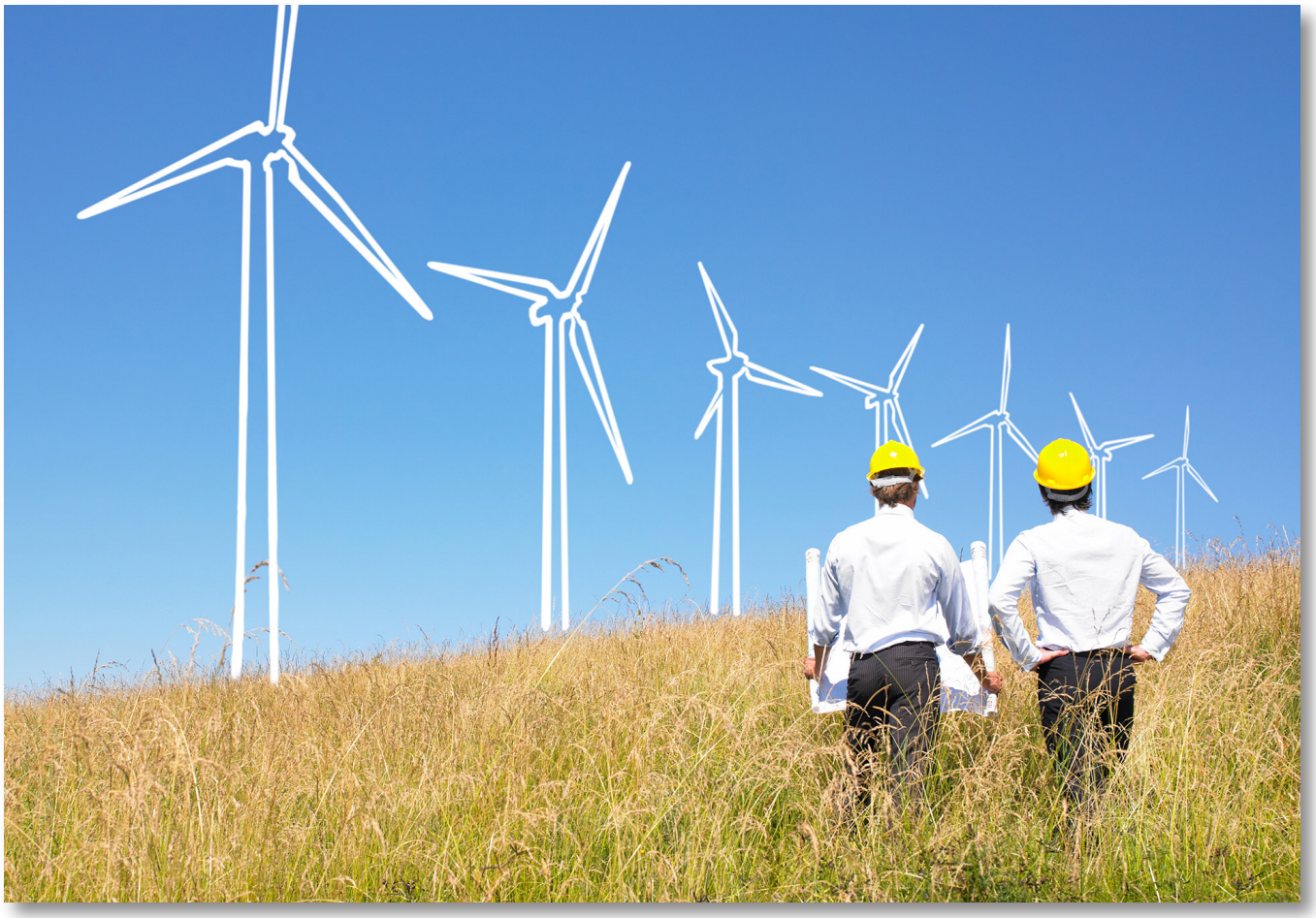
Application to the
Ohio Power Siting Board for a

Certificate of Environmental Compatibility and Public Need for the Seneca Wind Project

Case No. 18-0488-EL-BGN



Submitted by:

SENECA WIND, LLC

S·POWER
An AES and AIMCo Company

July 2018

Bricker&Eckler
ATTORNEYS AT LAW

COLUMBUS I CLEVELAND
CINCINNATI I DAYTON
MARIETTA

BRICKER & ECKLER LLP
100 South Third Street
Columbus, OH 43215-4291
MAIN: 614.227.2300
FAX: 614.227.2390

www.bricker.com
info@bricker.com

Dylan F. Borchers
614.227.4914
dborchers@bricker.com

July 16, 2018

Via Hand Delivery

Ms. Barcy McNeal
Administration/Docketing
Ohio Power Siting Board
180 East Broad Street, 11th Floor
Columbus, Ohio 43215-3793

Re: Seneca Wind, LLC
Case No. 18-488-EL-BGN

Dear Ms. McNeal:

Enclosed for filing in the above-referenced case is a copy of the Application of Seneca Wind, LLC for a Certificate of Environmental Compatibility and Public Need for a wind-powered generating facility in Seneca County, Ohio. In addition, we have provided Staff of the Ohio Power Siting Board ("Board") ten disks and five hard copies of the Application. Pursuant to Ohio Administrative Code Rule 4906-2-04(A)(3), the Applicant makes the following declarations:

Name of Applicant:	Seneca Wind, LLC whose authorized representative is Peter C. Pawlowski 2180 South 1300 East, Suite 600 Salt Lake City, UT 84106
Name/Location of Proposed Facility:	Seneca Wind, LLC Seneca County, Ohio
Authorized Representative Technical:	Peter C. Pawlowski Vice President, Wind Seneca Wind, LLC 2180 South 1300 East, Suite 600 Salt Lake City, UT 84106 Telephone: 801.679.3557 E:mail: ppawlowski@spower.com

Authorized Representative
Legal:

Dylan F. Borchers
Sally W. Bloomfield
Devin D. Parram
Bricker & Eckler LLP
100 South Third Street
Columbus, OH 43215
Telephone: (614) 227-4914; 227-2368; 227-8813
Facsimile: (614) 227-2390
E-Mail: dborchers@bricker.com
sbloomfield@bricker.com
dparram@bricker.com

Since the pre-application notification letter was filed, there have been no revisions that appear in the application.

Notarized Statement: See Attached Affidavit of Peter C. Pawlowski, on behalf of Seneca Wind, LLC

Sincerely on behalf of
SENECA WIND, LLC

Dylan F. Borchers

Enclosure

BEFORE
THE OHIO POWER SITING BOARD

In the Matter of the Application of **SENECA WIND, LLC** for a Certificate of Environmental Compatibility and Public Need for a Wind-Powered Electric Generating Facility in Seneca and Sandusky Counties, Ohio	)))))	18-488-EL-BGN

AFFIDAVIT OF PETER C. PAWLOWSKI

STATE OF UTAH :
: ss.
COUNTY OF SALT LAKE COUNTY :

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

1. I am the Vice President of Wind and an Authorized Representative of Seneca Wind, LLC ("Seneca Wind"). I am the primary individual in charge of the development of Seneca Wind.

2. I have reviewed Seneca Wind's Application to the Ohio Power Siting Board for a Certificate of Environmental Compatibility and Public Need.

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

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

Peter C. Pawlowski

Sworn to before and signed in my presence this 10th day of July 2018.

SABRINA FULLER
Notary Public
State of Utah
COMMISSION # 695614
My Commission Expires June 16, 2021

Notary Public

[SEAL]

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

ACRONYMS/ABBREVIATIONS

%	percent
µPa	micropascals
amsl	above mean sea level
ADLS	Aircraft Detection Lighting System
AEP	American Electric Power
AES	Applied Ecological Services
AEZ	alternative energy zone
BMPs	Best Management Practices
CDA	census-designated area
CEC	Civil & Environmental Consultants Inc
CMA Plan	Construction and Maintenance Access Plan
dB	decibels
dBA	A-weighted decibels
DOE	United States Department of Energy
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FTE	full-time equivalent
GE	General Electric
gen-tie	electric generation-tie
HDD	horizontal directional drilling
HHEI	Headwater Habitat Evaluation Index
HiF	high frequency bat calls
Hz	Hertz
IEC	International Electrotechnical Commission
IRAC	Interdepartmental Radio Advisory Committee
JEDI	Jobs and Economic Development Impact
JEDI Wind Model	Jobs and Economic Development Impact Land-based Wind Model
kHz	kiloHertz
Km	kilometer
kV	kilovolt
kW	kilowatt
L_{eq}	equivalent sound level
LoF	low frequency bat calls
m	Meter
mph	miles per hour
m/s	meters per second
MW	Megawatt
MWh	megawatt-hours
NAAQS	National Ambient Air Quality Standards
NFPA	National Fire Protection Association

NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NTIA	National Telecommunication and Information Administration
NWP	Nationwide Permit
O&M	operations and maintenance
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
ODOT	Ohio Department of Transportation
Ohio EPA	Ohio Environmental Protection Agency
Ohio EDA	Ohio Economic Development Association
OHPO	Ohio Historic Preservation Office
OPSB	Ohio Power Siting Board
ORAM	Ohio Rapid Assessment Method
ORC	Ohio Revised Code
OSHA	Occupational Safety and Health Administration
PE	Professional Engineer
PEM	palustrine emergent
PFO	palustrine forested
PILOT	payment in lieu of taxes
PJM	PJM Interconnection, LLC
POI	point of interconnection
PPA	Power Purchase Agreement
PPE	personal protective equipment
PSS	palustrine scrub-shrub
PTC	Production Tax Credit
PUB	palustrine unconsolidated bottom
QHEI	Qualitative Habitat Evaluation Index
rpm	revolutions per minute
RUMA	Road Use Maintenance Agreement
SCADA	system control and data acquisition
Seneca Wind	Seneca Wind LLC
sPower	sPower Development Company, LLC
SWPA	Source Water Protection Area
SWPPP	Storm Water Pollution Prevention Plan
the Project	Seneca Wind, a 212-MW wind energy facility
the Project Area	approximately 56,900 acres of private land in Seneca County
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

VMP	Vegetation Management Plan
WEST	Western EcoSystems Technology, Inc.
Wetland Survey Area	approximately 9,200 acres within the Project Area for which wetland delineation efforts were undertaken (within 100 feet of potential construction impact areas)

SENECA WIND
SUPPLEMENTAL INFORMATION

Overview

On July 16, 2018, and as amended on July 20, 2018, Seneca Wind, LLC (Seneca Wind or Project) filed its application for a certificate of environmental compatibility and public need for a wind-powered generating facility (Application). Seneca Wind hereby submits supplemental information regarding changes or updates to its Application. This supplemental information does not result in a material change in any of the potential impacts from the proposed Project, which are currently described in the Application. Further, these proposed changes do not result in a material increase in impacts related to the Project.

Attached are supplemental materials that address several updates and corrections to the Application. The following is a summary of the updates and corrections contained in this supplemental filing:

- Incorporation of the Siemens Gamesa (SG) Model 2.7-129 turbine as an alternative to the General Electric (GE) 2.5-127 turbines at the 84 locations where the GE 2.5-127 is currently proposed in the Application;
- Adjustment of the location of the proposed Project substation (and related collector line rerouting) and associated alternate location for the operations and maintenance (O&M) building;
- Landowner-suggested refinements to access roads and cranewalks;
- Correction of landowner residence status for two parcels;
- Correction of the Project's bat curtailment commitment; and
- Transmittal of the Project's 2017 Raptor Nest Report that was inadvertently omitted from the Application.

Details regarding these updates and corrections are discussed below and addressed in various attachments to this document.

Addition of Alternative Turbine Model

The Application reflects the use of two GE turbine models. The ten locations proposed as GE 2.3-116 turbines are unchanged. In the remaining 84 locations, which are proposed as GE 2.5-127 turbines in the Application, Seneca Wind will incorporate the potential for an alternative turbine model: the SG 2.7-129 turbine. Both models have been evaluated for the 84 potential turbine locations, although not all of the assessed turbine locations would be built.

The GE 2.5-127 and SG 2.7-129 turbines are very similar in dimension and profile, and the proposed hub heights are identical. Nevertheless, the Application materials including noise and shadow flicker studies have been updated to reflect relevant information and the slight differences in impacts associated with the SG 2.7-129 turbine. Note that not all graphics and figures that distinguished between the various GE models have been updated, as the differentiation was intended to identify the various hub heights of the turbines, which will not

vary between the GE 2.5-127 or the SG 2.7-129. OPSB setbacks will continue to be maintained, or appropriate waivers acquired.

Table 03-2 has been updated to incorporate applicable dimensions associated with the SG 2.7-129 turbine.

TABLE 03-2
APPROXIMATE TURBINE DIMENSIONS BY MODEL

Turbine Model	Rated Power (MW)	Hub Height	Rotor Diameter	Blade Length	Maximum Total Height[(a)]
GE 2.3-116	2.3	94 m (308 feet)	116 m (381 feet)	56.9 m (187 feet)	152 m (499 feet)
	2.3	90 m (295 feet)	116 m (381 feet)	56.9 m (187 feet)	148 m (486 feet)
	2.3	80 m (262 feet)	116 m (381feet)	56.9 m (187 feet)	138 m (453 feet)
GE 2.5-127	2.52	134 m (440 feet)	127 m (417 feet)	62.2 m (204 feet)	198 m (649 feet)
SG 2.7-129	2.75[(b)]	134 m (440 feet)	129.69 m (425.5 feet)	63.5 m (208 feet)	198.9 m (652.4 feet)

[(a)] Maximum total height is also referred to as tip height.
[(b)] Power boost to 2.9 MW is available under certain ambient wind and temperature conditions.

The noise analysis has been updated to reflect both turbine models as alternatives (see Attachment A). Under either scenario, OPSB standards will continue to be met. The flicker analysis has also been updated to reflect impacts resulting from both turbine models (see Attachment B); while the number of non-participating residences for which preliminary modeling indicates potential impacts greater than 30 hours per year increase to 27 (from the 22 identified in the Application), Seneca Wind remains committed to ensuring that all applicable residences are demonstrated to meet that OPSB shadow flicker requirement.

Seneca Wind also analyzed whether the introduction of the SG 2.7-129 turbine will result in any new impacts regarding other issues reflected in the Application; no other material changes are anticipated, as outlined below:

- Economic impacts will not change, as Project costs, workforce and purchases will remain generally the same.
- Information presented regarding air quality, water use and quality, solid waste impacts, aviation affects, geology, communications, ecological resources, land use, cultural resources, visual effect, or agricultural land will not be influenced by introduction of the SG 2.7-129 turbine, as the location and hub heights remain the same, with only a minimal difference in tip height.
- The SG 2.7-129 has similar safety features, including monitoring and double braking systems, resulting in no material change to the potential for blade shear or ice throw.

Except for those described herein, no other material differences in impact would result if the alternate SG 2.7-129 turbine were selected.

Update to Project Substation Location and Associated Infrastructure

Although a location was shown in the Application, the Project substation will be the subject of a separate filing with the OPSB. With selection of its final location, a small portion of the electrical collection system also required revision. The Application had noted that the length of 138-kilovolt electrical gen-tie would be approximately 3 miles; its length will now be approximately 1.8 miles. The Application reflected approximately 115 circuit miles of collector system; with the adjusted substation location the collector system extends approximately 127 circuit miles (even where they run in parallel). The additional length is primarily contained in a new 1.5-mile corridor. Due to the characteristics of the location for the adjusted collector line corridor and the fact that they will be installed underground, no wetland or tree clearing impacts are expected to materially change. As was the case for the routing reflected in the Application, this shifted collector line corridor will be subject to additional field confirmation.

The following revised materials are provided in Attachment C:

- Revised Figure 03-3 – Project Layout. The change reflecting the new location of the Project substation and associated electrical collection system adjustments can be found on Revised Sheet 15 of 27.
- Revised Figure 08-14 – Structures within 250 feet of a Project Component. A revision of this figure showing a 250-foot buffer around the adjusted electrical collection system, site roads, and temporary construction areas.
- Appendix O, Revised Table O-2 - Structures within 250 Feet of a Proposed Project Component. Revisions to reflect structures within the 250-foot buffer around the adjusted electrical collection system, site roads, and temporary construction areas. There are 251 structures within 250 feet of Project components, of which 129 are located on non-participating properties (the Application reflected 253 structures within this distance, 80 of which were on non-participating properties).

Access Road and Crane Path Adjustments

As referenced in Section 4906-4-08(E) of the Application, Seneca Wind is working closely with the participating landowners that will host turbines in their agricultural fields. As a result, several landowners have requested optimization of access roads to minimize potential interference with drainage tiles and/or ongoing use of the property. This has resulted in adjustments in eight general locations within the Project Area, as reflected in the Revised Figure 03-3 provided in Attachment C (on Sheets 5, 7, 9, 11, 12, 13, 15, 16, 20, 22, and 23 of 27). Revised Figure 08-14 and Revised Table O-2 also reflect these adjustments; the description above incorporates the access road and crane path adjustments in the structure totals. The total length of private access roads now proposed is approximately 38 miles (39 miles were reflected in the Application). No change in the magnitude of tree clearing has been identified. Wetland impact remain approximately 0.5 acres, as reflected in the Application. Stream crossing impacts are also similar to those reflected in the Application, with 10 stream crossings by access roads

and 8 stream crossings for temporary crane walks, as compared to the 11 stream crossings by access roads and 6 for crane walks reflected in the Application.

Correction to Landowner Status

Of the 506 properties within the Project Area reflected in the Application, two properties have been identified for which landowner status was inadvertently listed incorrectly. Property O49000790120000 and Property C13000131600000 are now designated as non-participating. Figure 03-2 (Project Area Parcel Status) has been updated to show the correct status; a Revised Sheet 7 of 11 (reflecting the change to Property C13000131600000) and Revised Sheet 8 of 11 (reflecting the change to Property O49000790120000) are provided in Attachment C.

In addition, the noise and flicker analyses noted above, have adjusted these two properties accordingly. On Property C13000131600000, a structure that was inadvertently noted as a residence has also been adjusted to be appropriately considered as a barn. The following additional revised materials are also provided in Attachment C:

- Revised Figure 08-13 – Structures within 1,500 feet of a Proposed Turbine. A revision to reflect the change in status for Property C13000131600000 as "non-participating."
- Appendix O, Revised Table O-1 Structures within 1,500 Feet of a Proposed Turbine. A revision to reflect the change in status for a portion of Property C13000131600000 to "non-participating."

Correction to Bat Curtailment Commitment

A correction is provided to the Project's proposed commitment to curtailing operation for bat protection presented in the Application. As noted in the Application, the curtailment commitment will vary seasonally. All curtailment periods apply to the time 30 minutes before sunset to 30 minutes after sunrise during temperatures above 10 degrees Celsius (the temperature clarification has been added). The Application also previously noted that, during spring and fall, the restrictions would apply to all turbines, while summer restrictions are for a more limited number of turbines.

While the Application noted that the turbines to be curtailed under certain conditions in the summer were those within a 2.5-mile buffer for documented Indiana bat roosts, a more expansive area is now proposed to be used for summer curtailment purposes:

- 5-mile buffer from Indiana bat captures;
- 3-mile buffer from a northern long-eared bat observation;
- 1.24-mile buffer from a little brown bat observation; and
- 0.9-mile buffer from a tricolored bat observation.

The Application inadvertently noted that, during the above conditions, turbines were proposed to be curtailed at wind speeds of 6.9 meters per second (m/s) or less. The Project is proposing to commit to the following restrictions under the conditions noted above:

- During spring, all turbines will be feathered when wind speed is below 3.5 m/s;

- During summer, the appropriate turbines will be feathered when wind speed is below 5.0 m/s; and
- During fall, all turbines will be feathered when wind speed is below 5.0 m/s.

