting in losses in agricultural production. Approximately 56 acres of land is expected to be permanently converted to wind farm use. The Applicant does not intend to remove or relocate any existing structures. The facility would comply with required property line setbacks unless waived by cooperating property owners. Significant impacts to commercial, industrial, residential, recreational, and institutional land uses are not anticipated, as the Board's turbine setback rules allow for sufficient distance to mitigate potential impacts. The Applicant would, by compliance with the Board's rules, control for excessive shadow flicker and noise impacts at any non-participating property.

Recreation

Construction and operation of the facility would not physically impact any recreational areas. Existing recreational areas would not experience any shadow flicker impacts that would exceed 30 hours per year. There are no national parks, forests, wildlife refuges, natural landmarks or federally designated scenic rivers in the 10-mile study area. Additionally, the study area is devoid of state nature preserves, state parks and state forests.

The Sandusky River is a state-designated scenic river located approximately 1.7 miles from the closest purposed turbine. This 1.7-mile separation provides for a significant buffer. Vegetation and

forested stream corridors, along with existing structures are expected to further diminish impacts for this scenic river.

Portions of the North Coast Inland Trail (a state bike route) and the Buckeye Trail are within the 10-mile study area. Turbines are expected to be visible along short sections of these trails.

Aesthetics

Due to the height of turbines in a wind farm, it is impractical to directly screen them from view. Aesthetic impacts and considerations are always measured against the surrounding land use features and potential viewers' subjective opinions. The turbines would be painted a neutral light color, per guidance from the Federal Aviation Administration (FAA). The placement of turbines within agricultural fields and adjacent to farm features such as storage silos provides additional visual minimization. The rural nature of the project vicinity limits the number of potential viewers. Transportation corridors typically are smaller and much more lightly traveled, which reduces the number of viewing impacts. Existing woodlots are also able to offer additional natural screening of portions of the facility.

Cultural, Archaeological, and Architectural Resources

The Applicant conducted a literature records review to ascertain potential impacts to historical properties and archaeological sites located within 5 miles of the project area. The review included an analysis of National Register of Historic Places (NRHP) and sites that may be eligible for the NRHP, as well as archaeological resources and known sites, landmarks, historical structures, bridges, cemeteries and historic districts. The records review identified 10 properties (eligible or listed) on the NRHP, 390 previously identified Ohio Historic Inventory structures, two historic bridges, 666 known archaeological sites and 63 cemeteries. The Applicant's initial review concluded that the proposed project would not physically impact above ground cultural resources, and potential impacts to archaeological resources remain unknown. Aesthetic impacts to above ground cultural resources will be determined by further study.

Staff recommends that the Applicant continue consultation with the Ohio Historic Preservation Office (OHPO) to prepare a Phase I field survey program, including evaluation of the effects on archaeological and architecturally significant properties. An evaluation of the Applicant's study results would need to be coordinated with the OHPO 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 shall submit a modification or mitigation plan to Staff. Any such mitigation effort, if needed, shall be developed in coordination with the OHPO, in accordance with Staff's recommended conditions.

Economics

The Applicant states that they would construct, own, and operate all structures of the proposed facility. Facility structures would be located on leased land, except for road crossings and, potentially, the substation and operations and maintenance facility.

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.

\The Applicant referenced a 2017 U. S. Department of Energy (USDOE) publication, which indicated that projects installed in 2016 had an average cost of \$1,590/kW. Staff verified the Applicant's assertion that the reported average cost of similar facilities is not substantially different from the Applicant's estimated costs for the proposed facility.

Operation and maintenance expense comparisons between the proposed facility and other comparable facilities are to be provided in the application. The Applicant referenced a 2017 USDOE report which indicated that operations and maintenance costs at recently installed wind facilities has fallen to an average of \$27/kW-year. Staff verified that the referenced study reported the capacity weighted average operations and maintenance costs for 33 projects that were installed since 2010 and evaluated in the study was \$27/kW-year, and Staff confirmed the Applicant's assertion that its operations and maintenance cost estimates were consistent with this amount. Additionally, Staff confirmed that the Applicant's estimate of facility operations and maintenance costs is consistent with the reported range of the operations and maintenance costs for its affiliates' facilities.

The Applicant provided its estimates of the cost of delays in permitting and construction of the proposed facility, although the estimated costs were filed under seal. The Applicant characterized permitting stage delay costs as being associated with the time value of delayed revenue payments. Costs of delay during construction would be associated with an idle workforce and idle equipment. The Applicant also stated that delays could prevent the project from meeting federal Investment Tax Credit deadlines, which could result in the loss of those benefits to the Applicant. Additionally, delays could result in penalties to the Applicant, to the extent that they would prevent the Applicant from meeting delivery deadlines under a potential power purchase agreement. The Applicant's characterization of its estimated costs of delays appears reasonable to Staff.

Republic Wind retained the services of EDR Environmental Services (EDR) to report on the economic impact of the Republic Wind Farm project. EDR used the National Renewable Energy Laboratory's Jobs and Economic Development Impact (JEDI) model, as well as data from the Ohio Department of Taxation to estimate the economic impact of the construction and operation of the wind farm.

Based on the results of the JEDI model analysis conducted by EDR, the Republic Wind Farm project is expected to have the following impacts:

Jobs

- 753 construction related job impacts for the state of Ohio.
 - 181 on-site job impacts, 403 manufacturing and supply chain related job impacts, and 169 induced job impacts.
- 41 long-term operational jobs for the state of Ohio.

Earnings

- \$41.4 million in new local earnings during construction for the state of Ohio.
- \$2.3 million in earnings resulting from annual operations for the state of Ohio.

Output

- \$112.2 million in local output during construction for the state of Ohio.

- \$5.9 million in local annual output derived from operations for the state of Ohio.

Taxes and Lease Payments

EDR additionally estimated revenue derived from lease payments and local tax revenue or payments in lieu of taxes (PILOT). Lease payments would include annual payments made to property owners for properties that contain components of the facility. The Applicant estimates that the total amount of these payments will total approximately \$1.3 million annually.

Estimated PILOT payments are calculated per MW of nameplate capacity and would range between \$1.2 million and \$1.8 million per year. These annual payments are based on the percentage of Ohio-domiciled employees working on the construction of the project.

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 Supply

The project area lies within the rural areas of Seneca and Sandusky Counties. The majority of the property owners in the project area utilize private wells for their water supply. The Applicant surveyed the 134 property owners within the project area. Of the 134 property owners, 79 completed surveys were returned by mail. The 79 respondents indicated that 86 private wells are in use on their properties. The 79 respondents also indicated that their wells were used for domestic purposes. Several property owners indicated their wells were also used for agricultural purposes. Five respondents indicated that their homes are connected to a public water supply system. About half of the 79 respondents provided limited information on their wells, such as the type of construction and depth to the bottom of the well. Well depths ranged from 18 to 160 feet. There were several dug wells with diameters reported between four and five feet. The dates these wells were installed went as far back as 1850 and as recent as 2011. Respondents provided very little detailed information regarding other characteristics of their wells, such as well design, identification of the aquifer, and depth to the water table.

Wind turbines generate electricity without burning fuel or releasing pollutants to the atmosphere. The required setback distance between residences and construction activities at the project sites would protect the private water wells from any significant negative impacts. The Applicant does not anticipate any adverse impacts to public or private water supplies during the construction and operation of the proposed wind farm.

The project area has three areas designated as Source Water Protection Areas (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 Regulation 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 biosolids, and voluntary brownfield cleanups. The SWPA in the project area are Capital Aluminum and Glass, the Clyde City Inland Surface Water protection Area, and the City of Fremont Inland Surface Water Protection Area. The Applicant has concluded that the proposed design and construction of the wind turbine facility as established would not restrict or have an adverse effect within either a surface or groundwater SWPA. Staff concurs with this finding.

Geology

Sandusky and Seneca counties are located within the Lake Plain and Till Plain sections of the Central Lowlands physiographic province. Rocks that outcrop within the project area in the two counties belong to relatively flat-lying sedimentary rocks of Silurian and Devonian age consisting of shale, limestone, and dolomite.

The underlying feature for all of the project area is the Wisconsin-age glacial till, lacustrine deposits, and sand and gravel outwash of variable thickness. Karst limestone occurs principally in the eastern portion of Sandusky and Seneca counties. The Applicant has noted that 27 of the proposed 64 wind turbines are situated in areas exhibiting karst features. Where the Applicant conducts future geotechnical studies that identify Karst features, those areas would be avoided for siting wind turbines.

Oil and gas extraction operations are scattered throughout the two county area. The Applicant does not have any wind turbines sited near any active oil and gas operations. There are several industrial mineral mining operations within the project area. Limestone and sand are the principle minerals extracted through the quarry mining approach. Active industrial mineral operations permittees Heitsche North Shore Stone (IM-0313) and Hanson Aggregates Davon (IM-0347) do not have any wind turbines sited on their respective properties

There have been six recorded seismic events in Sandusky and Seneca Counties dating back as far as 1936 and as recent as 2010. The magnitude ranged from a high of 3.7 on the Richter scale in 1961 and a low of 2.5 on the Richter scale in 1936. All of the seismic activity occurred either west or northwest of the project area. None of the seismic events have occurred within 10 miles of the proposed wind turbine facility. Staff finds there are no particular geological features that exist that would adversely affect or restrict the construction of the wind turbine facility.