Final curtailment will be determined through ongoing consultation with the Ohio Department of Natural Resources and United States Fish and Wildlife Service.

Transmittal of Raptor Nest Report

The 2017 Raptor Nest Report was inadvertently omitted from the Application and is provided as Attachment D.

Attachments

Attachment A – Updated Acoustical Assessment Report - Provided as Revised Appendix H

Attachment B – Updated Flicker Analysis - Provided as Revised Appendix J

Attachment C – Updated Application Figure and Appendix Materials - Provided in Revised Figures

- Revised Figure 03-2: Project Area Parcel Status
- Revised Figure 03-3: Project Layout
- Revised Figure 08-1a: Received Sound Levels: Wind Turbines at Critical Wind Speed (GE Scenario)
- Figure 08-1b: Received Sound Levels: Wind Turbines at Critical Wind Speed (GE/SG Scenario)
- Revised Figure 08-8a: Expected Shadow Flicker Impact Areas (GE2.5-127 Turbine Scenario)
- Figure 08-8b: Expected Shadow Flicker Impact Areas (SG2.7-129 Turbine Scenario)
- Revised Figure 08-13: Structures within 1,500 feet of a Proposed Turbine
- Revised Figure 08-14: Structures within 250 feet of a Project Component
- Revised Appendix O, - Provided as Revised Appendix O
    - Revised Table O-1 Structures within 1,500 Feet of a Proposed Turbine
    - Revised Table O-2: Structures within 250 Feet of a Proposed Project Component

Attachment D – 2017 Raptor Nest Report - Provided as Revised Appendix N-6

(Passerine Migration Surveys report inadvertently included in N-6 has been moved to Appendix N-5 as cited in the Application)

4906-4-02 Project Summary and Applicant Information

(A) SUMMARY OF THE PROPOSED PROJECT

Seneca Wind LLC (Seneca Wind) is proposing to develop, finance, build, own, and operate Seneca Wind (the Project), a new 212-megawatt (MW) wind-energy facility located in Seneca County, Ohio (Figure 02-1). The Project will consist of up to 85 wind turbine generators with a hub height of up to 134-meters (m), as well as access roads, electrical collector cables, a Project substation and 138-kilovolt (kV) electric generation tie (gen-tie) line, laydown yards for construction staging, an operations and maintenance (O&M) facility, and up to four permanent 134-m meteorological towers. The energy generated by the Project will deliver power to a single point of interconnection (POI) at the American Electric Power (AEP) Ohio Transmission Company, Inc.'s existing Melmore Substation. The substation and 138-kV gen-tie line will be the subject of a separate filing with the Ohio Power Siting Board (OPSB).

(1) General Purpose of the Project

The Project will help meet electricity demand in the region, particularly in light of the recent and planned retirements of existing coal-fired generating assets located in Ohio and throughout the PJM Interconnection, LLC (PJM) system.[1] The Project will utilize Ohio's natural wind resources to deliver clean, renewable energy to the existing electricity grid to meet the needs of Ohio's electric customers.

(2) Project Description

The Project will be located within approximately 56,900 acres of private land in Seneca County (the Project Area), predominantly on existing farm land (Figure 02-2).

[1] PJM is the regional independent transmission organization that coordinates movement of wholesale electricity in all or part of 13 states (including Ohio) and the District of Columbia. Its name results from its origin serving Pennsylvania (P), New Jersey (J), and Maryland (M).

Areas of wooded vegetation, local roadways, and residential development also occur throughout the Project Area. Within the Project Area, Seneca Wind has 100 percent site control for the Project. Participating landowners compose approximately 43 percent of the Project Area and, as described in Section 4906-4-06(F), Seneca Wind is active in communicating with the entire community, including non-participating landowners.

The Project's PJM interconnect application specifies a total electricity generation of up to 200 MW; the nameplate capacity of the Project would total 212 MW. The Project will consist of up to 85 wind turbine generators; two different models will be installed:

- General Electric (GE) Model 2.3-116 turbines will be installed in up to 10 locations, as shown in Figure 02-2. These turbines were purchased under Safe Harbor provisions to reserve Production Tax Credit (PTC) status for the Project. The turbines will have a 116-m rotor diameter and have a 2.3-MW nameplate capacity. Hub height for most of the Model 2.3-116 will be 94 m; two of the locations will incorporate shorter towers (one 90 m and one 80 m) to avoid interference with air navigation.
- The remaining turbines (as shown in Figure 02-2) will be GE Model 2.5-127 turbines. Hub height of the GE 2.5-127 turbines will generally be 134 m, with a 127-m rotor diameter, and a 2.52-MW nameplate capacity. It is possible that 112-m towers may be used for a few select turbines to address location-specific issues.

A total of nine alternate turbine locations are also addressed in this Application and reflected in the turbines shown on Figure 02-2. The 94 locations give Seneca Wind siting

flexibility and an ability to maintain its nameplate capacity, even if certain proposed locations become infeasible.

Underground electrical interconnections at 34.5 kV will be used to transmit generated electricity from the turbines to the Project substation (as shown on Figure 02-2). From there, a 138-kV gen-tie line will transmit the Project's power to the POI at the Melmore Substation As previously noted, the Project's substation and the 138-kV gen-tie line will be the subject of a separate filing with the OPSB.

The Project is expected to operate with an annual capacity factor of 43 to 46 percent, generating a total of 805,000 megawatt-hours (MWh) of electricity each year.

Additional details for the Project are provided in Section 4906-4-03(B)(2) of this Application.

(3) Site Suitability

The Project site selection process, as it affirms site suitability, is described in greater detail in Section 4906-4-04. As outlined in that section, Seneca Wind's market knowledge identified this region of northwestern Ohio as one where not only do planned shutdowns of existing coal-fired capacity create a need for power, but where wind resource to support a commercial wind energy facility was sufficient.

The general location of the Project was selected based on consideration of a range of key characteristics that are required for a successful wind energy facility. Once the general location was selected, additional scrutiny of a range of issues was undertaken prior to initiating the engineering and environmental activities necessary for completion of the OPSB Application.

Key characteristics of the proposed Project Area that makes it suitable for Project development are outlined in Table 02-1.

TABLE 02-1
PROJECT AREA CHARACTERISTICS

Key Attribute	Project Area Characteristics
Wind Resource Suitability	Initial screening and on-site measurements confirmed that the Project Area has an adequate wind resource.
Access to Transmission	The existing 138-kV electric transmission system within the Project Area provides adequate access both from a physical standpoint and in terms of its ability to accept the Project's power.
Land Lease Participants	Seneca Wind has obtained land lease agreements from sufficient participating landowners to support the Project.
Community Receptivity	Local and state stakeholders have been engaged, and participating landowners have entered into agreements.
Site Accessibility	The Project Area is served by an existing network of public roads.
Appropriate Geotechnical Conditions	Significant geological constraints for Project construction are not anticipated.
Limited Residential Density	The Project Area has a population density that allows for adequate Project space for consideration of issues such as setbacks, sound levels, and shadow flicker.
Compatible Land Use	The Project Area is predominantly agricultural land; this use can be continued with the Project in place.
Limited Sensitive Environmental Resources	The Project is not expected to result in significant adverse impacts to ecological resources.

(4) Project Schedule

The Project schedule is based on the submission of this Application in July 2018, the issuance of the OPSB certificate by December 2018, and the commencement of construction in the second quarter of 2019. Commercial operation is planned for the fourth quarter of 2019.

Any delay in the issuance of the OPSB certificate would have a significant negative commercial impact on the Project's planned operations and would jeopardize the Project's ability to meet the terms of its power purchase agreement (PPA).

(B) ADDITIONAL INFORMATION

(1) Description of Future Plans/Plans for Future Additions

No additional generating units are planned within the Project Area in direct association with this Project; generation output will be limited to 200 MW. Seneca Wind will be open to considering acquiring leases with additional landowners and could consider an additional Project in the future. Should this be the case, a new Application would be filed, as applicable.

(2) Applicant Information

Seneca Wind LLC is a Delaware limited liability company and a wholly owned subsidiary of sPower Development Company, LLC (sPower). sPower is an independent renewable energy company based in Salt Lake City, Utah. sPower currently owns and operates approximately 150 solar and wind projects across the United States generating 1.3 gigawatts of clean energy.

4906-4-03 Project Description and Schedule

(A) DETAILED DESCRIPTION OF THE PROJECT AREA

(1) Project Map

Figure 03-1 identifies: the proposed Project Area; proposed turbine locations; major population centers and administrative boundaries; major transportation routes and electric transmission corridors; named rivers, streams, and other bodies of water; and major institutions, parks, and recreational areas within a 2-mile radius of the Project Area.

(2) Project Area

The approximately 56,900-acre Project Area includes a total of approximately 25,691 acres that reflect participating landowners (as shown in Figure 03-2, along with other Project features). This acreage represents a total of 506 properties. The Project, however, will occupy a much smaller footprint. Table 03-1 presents the estimated area of disturbance for various Project components, based upon Seneca Wind's experience in the construction and operation of other wind energy facilities. These assumptions, which reflect average values that may sometimes be slightly more and sometimes slightly less, form the basis of impact assessments presented in the Application.

TABLE 03-1
PROJECT IMPACT ASSUMPTIONS

Project Components	Typical Area of Vegetation Clearing	Area of Total Soil Disturbance (temporary plus permanent)	Area of Permanent Disturbance (development areas/structures)
Turbine Site (per turbine)	300-foot radius	300-foot radius*	0.05 acre; 25-foot radius, which includes some graded area beyond the gravel
Access Roads (per linear foot of road)	40-foot wide	40-foot wide	16-foot wide

Project Components	Typical Area of Vegetation Clearing	Area of Total Soil Disturbance (temporary plus permanent)	Area of Permanent Disturbance (development areas/structures)
Crane paths (per linear foot where outside other disturbance areas)	60-foot width	60-foot width	None
Electrical Collection System (per linear foot of cable)	20-foot wide	20-foot wide	None**
O&M Building and Storage Yard	5 acres	5 acres	5 acres
Laydown Areas (3 areas, approximately 10 acres each)	30 acres	30 acres	None
Meteorological Towers (per tower)	1 acre	0.03 acre	0.002 acre

*Includes crane pad.
**If aboveground collector lines are used, a minor displacement would be associated with the poles.

(B) PROPOSED PROJECT DESCRIPTION

The following sections describe key aspects of the proposed Project. Figure 03-3 illustrates the Project layout.

(1) Project Details

(a) Type and Number of Turbines

Each wind turbine consists of three major components: the tower, the nacelle, and the rotor. The nacelle sits on top of the tower, and the rotor hub is mounted to the front of the nacelle. Hub height, the height of the center of the rotor, is measured from the base of the tower (excluding the subsurface foundation). Total turbine height is the height of the entire turbine, as measured from the tower base to the tip of the highest blade when rotated to the highest position. The 85 turbines that will be used for the Project are:

- Ten GE Model 2.3-116s, as shown in Figure 03-3. Most turbines will have 94-m hub heights, one turbine will have an 80-m hub height, and

another will have a 90-m hub height. All will have a 116-m rotor diameter, and a 2.3-MW nameplate capacity.

- The remaining turbines (as shown in Figure 03-3) will be GE Model 2.5-127 turbines. Turbine hub height will be 134 m, with a 127-m rotor diameter with a 2.52- MW nameplate capacity. It is possible that 112-m hub height towers will be used for a select few turbines to respond to location-specific issues.

A total of nine alternate locations are addressed in this Application. The alternates give Seneca Wind flexibility to select the most appropriate locations for the Project turbines.

The Project is expected to operate with an annual capacity factor of 43 to 46 percent, generating a total of 805,000 MWh of electricity each year.

(b) Description of Turbine

Table 03-2 presents the dimensions in meters and feet for the two turbine models (and height variations) that will be incorporated into the Project.

TABLE 03-2
APPROXIMATE TURBINE DIMENSIONS BY MODEL

Turbine Model	Rated Power (MW)	Hub Height	Rotor Diameter	Blade Length	Maximum Total Height[(a)]
GE 2.3-116	2.3	94 m (308 feet)	116 m (381feet)	56.9 m (187 feet)	152 m (499 feet)
	2.3	90 m (295 feet)	116 m (381 feet)	56.9 m (187 feet)	148 m (486 feet)
	2.3	80 m (262 feet)	116 m (381feet)	56.9 m (187 feet)	138 m (453 feet)
GE 2.5-127	2.52	134 m (440 feet)	127 m (417 feet)	62.2 m (204 feet)	198 m (649 feet)

[(a)] Maximum total height is also referred to as tip height.

(c) Fuel Quantity and Quality

This section is not applicable, as no fuel other than wind will be used to generate electricity from the Project.

(d) Pollutant Emissions

This section is not applicable, as no emissions result from generation of electricity using wind turbine technology.

(e) Water Volume Requirement

This section is not applicable, as no water is used or discharged from generation of electricity using wind turbine technology. The only water use and discharge will be sanitary uses at the Project's O&M building.

(2) Description of Construction Method and Project Components

Information about key Project components is provided below, including a discussion of general construction and reclamation methods; materials, colors and textures of surfaces; and dimensions.

(a) Turbines

The wind turbine installation will commence once internal access roads have been established. Foundation construction will occur in phases, depending upon the specific type of foundation to be used, and potentially includes: hole excavation; outer form setting; rebar and bolt cage assembly; casting and finishing of the concrete; removal of the forms; backfilling and compacting; and site restoration.

Foundation work will be conducted in a manner that minimizes the size and duration of disruption due to excavated areas. Generally, a circular area with a

radius of up to 300 feet around the foundation will be temporarily disturbed, although this area can vary based on specific location constraints. Initial activity will include establishing any necessary erosion controls and then removing the vegetative cover, as necessary. The topsoil will then be removed; because all Project turbines will be located in agricultural land, the topsoil will be stockpiled for replacement once the foundation is complete.

The foundation hole will then be dug by an excavator, with excavated subsoil and rock separated from topsoil. Preliminary geotechnical studies, as further discussed in Section 4906-4-08(A)(5)(c), indicate the need for blasting is unlikely. If necessary, dewatering of foundation holes will pump the water to a discharge point (with no direct discharge occurring to streams or wetlands), using Best Management Practices (BMPs) to decrease water velocity and trap suspended sediment.

Although final foundation design in each given location will not be known until completion of additional geotechnical evaluation, the two likely options are spread footing foundations and rock-anchored pile foundations. Materials removed from the hole will be used to backfill around and over the foundation. The top of the foundation will be a nominal 18-foot-diameter pedestal that typically extends 6 to 8 inches above grade and is surrounded by a 10-foot radius gravel apron. In addition, at the base of each tower, a level, compacted stone crane pad will be developed (approximately 100 feet by 60 feet), included in the 300-foot radius expected for turbine construction.

The following wind turbine models will be used for the Project: GE 2.3-116 and GE 2.5-127. Each wind turbine would result in an operational footprint of approximately 0.05 acre, and consist of three major components: the tower sections; the nacelle; and the rotor with blades, as discussed further below:

- Tower – The towers used for megawatt-scale turbines are tubular conical steel structures manufactured in multiple sections. Each tower will have a locked access door in the base section and internal lighting, as well as an internal ladder and/or mechanical lifts for access to the nacelle. The towers will be painted white or off-white in accordance with Federal Aviation Administration (FAA) regulations designed to make the structures more visible to aircraft when viewed from above. Although the white coloring increases visibility when viewed from above against the darker colored backdrop of the ground, the color minimizes visibility by ground-level viewers against the pale background of the sky.
- Nacelle – The primary mechanical components of the wind turbine are within the nacelle: the drive train; gearbox; and generator. The nacelle is housed within a steel-reinforced fiberglass shell that allows for adequate ventilation to cool internal machinery, protect internal machinery from the environment, and reduce sound. The nacelle is mounted on a yaw ring bearing that allows it to rotate, or yaw, into the wind to maximize wind capture and energy production. The nacelle is equipped with an external anemometer and a wind vane that signals

wind speed and direction information to an electronic controller. Aviation warning lights will be attached to the top of the nacelles, as determined through consultation with FAA and based on the specific turbine model; if approved by the FAA, Seneca Wind will incorporate an Aircraft Detection Lighting System (ADLS) in order to reduce nighttime lighting potential to only that necessary for aviation safety.

- Rotor – A rotor assembly is mounted to the nacelle, designed to operate upwind of the tower. Each rotor consists of three composite blades that will be up to 62.2 m (204 feet) in length, with a maximum rotor diameter of up to 127 m (417 feet). The rotor attaches the drive train at the front of the nacelle. Hydraulic motors within the rotor hub "feather" each blade according to wind conditions, enabling the turbine to operate efficiently at varying wind speeds. The rotor spins at varying speeds to operate more efficiently. Depending on the model, the Project's wind turbines are expected to begin generating energy at wind speeds as low as 3 meters per second (m/s) (6.7 miles per hour [mph]) and cut out at a maximum wind speed of 25 m/s (55.9 mph). Rotor speed will be in the range of 8 to 15.7 revolutions per minute (rpm).

The hub height, turbine height, rotor diameter, and blade length will vary for each turbine model, as listed in Table 03-2. The maximum total turbine height is 198 m (649 feet), associated with the GE 2.5-127 on a 134-m tall tower.

Other components of the turbines include hubs (the center portion of the rotor assembly), cabling, control panels, and internal facilities such as lighting, ladders, etc.

All turbine components will be delivered on transport trucks, with the main components typically off-loaded at the individual turbine locations (or, under certain circumstances, to the laydown yards). Turbine erection is performed in multiple stages, including setting the bus cabinet and ground control panels in the foundation; erection of the tower sections; erection of the nacelle; assembly and erection of the rotor; connection and termination of the internal cables; and inspection and testing of the electrical system prior to energization.

Turbine assembly and erection involves the use of large track-mounted cranes, smaller rough terrain cranes, boom trucks, and rough terrain fork-lifts for loading and off-loading materials. The tower sections, rotor components, and nacelle for each turbine will be delivered to each location by specialized trailers and unloaded by crane. A large erection crane will set the tower segments on the foundation, place the nacelle on top of the tower, and – following ground assembly – place the rotor onto the nacelle. The erection equipment will move from one tower to another along Project access roads or temporary crane paths. The rotor blades are installed simultaneously as a complete rotor.

(b) Storage Facilities

While the Project is under construction, fuel used by the construction equipment will be stored within appropriate containment in the laydown yards. Wind turbines generate electricity without the use of fuel or water, and without

generating waste. As such, the Project does not include any significant facilities for fuel, waste, water, or other storage, although the O&M building will store lubricants and other fluids used in turbine maintenance.

(c) Processing Facilities

Wind turbines generate electricity without the use of fuel or water, and without generating waste; therefore, no associated processing facilities are proposed.

(d) Water Supply and Discharge

The O&M building will be similar to a small business office, and will use potable water anticipated to be supplied by a local groundwater well. Sanitary wastes will be discharged using a septic system. No other Project components will use measurable quantities of water or wastewater.

(e) Associated Electric Transmission Lines

An approximately 3-mile long 138-kV gen-tie line will carry power from the Project to the existing Melmore Substation; the gen-tie line and Project substation will be the subject of a separate filing with the OPSB.

(f) Electric Collection Lines

The wind turbine transformer will "step-up" the voltage of electricity produced by the turbine to the 34.5-kV voltage level of the collection system. From the transformer, cables will join the collection circuit and turbine communication cables to form the electrical collection system (as shown in Figure 03-3). The majority of these will be underground, although above-ground poles (anticipated to wood or steel poles approximately 40 feet tall, similar to the electrical distribution

lines that extend through the Project Area) may be used in certain locations, if necessary to minimize wetland impact. The underground collection cables will be buried to a minimum depth of 36 inches below the ground surface.

As shown in Figure 03-3, the collection cables will join the individual turbines to the collection substation. The total length of buried 34.5-kV collection lines providing electricity from the turbines to the Project substation will be approximately 115 circuit miles (note that some will overlap). These extend across privately-owned land leased by Seneca Wind, and along public rights-of-way, as necessary. Although the most direct and least impact route possible has been incorporated into the layout, avoiding features such as existing subsurface drainage tiles could result in adjustments to the routing.

For the most part, a trencher will be used to bury the collection lines. The trencher uses a large blade or "saw" to excavate a trench of approximately 24 to 35 inches wide, sidecasting materials immediately adjacent to the trench. The cable will be installed between 36 and 48 inches deep. Using this method minimizes the need for clearing and surface disturbance. With all required equipment, a temporary disturbance width of approximately 20 feet is anticipated along the installation corridor.

Where a trencher cannot be used (e.g., in areas with unstable slopes, excessive unconsolidated rock, standing or flowing water, and/or suspected drainage tiles), installation will be in an open trench. Open trench installation is generally performed with a backhoe resulting in a trench of approximately 18 inches wide and 48 inches deep prior to backfill. However, an overall temporary

disturbance area of 20 feet in width is assumed to be the average, to allow for equipment movement and placement of spoil piles. Spoil material will be replaced immediately after installation of the collection lines. Subgrade soil will be replaced around the cable, and topsoil will be replaced at the surface. Any damaged tile lines will be repaired, and all areas adjacent to the open trench will be restored to approximate original grades and surface conditions. Stabilization and restoration will be via seeding and mulching of exposed soils, or other appropriate farming methods in active agricultural fields.

Where wetland and stream impacts will be avoided, horizontal directional drill (HDD) techniques will be used and/or collector line segments will be installed aboveground on approximately 40-foot wood or steel poles.

In agricultural areas, all topsoil within the work area will be stripped and segregated from the excavated subsoil.

(g) Ancillary Facilities

The Project substation will be located at approximately 4820 Route 67 in Tiffin (as shown on Figure 03-3). It will be accessed using a gravel driveway from Route 67, located between the intersections of Route 67/Township Road 0165 and Route 67/County Road 16. After construction, the Project substation will take up 5 acres at the site. The Project substation will step up voltage from 34.5 kV to 138 kV so it can be delivered to the POI via the Project gen-tie line. The 138-kV gen-tie line and associated substation will be addressed in a separate filing with the OPSB. The Project substation will include dead-end structures, circuit breakers, air

break switches, metering units, relaying, communication equipment, and a control house.

(h) Meteorological Towers

Four 134 m (440-foot) tall permanent meteorological wind measurement towers will be installed to collect wind data and support performance testing for the Project. The galvanized steel towers will be equipped with wind velocity direction measuring instruments at three different elevations; aviation warning lighting will be mounted at the top. Each tower will be self-supporting (non-guyed). Potential locations for the meteorological towers are shown in Figure 03-03.

(i) Roads

The Project will require new or improved roads for access to the turbines and other ancillary features, as shown in Figure 03-3. The total length of private access roads proposed is approximately 39 miles. The roads will be gravel, and 16 feet in finished width unless local conditions dictate otherwise. To the extent practicable, the Project will use existing roads and farm roads. These will be upgraded, as necessary, for use.

Where an existing road is not available, road construction will involve topsoil stripping and grubbing of stumps, as necessary. The stripped topsoil will be stockpiled along the road corridor for use in site restoration. Grubbed stumps will be removed, chipped, or buried. Following this initial preparation, the subsoil will be graded, compacted, and surfaced with gravel or crushed stone. The depth of stone will be determined for each individual location, as well as the need for

installation of geotextile fabric below the stone for additional support. Materials will be from local suppliers, to the extent practicable.

As noted above, the roads will be not greater than 16 feet wide; however, occasional wider pull-offs will be integrated into the design to accommodate passing vehicles and temporary earthen shoulders will remain through the construction period to accommodate crane travel. During this construction use, the total width is estimated to be a maximum of 40 feet. Where work is occurring through agricultural fields, activities will be restricted to this temporary road area and other specifically-designated work areas. Once construction is complete, the temporary use areas will be restored, including removal of any excess materials and restoration of contours to approximate pre-construction conditions.

(j) Construction Laydown Areas

Project construction will use construction staging areas, also known as laydown areas, for temporary storage of Project equipment and materials. The following three approximately 10-acre laydown areas are proposed to be located on leased property (as shown on Figure 03-3): a laydown area located on Cooper Road (Route 77); a laydown area located across Route 67 from the Project substation; and a laydown area located off of Township Road 81.

The laydown areas will accommodate material and equipment storage, construction worker parking, and trailers for use as construction offices. No lighting is proposed within the laydown areas, although it could be added as needed should safety or vandalism issues be identified.

(k) Security

An O&M building and associated storage yard (shown on Figure 03-03) will be used for operating personnel offices and parking, as well as storage of equipment and materials. The O&M building will be locked during all times when it is not staffed, and the storage yard will be fenced. Each turbine location will have 'no trespassing' signs posted, and the access door to each turbine will remain locked at all times when not in use by Seneca Wind or its authorized contractors.

(l) Other Installations

No other installations have been identified.

(3) Description of New Transmission Facilities

System interconnection studies have been completed, and a draft Interconnection Agreement has been negotiated with PJM for 200 MW. This reflects a POI at the existing Melmore Substation.

In order to provide the electricity generated by the Project to the POI, the Project will step up voltage from 34.5 kV to 138 kV so it can be delivered to the POI substation via the Project gen-tie line. The 138-kV gen-tie line and associated Project substation will be addressed in a separate filing with the OPSB. The substation will include dead-end structures, circuit breakers, air break switches, metering units, relaying, communication equipment, and a control house.

(4) Map of Project Site

Figure 03-3 illustrates the proposed Project on an aerial photograph overlain with the Project layout, showing surrounding road names, property lines and major features of the proposed Project.

(C) DETAILED PROJECT SCHEDULE

(1) Schedule

The Project schedule is shown in Figure 03-4. The planning stages for the Project have been underway since 2009, by a previous developer. The Project was acquired by sPower in the fall of 2017. Since that time, Seneca Wind has been actively working with local landowners and evaluating potential layout refinements. The goal is initiation of construction in the second quarter of 2019, to allow electricity to be provided to the electric grid by the fourth quarter of 2019.

(2) Construction Sequence

Initial construction activities will commence following certification by the OPSB and receipt of other environmental permits. The construction sequence is generally anticipated to be:

- Implementation of any necessary tree clearing within the appropriate season – Should it be necessary to advance these activities, clearing may be conducted during the winter season, with stumping delayed until full construction has commenced.
- Installation of appropriate BMPs to control erosion and sedimentation around work areas – The Project will develop a detailed Stormwater Pollution Prevention Plan (SWPPP) as a part of applying for coverage under the National Pollutant Discharge Elimination System (NPDES) General Construction Permit. This will identify measures planned for use that will protect water quality and provide for ground surface stabilization prior to removal of the BMPs. Measures are anticipated to include silt fence, hay bales, filter socks,

and/or temporary sedimentation basins, and will be tailored to address each specific setting within which work will occur. The SWPPP will include provisions for a qualified individual to inspect the BMPs throughout the construction process to affirm they are functioning as intended and to modify the plans, as appropriate to conditions.

- Grading and establishment of the field construction office and laydown yards – Preparation of work spaces will be completed (as addressed in Table 03-1), including any appropriate clearing or grading, installation of appropriate temporary stabilization measures, and establishment of construction trailers.
- Site preparation and construction of access roads, crane pads, and turn-around areas – Preparation of work spaces will be completed (as addressed in Table 03-1), including any appropriate clearing or grading, installation of appropriate temporary stabilization measures. Note that preparation of work areas will progress in advance of other installation areas and that, once the locations intended to be served by a given set of work spaces are completed, restoration activities may progress before the entire construction effort is complete.
- Construction of turbine foundations – This work will be conducted in each individual turbine location as described in Section 4906-4-03(B)(2).
- Grading for the substation area – The gen-tie line and related substation are not required at the commencement of construction, but will be required to be in place to support commercial operation. Therefore, this particular site preparation activity would occur partway through the construction schedule.
- Assembling and erection of the wind turbines;

- Construction and installation of the substations;
- Installation of the electrical collection system;
- Project commissioning and energization;
- Final grading and drainage – Graded areas will be smoothed, compacted, freed from irregular surface changes, and sloped to drain. Final earth grade adjacent to equipment and buildings will be below the finished floor slab and sloped away from the building to maintain proper drainage. Grading will integrate with the general topography and use adjacent properties, rights-of-way, setbacks, and easements.
- Restoration activities – As construction is completed, temporary disturbance areas will be restored and returned to approximate pre-construction contours. This will include removal of excess road materials, decompaction, as appropriate, and stabilizing exposed soils through seeding, mulching, or other plantings.

(3) Delays

A delay in the schedule before the beginning of construction would jeopardize the Project's ability to meet its PPA commitment.

4906-4-04 Project Area Selection and Site Design

(A) SITE SELECTION PROCESS

Seneca Wind's parent company has extensive experience understanding energy markets and areas of potential energy demand, as well as assessing suitability for locations of wind energy facilities. In this instance, Seneca Wind has acquired a Project location that had undergone initial development activities by others. However, in consideration of the acquisition process, Seneca Wind applied its typical considerations to affirm the Project selection was well supported.

(1) Description of Study Area

The particular region within which the Project is located was initially selected as a focus area due to a combination of need for additional electricity and strong availability of wind resources. Within Ohio generally, and within this area of Ohio in particular, current and future closures of several thousand megawatts of aging coal-fired generating facilities have created the need for that generation capacity to be replaced. In addition, the northeastern region of Ohio is the location of some of the strongest wind resources in the state, as shown on the Wind Resource Map of Ohio (Figure 04-1). Given the suitable and stable wind resource evident in the Seneca County area, Seneca County was identified as an appropriate target area for considering a wind energy project.

Selection of a study area was also informed through consideration of the existing electric transmission system and the general land use character, as a wind energy facility needs the ability to interconnect with the bulk power transmission system and also needs land area upon which to site turbines in a manner that is compatible with existing land uses. With significant transmission infrastructure located throughout the area, and existing land

use characterized by agricultural properties with substantial open spaces, a study area focused on Seneca County was confirmed.

(2) Maps of Evaluated Alternate Sites

Although Seneca Wind's parent company is constantly investigating the potential for energy facilities throughout the United States, Ohio was a particular target. As noted above, evaluation of potential locations within northwestern Ohio quickly focused on an available project in Seneca County. The focus for placement of turbines, and definition of a Project Area, was on properties with existing land agreements and the immediate surroundings, as shown in Figure 03-2. This area was determined to have the most favorable balance of attributes required for a wind energy project, as discussed further below.

(3) Siting Criteria

Careful site evaluation was undertaken to determine suitability for the proposed Project. In addition to the need for new generation, Seneca Wind considered the following criteria in selecting and evaluating the Project study area:

- Strong wind resource;
- Proximity of robust electrical interconnection;
- Willing land participants and host communities;
- Site accessibility;
- Appropriate geotechnical conditions;
- Compatible land use; and
- Limited environmental constraints.

(4) Process for Identifying the Proposed Site

As one of the leading developers of renewable energy projects in the United States, sPower not only develops its own projects but routinely seeks opportunities to acquire projects from other developers. The Project was first considered by sPower in the spring of 2017 during discussions with a development partner. The Project and its study area were then subjected to an evaluation in accordance with sPower's minimum siting criteria. The Interconnection Agreement already negotiated with PJM was a positive factor in supporting the selection of the Project by sPower, given its schedule.

sPower then acquired Seneca Wind LLC and the development rights for the Project, and initiated more detailed outreach to participating and potential participating landowners as well as other detailed assessments to review characteristics of the Project study area.

(5) Factors in Selecting the Proposed Site

The evaluation of the Project study area in accordance with Seneca Wind's key site selection characteristics identified that the Project was extremely suitable for its intended purpose, as further outlined below.

- Strong wind resource – Seneca Wind determined through an initial screening process using the statewide wind resource map that this area of Ohio has stable, strong winds. This was further evaluated and confirmed based upon existing meteorological data available from the prior developer of the Project.
- Proximity of robust electrical interconnection – Existing transmission infrastructure is located that extends through the Project study area. Based upon the Project Facilities Study conducted by PJM and AEP, this infrastructure was

determined to have the capacity to accept a 200-MW injection of electricity at a reasonable cost and with minimal upgrades needed.

- Willing land participants and host communities – Seneca Wind acquired land agreements with owners of contiguous and proximate parcels, and has subsequently engaged in additional communication to affirm the willingness of the land participants and community to host the Project.
- Site accessibility – The Project Area is served by a network of public roads that will facilitate construction deliveries, as well as O&M activities. Located approximately 45 miles southeast of Toledo and approximately 22 miles south-southwest of Sandusky, the Project Area is traversed by Highway 224 in an east-west orientation. Proximate highways include the Interstate 80/90, 14 miles north of the Project Area; Interstate 75, approximately 25 miles west of the Project Area; and Interstate 71, approximately 28 miles southeast of the Project Area. Other roads that cross the Project Area include Ohio-4, Ohio-19, Ohio-67, and Ohio-100.
- Appropriate geotechnical conditions – Based upon mapped resource data and limited information provided by the original developers, Seneca Wind determined that significant geotechnical constraints to the Project are not expected.
- Compatible land use – The Project Area and surrounding communities have a low population density compared to statewide estimates. Areas with limited residential development generally have more available space for siting wind turbines once constraints such as setbacks to account for adequate distance for

noise and shadow flicker are accommodated. The Project Area is predominantly rural agricultural use, which is compatible with wind energy facilities.

- Limited environmental constraints – Available resource mapping did not indicate substantial areas of wetland or other sensitive resources that could not be avoided.

(B) PROJECT LAYOUT DESIGN

With the results of the evaluation described above confirming the Project Area as favorable for the proposed Project, Seneca Wind continued with the more detailed environmental and other studies, as well as Project engineering design, to support the OPSB Application for the Project.

(1) Constraint Map

Figure 04-2 provides constraint mapping completed as part of the critical issues assessment for the Project.

(2) Project Layout Criterion

As illustrated in Figure 04-2, known features on the Project Area and in the surrounding area were considered when designing the Project layout, as well as other key factors. Elements considered in the Project layout included: wind resource constraints; turbine vendor and model; landowner considerations; avoidance of existing infrastructure, wetland and stream constraints; special-status species considerations; agricultural constraints; noise constraints; shadow flicker constraints; and other land use constraints. Numerous iterations of the Project layout were considered to optimize the layout as presented in the Application. Each element of the layout process is further discussed below.

- Wind resource constraints – A complex wind resource analysis was undertaken to optimize the turbine layout and assess the energy yield estimate. Locating turbines where the highest wind resource is available with the lowest wake loss influence between turbines requires considerable balancing within the context of other Project Area factors. Micro-scale modeling tools used inputs from meteorological monitoring and high-resolution terrain/roughness/land cover data from a digital terrain model.
- Turbine vendor and model – The turbine vendor, GE, was chosen so that the Project owner could utilize safe-harbor machines, thereby giving the Project 100 percent PTC qualifications. There is generally a trade-off between 2- and 3-MW turbine platforms with regard to energy production. Larger turbines (both in size and power output) are helpful to reduce the necessary number of pad locations, thereby reducing a project's footprint. However, larger turbines require larger setbacks from residences, roads, and other infrastructure. Additionally, two 3-MW turbines will also generally produce less energy than three 2-MW turbines. To fit within the complicated constraints of the Project Area, mostly 2.5-MW turbines were chosen. However, 134-m towers will be used, where possible, to increase turbine energy output.
- Landowner considerations – In addition to avoiding site features of importance to the individual landowners and allowing for efficient continued use of the surrounding land, this involves field review to identify appropriate factors, including separation distances.

- Wetland and stream constraints – Impact to wetlands and streams have been avoided by the layout to the greatest extent possible. Where impacts are necessary, alternatives have been considered to determine that the impact is unavoidable, and measures incorporated to reduce the impact to the greatest extent possible.
- Special-status species considerations – Locations of state- and federal-listed species, as well as nesting birds, were avoided to the greatest extent practicable. Where impacts are unavoidable, Seneca Wind has worked with United States Fish and Wildlife Service (USFWS) and Ohio Department of Natural Resources (ODNR) to minimize and mitigate impacts.
- Agricultural constraints – Agriculture is the dominant land use within the Project Area. A major layout goal has been maximizing the opportunity to continue agricultural use of active agricultural land. This has involved the landowner consultations, noted above, as well as specific consideration to placement of features and avoidance of impact to existing agricultural structures. Although the construction period will involve some more significant disruption of agricultural land uses, once the Project is in place its footprint will be small, it will be compatible with ongoing agricultural use, and will provide additional income for the farmers that will supplement their ongoing agricultural activities.
- Noise constraints – As layouts were identified, anticipated operational noise was considered in turbine placement to maximize compatibility with nearby non-participating residences.

- Shadow flicker constraints – As layouts were identified, anticipated effects associated with shadow flicker were considered in the placement of turbines.
- Other land use constraints – In addition to the issues discussed above, other land use factors considered in developing the Project layout included: minimizing the need for tree clearing; avoiding impacts to existing aviation facilities; and consideration of any other land use factors important to the local community.

(3) Comments Received

A public informational meeting was held on April 17, 2018. A total of 244 attendees provided contact information, and Seneca Wind estimates more than 300 people attended the meeting. Information displayed at the meeting is presented in Appendix A, along with blank copies of the sign-in and comment sheets utilized.

Written comments were received from 23 individuals. The majority of the comments related to the Project's impacts, focusing on environmental and health effects, as well as economic impacts. Comments were also made regarding details of the Project location and alternatives to the Project. Some comments simply expressed an opinion on the Project. The substantive comments received have been addressed in the Application in the appropriate sections.

Seneca Wind will continue to coordinate with local residents and officials throughout all phases of the Project.

4906-4-05 Electric Grid Interconnection

(A) INTERCONNECTION TO THE REGIONAL ELECTRIC POWER SYSTEM

The Project will deliver power to the electrical grid via interconnection with a 138-kV circuit located at the Melmore Substation. The substation location is shown in Figure 03-3.

The Project will utilize 34.5-kV electrical collector lines to connect the turbines to the collector substation, which will step up the voltage to 138 kV. An approximately 3-mile 138-kV electrical gen-tie line will connect the collector substation to the Melmore Substation.

Tie-in to the regional grid will be the responsibility of AEP, and final design of the proposed electrical interconnection will depend on guidance from AEP.

(B) INTERCONNECTION REQUEST

The Project was assigned queue positions of U4-028 and U4-029. System interconnection studies have been completed with PJM for 200 MW with the input of AEP and PJM. The PJM Facilities Study was completed in 2016 (Appendix B).

4906-4-06 Economic Impact and Public Interaction

(A) OWNERSHIP

Seneca Wind will develop, construct, own, and operate the proposed Project. Seneca Wind has land agreement options for the various parcels incorporated in the Project Area that will be executed prior to construction of the Project. Seneca Wind will own all the equipment, structures, and on-site improvements associated with the Project, with the exception of the direct connection and transmission system upgrade work performed by AEP as identified in the Facilities Study. The work space and temporary use areas identified for use during construction (totaling 768 acres) will be used under landowner agreements, but restored and returned to the existing landowners once construction is complete.

(B) CAPITAL AND INTANGIBLE COSTS

(1) Estimated Capital and Intangible Costs

Table 06-1 presents cost information using generally acceptable accounting principles accounting format. As noted, costs could range between approximately $275,000,000 and $300,000,000 ($1,297/kilowatts [kW] and $1,415/kW).