Slopes and Soil Suitability

The Applicant has noted the project area consists of soil types described primarily as silt loam, silty clay loam, clay loam and lesser amounts covered by various clay, silt, and clay loams. The Applicant has indicated there are no slopes in the project area greater than 12 percent. One particular concern in the project area is the potential for dissolution in the carbonate rocks exposed to slightly acidic groundwater. According to the *Soil Survey of Sandusky, Ohio* and the *Soil Survey of Seneca County, Ohio*, other potential limiting factors include soil type and its position on slopes, low strength, shrink-swell, erosion, frost action, moderate to slow permeability and somewhat poorly drained soils.

The Applicant would conduct a geotechnical drilling investigation to obtain further site-specific detailed information and engineering properties for the soils for design and construction purposes. The subsurface drilling would ensure that the structures would be installed in locations that are suitable based upon soil and rock properties. These noted limitations should not adversely effect or restrict the construction of this project.

Surface Waters

Stream impacts would occur as a result of proposed construction of access roads and installation of collection lines. Access roads would impact seven streams, including three intermittent and four ephemeral streams, with a total of approximately 0.07 acre of temporary stream impacts and 0.04 acre of permanent impacts proposed for the project. A total of 29 streams are proposed to be

crossed via open cut method for installation of collection lines. Total temporary impacts associated with collection lines would be 0.48 acre. Most stream impacts would be limited to manmade agricultural or roadside ditches. The Applicant proposes to use horizontal directional drilling (HDD) for installation of collection lines through perennial streams and no impacts to perennial streams are anticipated. Due to the use of HDD, the Applicant has developed a frac-out contingency plan which details monitoring, containment measures, cleanup, and restoration in the event of an inadvertent return.

The Applicant provided GIS data showing that collection lines would cross four wetlands, including one category 2 wetland, wetland WOH-225, and three category 3 wetlands, wetlands WOH-122, WOH-008, and WOH-236. The Applicant has indicated that the crossing of wetland WOH-225 is not necessary and was built in as an optional collection line route. Staff recommends that this option not be implemented. In review of the crossings through wetlands WOH-122, WOH-008, and WOH-236, Staff noted that impacts to wetlands WOH-122, WOH-008 could be avoided through a slight adjustment of less than 10 feet at the centerline. Impacts to wetland WOH-236 could be avoided through the use of HDD. The Applicant has indicated that impacts to these wetlands can be avoided through facility design or HDD. No permanent wetland loss would occur as a result of the project. As the Applicant has not finalized crane path design, there is still potential for temporary surface water impacts during construction. Staff recommends that the Applicant avoid impacts to category 3 wetlands during all phases of the project. Staff also recommends that the Applicant continue to coordinate with the Ohio EPA and the United States Army Corps of Engineers (USACE) to ensure that all anticipated wetland and stream impacts are properly permitted.

In order to minimize impacts to surface waters, Staff recommends that the Applicant be required to provide a construction access plan for review prior to the preconstruction conference, as outlined in the recommended conditions. The plan would consider the location of streams, wetlands, wooded areas, and sensitive plant species, as identified by the ODNR, and explain how impacts to all sensitive resources would be avoided or minimized during construction, operation, and maintenance.

Additional measures to reduce water quality impacts would be taken through the development of a Storm Water Pollution Prevention Plan (SWPPP), as part of the Ohio EPA issued National Pollutant Discharge Elimination System (NPDES) permit for storm water discharge associated with construction activities, to help control potential sedimentation, siltation, and run-off. No ponds or lakes would be impacted by the facility during construction or operation. Collection lines would cross 100-year floodplain areas and may require coordination with the local floodplain permit administrator. No other proposed facility components are within the 100-year floodplain.

Staff recommends that the Applicant have a Staff-approved environmental specialist on-site during construction activities that may affect sensitive areas. Sensitive areas include, but are not limited to, areas of vegetation clearing, areas of herbicide application, designated wetlands and streams, and locations of threatened or endangered species or their identified habitat. The environmental specialist must be familiar with water quality protection issues and potential threatened or endangered species of plants and animals that may be encountered during project construction.

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 Seneca and Sandusky counties reflects the results of the information requests, field assessments, and document review.

MAMMALS				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
Indiana bat	<i>Myotis sodalis</i>	Endangered	Endangered	Records exist within the project area.
northern long-eared bat	<i>Myotis septentrionalis</i>	Threatened	Threatened	Records exist within the project area.
big brown bat	<i>Eptesicus fuscus</i>	N/A	Species of Concern	Records exist within the project area.
eastern red bat	<i>Lasiurus borealis</i>	N/A	Species of Concern	Records exist within the project area.
little brown bat	<i>Myotis lucifugus</i>	N/A	Species of Concern	Records exist within the project area.
tri-colored bat	<i>Perimyotis subflavus</i>	N/A	Species of Concern	Records exist within the project area.
REPTILES & AMPHIBIANS				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
Blanding's turtle	<i>Emydoidea blandingii</i>	N/A	Threatened	Known range. Habitat includes wetlands and adjacent upland areas.
spotted turtle	<i>Clemmys guttata</i>	N/A	Threatened	Known range. Habitat includes wetlands and adjacent upland areas.
FRESH WATER MUSSELS				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
black sandshell	<i>Ligumia recta</i>	N/A	Threatened	Known range. Potential habitat includes perennial streams with a watershed of 10 square miles or greater.
FISH				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
greater redhorse	<i>Moxostoma valenciennesi</i>	N/A	Threatened	Known range. Habitat includes perennial streams.

PLANTS				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
Engleman's Spike Rush	<i>Eleocharis engelmannii</i>	N/A	Threatened	Records exist within the project area. Species grows in ephemeral wetlands that contain exposed mud or muck flats in the summer months. A pre-construction survey is recommended.

BIRDS				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
bald eagle	<i>Haliaeetus leucocephalus</i>	BGEPA & MBTA ¹⁶	N/A	Nearest nest 1.9 miles from project.
northern harrier	<i>Circus cyaneus</i>	N/A	Endangered	Records exist within the project area
loggerhead shrike	<i>Lanius ludovicianus</i>	N/A	Species of Interest	Records exist within the project area
upland sandpiper	<i>Bartramia longicauda</i>	N/A	Endangered	Records exist within the project area

The Applicant documented several listed species and their habitat during field surveys. Further, the ODNR Natural Heritage Database has records of multiple listed species within one mile of the project area. In the 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, within 24 hours. Staff recommends that activities that could adversely impact the identified listed plants or animals be immediately halted until an appropriate course of action has been agreed upon by the Applicant, Staff, and the appropriate agencies. Staff also recommends that if the Applicant encounters any listed plant or animal species prior to construction, the Applicant notify Staff of the location and how impacts would be avoided during construction.

Surveys documented several listed bat species within the project area, including the federal and state endangered Indiana bat, federal and state threatened northern long-eared bat, and state species of concern bat big brown bat, eastern red bat, little brown bat, and tri-colored bat. The primary threat to these species would be the risk of collision with an operational wind turbine. The Applicant would follow a curtailment regime to minimize impacts to bats and other avian species in the project area. The project site and adjacent parcels encompass habitat with confirmed use by listed species. The Applicant stated that it expects collision risk to bats in the project area to be consistent with other wind energy projects in agricultural landscapes in the Midwestern U.S. and estimates 980 to 2,200 bat deaths per year. However, the ODNR anticipates the mortality rate may be greater as this site has approximately five to eight times the amount of forested area as other operating projects in agricultural landscapes in Ohio. Additionally, active roost trees for the Indiana bat and northern long-eared bat have been documented in and adjacent to the project area during surveys. Staff recommends that the Applicant obtain an Incidental Take Permit (ITP) under

16. Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act of 1940 and the Migratory Bird Treaty Act of 1918.

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. Because an ITP can take years to obtain, Staff recommends that the Applicant obtain a Technical Assistance Letter (TAL) from the USFWS, which would detail a curtailment regime for avoidance of Indiana bat take. Staff recommends that the Applicant obtain the TAL prior to operation and implement the operational measures specified in the TAL for the entire facility until an ITP is obtained. Past TALs have recommended operational measures to protect Indiana bats during migrations, 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. Because this project is in the vicinity of documented resident Indiana bats, Staff expects that the letter issued for this case would include curtailment recommendations for portions of the facility which are near documented roost trees during the summer months as well. Staff would be supportive of this curtailment regime for the proposed facility. Additionally, Staff recommends that turbines be feathered below manufacturer's cut-in speed during the summer season from May 16 through July 31. The operational measures implemented both through the implementation of the TAL and the ITP would protect Indiana bats, northern long-eared bats, and other bat species.

On January 14, 2016 the USFWS published the final 4(d) rule, published in the Federal Register. This rule identifies prohibitions that focus on protecting the northern long-eared bat's sensitive life stages in areas affected by white-nose syndrome. The final 4(d) rule also provides that there are no prohibitions on incidental and purposeful take of northern long eared bats in certain instances. Incidental take of the northern long eared bat would not be federally prohibited in the project area as defined by the 4(d) rule. Presence of the northern long-eared bat during the summer months has been established for the project area. As this is also a state threatened species, Staff recommends that the Applicant afford the measures recommended to protect the Indiana bat, as detailed in the TAL, to the northern long-eared bat, including summertime feathering of turbines within specified distances of documented northern long-eared bat roost trees.

As tree roosting species in the summer months, the habitat of the Indiana bat and northern long-eared bat would be impacted by the Applicant's proposed tree clearing during construction. In order to avoid impacts to these species, Staff recommends that the Applicant adhere to seasonal tree cutting dates of October 1 through March 31 for all trees three inches or greater in diameter, unless coordination efforts with the ODNR and the USFWS allows a different course of action. The ODNR and the USFWS may allow tree clearing outside of these dates if the Applicant can document the absence of these species in the project area, which is usually accomplished through mist-net surveys. Presence of the Indiana bat and northern long-eared bat has been established in portions of the project area, so additional surveys in these areas could not establish the absence of this species.

Staff recommends that, sixty days prior to the first turbine becoming commercially operational, the Applicant submit a post-construction avian and bat monitoring plan for ODNR Division of Wildlife (DOW) and Staff review and approval. Staff would also require that the Applicant provide the monitoring plan to, and seek confirmation from, the USFWS. The Applicant's plan should be consistent with the ODNR-approved, standardized protocol, as outlined in the ODNR's On-Shore Bird and Bat Pre-and-Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio. The Applicant shall obtain the necessary permits from the ODNR and the USFWS to collect bat and migratory bird carcasses. The post-construction monitoring shall begin within two weeks of operation 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 would extend into the second calendar year. The Applicant may request that the second monitoring season be waived at the discretion of the ODNR and Staff. The monitoring start date and reporting deadlines would be provided in the DOW approval letter and the Staff concurrence letter. If it is determined that significant mortality, as defined in the ODNR approved, standardized protocols, has occurred to birds and/or bats, the Applicant would be required to develop a mitigation plan. If required, the Applicant would submit a mitigation plan to the DOW and Staff for review and approval within 30 days from the date stated on ODNR letterhead.

Raptor nest surveys completed in 2018 documented a bald eagle nest 1.9 miles from the nearest turbine. Although no eagle nests have been documented within the project area, the Applicant has not completed a bald eagle survey since 2012. Staff recommends that the Applicant coordinate with the USFWS to determine the adequacy of pre-construction eagle use surveys and assure that impacts to bald eagles are minimized. If the USFWS determines that impacts to bald eagle are likely it may recommend that the Applicant develop and implement an Eagle Conservation Plan. If recommended by the USFWS, the Applicant shall develop and implement an Eagle Conservation Plan. The Eagle Conservation Plan shall be developed in coordination with the USFWS and in accordance with the USFWS Eagle Conservation Plan Guidance document and 2016 Revised Eagle Take Permit Regulations.

No facility components would impact mussel habitat. However, temporary crane path installation during construction may require in-water work within suitable habitat. The ODNR stated that this project must not have an impact on freshwater native mussels at the project site. This applies to both listed and non-listed species. Per the Ohio Mussel Survey Protocol (2016), all Group 2, 3, and 4 streams require a mussel survey. Per the Ohio Mussel Survey Protocol, Group 1 streams and unlisted streams with a watershed of 10 square miles or larger above the point of impact should be assessed using a Reconnaissance Survey for Unionid Mussels to determine if mussels are present. Mussel surveys may be recommended for these streams as well. This is further explained within the Ohio Mussel Survey Protocol. The ODNR recommends that, if in-water work is planned in any stream that meets any of the above criteria, the Applicant provide information to indicate no mussel impacts would occur. If this is not possible, the ODNR recommends a professional malacologist conduct a mussel survey in the project area. If mussels that cannot be avoided are found in the project area, as a last resort, the ODNR recommends a professional malacologist collect and relocate the mussels to suitable and similar habitat upstream of the project site. Mussel surveys and any subsequent mussel relocation should be done in accordance with the Ohio Mussel Survey Protocol.

The project is within the range of the greater redhorse, a state threatened fish. Staff recommends no in-water work in perennial streams from April 15 through June 30 to reduce impacts to indigenous aquatic species and their habitat, unless coordination with the ODNR allows a different course of action.

Records exist within the project area for the upland sandpiper, a state endangered bird. Nesting upland sandpipers utilize dry grasslands. The grassland habitat used by upland sandpipers varies widely and can include both exotic and native grasses as well as associated forbs and legumes. Nesting upland sandpipers can be associated with areas that are grazed, hayed, or mowed. Staff

recommends that construction be avoided in these habitats during the species' nesting period of April 15 through July 31, unless coordination with the ODNR allows a different course of action.

Records exist within the project area for the northern harrier, a state endangered bird. This species is common in the vicinity of the proposed project area during migration and winter. Northern harriers breed and hunt in large wet meadows and dry grasslands. Staff recommends that construction be avoided in this habitat during the species' nesting period of May 15 through August 1, unless coordination with the ODNR allows a different course of action.

Records exist within the project area for the loggerhead shrike, a state endangered bird. The loggerhead shrike nests in hedgerows, thickets, fencerows, and other types of dense shrubbery habitat. Staff recommends that construction be avoided in these habitat types during the species' nesting period of April 1 through August 1, unless coordination with the ODNR allows a different course of action.

The project is within the range of the state threatened Blanding's turtle and state threatened spotted turtle. These species inhabit a variety of different types of streams, ponds, and wetlands. Although essentially aquatic, these species travel over land as they move from one wetland to the next. Because the project may impact potentially suitable habitat, the ODNR recommends that a habitat suitability survey be conducted by an approved herpetologist to determine if suitable habitat exists within the project area. If suitable habitat is determined to be present, the ODNR recommends one of the following:

- (1) The area determined to be suitable habitat be avoided along with an appropriate buffer.
- (2) A presence/absence survey be conducted by the approved herpetologist.
- (3) An avoidance/minimization plan be developed and implemented by the approved herpetologist.

If the Applicant conducts a presence/absence survey and either species is determined to be present, Staff recommends that the Applicant continue to coordinate with the ODNR to assure that impacts are avoided.

If construction is delayed beyond the initial 5-year term of the OPSB certificate, Staff recommends that certain wildlife surveys be updated as determined by the ODNR at that time.

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 Disturbance (Acres)	Permanent Loss (Acres)
Forestland	20.5	19.5	1
Agricultural Lands	566.5	517	49.5
Barren	12.1	12.1	0
Scrub Shrub	0.1	0.1	0
Total	599.2*	548.7	50.5

*Six 12-acre sites have been identified for possible laydown areas. Impacts to barren or agricultural land will vary based on which site is ultimately selected, as five potential sites are located in agricultural lands and one potential site is located in barren lands. Only one laydown area would ultimately be constructed.

Facility construction would result in minimal impacts to vegetative communities within the project area. Construction activities that may result in impacts to vegetation include site preparation, earthmoving, 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.

Records exist within the project area for the Engleman's spike rush a state endangered plant. This species grows in ephemeral wetlands that contain exposed mud or muck flats in the summer months. Due to the possible disruption of this species, Staff recommends a pre-construction survey of the proposed project site be conducted to ensure that the plant is not impacted. The Applicant shall coordinate survey efforts with the ODNR Division of Natural Areas and Preserves' chief botanist.

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. 4906.201(A) delineates how minimum setbacks for "an electric generating plant that consists of wind turbines and associated facilities with a single interconnection to the electrical grid that is designed for, or capable of, operation at an aggregate capacity of fifty megawatts or more" are to be determined. These minimum setback requirements are further detailed in Ohio Adm.Code 4906-4-08(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 at the time of certification application. The maximum rotor diameter proposed for this project is 492 feet. Using this measurement, the minimum setback calculates to 1,371 feet from the turbine base to nearest adjacent property. The Applicant states in the application that all turbine locations would comply with this requirement.

Pursuant to Ohio Adm.Code 4906-4-08, the distance from a wind turbine base to any property line of the wind farm, 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 602 feet. Therefore, setback to these facilities and roads for the proposed turbines would be required to be 662.2 feet. Staff's analysis indicates that there are no wind farm property lines, state or federal highways, or electric transmission lines or gas lines within 662 feet, with the exception of turbine 42 which is located approximately 609 feet from a mapped gas pipeline.

The Applicant would need to verify the distances referenced in this section, and either obtain a setback waiver or remove turbines from consideration if they do not meet the appropriate minimum setback requirements.