TABLE 06-1
ESTIMATED CAPITAL AND INTANGIBLE COSTS

Description	Cost ($1,000)
Turbine Costs (including transportation)	175,000
Construction and electrical materials	60,000
Labor Cost	30,000
Project Development Costs	15,000
Total (~ $1,320.75/kW)	**280,000**

(2) Capital Cost Comparison

Installed project costs compiled by the United States Department of Energy (DOE) National Renewable Energy Laboratory (NREL) in August 2017 indicate that the capital costs of the Project are consistent with recent industry trends. The NREL data show that capacity-weighted average installed costs in 2016 averaged roughly $1,509 per kW. This represents a decrease of approximately 33 percent from the average cost of installed projects reflected for 2009 and 2010. Early indications from a sample of projects currently under construction indicate that the capacity-weighted average will remain similar to those reflected for 2016.

(3) Present Worth and Annualized Capital Costs for Alternates

No Project configuration alternates are presently being considered and, thus, no comparison can be developed.

(C) OPERATION AND MAINTENANCE EXPENSES

(1) Estimated Annual Operation and Maintenance Expenses

Seneca Wind estimates that the fixed and variable annual O&M expense for the Project's partial calendar year in operation (2019) will be approximately $373,333. Commercial operation is currently expected to occur in December 2019, so that expenses for that year reflect only one months of operation. In 2020, the Project's first entire calendar year in operation, the estimated O&M expense will be $4,480,000. These costs include ongoing expenses related to environmental monitoring, property taxes, land royalties, reverse power, and insurance.

(2) Operation and Maintenance Expenses Comparison

O&M costs are a significant component of the overall cost of wind energy projects, but can vary widely between facilities. The Berkeley National Laboratory has compiled O&M cost data for 159 installed wind power facilities in the United States, totaling 13,120 MW of capacity, with commercial operation dates from 1982 through 2015. Considerable variability is noted. Capacity-weighted O&M costs for projects constructed in the 1980s are $69/kW-year, while projects installed in the 1990s reflect $57/kW-year, in the 2000s reflect $28/kW-year, and since 2010 reflect $27/kW-year. Therefore, in general, it appears that facilities installed more recently have lower O&M costs (Wiser and Bolinger 2017). This is likely due to coverage of more recent projects under manufacturer warranties (and the cost of the warranty may be accounted for elsewhere). It is also possible that, as wind energy technology improves, greater reliability and less O&M cost has resulted.

Based on the Project's O&M costs identified above, the estimated costs would be approximately $22.24/kW-year, depending on where the Project is in its life cycle. These costs are similar to O&M costs at other wind energy facilities operated by affiliates of Seneca Wind, which ranged from approximately $27 to $29/kW-year for smaller facilities.

(3) Present Worth and Annualized Operation and Maintenance Expenses for Alternates

Seneca Wind is not considering any alternate O&M regime or Project technology configurations at this time.

(D) COST OF DELAYS

A delay in Project schedule during the permitting process would have the potential to increase costs both in association with the time value of money and with potential increased equipment costs associated with delayed ordering. This is estimated to be about $500,000 per

month. If the delay were to occur during construction, the cost would include lost construction days and costs associated with idle crews and equipment. This is estimated to be approximately $1,000,000 per month.

A delay in either place in the schedule could influence the Project's ability to meet a delivery deadline under the PPA; monthly penalties could result on the order of $500,000. Prorating these delay costs monthly would not be meaningful, as the lost opportunity would be substantial but triggered at a single deadline that does not accrue over time.

(E) ECONOMIC IMPACT

The proposed Project is expected to generate local and statewide economic benefits. The following sections provide an overview of potential construction- and operation-related economic impacts including estimated payroll, employment, tax revenues, and regional economic benefits. These estimates were developed using Project-specific information and the NREL's Jobs and Economic Development Impact (JEDI) Land-based Wind Model (JEDI Wind Model). Economic impacts and the JEDI Wind Model are discussed further in the economic impact study prepared for this Project (Appendix C).

(1) Estimated Construction and Operation Payroll

Project construction is proposed for 2019, with construction activities expected to extend from the second quarter through the fourth quarter. Based on the results of the JEDI Wind Model analysis, construction of the Project is estimated to result in on-site employment of 121 full-time equivalent (FTE) positions that will be filled by Ohio

residents, with an estimated total of $8.9 million in payroll earnings.[2] These earnings are one-time payments expected to occur during 2019.

The results of the JEDI Wind Model indicate that the Project's O&M will result in 11 FTE positions on-site with combined estimated earnings of approximately $600,000. These payroll earnings are annual estimates that will continue for the life of the Project. The identified O&M positions are all expected to be filled by Ohio residents. Estimated construction and operation payroll is discussed in more detail in Appendix C.

(2) Estimated Construction and Operation Employment

Project construction is expected to take place in 2019, with construction activities expected to extend from the second quarter through the fourth quarter. Based on similar project experience, Seneca Wind estimates that Project construction will directly employ from 175 to 250 workers on-site, including construction workers, engineers, electricians, equipment operators, and a number of other contractors and service providers.

The JEDI Wind Model analysis estimates that Project construction will result in on-site employment of 121 FTE positions that will be filled by Ohio residents. On-site jobs expected to be filled by Ohio workers include an estimated 99 jobs associated with site work, foundations, electrical work, tower erection, and other associated labor needed to construct the Project. In addition, an estimated 22 construction-related service positions will be filled by Ohio workers. Jobs falling under the category of construction-related services include civil and electrical engineers, attorneys, and permitting specialists. Workers with more specialized skills, such as turbine assemblers, crane operators, and high

[2] One FTE job equates to one full-time job for one year or 2,080-hour units of labor. Part-time or temporary jobs constitute a fraction of a job. For example, if an engineer works just 3 months on a construction project, that would be considered one-quarter of an FTE job. FTEs are also sometimes referred to as job-years.

voltage electrical workers have greater potential to come from outside the state, remaining only for the duration of their employment.

The results of the JEDI Wind Model indicate that the Project's O&M will provide direct employment for 11 FTE workers, all of whom will reside in Ohio. This is an annual employment estimate that will continue for the life of the Project. Construction and operation employment is discussed in more detail in Appendix C.

(3) Estimated Increase in Local Revenue

Wind energy projects in the State of Ohio can be exempted from tangible personal property and real property tax payments if they meet certain conditions (as discussed in Appendix C). Seneca Wind anticipates that it will meet these conditions and, instead, make annual payments in lieu of taxes (PILOT) in accordance with Ohio Revised Code (ORC) 5727.75. Under this scenario, annual PILOT payments are determined based on the size of the Project and the share of the construction workforce normally resident in the State of Ohio.

The conditions that need to be met include the county commissioners of a county in which the energy project is located either adopting a resolution approving the application submitted to the Ohio Development Services Agency or passing a resolution declaring the county an alternative energy zone (AEZ). Under ORC 5727.75, county commissioners may also require an additional service payment, with a combined service and PILOT payment not to exceed $9,000 per MW.

The Board of Seneca County Commissioners adopted a resolution designating Seneca County as an AEZ in October 2011, with the owner or lessee of a qualified energy project that is exempted from taxes and assessments required to make annual PILOT and

service payments to the Seneca County Treasurer (Seneca County Commissioners' Office 2011). The resolution further states that the combined PILOT and service payment shall be equal to $9,000 for each MW of nameplate capacity.

Seneca Wind anticipates that it will make payments in lieu of real and personal property taxes in accordance with the applicable statute (ORC 5727.75) and the Board of Seneca County Commissioners' 2011 resolution (Seneca County Commissioners' Office 2011), with the Project estimated to generate $1.91 million in PILOT and related service payments during its first year of operation, and each year thereafter.

(4) Estimated Economic Impact

Construction and operation of the proposed Project will have a substantial positive effect on local commercial and industrial activities. The largest share of the overall construction cost is the purchase and transportation of the equipment (turbines, blades, and towers) to the Project site. Expenditures related to this construction component are expected to occur outside the State of Ohio. Balance-of-plant and development and other costs are two other broad categories of costs that would have the potential to occur in-state. Balance-of-plant activities assessed in the JEDI Wind Model include materials, labor, and development and other costs. The materials portion includes concrete, rebar and other construction materials, as well as the electrical components and cabling required to prepare the site and connect the turbines. The labor component includes the site work, foundations, electrical, erection, and other associated labor needed to construct the Project. Development and other costs include legal fees, engineering, site certificates, and other miscellaneous expenditures. Shares of these expenditures are expected to be made locally,

within Seneca County and elsewhere in Ohio. This local spending will generate economic activity and support jobs and income elsewhere in the local and regional economies.

The Project will also provide direct operation-related employment and Project-related operations expenditures will generate economic benefits in the local economy. Typical local operation-related expenditures include vehicle-related expenditures, such as fuel costs, site maintenance, replacement parts and equipment, and miscellaneous supplies.

Potential regional economic impacts of Project construction and operation were evaluated using the JEDI Wind Model. The results of this analysis are presented in Appendix C and may be summarized as follows:

- Project construction will result in on-site employment of 121 FTE positions that will be filled by Ohio residents, including an estimated 99 FTE jobs associated with site work, foundations, electrical work, tower erection, and other associated labor needed to construct the plant, as well as an estimated 22 construction-related service jobs.

- Construction of the Project will also support employment, income, and output elsewhere in the state, with turbine and supply chain impacts expected to support 479 jobs in Ohio and induced impacts expected to support an additional 195 jobs. Overall, construction of the Project is expected to support 795 total jobs in Ohio and approximately $47 million in earnings, with total economic output of approximately $133 million.

- Once operational, the Project will employ a total of 11 workers, all of whom will reside in Ohio. Project O&M will also support employment, earnings, and

output elsewhere in the state, with local revenue and supply chain impacts expected to support 14 jobs in Ohio and induced impacts expected to support an additional 14 jobs. Overall, operation of the Project is expected to support 39 total jobs in Ohio and approximately $2.4 million in earnings, with total output of approximately $7.8 million. These annual average impacts are expected to occur over the life of Project operation.

(F) RESPONSIBILITY TO THE PUBLIC

(1) Public Information Program

Work within the community has been on-going since 2009 by the previous developers and since December 2017 by Seneca Wind, including meetings with the local political leadership as well as potential participating landowners. A local office will open to be a place for residents to learn more about the Project, ask questions, voice concerns and sign documents, as needed.

Seneca Wind's planned public interaction included mailing letters and Project boundary maps to residents, tenants, and elected officials; issuing a public notice and a news release to the local media; creating a website; and hosting a public informational open house on April 17, 2018. Additional meetings have been held with individual and participating landowners. Copies of informational materials available at the public open house are included in Appendix A. Additional materials provided subsequent to the public open house are also provided in Appendix A, including a letter providing additional Project information, and several newspaper ads about the Project and its impacts, some of which have been published and others that are scheduled to be published. During the construction

of the Project, Seneca Wind will maintain Project updates via postings on its website at *www.senecawind.com*.

The procedures outlined in the Complaint Resolution Program (provided in Appendix D) will be implemented during the construction of the Project. Notification to affected parties will be provided at least seven days prior to the start of construction. All complaints will be addressed in a timely manner, with information sought to identify and address the root cause, as appropriate. Once the Project is operational, the Complaint Resolution Program will be updated accordingly and will continue to be used.

From construction and on into operations, the Project can be a focal point for on-the-job education, internships, workshops, and seminars regarding renewable energy. Seneca Wind is working with local school officials to establish a partnership between the Project and local/regional education system.

(2) Liability Compensation Plans

Seneca Wind will carry significant amounts of liability insurance. The Project will be covered under Seneca Wind's liability insurance programs for general commercial liability insurance and automobile liability insurance during the construction and operation of the Project.

(3) Impact to Roads and Bridges

Seneca Wind is committed to repair and restore any roads, bridges or culverts that become damaged by the Project's construction. Seneca Wind also expects to enter into a Road Use Maintenance Agreement (RUMA) with Seneca County that will detail specifics of planned roadway use and any necessary upgrades prior to Project construction based upon existing infrastructure conditions.

The Transportation Management Plan provided in Appendix E identifies preliminary transportation routes anticipated to be used for delivery of Project components to the Project Area, evaluates the existing characteristics of the roadways and bridges, and identifies limitations anticipated to require mitigation measures.

The Project will use portions of state, county, and township roads for component deliveries and general construction traffic to the Project Area. Secondary access roads to be utilized include: U.S. Highway 224; State Route 162; State Route 4; State Route 19; and State Route 67. The existing conditions of these secondary roads are satisfactory for component delivery, and will require no proposed improvements other than temporary turning radius modifications and new temporary/permanent Project entrances at various locations, as further described in Appendix E. Tertiary roads such as County Routes (36, 16, 43, 6, 58) and Township Routes (197, 12, 104, 81, 8, 79, 77, 106, 173, 58, 44) will require various upgrades including, but not limited to: road widening; vertical geometry improvements; upgrading/replacing various bridges or culverts; radius modifications; temporary/permanent access points; and profile modifications at railroad crossings. Both secondary and tertiary road routes will require raising electric lines that cross the roads and/or utility pole relocation and other temporary measures (e.g., tree trimming, sign relocation).

As further details are developed, more detailed reports will be submitted to the Seneca County Engineer and the Ohio Department of Transportation (ODOT) District Engineer for review, and appropriate measures will be identified. The plan will accommodate:

- Construction/delivery vehicles – Standard construction equipment will be used for concrete, gravel, excavation equipment, and construction workers to travel to each turbine location throughout the construction process.
- Turbine delivery vehicles – Delivery of the wind turbine components will be via oversized flatbed trucks with multiple axles. These vehicles will have unique lengths, widths, heights, and weights, and their clearance distance and turning radius requirements will also vary. Some temporary road improvements are likely to be required to accommodate these special deliveries. Expected deliveries and vehicle characteristics are:
    - Blade sections will be transported on trailers with one to three blades per vehicle. The length of the blades would determine the length of the vehicle and the radius of curves that can be navigated. The vehicles will have articulating (manual, or self-steering) rear axles to assist with maneuverability through curves.
    - Tower sections are typically transported with one section per vehicle, depending on the supplier. Design vehicle length is typically standard, but the vertical clearance requirements may vary by turbine type.
    - The turbine nacelle, hub and related elements are typically the heaviest components and may require special weight consideration.
    - Escort vehicles will be smaller trucks with signs and banners that will travel immediately in front and/or behind the various oversized loads to warn motorists

The final delivery route and assessment of transportation needs will be provided to the Seneca County Engineer and other applicable highway authorities once developed. It is currently anticipated that delivery of turbine components to the Project Area will be from the northeast via Interstate 80/90 to State Route 4 or from the northwest via Interstate 75 to US Route 224.

It is expected that oversized construction vehicles may cause minor delays on public roads in the Project vicinity, but the relatively low traffic volume throughout the area is anticipated to minimize the effect. The greatest transportation-related impact is anticipated to be associated with infrastructure improvements needed for oversized vehicles. Temporary turn-outs may be installed to minimize interruptions to existing traffic flow, and widening of some turns maybe also be required. Overhead utility line relocations are anticipated for some areas, and culvert and/or bridge reinforcement may be necessary where heavy vehicle deliveries will occur. All such improvements will be reviewed and approved by applicable authorities and will be reflected in the RUMA and final Transportation Management Plan.

Police officers, escorts, and/or other flaggers will be used to accompany vehicles that require movements such as crossing into opposing lanes of traffic. Other mitigation measures anticipated for specific circumstances are outlined below and will be later documented in detail as part of the Special Hauling Permit requirements.

- Insufficient roadway width – Measures could include: road widening; re-routing over-width vehicles to wider roadways.

- Insufficient vertical clearance – Measures could include: temporary or permanent relocation of overhead utility lines and poles; rerouting over-height vehicles to roadways with sufficient vertical clearance.
- Insufficient cover over drainage structures – Measures could include: adding temporary gravel; reinforcing structures with bracing; using bridge jumpers to clear structures; structure replacement prior to construction; repair or replacement after construction, if damage results; re-routing heavy-loaded vehicles to avoid structures.
- Poor structure condition – Measures could include: repair prior to construction; replacement during or after construction, if damaged; using bridge jumpers to clear structures; re-routing heavy-loaded vehicles to avoid structures.
- Inadequate bridge capacity – Measures could include: using bridge jumpers to clear bridges; reinforcing bridge with additional longitudinal or lateral support beams; replacing bridge component with insufficient capacity; rerouting heavy-loaded vehicles to avoid bridges.
- Insufficient Roadway Geometry – Measures could include: enhancing turning radii at intersections where necessary (which could involve clearing and grubbing, grading, extension or relocation of drainage features, utility relocations, and construction of suitable roadway surface); rerouting over-sized vehicles to avoid insufficient roadway geometry; profile adjustments.

Prior to construction, the selected roadways will be video-documented to establish existing conditions. A second video will be made after construction for review with county authorities or other applicable jurisdictions. Should any damage result, Seneca Wind will

return all roadways to their pre-construction condition, as will be documented in the RUMA and through any other applicable permitting processes.

Based on preliminary information evaluated and on current delivery vehicle assumptions, sufficient infrastructure exists to transport Project components to the Project Area, although various upgrades are likely to be required (as discussed in Appendix E).

Once in operation, the permanent staff required to operate and maintain the Project is not expected to exceed 11 employees. In addition, manufacturer technicians will visit the Project to evaluate and repair turbine components on a periodic basis. This additional, minor volume on the existing transportation infrastructure is not expected to result in a noticeable impact.

(4) Transportation Permits

Prior to construction, the selected transportation provider will obtain all necessary permits from the ODOT, Seneca County, and any affected townships. It is anticipated that permits will be required for oversized loads, new permanent access points, temporary intersection and entrance improvements, and improving existing roadways. All upgrades that may be required to accommodate construction vehicles will be identified as part of the RUMA and the final Traffic Management Plan. To the extent public roads are damaged in association with construction, Seneca Wind will restore the roadway to its original conditions, as will be specified in the RUMA and applicable permit conditions.

A Special Hauling Permit is required for vehicles and/or loads that exceed the legal maximum dimensions or weights specified by the ODOT; each vehicle transporting such loads will be required to obtain an individual permit from each jurisdiction owning a road

used for transport. The specifications of the Special Hauling Permit will depend on the characteristics of the vehicle, its cargo, and the duration of the delivery schedule.

In addition to coordination with transportation authorities for permits, Seneca Wind will consult about the need for any temporary or permanent road closures, lane closures, road access restrictions, and/or traffic control necessary during construction or operation of the Project. Public safety and minimization of impacts to the local residents are of paramount concern and are a special focus of Project planning and design.

All such issues will be addressed in greater detail in the final Transportation Management Plan.

(5) Plan for Decommissioning

The Project is expected to be in place and providing efficient energy throughout its operating life, which is expected to be 30 years, and perhaps longer with replacement or repowering.

A Decommissioning Plan will be submitted at least 30 days prior to the Project's preconstruction conference. The Decommissioning Plan will be updated every 5 years from the commencement of construction. An independent, registered Professional Engineer (PE) will be retained to estimate the decommissioning costs at least 7 days before the preconstruction conference, and every 5 years following commencement of construction. This effort will be used to determine the funds to be posted in a performance bond. The bond will be updated every 5 years following the estimate by the PE.

During decommissioning, equipment to be removed will be evaluated by a professional to determine the extent to which individual components or materials can be recycled or reused in another location. Once all useful equipment and material is salvaged,

other aboveground structures to be removed will be demolished and disposed of in accordance with federal and state law. Belowground features that are installed at depths of less than 36 inches will be removed, with any infrastructure at greater depths abandoned in place. Appropriate dust control and other measures will be utilized to protect air quality and minimize the potential for offsite impacts. At the time the Project is no longer planned for operation, Seneca Wind will work closely with individual landowners to remove the equipment no longer required. As may be requested by the landowner, certain features (roads, foundations, buildings, etc.) may remain in place to the extent allowable for safety or in compliance with other legal requirements.

During decommissioning activities, BMPs such as silt fencing or silt socks will be employed to prevent inadvertent erosion and sedimentation or impact to surface waters or wetlands. Once all equipment to be removed is no longer present, disturbed areas will be re-graded to approximate original grades and soil stabilization measures suitable to the remaining features will be employed (e.g., seeding).

Should environmental impacts be anticipated from removal of Project features, appropriate state and/or federal approvals will be obtained prior to the impact for which approval would be required.

Additional discussion regarding decommissioning can be found in Section 4906-4-09(I).

4906-4-07 Air, Water, Solid Waste, and Aviation Regulations

(A) COMPLIANCE WITH APPLICABLE REGULATIONS

This section provides an assessment of the environmental effects, specifically relating to air quality, water quality and waste generation/disposal associated with the proposed Project.

(B) AIR QUALITY

(1) Preconstruction

(a) Ambient Air Quality

The Ohio Environmental Protection Agency (Ohio EPA) collects air quality data (ambient air pollutant concentrations) at monitoring locations throughout Ohio. No violations of the National Ambient Air Quality Standards (NAAQS) have been reported and Seneca County is designated as attainment or unclassifiable with the NAAQS. Local air quality is predominantly influenced by farm operations, vehicle traffic, quarrying, and manufacturing.

Vehicle traffic produces engine exhaust and fugitive dust from roads. Farming equipment also produces engine exhaust and fugitive dust emissions from exposed agricultural soils. Certain farming practices such as manure spreading and pesticide application also produce emissions with associated odors that may impact air quality. The largest emission sources in the vicinity of the Project are Carmeuse Lime, Inc. - Maple Grove Operations, a limestone and aggregate mine (located 6 miles to the northwest) and Church and Dwight Co. Inc., which produces consumer chemicals in Old Fort (approximately 12 miles to the north of the Project). Several manufacturing facilities are located in Fostoria, approximately 15 miles to the east of the Project, including Intermetro Industries Corporation, which manufactures

plastic containers and shelving; Autolite, which produces spark plugs; Poet Biorefining, which produces bioethanol; and Morgan Advanced Materials, which produces carbon-graphite products.

(b) Pollution Control Equipment

Wind turbines generate electricity without releasing emissions and, therefore, no air pollution control equipment is required for the Project.

(c) State and Federal Performance Standards

Wind turbines generate electricity without releasing emissions; therefore, federal and state programs applicable to emissions sources do not apply. Seneca Wind will control fugitive dust using BMPs, as described in Section 4906-4-07(B)(2).

(d) Required Permits

No air permit is required for the Project.

(e) Air Monitoring Stations and Major Source Mapping

Air monitoring stations and major source mapping are not applicable to wind farms.

(f) Compliance Plans

Wind turbines generate electricity without generating emissions and an air permit is not required for the Project. However, fugitive dust can be generated during construction; therefore, Seneca Wind will control fugitive dust using BMPs as described in Section 4906-4-07(B)(2).

(2) Construction

Construction equipment is required for clearing, grading, excavation, and structure erection. Construction impacts on air quality will be minor emissions associated with

construction equipment operation and fugitive dust emissions. Construction equipment (gasoline- and diesel-powered engines) will emit minor amounts of volatile organic compounds, sulfur dioxide, carbon monoxide, nitrogen oxides, and particulate matter. These contaminants are not expected to cause significant impacts beyond the immediate work area. Dust control measures will include minimizing disturbances and restoring or stabilizing exposed or disturbed areas. Stabilization measures on unpaved roads could include applying water or a dust suppressant such as calcium carbonate. For laydown yards, temporary paving or gravel surfacing may be utilized. Any unanticipated construction-related dust will be addressed as it is identified.

(3) Operation

(a) Description of Air Monitoring Plans

Air monitoring plans are not applicable to wind farms.

(b) Estimated Air Concentration Isopleths

Air concentration isopleths are not applicable to wind farms.

(c) Potential Failure of Air Pollution Control Equipment

Air pollution control equipment is not applicable to wind farms.

(C) WATER QUALITY

The Project's water and wastewater requirements are limited to sanitary use associated with its O&M building. Potable water is anticipated to be provided by a groundwater well, and sanitary wastewater will be disposed via a septic system. Other considerations for water quality pertain to stormwater management, and any Water Quality Certification review necessary in association with unavoidable wetland impact and associated permitting. Details for the various Project phases are provided in the sections below.

(1) Preconstruction

(a) Required Permits

Prior to construction, the Project will obtain coverage under the general NPDES permit for stormwater discharges associated with construction (Ohio EPA's Construction General Permit #OHC000004). It is anticipated that wetland impacts will be qualified to receive coverage under the United States Army Corps of Engineers (USACE) Nationwide Permit (NWP) program, and that no individual Water Quality Certification will be required (as it will, instead, be integrated into the NWP). A septic system permit will be obtained from Ohio EPA prior to installation and use.

(b) Location of Survey Data Sources

No new surface sources will be utilized by the Project, and its well will be similar to a residential installation; therefore, no monitoring or gauging stations have been used to collect preconstruction survey data. Standard engineering design and BMPs will be utilized to minimize impacts associated with on-site stormwater, septic discharge, and well use. Stormwater and wastewater flows will have no discernible effect on surface or groundwater quality.

(c) Description of Data Sampling Stations and Reporting Procedures

Since there are no monitoring stations, this section is not applicable.

(d) Water Quality of Receiving Stream

The Project will not discharge into streams or water bodies. This section is, therefore, not applicable.

(e) Water Discharge Permit Information

No water discharge permitting is required prior to construction, other than confirmation of coverage under the Ohio EPA construction general permit.

(2) Construction

(a) Location of Monitoring Equipment

Stormwater runoff and dewatering are the only discharges associated with the Project during construction. The Project will hire an independent contractor to provide portable sanitary waste units during construction. Therefore, no monitoring or gauging stations will be utilized during construction.

(b) Aquatic Discharges

Discharges that would influence aquatic resources are not anticipated to occur during Project construction. Stormwater flows, and any dewatering discharge, will be treated using appropriate velocity dissipation and sediment control measures.

(c) Mitigation Plans

The use of BMPs in accordance with federal and state requirements will ensure that erosion and sedimentation will be minimized during construction, and that stormwater from the Project will not cause off-site impacts.

BMPs for dewatering will include use of a sump pit to trap and filter water for pumping to a suitable discharge point. Clean pumped water will be discharged to a level spreader, riprap energy dissipater, or vegetated/stabilized area to prevent scouring of the receiving area. A filter bag or other sediment trapping device will

be used prior to discharge; no discharges will occur directly to a water body, stream, or wetland.

The Project may utilize HDD to avoid crossing major streams and areas of environmental concern (as further discussed in Section 4906-4-08(B)(2)). HDD is a trenchless technology allowing utility and conduit installation using a drill rig. The technology evolved from the oil fields to be used in the utility industry. HDD has been widely used in the linear infrastructure installation industry by specialty contractors. It is most often used to bypass natural obstacles such as rivers, lakes, and swamps with linear utilities drilled underneath the water body. Man-made structures such as roads, railroads, and buildings can also be traversed using HDD.

(d) Changes in Flow Patterns and Erosion

It is anticipated that existing drainage patterns will generally be maintained, with no significant changes in flow patterns anticipated. The Project's additional impervious surfaces will be limited to a total of approximately 97.8 acres within the approximately 56,900-acre the Project Area. The Project's impervious surfaces are associated with tower bases, access roads, and substation, and total approximately 0.17 percent of the Project Area.

(e) Description of Monitoring Equipment

Since no water discharges are anticipated to occur in association with Project construction, with the exception of stormwater runoff and dewatering, no monitoring stations are proposed.

(3) Operation

(a) Location of Monitoring Equipment

No monitoring or monitoring equipment is proposed in association with the Project, as measurable impacts on water quality are not anticipated. Stormwater management will use appropriate BMPs.

(b) Water Pollution Control Equipment and Treatment Process

No water pollution control equipment or treatment processes are proposed for the Project, with the exception of the septic system; therefore, this section is not applicable.

(c) Issuance of Required Permits

Permits required for the septic system will be obtained prior to its installation, which will occur near the end of the construction period. No other operating permits are anticipated.

(d) Quantitative Flow Diagram

A quantitative flow diagram is not provided, as the only operational discharge anticipated by the Project will be its sanitary waste via a septic system. Discharge flows are estimated to be comparable to a small business office. No blowdown, chemical and additive processing, wastewater processing, oil/water separators, or runoff are proposed in association with the Project's creation of energy.

(e) Water Conservation

The Project, as a wind energy facility, uses water only for sanitary purposes in its O&M building, where low flow design and equipment will be used.

With regard to water demand, wind energy compares favorably to thermoelectric power. A DOE Office of Energy Efficiency and Renewable Energy report indicates a 212-MW wind farm, such as the proposed Project, will conserve approximately 315 million gallons of water annually (NREL 2006).

(D) SOLID WASTE

(1) Preconstruction

(a) Debris and Solid Waste

No debris or solid waste is currently known to exist within the Project Area that would require removal prior to construction.

(b) Waste Management Plan

As there will be no debris or solid waste requiring removal prior to construction, a pre-construction Waste Management Plan is not required.

(2) Construction

(a) Debris and Solid Waste

During Project construction, solid waste will be generated that is typical of normal construction efforts. This includes packing materials, office waste, scrap lumber, metals, cables, glass, cardboard containers, and miscellaneous trash. The estimated volume of solid waste generated by construction activities during this time is approximately 2,800 cubic yards.

(b) Waste Management Plan

Solid waste that can be neither recycled nor reused will be stored in on-site containers for disposal. Temporary collection areas may exist within each construction area, with larger dumpsters stored within the laydown yards. Programs will be developed to ensure that potentially hazardous wastes are

segregated from normal waste; steps will include separate storage areas and proper container labeling. All waste will be removed from the Project work areas by licensed contractors in accordance with applicable regulatory requirements and managed in licensed facilities.

(3) Operations

(a) Solid Waste

During Project operation, generated solid waste is anticipated to consist of office waste from the O&M building, including paper and miscellaneous trash. Lube oil containers, used oil, used antifreeze, and universal waste may also be generated. The estimated volume of solid waste generated during operation of the Project is 110 cubic yards on an annual basis.

(b) Waste Management Plan

Any solid waste generated during operation of the Project will be removed by a licensed hauler. Recycling of materials will occur, as possible, and disposal will be in accordance with applicable federal and state requirements.

(4) Licenses and Permits

No new solid waste treatment or disposal facility is proposed as part of this Project, or will be necessitated as a result of the construction or operation of this Project. All wastes generated will be trucked off-site by an appropriately licensed contractor. Depending upon quantities, the Project may register as a generator of Resource Conservation and Recovery Act wastes. Other than that registration, no waste disposal license or permit will be required.

(E) AVIATION

(1) Surrounding Air Navigation Facilities

As shown in Figure 07-01, no air navigation facilities are located within the Project Area. One public airport is located within 5 miles of the Project Area, the Seneca County Airport. The Seneca County Airport, owned by the Seneca County Commission, has one asphalt runway that is 4,000 feet long; it is located approximately 4.4 miles northwest of the Project Area in Seneca County. Three other private air navigation facilities are located within 5 miles of the Project Area:

- Bandit Field, located just barely within the 5-mile radius to the north in Clyde, Sandusky County, has a single dual-directional runway;
- Tiffin Mercy Hospital Heliport is located almost 5 miles from the Project Area, in Tiffin, Ohio; and
- Freefall Field, located about 4.3 miles southwest of the Project Area in Wyandot County, consists of one 2,000-foot long unpaved runway.

Through consultation with the FAA (Appendix F) and ODOT Office of Aviation, Seneca Wind will ensure that no aviation impacts will result from the Project, appropriate air navigation facilities are notified, and appropriate lighting and marking is incorporated.

(2) Federal Aviation Administration Filings

Seneca Wind has filed with the FAA for review of the proposed turbine locations (Appendix F). Following issuance of the FAA Determinations, ODOT will process its review and documentation to affirm its review of the turbines. If approved by the FAA, Seneca Wind plans to utilize an Aircraft Detection Lighting system, in order to reduce

lighting to only that necessary for aircraft safety. Adherence to FAA and ODOT requirements will mitigate any potential adverse impact on air travel.

4906-4-08 Health and Safety, Land Use, and Ecological Information

The data presented in this section assess the Project's costs and benefits regarding health and safety; ecology; land use; community development; cultural and aesthetic qualities; public responsibility; and agricultural district land.

(A) HEALTH AND SAFETY

(1) Equipment Safety

(a) Public Safety Equipment

During Project construction, safety plans will be in place to address issues associated with large construction vehicle movement, as well as other construction activities. For example, foundation excavation, working at heights when installing turbine components, and working with electricity each pose specific hazards that will require plans, awareness, and training. Daily safety tailgates, regular safety meetings, and using appropriate personal protective equipment (PPE) will protect the health, safety, and welfare of construction workers and those who may be within the work areas. Occupational Health and Safety Administration (OSHA) standards will be adhered to during the Project's construction and operation. The public will not generally be exposed to construction-related activities, as appropriate fencing, signage and/or other means to prevent access by unauthorized personnel will be used.

During construction, the Project will use existing roadways within the Project Area and the broader region for worker and material transport, which could result in public safety concerns, if not properly managed. Seneca Wind will work closely with appropriate road authorities as well as local emergency service

providers prior to and throughout the construction effort to plan for the construction process and implement measures to minimize associated hazard potential.

Once construction is complete, no public access will be allowed to the turbines; tower access doorways will be locked and accessible only to authorized personnel. The turbines and associated equipment contain relatively few flammable components, and would not be expected to pose a public hazard. However, any installation that includes electrical generating equipment, high voltage electricity, and various oils (lubricating, cooling, and hydraulic) does have the potential for fire, and the height of the nacelle and the enclosed space of the tower interior make accessibility difficult. Due to these Project characteristics, as well as specialized issues associated with high-voltage electrical equipment, the Project will not rely solely on local fire departments and emergency service providers, but will be prepared to address such issues with internal resources.

Construction and maintenance personnel, as well as local and regional responders, will be trained; appropriate equipment to address emergency situations that may occur at the Project (e.g., tower rescue, working in confined spaces, working with high voltage equipment) will be made available. Local rescue workers will be included in regular training for emergency procedures specific to the turbine models in use for the Project, to increase awareness and assure an appropriate responder response if an injury or accident occurs.

The turbines and equipment will be installed in accordance with National Fire Protection Association (NFPA) 70E code standards. Integrated safety systems will be incorporated in the design. The system control and data acquisition

(SCADA) system will sense when equipment operation is compromised and report conditions to the control center at the O&M building. Depending on the specific condition noted, the affected turbine(s) may immediately be shut down or other actions will be taken, allowing Project maintenance personnel to respond as appropriate.

Lightning protection will be incorporated as a standard element of the turbine design. The system will incorporate lightning receptors (including at the outermost blade tip and the blade root surface) and diverter strips in the blades that provide a path for the lightning strike to follow to the grounded tower. The SCADA system will document all critical lightning events and, if a problem is detected, the turbine will shut down automatically and be inspected to assure that damage has not occurred. Although unlikely, if a turbine were to catch fire, power would be disconnected from the turbine and the fire would be allowed to burn itself out while maintenance and fire personnel maintain a safe area around the turbine (to protect against the potential for ground fires from sparks or falling material). Because there is little flammable material in the turbine, any such fire would be expected to be short lived. Due to the short duration, fire-fighting from the air would be impractical. Public risk will be minimized, since the turbines will be located on private property with substantial set-backs, and an appropriate safety perimeter could be easily maintained.

The transformers at the substation will be equipped with a fire suppression system that would quickly extinguish potential fires at that location, and the O&M building will use standard office-type fire extinguishing systems.

The turbines will also use ice detection equipment that will monitor ambient temperature and conditions. Ice forming on the detection unit will generate a signal shutting down the turbine, if conditions warrant. In addition, windspeed-to-power ratios will be monitored; when the windspeed-to-power ratio is more or less than expected, the blades will be shut down in order to examine operating conditions.

During construction and operation, chemicals and hazardous substances will be handled, stored, and disposed of in accordance with applicable regulatory requirements and manufacturer recommendations.

(b) Equipment Reliability

The turbine models selected for this Project, the GE Model 2.3-116 (a total of 10 turbines) and the GE Model 2.5-127 (a total of 75 turbines), are independently certified to verify the safety, reliability, performance and compliance of turbines and components. Independent certification organizations have certified the turbines and components according to internationally recognized standards, considering at least a 20-year design life. In addition to design specifications, the turbines are equipped with internal sensors to monitor variables such as blade vibration and wind speed. These sensors automatically initiate turbine shut-down if design values are exceeded. Equipment maintenance will follow the manufacturer's recommended preventative maintenance schedule for continued reliability.

(c) Safety Manuals

A safety manual addressing situations specific to O&M employees, including first aid, protection against falls, and PPE, are provided in Appendix G

for the GE turbine models selected. In addition, Seneca Wind will develop a Project-specific Emergency Response Plan and will follow safety practices typical for facilities of this type during both construction and operation.

(d) Public Access

There will be no public access, as the Project will be located on private property; the public would encounter the Project only by trespassing. Signs will be posted at all access road entrances from public roads. These signs will identify the turbine(s) served by the access road and have a statement prohibiting unauthorized entry. Entrances will not be fenced or gated, unless a fence already exists. Access doors at the base of the turbines will be locked, the Project substation will be enclosed by a locked chain link fence, and the O&M building and associated equipment storage areas will be locked when staff are not present.

(e) Emergency Plans

Safety is extremely important to Seneca Wind. Project employees and contractors will be required to follow a Project-specific Emergency Response Plan and Health and Safety Plan that will both be developed prior to construction. These plans will be adjusted, as appropriate, to anticipate potential safety and emergency issues that reflect Project conditions as they may change throughout construction and operation. The Emergency Response Plan will include coordination with local emergency responders and address potential emergencies and available emergency resources (equipment and personnel). Seneca Wind will collaborate with local emergency responders in developing a detailed plan that outlines: the appropriate response level; principles to be applied during a response; and detailed steps for

initial response, containment, rescue, first aid, and evacuation. This coordination will include training for Project staff and local resources on any specialized rescue equipment, its location and its proper use in order to ensure prompt, efficient, and coordinated response to an emergency. The plan will also provide a process to update and modify the emergency procedures, as warranted.

(2) Impact of Air Pollution Control Equipment Failures

No air pollution is generated by wind energy generating facilities; therefore, this section is not applicable.

(3) Noise

An analysis of construction and operational sound anticipated from the Project has been completed, as outlined in the following sections and detailed in Appendix H.

Energy is required to produce sound and this sound energy is transmitted through the air in the form of sound waves – tiny, quick pressure oscillations just above and just below atmospheric pressure. These oscillations, or sound pressures, impinge on the ear, creating the sound we hear. Since the range of human hearing is so wide, sound levels are expressed in terms of decibels (dB). The sound pressure level in dB is a logarithmic ratio of the measured sound pressure to the reference sound pressure of 20 microPascals (μPa), multiplied by 20. The sound pressure range that can be detected by a person with normal hearing is very wide, ranging from about 20 μPa for very faint sounds at the threshold of hearing to nearly 10 million μPa for extremely loud sounds, such as a jet during take-off at a distance of 300 feet.

An inherent property of the logarithmic dB scale is that the sound pressure levels of two separate sources are not directly additive. For example, if a sound of 50 dB is added

to another sound of 50 dB, the result is a 3-dB increase (or 53 dB), not an arithmetic doubling of 100 dB.

Since the human ear does not perceive every frequency with equal loudness, spectrally-varying sounds are often adjusted with a weighting filter. The A-weighted filter is applied to compensate for the frequency response of the human auditory system, and is represented in A-weighted decibels (dBA).