Turbine Foundations

The Applicant would prepare a wind turbine assembly area by grading and removing vegetation within a maximum radius of 300 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.

Turbine foundation systems would be designed upon completion of the detailed geotechnical exploration, but the two most likely foundation types would be spread footing or rock-anchored pile foundations. The Applicant is aware of complexities of spread footer and rock-anchored pile foundations and how to address them as indicated in Applicant's response to Staff's data request dated March 22, 2019. Both are commonly used foundation designs for wind turbines and would be reasonable to use at this proposed facility.

Based on the preliminary geological assessment of the project area, the Applicant states that blasting is highly unlikely to be necessary for foundation construction. Pursuant to Ohio Adm.Code 4906-4-09, should site-specific conditions warrant blasting, the Applicant would be required to submit a blasting plan to Staff for review and acceptance in advance of any blasting.

Wind farms typically submit to the OPSB detailed engineering drawings of their proposed foundations. Staff recommends that when the Applicant submit detailed engineering drawings of the foundation, that it include the identity of the registered professional engineer, structural engineer, or engineering firm, that approved the designs, and that the entity be licensed to practice engineering in the state of Ohio.

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 the selection of one primary route and one alternate route for the delivery of components to the project area. Each route is listed below:

- Primary route from I-90 to US Route 20 traveling east to enter the west portion of the project area; or
- Alternative route from I-90 to State Route 4, delivery vehicles would travel southwest to enter the east portion of the project area; or continue west on US 224 to enter the west portion of the project area.

Delivery of wind farm equipment and materials would impact local roads. The Applicant conducted a field review of local project area roads, within the project area to identify possible impacts to township and county roads from construction. The Applicant also reviewed issues including the pavement condition, load capacity, and restricted turning radii from trucks delivering turbine components.

The Applicant expects some modifications to local roads, which would include the expansion of intersection turns to accommodate specialized turbine component delivery vehicles and conventional construction trucks. Other transportation infrastructure improvements would include temporary road gravel fills, pipe to maintain drainage in the ditched areas, and relocation of poles,

street signs and other appurtenances. Upon completion of the facility, the Applicant would return all roadways to their pre-construction conditions or better.

The Applicant stated that, prior to commencement of construction activities that require transportation permits, it 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 and operation of the proposed facility. Coordination would include, but not be limited to, the county engineer, ODOT, local law enforcement, and health and safety officials. This coordination would be detailed as part of a final traffic plan 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 stated that it would provide the final delivery route plan and the results of any traffic studies to Staff and the county engineer 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; identifying 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; identifying 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; identifying 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.

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 request that they remain. The Applicant would provide financial assurance to the counties that it will restore the public roads it uses to their condition prior to construction or maintenance.

The Applicant stated that it expects to enter into a road use agreement with the county engineer 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; and, turbine shut down at excessive wind speeds and at excessive 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 an occurrence of any blade shear event, to be followed up by a written report within 30 days of the event detailing the incident and corrective actions to be taken to avoid, prevent, mitigate, or minimize a recurrence.

Ice Throw

Ice throw occurs when accumulated ice on a wind turbine blade 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.

Staff recommends that the certificate be conditioned to require that the Applicant notify Staff within 24 hours of an occurrence of any ice throw event resulting in injury, to be followed up by a written report within 30 days of the event detailing the incident and corrective actions to be taken to avoid, prevent, mitigate, or minimize a recurrence.

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. The Applicant modeled the facility noise output using DataKustic GmbH's Cadna/A® noise modeling software. In order to estimate the potential noise impact associated with the proposed facility, the model used the maximum sound power for each of the proposed turbines. The Applicant modeled 50 potential turbine locations.

In order to characterize the existing ambient noise level, an acoustic survey of the project area was conducted by the Applicant between February 3 and February 18, 2016. Seven survey locations were sampled. Based on this study, the Applicant found that average ambient noise levels (LEQ)

across the project area ranged from 37 to 52 decibels A-weighted (dBA) during the day and from 32 to 51 dBA at night. The average nighttime L_{EQ} was determined to be 41 dBA.

The Applicant used an operational sound output limit of 46 dBA at all non-participating receptors. These design goals equate to the addition of 5 dBA to the average nighttime L_{EQ} . In order to achieve the sound output limit, several turbines would need to operate in a noise reduction operation (NRO) mode. The Applicant's analysis of noise impacts, incorporating NRO modes for certain turbines, showed that for the eight turbine models evaluated no non-participating receptors had modeled sound impacts in excess of 46 dBA.

Staff recommends that the certificate be conditioned to require that the Applicant demonstrate adherence to the sound output limit and any cumulative noise impact associated with adjacent wind farms should they be built before the proposed project. 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 would be in operation.

Low Frequency Noise and Infrasound

Low frequency noise is noise that occurs in the 20 to 200 Hz range. Infrasound is noise that occurs below the human threshold of hearing which is generally below 20 Hz. The turbines proposed for this project would produce low frequency noise and infrasound, but at levels too low to cause adverse effects to human health. In response to Staff's question on low frequency noise and infrasound from wind turbines the Ohio Department of Health has stated, "...it is unlikely that infrasound generated by wind turbines would pose a significant health threat to residents living adjacent to the wind turbine projects..."

Several international studies have come to similar conclusions:

In 2014, the Australian Medical Association evaluated the health impact relative to wind turbines and released a position statement: "The available Australian and international evidence does not support the view that the infrasound or low frequency sound generated by wind farms, as they are currently regulated in Australia, causes adverse health effects on populations residing in their vicinity. The infrasound and low frequency sound generated by modern wind farms in Australia is well below the level where known health effects occur, and there is no accepted physiological mechanism where sub-audible infrasound could cause health effects."¹⁷

In March 2017, the French Agency for Food, Environmental and Occupational Health & Safety (ANSES) carried out measurement campaigns near three wind farms.¹⁸ Their report concluded, "The results of these campaigns confirm that wind turbines are sources of infrasound and low sound frequencies, but did not show any cases of the hearing thresholds in the areas of infrasound

17. Australian Medical Association, (2014) Position Statement, Wind Farms and Health, accessed March 13, 2019, <https://ama.com.au/system/tdf/documents/Wind%20Farms%20and%20Health%202014.pdf?file=1&type=node&id=40584>.

18. French Agency for Food, Environmental and Occupational Health & Safety, (2017) Opinion of the French Agency for Food, Environmental and Occupational Health & Safety regarding the expert appraisal on the "Assessment of the health effects of low-frequency sounds and infrasounds from wind farms," accessed March 1, 2019, <https://www.anses.fr/en/system/files/AP2013SA0115EN.pdf>.

and low frequencies up to 50 Hz being exceeded.” The study further noted that “The review of these experimental and epidemiological data did not find any adequate scientific arguments for the occurrence of health effects related to exposure to noise from wind turbines, other than disturbance related to audible noise and a placebo effect, which can help explain the occurrence of stress-related symptoms experienced by residents living near wind farms.”¹⁹

Annoyance can lead to stress and stress can lead to adverse health effects. A 2001 New York State Department of Environmental Conservation (NYSDEC) document notes that, in non-industrial settings, the ambient noise level at any given receptor should probably not be exceeded by more than 5 dBA, and an increase of 5 dBA may cause complaints.²⁰

In order to mitigate annoyance due to operational noise, Staff recommends the applicant comply with Ohio Adm. Code 4906-4-09(F)(2).²¹

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 one mile of the project area. The model included 837 receptors and 50 turbine locations. 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 Vestas V150 turbine has the largest rotor diameter of the proposed turbines and was the turbine model used for the shadow flicker analysis. The model showed that for the Vestas V150 turbine model 46 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.

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 the facility

19. The placebo effect occurs when adverse effects are generated by negative expectations.

20. NYSDEC, (2001) Assessing and Mitigating Noise Impacts, Albany, New York. Accessed March 13, 2019, http://www.dec.ny.gov/docs/permits_ej_operations_pdf/noise2000.pdf.

21. The facility shall be operated so that the facility noise contribution does not result in noise levels at any non-participating sensitive receptor within one mile of the project boundary that exceed the project area ambient nighttime average sound level (Leq) by five A-weighted decibels (dBA). During daytime operation only (seven a.m. to ten p.m.), the facility may operate at the greater of: the project area ambient nighttime Leq plus five dBA; or the validly measured ambient Leq plus five dBA at the location of the sensitive receptor.

would 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 adjacent wind farms should they be built before the proposed project.

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).²² This project's maximum wind turbine rotor speed translates to a blade pass frequency of approximately 0.65 Hz and therefore would not be likely to trigger seizures.²³

Wind Velocity

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 vary by model. The maximum cut-out speed is less than or equal to 27 meters per second (m/s), or 60.4 miles per hour (mph). The Vestas V150 model is certified by the IEC as Class III wind turbine 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 SG145 model is certified by the IEC as Class II wind turbine 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). The Nordex N149 model is certified by the IEC as Class S wind turbine 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) at an air density of 1.32 kg/m³. The Vestas V136 model design can be certified by the IEC as either Class II, Class III, or Class S. 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.²⁴ 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 Vestas,

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

23. 13 RPM = 0.22 Hz x 3 blades = 0.65 Hz.