While the concept of sound is defined by the laws of physics, the term "noise" has further qualities of being excessive or loud, and is subjective. The perception of sound as noise is influenced by technical factors such as intensity, sound quality, tonality, duration, and existing background levels, which may mask new sources.

Sound can be measured, modeled, and presented in various formats, with the most common metric being the equivalent sound level (L_{eq}). The L_{eq} has been shown to provide both an effective and uniform method for comparing time-varying sound levels and is the metric used by the OPSB to evaluate sound associated with wind energy facilities.

No noise rules or regulations exist at the state level in Ohio other than those established by the OPSB, nor do noise requirements exist at the county or local level that apply to the Project. Therefore, the Project is assessed in accordance with the OPSB's guidance that provides limitations on construction activities, establishes operational noise requirements for the effect of turbines on non-participating landowners, and requires the use of a complaint resolution program (Appendix D) to address issues that may arise.

The OPSB operational standards (Ohio Administrative Code [OAC] 4906-4-09(F)(2)) are based upon ambient L_{eq} sound levels within the Project Area, and establish acceptable sound levels as 5 dBA over the ambient nighttime L_{eq}, with higher daytime

limits allowed. Based upon the ambient monitoring program completed for the Project (described in Section 4904-4-08(A)(3)(e)) and consideration of critical design wind speed, nighttime ambient was measured to be 46 dBA; operational sound levels, therefore, are compared to a 51 dBA acceptable standard at non-participating residences.

The following sections address the required elements of OPSB review for noise-related evaluation.

(a) Construction Noise

Construction of the Project is expected to be typical of other wind energy facilities in terms of schedule, equipment, and activities. All reasonable efforts will be made to minimize the impact of noise resulting from construction activities. As the design of the Project progresses and construction scheduling is finalized, community notifications with information regarding the construction schedule and duration will be provided. To the extent practicable, louder construction activities will be scheduled during daytime hours, between 10:00 a.m. and 5:00 p.m., and general construction activities will be limited to the greatest extent practicable to between the hours of 7:00 a.m. and 7:00 p.m., consistent with OAC 4906-4-09(F)(1). Construction is anticipated to be completed in less than 12 months. Activities may occur 6 days per week, 10 hours per day, and nighttime construction may occur when continuous construction is required (in the case of activities such as foundation pours) or where daytime implementation may be more disruptive (such as flying rotors). Care will be taken to minimize noise to the greatest extent practicable. Internal combustion engines will be equipped with appropriately-sized muffler systems to minimize noise emissions.

Noise from construction activities is expected to have a temporary impact at some of the residences within the Project Area, particularly those close to proposed work areas. Sound levels will vary significantly depending on the type and phase of activity and the specific equipment in use. Because the construction effort will mobilize to individual locations throughout the Project Area, the maximum potential noise impact at any single residence will be very temporary in nature (analogous to a few days to a few weeks of repair or repaving work on a nearby road or to the sound of machinery operating on a nearby farm). More commonly, construction sounds will be audible in the distance, with sounds such as equipment blending into the background, but less regular sounds (e.g., back-up alarms, irregular engine revs, gravel dumping, clanking of metal components) being more noticeable. Although preliminary geotechnical investigations suggest that blasting may not be necessary, if it is required, this would result in considerably higher sound levels in the immediate vicinity. Such activities, however, would occur only intermittently and for a limited period of time. Implementation of additional geotechnical investigations to confirm the need for blasting in specific turbine locations will occur prior to construction, with borings extending to competent bedrock or the design depth (whichever is encountered first). This will inform the final foundation design for each location and, in turn, will determine the need for blasting.

Construction activities for the Project can be generally divided into four phases:

- *Site Clearing*: The initial site mobilization phase includes the establishment of temporary site offices, workshops, stores, and other on-site facilities. Installation of erosion and sedimentation control measures will be completed as well as the preparation of initial haulage routes.
- *Excavation*: This phase would begin with the excavation and formation of access roads and preparation of laydown areas. Excavation for the concrete turbine foundations would also be completed, which incorporates necessary rock drilling.
- *Foundation Work*: Construction of the reinforced concrete turbine foundations would take place in addition to installation of the internal transmission network.
- *Wind Turbine Installation*: Delivery of the turbine components would occur followed by their installation and commissioning.

Acoustic emission levels for activities associated with Project construction were based upon typical ranges of energy equivalent noise levels at construction sites, as documented by the United States Environmental Protection Agency (USEPA) (USEPA 1971b) and the USEPA's "Construction Noise Control Technology Initiatives" (USEPA 1980). The USEPA methodology distinguishes between type of construction and construction phase. Using those energy equivalent noise levels (L_{eq}) as input to a basic propagation model, construction noise levels were calculated at the nearest non-participating residential structure and at the farthest non-participating residential structure (Table 08-1).

TABLE 08-1
PROJECT CONSTRUCTION NOISE LEVELS BY PHASE

Construction Phase	Construction Noise Level at 50 Feet (dBA)	Construction Noise Level at 1,260 Feet* (dBA)	Construction Noise Level at 1,500 Feet (dBA)
Phase 1: Site Clearing	86	58	56
Phase 2: Excavation	90	62	61
Phase 3: Foundation Work	85	57	55
Phase 4: Wind Turbine Installation	83	55	54

*Nearest non-participating residential structure.

The basic model assumed spherical wave divergence from a point source located at the acoustic center of a turbine location. Furthermore, the model conservatively assumed that all pieces of construction equipment associated with an activity would operate simultaneously for the duration of that activity. An additional level of conservatism was built into the construction noise model by excluding potential shielding effects due to intervening structures and buildings along the propagation path from the site to receiver locations.

The construction of the Project is likely to cause short-term but unavoidable noise impacts. Based on sound propagation calculations, construction sound levels are predicted to range from 55 dBA to 62 dBA at the nearest non-participating residential structure (approximately 1,260 feet from the turbine); sound further decreases with additional distance. Periodically, sound levels may be higher or lower than those presented in Table 08-1 depending on several factors, such as the type, number, and age of construction equipment in use, the specific equipment manufacturer and model, the operations being performed, and the overall condition

of the equipment and its exhaust system mufflers. Note that these activities would occur sequentially for discrete groupings of turbines, with the potential for overlap. In addition to the turbines, construction activities will also occur for supporting infrastructure. The electrical collector lines are likely to be completed while each respective turbine is being constructed; other Project-related elements, such as the O&M building, would occur independently and then be complete.

In addition to construction equipment, the increased levels of traffic on local roads, associated with workers and deliveries, can also result in temporary increases in sound levels. However, travel will occur largely along existing roads that currently experience truck traffic or on accessways across private property. At the early stage of construction, equipment and materials will be delivered, and set-up will occur at laydown yards. Site preparation efforts (e.g., creation of access roads, preparation of foundation platforms) will require that equipment such as hydraulic excavators and associated spreading and compacting equipment be delivered and used at each location, moving on to the next location once each task is completed. Equipment for lifting the towers and vehicles delivering turbine components is larger and will move more slowly on the local roadways. Deliveries will occur for each turbine and will be timed, to the extent practicable, to allow for immediate assembly. The local community will be notified of the timing of large equipment deliveries. For the cranes and assembly equipment, once they are local, they will move from location to location until all turbines are installed. It is not expected that traffic noise will make a significant contribution to community sound, particularly due to its transient nature.

Reasonable efforts will be made to minimize construction sound level impacts. Notification will be provided to the local community when construction scheduling is finalized, and a Project contact will be established to facilitate responses to any specific complaints (see Appendix D). As installations are completed, construction-related sound will only occur in areas where installations have not yet been completed.

Although road construction or trenching operations may occur close to homes, this would be typical of any local utility installation activity. Every effort will be made to give affected residents advanced notice about the timing and duration of this type of work.

Traffic will increase throughout the construction period associated with workers as well as equipment and materials delivery. The vehicle type and number and the specific roads used will vary depending on the construction activities taking place.

Typical noise levels for passenger vehicles traveling 55 mph are 72 to 74 dBA at 50 feet. Heavy trucks at the same speed would range from 84 to 86 dBA at 50 feet. Based on similar wind energy facilities, approximately 50 percent of the traffic is expected to be heavy vehicles. The greatest impact in traffic noise will be on roadways that are expected to have peak average daily traffic volumes increase by more than a factor of two (which is equivalent to a 3 dBA increase in the hourly L_{eq} sound level). This would be the case on roads with existing low traffic volumes. For other access roads, construction of the Project is unlikely to cause increases in existing traffic noise in excess of 3 dBA.

(b) Operational Noise

(i) Generating Equipment

Operational broadband (dBA) sound pressure levels were calculated using the Cadna-A® model for normal operation assuming that all equipment is operating continuously and concurrently at the representative manufacturer-rated sound levels. Manufacturer sound levels were obtained, as tested and reported under the following standards:

- International Electrotechnical Commission (IEC) standard IEC 61400-11:2202(E), "Wind Turbine Generator Systems – Part 11: Acoustic Noise Measurement Techniques"; and
- IEC 61400-14:2005(E), "Wind Turbine Generator Systems – Part 14: Declaration of Apparent Sound Power Level and Tonality Values."

These standards provide sound power emission levels from a turbine, by wind speed and frequency, as well as a confidence interval.

A sound contour plot displaying the modeled broadband (dBA) sound levels presented as color-coded contours is provided on Figure 08-1. Impacts are shown out to 40 dBA; sound levels would continue to drop off with distance. The contours are graphical representations of the sound associated with full operation of the turbines associated with the Project and show how operational noise would be distributed over the surrounding area. The contour lines shown in the figures are analogous to elevation contours

on a topographic map, i.e., the noise contours are continuous lines of equal noise level around some source, or sources, of noise.

As reflected in Figure 08-1, sound levels at non-participating residences are no higher than 51 dBA, and therefore, meet the OPSB standards for no greater than a 5-dBA increase over nighttime ambient. Note that this analysis likely overstates the potential impact for two reasons. First, as sound from a wind turbine can often be masked by wind noise at downwind receivers because the frequency spectrum from wind is very similar to the frequency spectrum from a wind turbine. In general, wind turbines only operate and produce noise when the wind exceeds a minimum cut-in speed of approximately 3 m/s at hub height. Turbine sound levels increase with wind speed up to about 9 m/s, when the sound produced reaches a maximum and no longer increases because the rotor has reached a pre-determined maximum rotational speed. Therefore, at moderate to high wind speeds, when turbine sound levels are highest, the level of natural masking noise is also relatively high due to tree or grass rustle, thus reducing the perceptibility of the turbine noise. Impact levels are also overstated because 94 potential turbine locations were cumulatively evaluated, and only 85 turbines will ultimately be built.

(ii) Processing Equipment

No processing equipment is associated with the Project; therefore, this section does not apply.

(iii) Associated Road Traffic

Transportation noise during Project construction is addressed in Section 4906-4-08(3)(a). Once construction is complete, the Project will consist of limited operations personnel traveling to and from the O&M building and turbine sites. Routine maintenance will occur on a quarterly basis for each turbine and for the substation; this will require one or two pick-up trucks. The operational activities will not significantly contribute to traffic and traffic noise on local roadways.

(c) Noise-Sensitive Areas

The Project Area is located in a rural setting, with the Project Area and immediate surroundings dominated by active agricultural fields. There are scattered residences throughout the Project Area, with over 2,500 residential structures within a 1-mile radius of the Project Area. There are no nursing homes or hospitals within 1 mile of the proposed turbines. At the closest point, Seneca East High School is located approximately 0.4 mile southeast of a generating component (Turbine 20). The villages of Attica and Bloomville are the location of several other sensitive receptors, including a library, two churches, and several cemeteries, within 1 mile of the Project (both approximately 0.3-mile from the nearest turbine). The Attica Fairgrounds are also located within 1 mile of the proposed Project (more than 0.4-mile from the nearest turbine).

Two sites listed by the National Register of Historic Places (NRHP) (Sunbury Tavern [75001376] and Omar Chapel [87001982]) are within 1 mile of

the Project, as is the Silver Creek Wildlife Area, Garlo Heritage Nature Preserve, and Forrest Nature Preserve.

The modeled sound contours illustrated in Figure 08-1 indicate anticipated received sound levels from the Project at noise sensitive locations within 1 mile of the Project Area. Adverse impact to noise-sensitive areas from Project-related sound is not anticipated (i.e., Project-only sound levels will not exceed 51 dBA at non-participating residences). See Section 4906-4-08(D)(3) of this Application for additional information on impacts to proximate recreational areas.

(d) Noise Mitigation Measures

(i) Construction Noise

Construction noise is difficult to control because of the mobile nature of its sources and the flexibility of schedule inherent in most construction work. However, construction is also temporary in nature. In order to mitigate the possible effect of noise caused during the temporary construction period, the following steps will be taken:

- Maintain construction tools and equipment in good operating order according to manufacturers' specifications.
- Limit use of major excavating and earth moving machinery to daytime hours.
- To the extent practicable, schedule construction activity during normal working hours on weekdays when higher sound levels are typically present, and are found acceptable (some limited

activities, such as concrete pours or rotor fly, may occur at night).

- Equip internal combustion engines used for any purpose on the job or related to the job with a properly-operating muffler that is free from rust, holes, and leaks.
- For construction devices that utilize internal combustion engines, ensure the engine's housing doors are kept closed and install noise-insulating material mounted on the engine housing consistent with manufacturers' guidelines, if possible.
- Prior to the start of construction, implement the Complaint Resolution Plan, provided in Appendix D, to address any complaints received from residents.
- Notify the community prior to extended periods of activity that could be temporarily disruptive to the community, especially specific loud noise activities, such as blasting.

By scheduling the construction effort to be as efficient as practicable, sound associated with construction activity will be minimized as the duration of the construction effort is minimized. Because of the temporary nature of the construction noise, no adverse long-term effects are anticipated.

(ii) Operational Noise

The Project will use current turbine technology, which includes advances in sound reduction through technology, engineering, and

insulation. Blade airfoil efficiency improvements result in more wind energy being converted to rotational energy rather than acoustic energy. Vibration dampening and improved mechanical design have also reduced sound. Aerodynamic sound production is also very sensitive to speed at the blade tips. Modern variable speed wind turbines, such as those proposed for the Project, rotate at slower speeds in low winds, increasing in higher winds. This results in quieter operation in low wind as compared to older constant speed wind turbines.

Operational mitigation, therefore, is inherent in the design; at limited turbine locations, additional sound reduction has been incorporated in the design in order to meet the desired sound levels. Conservative assumptions in the modeling analysis are also anticipated to result in lower sound level impacts than reflected.

The Complaint Resolution Plan (Appendix D) that will be used for construction will continue to be used during Project operation as a framework for investigating and responding to community noise concerns that may arise.

(e) Existing Ambient Conditions

Existing ambient conditions were measured during a continuous 10-day period in May 2018, as described in additional detail in Appendix H. Five monitoring locations were selected in locations throughout the Project Area (as shown on Figure 08-1). Daytime and nighttime measurements were collected at each location, followed by a time history assessment and regression analysis to

determine an appropriate daytime and nighttime ambient for use in evaluating Project impacts. The results of the ambient sound survey for the critical design wind speed (9 m/s) are summarized in Table 08-2; further information is provided in Appendix H.

TABLE 08-2
AMBIENT SOUND SURVEY RESULTS

Monitoring Location	Time Period	Sound Level for Critical Design Wind Speed (L_{eq}, dBA)
Monitoring Location 1	Day	52
	Night	49
Monitoring Location 2	Day	47
	Night	48
Monitoring Location 3	Day	52
	Night	50
Monitoring Location 4	Day	47
	Night	42
Monitoring Location 5	Day	46
	Night	42
Project Area	Day	53
	Night	46

(4) Water

(a) Construction and Operation Impacts

No significant impact to water bodies or other water resources is expected as a result of the Project. Should any water be required for construction, it will be supplied from existing municipal or other currently permitted supplies. The only water required for the Project's operation is potable water associated with the O&M building. This water is anticipated to be supplied by a private groundwater well,

which will have the ability to provide adequate supply and can meet the Project's minor water demands without adverse effect to other users.

No discharge will be associated with the Project other than the sanitary waste at the O&M building, which will use a septic system.

Stormwater during construction will use temporary measures to control storm flows and allow for settling prior to discharge. Once the Project's construction is completed, the relatively small area of ground disturbance associated with Project components is not expected to require significant stormwater management measures. As a part of final design, the need for such controls will be evaluated, and implemented as required in accordance with the Ohio Rainwater and Land Development manual.

Known groundwater well logs and water protection areas in locations surrounding the Study Area are shown on Figure 08-2. Within Seneca County, many residents rely on private wells for their potable water, generally developed in the carbonate limestone bedrock aquifer. In addition to potable uses, some wells within the Project Area are used for agricultural purposes. Based on geologic mapping, it is expected that typical yields are on the order of 3 to 10 gallons per minute, as shown on Figure 08-3. Because the Project will adhere to setbacks from non-participating property owners, Project construction is not expected to impact neighboring groundwater wells.

Three source water protection areas (SWPAs) are located within the Project Area (as shown on Figure 08-2), representing public water supply wells, although the Project is not a use that is restricted within such areas. To the north, an SWPA

extends around the Village of Republic's two public wells; one of the Project's turbines is located within that area. In the central part of the Project Area is a very small SWPA associated with the Corner Restaurant and Lindsey-Olds Funeral Home's two wells, each also considered sufficiently large to be classified as public wells. No turbines are located in this area. To the south, an SWPA reflects the Village of Bloomville's two wells, with two Project turbines proposed within this area.

The Project will implement spill prevention practices during both construction and operation that will further protect surrounding wells from potential impact. In addition to design measures, staff will receive training on emergency procedures to ensure prompt and efficient response in the event of an accidental release to the environment.

(b) Impact of Pollution Control Equipment Failure

The only water pollution control equipment to be employed by the Project will be BMPs during construction to control stormwater, and the septic system at the O&M building during operation. No impact to public or private water supplies is expected as a result of water pollution control equipment failures.

(c) Proximate Water Sources

Figure 08-2 identifies the locations of known water wells and drinking water source protection areas within the Project Area. Development with the Project Area is primarily supplied by private wells, with nearly 300 water wells located within the Project Area. As discussed, no impact to existing use of groundwater is expected from the Project. The small groundwater well planned for the O&M

building will be similar to residential wells in the area, and will not affect other nearby well users.

(d) Compliance with Water Source Protection Plans

As shown on Figure 08-2, the villages of Republic and Bloomville and two businesses have SWPAs, reflecting areas where groundwater is used as public drinking water. Activities restricted within such areas include concentrated animal feeding operations; sanitary, industrial, or residual waste landfills; land application of biosolids; and voluntary brownfield cleanups. Although the Project does not constitute a use that is restricted within SWPAs, Seneca Wind will employ BMPs throughout construction to ensure that water quality standards are met and erosion and sedimentation is minimized. Should blasting be required, a licensed professional will conduct any blasting activities in accordance with BMPs. Employing BMPs will ensure safety and mitigate impacts to area water sources.

(e) Potential for Flooding

Figure 08-4 illustrates the mapped 100- or 500-year flood zones within the Project Area. As can be seen, all but two (Turbines 60 and 64) of the proposed turbine locations are outside of the 100- and 500-year flood zone, as defined by the Federal Emergency Management Agency (FEMA). Should these turbines remain in these locations, appropriate floodproofing and local approvals will be obtained for the very small permanent alteration within this area. The proposed substation and O&M building are also located outside of FEMA-defined flood zones. Although some underground interconnecting cables are proposed to traverse a mapped flood zone, appropriate measures will be used to protect the cables and the

original surface grade will be in place following installation. Therefore, the Project is not expected to increase potential for flooding.

(5) Geological Features

(a) Site Geology

The Project Area is located entirely within Seneca County, Ohio. The approximate centroid of the Project Area is located at a latitude of 41.07° North and a longitude of 83.00° West.

The Project Area is located in the Central Ohio Clayey Till Plain physiographic region of Ohio, which is located in the Till Plains Section, Central Lowland Province, Interior Plains Division. This physiographic region is characterized by well-defined moraines with intervening flat-lying ground moraines and intermorainal lake basins, with moderate relief and elevations between 700 and 1150 feet above mean sea level (amsl). The geology of this physiographic region is dominated by clayey, high-lime Wisconsinan-age till and lacustrine materials over Lower Paleozoic-age carbonate rocks (ODNR 1998).

The Project Area has moderate relief, with a high elevation of 1,007 feet amsl in the southern portion, and a low elevation of 745 feet amsl in the western portion.

(b) Soils and Soil Suitability

Review of the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey and the Soil Survey of Seneca County, Ohio indicates that the Project Area is comprised of the following soil units (as shown on Figure 08-5), identified in the order of prevalence within

the Project Area:[3] Blount silt loam (end moraine, 2 to 4 percent slopes [Ble1B1]; end moraine, 0 to 2 percent slopes [Ble1A1]; ground moraine, 2 to 4 percent slopes [Blg1B1]; and ground moraine, 0 to 2 percent slopes [Blg1A1]); Tiro silt loam (0 to 2 percent slopes [TrA] and 2 to 6 percent slopes [TrB]); Glynwood (clay loam, end moraine, 2 to 6 percent slopes, eroded [Gwe5B2]; clay loam, 6 to 12 percent slopes, eroded [Gwd5C2]; and silt loam, end moraine, 2 to 6 percent slopes [Gwe1B1]); Pandora silt loam (Pa); Chagrin silt loam, occasionally flooded (Ch); Bennington silt loam (2 to 6 percent slopes, frequently flooded [BgB]; and 2 to 6 percent slopes, eroded [BgB2]); Shoals silt loam , 0 to 2 percent slopes, frequently flooded (Sh); Digby loam, 1 to 4 percent slopes (DmA); and Gallman loam (2 to 6 percent slopes [GaB]). The distribution of the soils within the Project Area is presented in Figure 08-5. Additional information detailing each soil unit is provided below, in the order of prevalence within the Project Area.

Blount silt loam (Ble1B1, Ble1A1, Blg1B1, and Blg1A1) covers approximately 51 percent of the Project Area. This series is comprised of deep, somewhat poorly drained soils commonly found on till plains (end and ground moraines). Depth to a restrictive feature is between 30 and 60 inches. Depth to the water table is about 6 to 12 inches. Available water storage in the soil profile is low to moderate.

Tiro silt loam (TrA and TrB) covers approximately 15 percent of the Project Area. This series is comprised of deep, somewhat poorly drained soils commonly found on till plains. Depth to a restrictive feature is more than 80 inches. Depth to

[3] Only those soil types that cover at least approximately 1 percent of the Project Area are discussed in this section.

the water table is about 12 to 30 inches. Available water storage in the soil profile is moderate.

Glynwood clay loam (Gwe5B2 and Gwd5C2) covers approximately 8 percent of the Project Area and Glynwood silt loam (Gwe1B1) covers an additional 2 percent of the Project Area. This series is comprised of deep, moderately well-drained soils commonly found on till plains (end moraines). Depth to a restrictive feature is between 24 and 42 inches. Depth to the water table is about 12 to 24 inches. Available water storage in the soil profile is low.

Pandora silt loam (Pa) covers approximately 7 percent of the Project Area. This soil is a deep, poorly drained soil commonly found in depressions and drainageways. Depth to a restrictive feature is more than 80 inches. Depth to the water table is about 0 to 12 inches. Available water storage in the soil profile is moderate.

Bennington silt loam (BgB and BgB2) covers approximately 5 percent of the Project Area. This series is comprised of deep, somewhat poorly drained soils commonly found on till plains (end and ground moraines). Depth to a restrictive feature is more than 80 inches. Depth to the water table is about 6 to 12 inches. Available water storage in the soil profile is moderate.

Chagrin silt loam (Ch) covers approximately 3 percent of the Project Area. This series is composed of deep, well-drained soils commonly found on flood plains. Depth to a restrictive feature is more than 80 inches. Depth to the water table is about 48 to 72 inches. Available water storage in the soil profile is high.

Shoals silt loam (Sh) covers approximately 2 percent of the Project Area. This series is composed of deep, somewhat poorly drained soils commonly found on flood plains. Depth to a restrictive feature is more than 80 inches. Depth to the water table is about 6 to 18 inches. Available water storage in the soil profile is high.

Digby loam (DmA) covers approximately 2 percent of the Project Area. This series is comprised of deep, somewhat poorly drained soils commonly found on outwash plains and terraces. Depth to a restrictive feature is more than 80 inches. Depth to the water table is about 12 to 30 inches. Available water storage in the soil profile is moderate.

Gallman loam (GaB and GaA) covers approximately 2 percent of the Project Area. This series is comprised of deep, well-drained soils commonly found on outwash plains and terraces. Depth to a restrictive feature is more than 80 inches. Depth to the water table is more than 80 inches. Available water storage in the soil profile is moderate.

The remaining area is composed of soil types that each account for less than 1 percent of the total area and are, therefore, not discussed in greater detail. Figure 08-5 illustrates the predominant soils present within the Project Area, which are expected to be suitable for Project use.

Table 08-3 presents a summary of the soil properties and characteristics, in order of their prevalence within the Project Area, as provided by the USDA.

TABLE 08-3
SOIL PROPERTIES AND CHARACTERISTICS

Soil Series (Unit[s])	Depth Below Surface (inches)	Permeability (inches per hour)	Soil pH	Potential Frost Action	Shrink-Swell Potential
Blount (Ble1B1, Ble1A1, Blg1B1, Blg1A1)	0 – 7 7 – 30 30 – 60	0.6 – 2.0 0.06 – 0.6 0.06 – 0.6	5.1 – 6.5 4.5 – 7.8 7.4 – 8.4	High	Low Moderate Moderate
Tiro (TrA, TrB)	0 – 9 9 – 30 30 – 60	0.6 – 2.0 0.6 – 2.0 0.06 – 0.6	5.6 – 7.3 4.5 – 6.5 6.6 – 7.8	High	Low Moderate Low
Glynwood (GwdB2, Gwe5B2, Gwe1B1)	0 – 9 9 – 36 36 – 60	0.6 – 2.0 0.06 – 0.2 0.06 – 0.2	5.6 – 7.3 4.5 – 8.4 7.4 – 8.4	High	Low Moderate Moderate
Pandora (Pa)	0 – 7 7 – 55 55 – 60	0.6 – 2.0 0.2 – 0.6 0.06 – 0.2	6.1 – 7.3 6.1 – 7.8 7.4 – 8.4	High	Low Moderate Moderate
Bennington (BgB, BgB2)	0 – 9 9 – 34 34 - 60	0.6 – 2.0 0.06 – 0.6 0.06 – 0.2	5.1 – 6.5 4.5 – 7.8 7.4 – 8.4	High	Low Moderate Low
Chagrin (Ch)	0 – 9 9 – 28 28 – 60	0.6 – 2.0 0.6 – 2.0 0.6 – 2.0	5.6 – 7.3 5.6 – 7.3 5.6 – 7.3	Moderate	Low Low Low
Shoals (Sh)	0 – 8 8 – 40 40 – 60	0.6 – 2.0 0.6 – 2.0 0.6 – 2.0	6.1 – 7.8 6.1 – 7.8 6.6 – 7.8	High	Low Low Low
Digby (DmA)	0 – 10 10 – 37 37 – 60	0.6 – 2.0 0.6 – 2.0 6.0 – 20	5.6 – 7.3 4.5 – 7.8 7.4 – 8.4	High	Low Low Low
Gallman (GaB)	0 – 10 10 - 60	2.0 – 6.0 2.0 – 6.0	5.6 – 7.3 4.5 – 7.8	Moderate	Low Low

As previously noted, a preliminary geotechnical investigation has been completed within the Project Area (Appendix I) to determine the suitability of the subsurface soil for construction of the proposed Project.

To maintain soil stability during construction, adequate surface water drainage will be established and properly controlled at each proposed construction

site to minimize increase in moisture content of the subgrade material. Positive drainage of each construction site will be created by gently sloping the surface toward drainage swales.

Construction will involve topsoil stripping and grubbing of stumps, as necessary. Stripped topsoil will be stockpiled for later use in site restoration. Following removal of topsoil, subsoil will be graded, compacted, and surfaced with gravel or crushed stone (depth to be determined on a case by case basis), and geotextile fabric or grid will be installed beneath road surfaces as necessary to provide additional support. In agricultural areas (where most of the construction will occur), all topsoil within the work area will be segregated and, as appropriate, restored once work is complete. Exposed subsoils will be de-compacted with a deep ripper or heavy-duty chisel plot to a maximum depth of 18 inches. Once the subsoil has been decompacted, the surface will be picked over to remove rocks that are four inches in size or larger, then stockpiled topsoil will be returned to disturbed agricultural areas and regraded to approximate original contours. The survey of the re-graded topsoil will be disked, large rocks again removed, and seeded and/or mulched for stabilization (unless other arrangements have been made with the landowner).

The access roads will be regraded as necessary to create a smooth travel surface, allow crossing by farm equipment, and prevent interruption of surface drainage. Temporary water bars and culverts will be removed once no longer necessary.

(c) Geotechnical Evaluation Plan

A preliminary geotechnical investigation has been completed for the Project. Figure 08-6 shows the location of geotechnical borings, intended to reflect the proposed turbine locations; note that, as a result of this geotechnical work, certain turbine locations have been adjusted. A copy of the report is provided as Appendix I, with information summarized in this section of the OPSB Application.

Based on reviews of the boring logs and laboratory test results provided in Appendix I, clay soils were encountered in the majority of the geotechnical borings. The general soil stratigraphy consisted of a thin layer of topsoil or mixed soil used for farming, overlying lean clay glacial till soil, with occasional interbedded sandy outwash zones. Underlying the glacial deposits were limestone of the Columbus Formation. The western portion of the Project Area generally had shallower limestone bedrock, while the north-central and eastern part of the Project Area often did not encounter bedrock, or encountered it deep in the borings. The bedrock primarily consisted of Ohio Shale. The bedrock encountered in the borings consisted of gray to tan, massive limestone and was encountered between 2.2 feet and 57.5 feet below ground surface. There is some potential for karst-related settlement within the Project due to the presence of underlying Columbus Limestone; for this reason, Seneca Wind conducted this detailed program of preliminary borings and will carefully evaluate subsurface conditions for final design, including additional borings in locations where turbine locations have shifted.

Groundwater was encountered during the drilling at varying depths during or immediately after drilling. The shallowest observed groundwater was at a depth of 0.5 feet after drilling. Based on the results of the groundwater measurements, the groundwater appears to generally be within the clayey glacial till soil overlying bedrock.

According to the ODNR, no earthquake epicenters lie within the Project Area. The Project Area is located in a relatively inactive seismic area, but is on the periphery of the New Madrid Seismic Zone, which has some heightened level of risk. No Quaternary faults[4] or folds are known to be located near the Project Area. However, the Tiffin Fault extends to the west, with the probable end occurring approximately 3.1 to 4.4 miles from the Project Area. The Seneca Anomaly covers most of the northern part of Seneca County. The next closest fault or fault system is the Outlet Fault, part of the Bowling Green Fault System, located approximately 21.7 miles west and 18.6 miles southwest of the Project Area.

Four earthquakes have originated in Seneca County. These earthquakes have been low in seismic magnitude/intensity (in range of 2.4 to 3.7 on the Richter scale). The closest documented earthquake epicenter to the Project Area occurred in Seneca County in 1936, approximately 8.7 miles northwest of the Project Area.

Damage to structures during an earthquake is primarily the result of liquefaction of soils. For liquefaction to occur, appreciable sand strata (typically loose and/or saturated) must be present in the subsurface profile. Liquefaction

[4] A Quaternary fault is an active fault that has been recognized at the surface and has had evidence of movement in the past 1.6 million years (the Quaternary Period).

potential due to seismic-induced motions does not represent a significant risk within the Project Area. Therefore, due to the low number of recorded seismic events in the region and the presence of soils not susceptible to liquefaction from seismic events, damage to structures within the Project Area is unlikely.

The most common geotechnical issue encountered in the Project Area are sinkholes resulting from karst features. Due to the glacial history and presence of karst topography within the Project Area, the depth to bedrock varies considerably. Based on the mapped known and probable karst locations, it appears that several known and suspected karst features are present within the southwestern portion of the Project Area (Pavey et al 1999). In addition, the drift thickness is generally less on the western side of the Project Area, which contains mapped karst features. The north-central and central portion of the Project Area has scattered mapped karst features, but these are generally not in the vicinity of proposed wind turbine locations.

Additional geotechnical investigations will be conducted prior to construction to finalize foundation design. Boring locations will be at appropriate turbine sites and associated access roads, as determined necessary by the geotechnical engineer.

The Geotechnical Report, provided in Appendix I, provides a summary of the overall risk of potential karst at each investigated location to date. Of the boreholes more closely examined, two locations indicated voids, or tubes, which extend back from the boreholes or large collapsed plates indicative of minor roof collapse. Turbine locations were adjusted accordingly.

If it is determined that shallow foundations are not suitable for structural support, extended foundation systems (e.g., driven H-piles or auger cast piles) may be necessary. The geotechnical engineer will examine foundation designs and compatibility with supporting soils, and approve the work prior to placement of foundation components.

Based on a review of geological and seismic information, Project components are expected to be sited in locations where geological issues will not restrict development. Project design and construction will take into consideration the potential presence of karst features, avoiding and minimizing risk to the maximum extent practicable.

(6) Potential for High Wind Conditions

As the Project is powered by the wind, an area with higher wind speeds is considered optimal. The turbines proposed for the Project are rated to withstand wind speeds well above those anticipated within the Project Area. The selected turbines are designed to meet the standards of the IEC-61400 series and are rated to specific wind classes. IEC IIIa and IIIb provides that the structure is designed to withstand average wind speeds of 7.5 m/s (17 mph) and extreme 10-minute average wind speeds of 37.5 m/s (84 mph), as minimum design values.

Figure 08-7 presents the distribution of wind speeds and directions for historic data collected on-site for the period of October 2009 through June 2018 in the form of a wind rose. The prevailing wind direction, occurring approximately 13.7 percent of the time, is from the south-southwest. The mean wind speed at the 134-m hub height level is 15.55 knots (17.90 mph). High winds (greater than or equal to 29.2 knots) have been recorded

from the west southwest, west, and southwest. Calm winds (less than 1.94 knot, or 2.25 mph) were recorded 1.6 percent of the time. These reflect values well within the turbine capabilities.

(7) Potential Impact from Blade Shear

A potential public safety concern with wind power projects is the possibility of a wind turbine tower collapsing or a rotor blade dropping or being thrown from the nacelle. While extremely rare, such incidents have occurred, although it is not believed that any member of the public has ever been injured due to such incidents, indicating that the setbacks employed have been sufficient to protect homes and roadways.

Tower collapse or blade throw might be caused by a variety of factors. For the most part, these events have been related to a control system failure leading to over-speed operation, a lightning strike, or a manufacturing defect in the blade. Technological improvements and mandatory safety standards during turbine design, manufacture, and installation have significantly reduced the instances of blade throw. As certification requirements have evolved, requiring quality control audits of blade manufacturing facilities and strength testing of construction materials, fewer issues have occurred. These audits typically involve a dynamic test that simulates the life loading and stress on the rotor blade (Garrad Hassan 2010).

Current international standards used for turbine certification include ratings for withstanding different levels of hurricane-strength winds and other criteria (American Society of Civil Engineers [ASCE] and American Wind Energy Association [AWEA] [ASCE/AWEA 2011]). The Project's turbines will meet all applicable engineering standards. State-of-the-art braking systems, pitch controls, sensors, and speed controls on

wind turbines have greatly reduced the risk of blade throw. The Project's turbines are anticipated to incorporate two fully independent braking systems to stop the rotor from turning, as appropriate (for example, if significant vibrations or rotor blade stress is sensed by the monitoring systems). As a matter of standard practice, the turbines will automatically shut down at wind speeds over the manufacturer's threshold. For these reasons, the risk of catastrophic blade throw is minimal.

Although the risk is minimal, Seneca Wind will have procedures in place for the unlikely event of a blade throw incident. This will include emergency shutdown procedures, post-event site security measures, immediate notification of state and local officials, and implementation of any specific measures recommended by the manufacturer. Seneca Wind will conduct annual training for operating staff as well as local first responders on these procedures.

Given the low risk of tower collapse and blade throw, the potential impact is not significant. The Project's setbacks from residents and property lines will adequately protect the public. The distance between proposed turbine locations and the nearest non-participating property line ranges from 735 to 2,030 feet, averaging 1,180 feet. The distance from the nearest public road is 750 feet.

(8) Potential Impact from Ice Throw

Ice shedding and ice throw refer to the phenomena that can occur when ice builds up on rotor blades and subsequently breaks free and falls to the ground. No serious accidents caused by ice throw from an operating wind turbine have been reported (Garrad Hassan 2007; Baring-Gould et al. 2012; Gipe 2013). However, ice shedding and ice throw do occur, and could represent a potential safety concern.

Ice shedding and ice throw occur under certain weather conditions that cause ice to build up on the rotor blades and/or sensors, slowing the rotational speed and potentially creating an imbalance in the weights of the individual blades. This condition will be sensed by the turbine's computer controls, resulting in the turbine being shut down until the ice melts. Ice shedding most often occurs as air temperatures rise and ice that has accumulated on the rotor blades begins to thaw. With the turbine shut down, the ice fragments would drop off the rotors and land near the base of the turbine (Morgan et al. 1998; Ellenbogen et al. 2012). Ice can potentially be "thrown" when the turbines blades begin to rotate again while this melting is occurring, during high wind conditions strong enough to carry the ice some distance, or in the event of a failure of the turbine's control system.

The distance a piece of ice can travel depends on: the position of the blade and the location of the ice on the blade when the ice releases; the shape of the ice that is shed (e.g., spherical, flat, smooth); and the prevailing wind speed. However, the farther the distance from the turbine, the less risk of ice landing. Research by the European Union Wind Energy in Cold Climates collaborative (Siefert et al. 2003) indicated that ice fragments typically fall within 410 feet of the wind turbine.

Additional studies have considered this issue. At a wind turbine near Kincardine, Ontario, the operator conducted approximately 1,000 inspections between December 1995 and March 2001. During only 13 of these inspections was ice build-up noted; when ice pieces were identified on the ground, none were found further than 328 feet from the base of the turbine, with most found within 164 feet (Garrad Hassan 2007). Studies conducted in the Swiss Alps found a maximum throwing distance of 302 feet (Cattin et al. 2008). Almost 50 percent of the ice fragments weighed 0.1 pound or less (Cattin et al. 2007; 2009)

with the heaviest ice fragment weighing nearly 4 pounds (Cattin et al. 2008; 2009). While turbine height is also a factor to be considered in ice throw, an independent expert panel concluded that, "ice is unlikely to land farther from the turbine than its maximum vertical extent" (Ellenbogen et al. 2012).

Data collected by the Global Wind Energy Council (2014) indicate more than 268,000 turbines in operation by the end of 2014, and more have been constructed since. The lack of reported injury with this number of operational turbines is further indication that risk is low.

The Project's monitoring system will be used to minimize the potential for ice throw, shutting the rotors down as ice accumulation is indicated by vibration or other imbalances. However, based upon the range of available studies, impacts associated with potential ice shedding for the Project are expected to occur only within the established setbacks. The closest non-participating residence property boundary is 735 feet from a turbine, and the closest roadway is 750 feet from a turbine. These distances are well over the 410-foot maximum distance reported in the studies, and greater than the vertical distance of the tallest proposed turbine.