24. Amended Application, p. 63.

Nordex, and Siemens Gamesa turbine models. The purpose of Staff's review of this safety information is to ensure safety requirements or setback recommendations would be upheld by the wind farm 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 operations and maintenance 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 inappropriate public access to the facility. The Applicant intends to install signs, and gates at the intersections of public roads and access roads that identify the turbine and prohibit unauthorized entry.

According to the Applicant, the turbines and equipment will be installed in accordance with National Fire Protection Association 70E code standards. The Applicant states that in the event of a turbine fire, the Applicant would disconnect power to the turbine, set and maintain a temporary safety area, and allow the fire to burn itself out.²⁵ The Applicant stated it would develop an emergency action plan during both construction and operation.²⁶

Additionally, the Applicant explained it has restart procedures and protocols after an automatic shutdown event. Specifically, automatic shutdowns due to excess vibration, ice, lightning storms, high wind and temperature events are specified in its turbine manuals. Republic Wind explains it will comply with the applicable safety procedures when restarting a turbine. Republic Wind explained that the 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. Staff recommends reporting requirements for any of these extraordinary events.

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

By letter dated October 4, 2018 and follow-up conversation, Staff received two general concerns about the Republic Wind farm from LifeFlight, a medical air ambulance company that operates in the project area. The first concern is that the wind farm would require it to climb higher to avoid the wind turbines. This concern was evaluated by the FAA during its review. The FAA in its determination of no hazard letter acknowledged the importance of life flight access to the project area, but indicated that the number of those types of flights to specific repeat locations in the project area does not constitute a significant adverse effect.

The second concern is that there will be limited/reduced landing zones within the wind farm project area. Patients requiring this air ambulance service would need to be re-routed to predesignated landing zones outside the wind farm project area. Staff's research on the subject has found that a predesignated landing zone can be a cleared field marked by safety cones or a concrete pad. The Applicant indicated that it held a round-table discussion with local emergency services and critical care transport pilots. On a site visit, the Applicant indicated that it would put local emergency and air ambulatory services in touch with the Applicant's 24-hour emergency operation center to coordinate shutdown of the turbines during medical emergencies.

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

25. Ibid, p. 62.

26. Ibid, p. 64.

also intends to provide proper equipment (R.C. 5727.75 (F)) to fire and emergency responders to enable them to respond to emergencies. Staff encourages continued coordination between critical care transport pilots, the Applicant, and local emergency services. Staff recommends that the Applicant explore constructing one predesignated landing zone within the project area to mitigate impacts to LifeFlight and other air ambulatory services.

Communications

The Applicant evaluated potential impacts from its wind farm proposal on communication systems in the project area. The Applicant expects the project to cause a slight impact to off-air television signals. Specific impacts to television reception could include interference, reduced picture quality, and signal loss.²⁷ The Applicant stated that communities and homes within 6.2 miles of the wind farm may have degraded reception of the following television stations: WGGN-TV, WMFD-TV, WOHZ-CD, WNWO-TV, WTOL, WGTE-TV, WUPW, WTVG, WBGU-TV, WJW, WEWS-TV, WKYC, CICO-DT-32, and CBET-DT. If facility operation results in impacts to existing off-air television coverage, Staff concurs with the Applicant's proposal 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, which includes a hotline. 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 0.19 mile. All AM stations are located well outside the project area, with the closest station located approximately 10 miles from the nearest proposed turbine site. No impact to AM broadcast coverage is expected.

The closest operational FM radio station, WOHF, is located approximately 0.68 mile from the nearest proposed turbine location, a distance that the Applicant expects not to degrade or interfere with WOHF'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 41 licensed microwave paths intersecting the project area. A Worst Case Fresnel Zone (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. Staff concurs with the Applicant that none of the proposed wind turbine locations would obstruct the WCFZ of the licensed microwave paths in the project area.

Staff found that turbines 4, 7, 23, 27, 32, 39, 45, and 49 are close to existing microwave communication beam paths. Staff recommends that the Applicant denote avoidance procedures of the beam paths on the construction plans, so that construction cranes are not placed in the beam paths during construction.

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

The microwave 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. To evaluate this potential, the Applicant sent a notification letter to the National Telecommunications and Information Administration (NTIA) on November 21, 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 February 15, 2019, did not identify any concerns regarding radio frequency blockage and had no issues with turbine placement in the project area. The wind farm will be in the line of sight of multiple aviation surveillance radar systems. This concern was evaluated by the FAA during its review of the aeronautical studies. In the FAA's determination of no hazard letters, the FAA determined that the wind farm project would not create a substantial adverse impact to those multiple aviation surveillance radar systems' operations at this time.

No impacts to AM or FM radio, cable television, radio frequency, or satellite systems are expected. Impacts to radar systems and television reception would be mitigated. 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 and, where no expectation of re-operation exists, 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, partial removal 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 Sandusky and Seneca County engineers 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.²⁸ Electrical collection lines that are at a depth greater than 36 inches would generally be de-energized and then abandoned in place. The Applicant intends to 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.²⁹

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 equal to the per-turbine decommissioning costs multiplied by the sum of the number of turbines constructed and under construction. 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.

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

29. Amended Application, p. 47.

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 northeastern Seneca County and southeastern Sandusky County fit the criteria well enough to invest in planning a wind power generation project. The area selected possesses adequate wind resources, adequate power transmission and transportation infrastructure, and land that is sparsely populated relative to other areas of the State and used for agriculture.

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 Republic Wind Farm in ways that would minimize potential impacts. However, as of the date of publication of this Staff Report, measures needed to assure minimization of potential adverse impacts to air navigation are uncertain.

Of the 19,000 acres of leased land, 50.5 acres would be converted into built facilities. Agricultural land accounts for approximately 98 percent of all land that would be directly 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 not significantly impact agricultural production, and could provide additional revenues and job creation in the local communities.

In order to avoid potential impacts to cultural resources within the project area, the Applicant must consult with the OHPO to finalize a cultural resources survey program. Staff has recommended a condition to assure appropriate protection of cultural resources in the project area.

The proposed facility would have several positive impacts 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.

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, the Applicant has provided a frac-out contingency plan. Construction of collection lines would require work within mapped 100-year floodplains.

The Applicant has acknowledged that operation of the facility may result in incidental taking 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. Staff recommends that the Applicant should work with the USFWS to apply for an ITP and should 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.

The Applicant is currently pursuing waivers of the minimum setback with landowners and states it understands that a turbine may not be constructed at a location which does not meet the minimum required setback unless the appropriate waivers have 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 recommended 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 and depending on the turbine model, up to 46 non-participating receptors and 31 participating receptors would be exposed to more than 30 hours of shadow flicker per year by the facility. In order to minimize adverse impacts associated with shadow flicker, Staff has recommended a condition that the Applicant be required to undertake mitigation measures for these non-participating residents so that they receive no more than 30 hours of exposure to shadow flicker.

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, radio frequency, or satellite systems are expected. There would, however likely be impacts to radar systems and off-air television reception. Staff recommends that the Applicant mitigate any potential impacts. The Applicant has stated that issues concerning radio and television interference would be handled through their proposed complaint resolution process. Interference with air navigation radar has been determined by the FAA to be minimal.

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. Staff concludes there is low potential to impact land use, cultural resources, streams, wetlands, wildlife, transportation, and communications.

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 of the report 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 Sandusky and Seneca Counties, capable of producing up to 200 MW. The proposed facility would interconnect to American Electric Power's (AEP) Fremont Center-Tiffin Center 138 kV circuit.

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 Interconnection, LLC (PJM).³⁰

PJM

The Applicant submitted its generation interconnection request for the proposed facility to PJM on November 12, 2009. PJM gave the application a queue ID of V4-010. PJM released revisions to the System Impact Study (SIS) in November 2011 and the Facilities Study in May of 2017. The Interconnection Service Agreement and Interconnection Construction Service Agreement were executed in September 2017.³¹

PJM studied the interconnection as an injection into the BPS via AEP's Fremont Center-Tiffin Center 138 kV circuit. The Applicant requested a maximum facility interconnection of 200 MW, of which 26 MW would be capacity. The capacity market ensures the adequate availability of necessary generation resources can be called upon to meet current and future demand.³²

PJM Network Impacts

PJM analyzed the bulk electric system with the proposed facility interconnected to the BPS via AEP's Fremont Center-Tiffin Center 138 kV circuit. A 2014 summer peak power flow model was

30. 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.

31. PJM Interconnection, LLC, "New Services Queue, Queue IDV4-010," accessed April 8, 2019, <http://pjm.com/planning/generation-interconnection/generation-queue-active.aspx>.

32 For wind resources, PJM Interconnection, LLC recognizes 13 percent of a wind facility's capacity in the PJM capacity market. 200 MWs * 13% = 26 MW.

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.³³

PJM REGIONAL SYSTEM IMPACTS	
Generator Deliverability - System Normal & Single Contingency Outage	
<i>Plant Output: Capacity Level – 26 MW</i>	No problems identified
Category C and D - Multiple Contingency Outages	
<i>Plant Output: Full Energy Level – 200 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 upgrades are at the discretion of the Applicant and not required. The below chart displays the overloads found.

PJM CONGESTION OF FULL ENERGY OUTPUT		
Line Overload	Contingency	Overload Level
Melmore-Fostoria Central 138 kV	No Contingency	No facility: 82.04% Facility in-service: 116.22%
	Single Contingency	Pre contingency: 65.44% Contingency: 110.13%
Melmore-Howard 138 kV	No Contingency	No facility: 83.06% Facility in-service: 150.01%
Howard-Brookside 138 kV	No Contingency	No facility: 168.42% Facility in-service: 174.47%
	Single Contingency	No facility: 145.11% Facility in-service: 150.01%

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.

33. “PJM Interconnection, LLC, “New Services Queue, Queue IDV4-010,” accessed April 8, 2019, <http://pjm.com/planning/generation-interconnection/generation-queue-active.aspx>.

AEP also conducted stability analysis on their local transmission system using a 2013 summer peak power flow model. The results revealed that during a double contingency of the Tiffin Center-Fremont Center 138kV and the Melmore-Fostoria Central 138kV lines or the Greenlawn-Melmore 138kV and Fremont Center-Tiffin Center 138kV lines there may be some instability on the system.

Conclusion

PJM analyzed the bulk electric system, with the facility interconnected to the transmission grid, for compliance with NERC reliability standards and PJM reliability criteria. No reliability standards or criteria were violated. In addition, no potential violations were found during the short circuit analysis. The SIS indicated at the full energy output of 200 MW, operational restrictions may be enforced, limiting facility output. The restrictions can be removed by completing necessary system upgrades. The upgrades are at the sole-discretion of the Applicant.

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.

During construction, 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

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

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.

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 debris or solid waste removal necessary prior to construction. Waste generated during construction would consist of metals, packing/package materials, construction debris, office waste, scrap lumber, cables, glass, 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.

During operation of the facility, the solid waste would likely consist of office waste, lube oil containers, used oil, used antifreeze, and general waste. The operation and maintenance facilities would utilize licensed 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 FAA and ODOT Office of Aviation administer regulatory programs to evaluate and authorize certain obstructions near airports and provide navigable airspace analysis.

FAA

The FAA conducts an aeronautical study process to determine whether the proposed wind farm would create a hazard to navigable airspace. The FAA authorization or analysis covers individual wind turbines, meteorological towers, use of construction cranes, and use of an aircraft detection lighting system. The FAA requires a wind farm developer to file a *Notice of Proposed Construction* (Form 7460-1) for any structure greater than 199 feet above ground level. The Applicant submitted these forms to the FAA on December 7, 2018 for all of the individual wind turbines. The tip height for the wind turbines ranges from 492 to 602 feet tall depending on the model selected. The heights for the proposed meteorological towers are 295 feet. The Applicant provided different structure identification numbers to the FAA than it provided to the OPSB.

The FAA also has policy explanation document related to wind turbines on its website, entitled *Wind Turbine FAQs (latest revision 04/02/2018)*.³⁴ This document describes the FAA obstruction evaluation/airport airspace analysis group's policies on wind turbine aeronautical study analysis.

Particularly relevant to the Republic Wind farm, in the *Wind Turbine FAQs* document at question 27, the FAA explains that objects over 500 feet require special attention. According to the FAA, "... at 500 feet or higher, your proposed structure will be in altitudes available to general aviation aircraft. A public notice may be issued to gather aeronautical information, and this includes a 30-day comment period." During this time, the FAA receives and considers public comment from the flying public and the structures' effect on aviation. At the end of the review, the FAA issues either a Determination of No Hazard (DNH) or a Notice of Presumed Hazard (NPH).

During the FAA review of the Republic Wind project, the FAA initially found that proposed wind turbines 1, 2, 3, and 10 would impact the 14 CFR Part 77.17 (a)(2) surfaces of the Sandusky County Regional Airport. The Applicant incorrectly identified these as T48, T49, T1, and T8 respectively to the FAA.

The FAA also found that thirty-three proposed wind turbines would exceed the 14 CFR Part 77.17 (a)(3) for various instrument flight rule procedures for the Seneca County and Fostoria Metropolitan Airports.³⁵

The Applicant notes that the closest private airport is the Dougherty Airport (1OH2). The private-use airport is on a parcel that is participating in the project. An aircraft would need to obtain permission prior to landing there.

34. "Wind Turbine FAQs" (latest revision April 2, 2018), accessed July 1, 2019, <https://oeaaa.faa.gov/oeaaa/external/searchAction.jsp?action=showWindTurbineFAQs>.

35. Part 77 surfaces such as approach, transitional, and horizontal surfaces are FAA defined airspaces or clearance areas around airports.

The FAA also determined that there was no significant adverse effect on aeronautical operations for aircraft that operate under visual flight rules. Crop dusting operates under visual flight rules. The FAA also found that no issues were raised during its public comment period.³⁶

On June 26, 2019, the FAA concluded its review/analysis and issued DNH letters for all 50 proposed wind turbine locations.

ODOT Office of Aviation

The ODOT Office of Aviation has access to the same aeronautical studies submitted to the FAA and often performs a simultaneous review. The ODOT Office of Aviation implements R.C. 4561.31, which is a construction permit program for structures affecting airport operations. According to the ODOT Office of Aviation, its duty is to protect Federal Aviation Regulations Part 77 surfaces (14 CFR 77) which is slightly different than the FAA analysis. For proposed major utility facilities and economically significant wind farms, participation in the Ohio Power Siting Board process, pursuant to R.C. 4561.31(E) and R.C. 4906.10(A)(5) replaces the permitting process.

Staff contacted the ODOT 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 initially provided its “preliminary, cursory, and incomplete” recommendations to address airspace navigation issues in a letter to Staff dated April 11, 2019. The ODOT Office of Aviation found that the location and height of all 50 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 107 feet. According to the ODOT Office of Aviation, “the impacts to the minimum obstacle clearance altitude or minimum vectoring altitude of various en route airways or arrival procedures, in addition to any impacts to approach or departure procedures to any public use airport, all of which are 14 C.F.R. Part 77.17(a)(3) impacts, are currently unknown.”

The ODOT Office of Aviation updated its 4561.341 letter on July 18, 2019 after receiving the FAA determinations of no hazard.

ODOT Office of Aviation advises that the location and height of wind turbine 3 impacts the non-directional beacon navigation system for a runway approach to Seneca County Airport unless it is lowered. Only the Vestas V136 turbine model, with a tip height of 492 feet, would work at this location to avoid this impact to the Seneca County Airport.

ODOT Office of Aviation found that the location and height of wind turbines 1, 2, 3, and 10 would constitute an obstruction to air navigation by exceeding the 14 CFR Part 77.17(a)(2) surface of the Sandusky County Regional Airport by significant heights. None of the turbines proposed by the Applicant can meet these height restrictions. ODOT Office of Aviation advised that this obstruction can be waived. To waive the obstruction standards, these turbines would need to comply with the FAA conditions in the DNH letter. Also, the Applicant would need to obtain acceptance/concurrence from the Sandusky County Regional Airport Authority with the impact to airspace navigation from those four turbines. This could be through a resolution or signed letter.

36. Page 10 of the FAA’s Aeronautical Study No. 2018-WTE-11673-OE dated June 26, 2019.

Lastly, the ODOT Office of Aviation found that location and height of 33 of the wind turbines would constitute an obstruction to air navigation by exceeding 14 CFR Part 77.17(a)(3) for various Instrument Flight Rule procedures for the Seneca County Airport and the Fostoria Metropolitan Airport. This would result in an increase in various instrument flight rule terminal minimum altitudes. For all the wind turbines (excluding turbines 1, 2, 3, and 10), ODOT Office of Aviation advises that compliance with the obstruction standards may be waived as long as the conditions of the FAA DNH are complied with.

Department of Defense

Military aviation training route SR-708 crosses the Republic Wind project area. An SR route, or slow speed route, is flown at or below 1,500 feet above ground level at speeds of 250 knots or less. This military aviation training routes is used by the 179th Airlift Wing of the Ohio Air National Guard. Staff found that turbines 10, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 40, and 41 are within the SR-708 military aviation training route.

The Department of Defense (DoD) siting clearinghouse has a mission compatibility evaluation process (outlined in 32 CFR Part 211) where energy developers coordinate their proposed projects with the military to prevent, minimize, or mitigate adverse impacts to military training, testing, and readiness operations. When the Applicant submitted the FAA Form 7460-1, the DoD began an evaluation of the wind farm project aeronautical studies, which included coordination with the Ohio Air National Guard and US Air Force. After its evaluation process is completed, the DoD will make recommendations to the developer and FAA.

In March 2019 the DoD representative contacted Staff by email concluding its evaluation of the wind farm project. The email stated that the proposed wind farm does not propose an unacceptable risk to national security. The DoD requested that the obstruction lighting for wind turbines in the project area be night vision (NVG) compatible. The DoD also requested APEX Clean Energy communicate any proposed future wind farm development that is south of the 41.05° North line of latitude to the 179th Airlift Wing of the Ohio Air National Guard.

Consultant Report

Staff reviewed Capitol Airspace Group's March 8, 2019 report that was prepared on behalf of the Applicant. The Capitol Airspace Group noted that turbines 1 and 3 impact an approach to the Seneca County Airport. The Capitol Airspace Group found that the Nordex N149 wind turbine model at turbine sites 4, 10, and 18 impact the Toledo Terminal Radar Approach Control and the Cleveland Air Route Traffic Control Center. Capitol Airspace Group found that the wind farm will be in the line of sight of multiple aviation surveillance radar systems. Capitol Airspace Group further indicated that approximately 43 wind turbine sites would impact multiple instrument approach procedures. These concerns were evaluated by the FAA during its review of the aeronautical studies.

Meteorological Towers

The Applicant proposed four locations for the 295 feet tall permanent meteorological towers; however, it would only build three of those locations. The proposed permanent meteorological towers do not have FAA authorization at the time of this report. Staff recommends that the Applicant not construct the permanent meteorological towers as proposed until receipt of FAA DNH letters.

Construction Cranes

Construction 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 may need to be obtained from the FAA, which would detail the height, operating conditions, and duration of the crane work.

Staff recommends that the Applicant file in this docket copies of the FAA temporary construction permits for any work activity involving construction cranes once they are received, but no later than seven days prior to crane deployment.

Conclusion

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 and Participation

The Applicant hosted two public informational meetings for this project. The first meeting was held on November 29, 2017, prior to the filing of the original application. The second meeting was held on December 11, 2018, prior to the filing of the amended application. The Applicant provided attendees at both meetings with the opportunity to view maps of the project, speak with representatives of the Applicant, and provide written comments regarding project. The Applicant provided copies of written comments received during the meetings in the amended application.³⁷

The Applicant maintains a local office in Bellevue, Ohio, and a project website at www.republicwindenergy.com, and has committed to be available to communicate with the community and public officials during construction and operation.

The Applicant has committed to implement a complaint resolution plan to investigate and resolve complaints received during construction and operation of the facility. The Applicant included a draft complaint resolution plan in its amended application and will formalize this plan with Staff prior to construction.³⁸ The Applicant stated that it will notify, by mail, affected property owners and tenants regarding the project about the project and the complaint resolution plan no later than seven days prior to the start of construction. A sample draft of this mailing is included in the amended application.³⁹ Staff recommends that a similar notice be mailed to the same addresses at least seven days prior to the start of operation.

The Applicant served copies of the complete amended application on the Seneca and Sandusky county commissioners, the Seneca and Sandusky county engineers, the Seneca Soil and Water Conservation District, Sandusky County Soil and Water, the Seneca Regional Planning Commission, the Adams, Pleasant, Reed, Scipio, and Thompson township trustees in Sandusky County, and the Green Creek and York township trustees in Sandusky County. The Applicant sent a copy of the complete application to the Tiffin-Seneca Public Library and the Birchard Public Library of Sandusky County. Copies of the complete amended application are also available for public inspection at the offices of the PUCO and on the PUCO online Docketing Information System website.

As of the filing of this report, 245 documents have been filed in the public comments of the case record for this proceeding. Public comments are often filed in groups by the PUCO Docketing Division. Therefore, an individual document may include multiple public comments. All public comments received by the Board are made available for Board members and the public to view online in the case record at <http://dis.puc.state.oh.us>.

37. Amended Application, Exhibit T.

38. Ibid, Exhibit U.

39. Ibid.

The administrative law judge will schedule a local public hearing and an adjudicatory hearing for this proceeding. The administrative law judge has granted intervention in this proceeding to multiple local residents; the Board of County Commissioners of Seneca County; the Seneca County Park District; Adams, Reed, Scipio, and York townships; the Ohio Farm Bureau; the Ohio Environmental Council; and the Environmental Defense Fund.

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.

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 10 acres or produce a minimum average gross annual income of \$2,500.

The construction, operation, and maintenance for the Republic Wind Farm would occur mainly on land currently used for agricultural purposes. According to the Applicant, 49.5 acres of farmland would be repurposed for use by the facility, and up to 537 acres of soil would be temporarily disturbed.

Wind turbines, access roads, the operations and maintenance building, 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 18 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 83 circuit miles of electric collection cable would be installed at a minimum depth of 36 inches. Most of this installation would take place either across or adjacent to agricultural fields. Installation would be by direct burial, trenching, and, to a lesser extent, directional drilling. Trenching and direct burial activities would create temporary disturbance as the 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.

The impacts of access roads and the methods to mitigate those impacts to the surrounding agricultural land is as follows. 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 stated that it 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 continue to hold meetings with participating landowners to ensure uninterrupted, efficient use of agricultural land.
- During restoration, the Applicant would de-compact any soils compacted by construction activity.

- The Applicant would coordinate with landowners to avoid long-term impacts to field irrigation systems.
- The Applicant would 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 does not plan to impact any agricultural structures during construction or operation of the facility.
- In order to restore the agricultural land to its intended use following construction, the Applicant would conduct activities including the following: restore soil, revegetate pasture, repair surface and subsurface features, clean up construction debris, and remove excess and unnecessary material.
- The Applicant would coordinate with affected landowners during the growing season following construction completion in order to identify and correct any remaining issues resulting from the project.

Recommended Findings

Staff recommends that the Board find that the impact of the proposed facility on the viability of agricultural land in an existing 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 use 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 operations and maintenance 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, 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.

This page intentionally left blank.

IV. RECOMMENDED CONDITIONS OF CERTIFICATE

Following a review of the application filed by the Republic Wind LLC, 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 provide a detailed construction project schedule within 7 days of the date of journalization of the certificate.
- (4) 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.
- (5) 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.
- (6) 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.
- (7) 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.

- (8) 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.
- (9) The Applicant shall coordinate with local building code enforcement officials with regard to the construction of any new structures, or modification of any existing structures, not directly related to the operation of the generation facility.
- (10) 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. The detailed engineering drawings of the final project design and foundation design shall include the identity of the registered professional engineer(s), structural engineer(s), or engineering firm(s), licensed to practice engineering in the state of Ohio who reviewed and approved the designs.
- (11) At least 30 days before the preconstruction conference, the Applicant shall provide Staff with a copy of a finalized complaint resolution plan that provides a procedure to address potential complaints resulting from facility construction and operation. The Applicant shall file this plan on the public docket.
- (12) At least 30 days before the preconstruction conference, the Applicant shall provide Staff with a copy of its finalized public information program that informs affected property owners and tenants, as well as anyone who has requested updates regarding the project, about the project and provides contact information of personnel who are familiar with the project, the proposed timeframe for project construction, a schedule for restoration activities, and a copy of the complaint resolution plan. The Applicant shall file this program on the public docket.
- (13) At least seven days prior to the start of construction, the Applicant shall notify via mail affected property owners and tenants who were provided notice of the public informational meeting, residences located within 1 mile of the project area, parties to this case, county commissioners, township trustees, emergency responders, airports, schools, and libraries, as well as anyone who has requested updates regarding the project. This notice will provide information about the project, contact information of personnel who are familiar with the project, the proposed timeframe for project construction, a schedule for restoration activities, and a copy of the complaint resolution plan. The Applicant shall file this notice on the public docket.

- (14) At least seven days prior to the start of facility operations, the Applicant shall notify via mail affected property owners and tenants who were provided notice of the public informational meeting, residences located within 1 mile of the project area, parties to this case, county commissioners, township trustees, emergency responders, airports, schools, and libraries, as well as anyone who has requested updates regarding the project. This notice will provide information about the start of operations, contact information of personnel who are familiar with the project, and a copy of the complaint resolution plan. The Applicant shall file this notice on the public docket.
- (15) During the construction and operation of the facility, the Applicant shall submit to Staff a complaint summary report by the fifteenth day of April, July, October, and January of each year. The report should include a list of all complaints received through the Applicant's complaint resolution plan, a description of the actions taken toward a resolution of each complaint, and a status update if the complaint has yet to be resolved.
- (16) The facility shall be operated in such a way as to assure that no more than 200 megawatts would at any time be injected into the Bulk Power System.
- (17) Prior to construction, the Applicant shall submit information to staff detailing the locations of the operations and maintenance building, concrete plant, and concrete truck clean-out pits for Staff's review.

SOCIOECONOMIC CONDITIONS

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

- (18) 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. If mitigation is not feasible, the Applicant shall submit a revised filing to the Board.
- (19) 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:

- (20) The Applicant shall not construct the collection line option which would impact wetland WOH-225.

- (21) The Applicant shall avoid all impacts to category 3 wetlands through facility design, HDD or other methods.
- (22) 30 days prior to the preconstruction conference, the Applicant shall provide Staff with a construction access plan for review. The plan would consider the location of streams, wetlands, wooded areas, and sensitive plant species, as identified by the Ohio Department of Natural Resources (ODNR) and explain how impacts to all sensitive resources would be avoided or minimized during construction.
- (23) Prior to construction, the Applicant shall provide a copy of any floodplain permit required for construction of this project, or a copy of correspondence with the floodplain administrator showing that no permit is required.
- (24) 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.
- (25) The Applicant shall contact Staff, the ODNR, and the U.S. Fish and Wildlife Service (USFWS) within 24 hours if state or federal listed species are encountered during construction, operation, or monitoring activities. Activities that could adversely impact the identified plants or animals shall be immediately halted until an appropriate course of action has been agreed upon by the Applicant, Staff and the appropriate agencies. If the Applicant encounters any listed plant or animal species prior to construction, the Applicant notify Staff of the location and how impacts would be avoided during construction.
- (26) 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 should include feathering of turbines during periods of risk to these species. Summertime feathering measures identified in the technical assistance letter for the Indiana bat, including feathering within specified distances of documented roost trees, shall also be applied to the northern long-eared bat. 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.
- (27) Turbines shall be feathered below manufacturer's cut-in speed during the summer season from May 16 through July 31, as a measure to minimize bat strikes at operating turbines.
- (28) 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 USFWS allows a different course of action.
- (29) If Staff and the ODNR, in consultation with the USFWS, determine the project results in significant adverse impact to wild animals, the ODNR and Staff will notify the

Applicant. As soon as possible and no longer than 30 days after receiving notification of the significant adverse impact, Applicant shall implement practices to rectify the significant adverse impact, which will include development and submission of a mitigation plan or adaptive management strategy to Staff and the ODNR for review to confirm compliance with this condition. Operation activities that could adversely impact the identified animals shall be modified to minimize risk until the mitigation plan or adaptive management strategy is agreed upon.

- (30) Sixty days prior to the first turbine becoming operational, the Applicant shall submit a post-construction avian and bat monitoring plan for the ODNR Division of Wildlife (DOW) and Staff review and confirmation that it complies with this condition. The Applicant's plan shall be consistent with ODNR-approved, standardized protocol, as outlined in the 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 the ODNR and Staff. The monitoring start date and reporting deadlines will be provided in the DOW approval letter.
- (31) Prior to any in-water work, the Applicant shall provide information to Staff and the ODNR indicating that no mussel impacts would occur at stream crossings. If this is not possible, then the appropriate survey(s) shall be performed in coordination with the ODNR and Staff. If mussels found in the project area cannot be avoided, as a last resort, a professional malacologist shall collect and relocate the mussels to suitable and similar habitat. All surveys, assessments, and relocation plans shall be completed in accordance with the Ohio Mussel Survey Protocol and provided to Staff and the ODNR for review to ensure compliance with this recommendation.
- (32) The Applicant shall conduct no in-water work in perennial streams from April 15 through June 30 to reduce impacts to indigenous aquatic species and their habitat.
- (33) Construction in upland sandpiper preferred nesting habitat types shall be avoided during the species' nesting period of April 15 through July 31, unless coordination with the ODNR allow a different course of action.
- (34) Construction in northern harrier preferred nesting habitat types shall be avoided during the species' nesting period of May 15 through August 1, unless coordination with the ODNR allow a different course of action.
- (35) Construction in loggerhead shrike preferred nesting habitat types shall be avoided during the species' nesting period of April 1 through August 1, unless coordination with the ODNR allow a different course of action.

- (36) Prior to construction, if impacts to wetlands or upland habitats adjacent to wetlands are proposed, the Applicant shall obtain an ODNR-approved herpetologist to conduct Blanding's turtle and spotted turtle habitat suitability surveys to determine if suitable habitat exists within the project area. If suitable habitat is determined to be present, the Applicant shall avoid impacts to this habitat by doing one of the following:
- (a) Avoid the area determined to be suitable habitat along with an appropriate buffer determined by the ODNR.
 - (b) Obtain an ODNR-approved herpetologist to conduct a presence/absence survey. If either species is determined to be present, the Applicant shall continue to coordinate with the ODNR to assure that impacts are avoided.
 - (c) Obtain an ODNR-approved herpetologist to develop and implement an avoidance/minimization plan.
- (37) Should construction be delayed beyond five years of the date of the certificate, certain wildlife surveys may be required to be updated as determined by Staff and the ODNR.
- (38) The Applicant shall conduct a pre-construction survey of the proposed project site to ensure that the Engleman's spike rush is not impacted. The Applicant shall coordinate survey efforts with the ODNR Division of Natural Areas and Preserves' Chief Botanist.
- (39) For both construction and maintenance, the Applicant shall limit, to the greatest extent possible, the use of herbicides in proximity to surface waters. Individual treatment of tall-growing woody plant species is preferred, while general, widespread use of herbicides during initial clearing or maintenance should only be used where no other options exist, and with prior approval from the Ohio EPA. Prior to commencement of construction, the Applicant shall submit a plan to Staff for review and confirmation that it complies with this condition, describing the planned herbicide use for all areas in or near any surface waters during initial project construction and/or maintenance.
- (40) The Applicant shall coordinate with the USFWS to determine the adequacy of pre-construction eagle use surveys and assure that impacts to bald eagles are minimized. If recommended by the USFWS, the Applicant shall develop and implement an Eagle Conservation Plan. The Eagle Conservation Plan shall be developed in coordination with the USFWS and in accordance with the USFWS's Eagle Conservation Plan Guidance document and 2016 Revised Eagle Take Permit Regulations (50 CFR 22). Further correspondence with USFWS shall be provided to Staff 30 days prior to turbine construction to confirm compliance with this condition.

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:

- (41) The Applicant shall notify 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, property damaged by ice throw, 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.

- (42) The Applicant shall not construct turbines 10, 38, or 43 as proposed, because these do not meet the minimum setback outlined in Ohio Adm.Code 4906-4-08(C)(2).
- (43) The Applicant shall not construct turbine 42 as proposed, because it does not meet the setback to an existing pipeline
- (44) The facility shall be operated so that the cumulative nighttime sound level at any nonparticipating sensitive receptor within one mile of the project boundary will not exceed 5 dBA over the project area ambient nighttime average sound level (Leq), except during daytime operation that is in accordance with Ohio Adm.Code 4906-4-09(F)(2).
- (45) At least 30 days prior to construction, the Applicant shall submit a shadow flicker study showing that cumulative shadow flicker impacts will not exceed 30 hours per year at any non-participating sensitive receptor.
- (46) The Applicant shall notify Staff at (866) 270-6772 or contact OPSB@puco.ohio.gov as soon as practicable, but in no event, later than 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, ice throw beyond the setback, 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.
- (47) The Applicant shall denote on the set of detailed engineering drawings of the final project design the microwave paths and procedures to avoid interference with those microwave paths by construction equipment within the 300-foot radius workspace around each turbine and specifically for turbines 4, 7, 23, 27, 32, 39, 45, and 49.
- (48) At least 30 days prior to construction, the Applicant shall submit to Staff relevant portions of the turbine manufacturer's turbine restart procedures due to vibration, ice accumulation, lightning storm, collector or feeder line failure.
- (49) At least 30 days prior to construction, the Applicant shall prepare through interested and pertinent persons, a plan for at least one predesignated emergency-response landing zone within the project area. The Applicant shall include the location of this landing zone in its emergency response plan.
- (50) 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.
- (51) 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:

- (52) 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 structures 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.
- (53) 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 permanent meteorological towers.
- (54) The Applicant shall file in this docket copies of the FAA temporary construction permits for any work activity involving construction cranes when they are received, but no later than seven days prior to crane deployment.

- (55) The Applicant shall use NVG (night vision) compatible lighting for at least turbines 10, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 40, and 41 that are within the military aviation training route.
- (56) The Applicant shall only construct a Vestas V136 with a tip height of 492 feet at turbine 3, in order to avoid interference with the non-directional beacon runway approach at Seneca County Airport.
- (57) Provide in this docket, prior to construction proof of a resolution/letter from the Sandusky County Regional Airport authority indicating that it concurs with the construction of turbines 1, 2, 3, and 10 as these turbines would otherwise exceed the 14 CFR Part 77.17(a)(2) surface of the Sandusky County Regional Airport.



**Power Siting
Board**

An Equal Opportunity Employer and Service Provider

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

180 E. Broad St.
Columbus, OH 43215-3793

This foregoing document was electronically filed with the Public Utilities

Commission of Ohio Docketing Information System on

7/25/2019 2:21:41 PM

in

Case No(s). 17-2295-EL-BGN

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