Seneca Wind will keep records of icing conditions that cause turbine shut down.

(9) Potential Impact from Shadow Flicker

A wind turbine's moving blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows, called shadow flicker, are a temporary phenomenon experienced near the turbines; the effect decreases with distance. The impact area depends on the time of year and day (which determine the sun's azimuth and altitude angles) and the wind turbine's physical characteristics (height, rotor diameter,

blade width, and orientation of the rotor blades). Shadow flicker impact to surrounding properties generally occurs during low angle sunlight conditions, which typically occur during sunrise and sunset. However, when the sun angle gets very low (less than 3 degrees), sunlight passes through more of the atmosphere and becomes too diffused to form a coherent shadow (i.e., would not be perceived as flash). Shadow flicker will also not occur when the sun is obscured (e.g., by clouds or fog or at night) or when the source turbine(s) are not operating. In addition, shadow flicker is only an issue when at least 20 percent of the sun's disc is covered by the turbine blades.

Shadow flicker intensity is defined as the difference in brightness at a given location in the presence and absence of a shadow. Shadow flicker intensity diminishes with greater receptor-to-turbine separation distance. Shadow flicker intensity for receptor-to-turbine distances beyond 2,500 m (8,202 feet) is very low, and generally considered imperceptible. In general, closer proximity to turbines may make shadow flicker more noticeable, with the largest number of shadow flicker hours, along with greatest shadow flicker intensity, occurring in locations closest to the wind turbines.

Shadow flicker frequency is related to the wind turbine's rotor blade speed and the number of blades on the rotor. From a health standpoint, the low flicker frequencies associated with wind turbines are harmless, and public concerns that flickering light from wind turbines can have negative health effects, such as triggering seizures in people with epilepsy, are unfounded. Epilepsy Action (the working name for the British Epilepsy Foundation) states that there is no evidence that wind turbines can cause seizures (Epilepsy Action 2018). However, they recommend that wind turbine flicker frequency be limited to 3 Hertz (Hz); for comparison, strobe lights used in discos have frequencies which range

from about 3 Hz to 10 Hz (1 Hz = 1 flash per second). Since the Project's wind turbine blade pass frequency is approximately 0.8 Hz (less than 1 blade pass per second), no negative health effects to individuals with photosensitive epilepsy are expected.

The OPSB has established specific standards for shadow flicker related to wind energy facilities in OAC 4906-4-09(H)(1). This regulation requires that applicable facilities, such as the Project, be designed to avoid unreasonable adverse shadow flicker effect at any non-participating sensitive receptor within 1,000 m of any turbine, and establishes a shadow flicker level of 30 hours per year as a minimum threshold for determining impacts. This metric has been used as a benchmark for the shadow flicker analysis.

A shadow flicker analysis has been completed for the Project, considering sensitive receptors (occupied houses), using WindPRO software (version 3.1) and its associated Shadow module (Appendix J). Assumptions incorporated reflect a conservative estimate of anticipated shadow flicker impacts. The modeling (as depicted in Figure 08-8) found that (for a total of 1,299 receptors analyzed):

- 59.0 percent of the receptors are not expected to experience any shadow flicker;
- 22.9 percent of the receptors may be affected for 0 – 10 hours/year;
- 10.2 percent of the receptors may be affected for 10 – 20 hours/year;
- 4.2 percent of the receptors may be affected for 20 – 30 hours/year; and
- 3.7 percent of the receptors may be affected for more than 30 hours/year.

Of the 48 receptors predicted to conservatively receive more than 30 hours of shadow flicker per year, 26 are participating landowners. The predicted shadow flicker impacts for non-participating residences range from 62 hours and 18 minutes per year to

30 hours and 23 minutes. Even the highest predicted shadow flicker impacts (62 hours and 18 minutes) reflects only approximately 1.4 percent of annual daylight hours.

Seneca Wind is, however, committed to reducing shadow flicker impacts to meet the OPSB requirements. For each of the 22 non-participating residences that currently show impacts greater than that standard, additional investigation and/or coordination will occur to determine the most effective approach. This may include refined modeling analyses that account for the potential for vegetation to block line-of-sight and/or to refine window exposures; as well as consideration of mitigation measures such as window shades or other screening measures. As decisions are made regarding which specific turbine locations will be constructed, flicker modeling may be revised, as contributing turbines (if not to be constructed) may be skewing the results higher than will be actually experienced. If necessary, curtailed operation under certain conditions may also be considered

(10) Potential Impact to Radio and TV Reception

An analysis has been completed of the Project's potential impact to radio and television reception (Appendix K). The results are described below.

(a) Off-Air Television Analysis

Off-air stations are television broadcasts that transmit signals that can be received directly by a television receiver or house-mounted antenna. TV stations at a distance of 100 kilometers (km) or less are the most likely to provide off-air coverage to the Project area and neighboring communities.

A total of 60 database records for stations exist within approximately 100 km of the Project. Of these stations, only 44 are currently licensed and operating; 16 of these are low-power stations or translators. Translator stations are low-power

stations that receive signals from distant broadcasters and retransmit the signal to a local audience. These stations serve local audiences and have limited range, which is a function of their transmit power and the height of their transmit antenna. The remaining 28 stations would operate at full power.

The analysis determined that eight of the full-power stations, and one Class A low-power station, have the potential for reception disruption in and around the Project. The areas primarily affected would include TV service locations with 10 km of the Project that have a clear line-of-sight to a turbine but not to the respective station.

Communities and homes in these locations may have degraded reception of these stations after the Project is in place due to signal scattering that can occur when TV signals are reflected by the rotating wind turbine blades and mast. If interference occurs, a high-gain directional antenna can be used, preferably outdoors, and oriented toward the signal to mitigate the interference. Neither cable service or direct broadcast satellite service will be affected by the Project, and could also be offered as mitigation. The complaint resolution process (Appendix D) will be used to identify and respond to such issues.

(b) AM/FM Analysis

Six records were identified for AM stations within approximately 30 km of the Project. Potential problems with AM broadcast coverage can occur when stations with directive antennas are located within the lesser of 10 wavelengths or 3 km of turbines, or when stations with non-directive antennas are located within one wavelength. All of the identified AM stations are located well outside of this

distance (with the closest located more than 12 km from the Project), and no degradation of AM broadcast coverage is anticipated.

A total of 27 FM stations were identified within approximately 30 km, although only 24 of these stations are currently licensed and operating. Seven of these are low-power or translator stations that broadcast with limited range. FM station coverage is not generally susceptible to interference caused by wind turbines, especially when the turbines are located in the far field region of the radiating FM antenna in order to avoid the risk of distorting the antenna's radiation pattern. The closest operational FM station to the Project is more than 1.5 km from the nearest turbine. At this distance there should be adequate separation to avoid radiation pattern distortion and degradation of FM broadcast coverage.

(11) Potential Impact to Radar Systems

A written notification of the proposed Project was sent to the National Telecommunications and Information Administration (NTIA) of the U.S. Department of Commerce on June 25, 2018. The NTIA then provides the information to the federal agencies represented in the Interdepartment Radio Advisory Committee (IRAC), which include the Department of Defense, the Department of Education, the Department of Justice, and the FAA. If the Project had the potential to interfere with military or civilian radar systems, such conflicts would be identified during IRAC review and the NTIA would provide notification.

(12) Potential Impact to Microwave Communications

Microwave telecommunication systems provide long-distance and local telephone service, backhaul for cellular and personal communication service, data interconnects for

mainframe computers and the Internet, network controls for utilities and railroads, and various video services. As wireless point-to-point links that communicate between two antennas, they require clear line-of-sight conditions between each antenna. For an uninterrupted line of communications, a microwave line should be clear not only along the axis between the center point of each antenna, but within a mathematical distance around the center axis known as the "Fresnel Zone." Microwave bands that should be considered for potential impact from wind turbines operate over a wide frequency range (900 MHz – 23 GHz).

A worst-case Fresnel Zone was calculated for the 59 microwave paths that have been identified in the vicinity of the Project. All 94 potential turbine locations were included in the analysis, although only a total of 85 will be built. Of these turbines, five were found to intersect the Fresnel Zones of three microwave paths. A cross-sectional analysis was performed to determine the diagonal clearance value for these cases, and determined that only two of these locations have a potential to degrade microwave telecommunications.

(B) ECOLOGICAL RESOURCES

(1) Existing Ecological Resources

(a) Nearby Resources

Figure 08-9 shows an area 0.5 mile from the Project Area indicating: Project features; undeveloped woodlots or vacant tracts of land subjected to past or present surface mining activities, excluding game preserves or areas in active agricultural use; wildlife areas, nature preserves, and other conservation areas; surface bodies of water and wetlands; and highly-erodible soils and slopes of greater than 12

percent. As can be seen, the majority of the Project Area is in active agricultural use, and steep slopes are generally limited to areas along stream embankments.

(b) Wetland and Surface Water Survey

A Preliminary Aquatic Resource Evaluation Report has been completed for the Project and is provided in Appendix L. As specified in 4906-4-08(B)(1)(b), the field investigation focused on the vegetation, wetlands and surface waters located within 100 feet of the potential construction impact areas associated with the Project (the Wetland Survey Area). The Wetland Survey Area covers approximately 9,200 acres within the Project Area. Figure 08-10 illustrates the Wetland Survey Area, and wetland and stream resources identified.

In addition to identifying aquatic resources throughout the Wetland Survey Area using mapping resources and field confirmation, preliminary data was collected to initiate the evaluation of identified wetlands using the Ohio Rapid Assessment Method (ORAM). ORAM scores provide a functional assessment of wetland quality, with Category 3 wetlands being of the highest quality and Category 1 wetlands being of the lowest quality. In addition, preliminary data were recorded to initiate the evaluation of identified stream feature quality using the Ohio Headwater Habitat Evaluation Index (HHEI) and/or the Ohio Qualitative Habitat Evaluation Index (QHEI) scoring methods, as applicable. These methods yield a numerical score that indicates the probable existing aquatic life use of each stream. HHEI scoring classifies streams from Class III (indicating the highest quality) to Class I (indicating the lowest quality) of headwater stream habitat. QHEI scoring results in a narrative rating of Excellent to Very Poor.

Jurisdictional streams were identified as those waters that had an Ordinary High Water Mark, a defined bed and banks, and a non-vegetated substrate indicative of periodic to persistent flowing water; such resources are considered jurisdictional aquatic resources, whereas features such as roadside ditches are not. A total of 94 waterbodies were identified in the wetland survey; all were identified as jurisdictional streams. Based on the evaluation conducted, none of these waterbodies score high enough to be considered Class III waterbodies.

A total of 176 wetlands were identified within the Wetland Survey Area (as shown on Figure 08-10). Of these, a total of 21 are located on properties for which survey access was not granted; evaluation of these resources relied on desktop resources and, where possible, viewing from public or accessed property. Many of the wetlands follow riparian corridors that extend throughout the Project Area, which will be largely avoided by the Project. A total of 95 of the wetlands within the Wetland Survey Area were identified as palustrine forested (PFO), two as palustrine scrub-shrub (PSS), 61 as palustrine emergent (PEM), and 18 as palustrine unconsolidated bottom (PUB) wetlands. No isolated wetlands were identified; therefore, all identified wetlands are presumed to be federally jurisdictional. Based on the evaluation conducted, none of the wetlands scored high enough to be considered Category 3.

More detailed delineations to refine the conservative boundaries identified through this field reconnaissance will be conducted in specific locations where Project activities occur in or near wetland resources prior to preparing appropriate permit applications.

(c) Species Literature Survey

Consultation with the USFWS and ODNR has been ongoing since 2009 in association with earlier versions of wind energy facilities proposed within the Project Area (see Appendix M). In addition to correspondence and meetings, surveys have been implemented within the Project Area in accordance with the ODNR On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocols for Commercial Wind Energy Facilities in Ohio (ODNR 2009), the Land-based Wind Energy Guidelines (USFWS 2012), and the Eagle Conservation Plan Guidance (USFWS 2013). Studies determined to be appropriate and necessary included: bat mist-netting and telemetry; passive bat acoustic monitoring; large bird and raptor migratory surveys; passerine migration surveys; raptor/eagle nest surveys; waterfowl surveys; and nocturnal marsh bird surveys. Details regarding these surveys are provided in Section 4906-4-08(B)(1)(e), and mitigation plans are addressed in Section 4906-4-08(B)(2)(b). More general habitat information is provided in the following section.

(d) Species Field Survey

Plant and animal life was surveyed during wetland reconnaissance activities. More detailed observations occurred within the 9,200-acre Wetland Survey Area, although observations occurred throughout the Project Area when traveling between portions of the Wetland Survey Area. This data was supplemented with desktop analysis to confirm the relative homogeneity of the

Project Area and to characterize ecological communities within the Project Area (see Figure 08-11).

The predominant ecological community present within the Project Area is cultivated agricultural lands (approximately 78 percent of the Project Area). Wetland areas (PFO, PSS, PEM, and PUB) cover approximately 15 percent of the Project Area. Although areas of forest occur within the Project Area, such areas either partially or completely reflect wetland conditions. For the purposes of this Application, the small amounts of upland deciduous early successional hardwood forest that are in close proximity to wetland features have been described as part of the wetland habitat. As noted previously, where Project activities are in proximity, more detailed delineation efforts are planned to further refine resource characteristics. The remaining 7 percent of the Project Area reflects developed areas such as residences/yards parking lots; paved and unpaved roads; railroads; and landscaped trees.

(i) Flora

Each of the vegetative communities identified within the Project Area are described below, and shown on Figure 08-11. Note that the streams and wetlands that lie within the bounds of the Wetland Survey Area are addressed in Section 4906-4-08(B)(1)(b) and in Appendix L.

Agricultural Fields

Agricultural crops within the Project Area consist primarily of corn (*Zea mays*), barley (*Hordeum* spp.) and soybeans (*Glycine max*). Although the type of crop in any given field may change seasonally, the general extent

of the cultivated area typically remains constant. Many of the fields and roadsides have human-made or modified ditches; shallow swales; and/or drain tiles to maintain proper drainage for optimal agricultural crop production. Roadside ditches are often vegetated with reed canary grass (*Phalaris arundinacea*), narrow-leaf cattail (*Typha angustifolia*), or various sedge species (*Carex* spp.), as would be expected for locations with water present during portions of the year. Other ditches lack vegetation or are vegetated with a mix of upland grasses, such as fescue species (*Festuca* spp.); perennial ryegrass (*Lolium perenne*); orchard grass (*Dactylis glomerata*); and/or Timothy grass (*Phleum pratense*). Typically, man-made swales located within agricultural fields follow localized topographical low spots and are underlain by installed drain tiles to ensure the proper field drainage. These swales are typically vegetated with a mix of upland grasses and forbs and appear to be mowed seasonally, which reduces development of woody vegetation. Most roadside ditches have banks covered in weedy species such as Canada goldenrod (*Solidago canadensis*), spotted knapweed (*Centaurea stoebe*); Queen Anne's lace (*Daucus carota*), common teasel (*Dipsacus fulonum*), and white old-field American aster (*Symphyotrichum pilosum*). The limited woody vegetation and shrub growth observed in these agricultural fields occurred exclusively along tree lines and hedgerows; typical species included: ash-leaf maple (*Acer negundo*), silver maple (*Acer saccharinum*), gray dogwood (*Cornus racemosa*), hawthorn species (*Crataegus* spp.), black cherry (*Prunus serotina*), pin oak (*Quercus*

palustris), and Eastern poison ivy (*Toxicodendron radicans*). A summary of vegetation observed within agricultural field habitat is provided in Table 08-4.

TABLE 08-4
VEGETATION RECORDED WITHIN AGRICULTURAL FIELD HABITAT

Row Crops		
Common Name	**Scientific Name**	**Strata**
Soy	*Glycine max*	Herb
Barley	*Hordeum spp.*	Herb
Cereal rye	*Secale cereale*	Herb
Wheat	*Triticum spp.*	Herb
Corn	*Zea mays*	Herb

Fallow Fields		
Common Name	**Scientific Name**	**Strata**
Ash-leaf maple	*Acer negundo*	Tree/Shrub
Silver maple	*Acer saccharinum*	Tree/Shrub
Bentgrass	*Agrostis spp.*	Herb
Field meadow foxtail	*Alopecurus pratensis*	Herb
Swamp milkweed	*Asclepias incarnata*	Herb
Common milkweed	*Asclepias syriaca*	Herb
Garden yellowrocket	*Barbarea vulgaris*	Herb
Smooth brome	*Bromus inermis*	Herb
Hairy bittercress	*Cardamine hirsuta*	Herb
Pointed broom sedge	*Carex scoparia*	Herb
Short's sedge	*Carex shortiana*	Herb
Squarrose sedge	*Carex squarrosa*	Herb
Common fox sedge	*Carex vulpinoidea*	Herb
Spotted knapweed	*Centaurea stoebe*	Herb
Chicory	*Cichorium intybus*	Herb
Canadian thistle	*Cirsium arvense*	Herb
Bull thistle	*Cirsium vulgare*	Herb
Devil's-darning-needles	*Clematis virginiana*	Herb
Gray dogwood	*Cornus racemosa*	Shrub
Hawthorn	*Crataegus* sp.	Tree/Shrub
Chufa	*Cyperus esculentus*	Herb

Fallow Fields		
Common Name	**Scientific Name**	**Strata**
Orchard grass	*Dactylis glomerata*	Herb
Queen Anne's lace	*Daucus carota*	Herb
Deer-tongue rosette grass	*Dichanthelium clandestinum*	Herb
Fuller's Teasel	*Dipsacus fullonum*	Herb
Large barnyard grass	*Echinochloa crus-galli*	Herb
Common spike-rush	*Eleocharis palustris*	Herb
Wildrye	*Elymus sp.*	Herb
Annual fleabane	*Erigeron annuus*	Herb
Fescue	*Festuca spp.*	Herb
Mother-of-the-evening	*Hesperis matronalis*	Herb
Lesser poverty rush	*Juncus tenuis*	Herb
Ox-eye daisy	*Leucanthemum vulgare*	Herb
Perennial ryegrass	*Lolium perenne*	Herb
Bird's-foot trefoil	*Lotus corniculatus*	Herb
Virginia jumpseed	*Persicaria virginiana*	Herb
Reed canary grass	*Phalaris arundinacea*	Herb
Common Timothy	*Phleum pratense*	Herb
English plantain	*Plantago lanceolata*	Herb
Great plantain	*Plantago major*	Herb
Bluegrass	*Poa spp.*	Herb
Common selfheal	*Prunella vulgaris*	Herb
Black cherry	*Prunus serotina*	Tree/Shrub
Littleleaf buttercup	*Ranunculus abortivus*	Herb
Pin oak	*Quercus palustris*	Tree/Shrub
Multiflora rose	*Rosa multiflora*	Herb
Allegheny blackberry	*Rubus allegheniensis*	Herb
Green-head coneflower	*Rudbeckia laciniata*	Herb
Curly dock	*Rumex crispus*	Herb
Bitter dock	*Rumex obtusifolius*	Herb
Tall fescue	*Schedonorus arundinaceus*	Herb
Wrinkle-leaf goldenrod	*Solidago rugosa*	Herb
Goldenrod	*Solidago sp.*	Herb
White oldfield American aster	*Symphyotrichum pilosum*	Herb
Dandelion	*Taraxacum officinale*	Herb
Eastern poison ivy	*Toxicodendron radicans*	Vine
Purpletop tridens	*Tridens flavus*	Herb
Red clover	*Trifolium pratense*	Herb
White clover	*Trifolium repens*	Herb

Fallow Fields		
Common Name	**Scientific Name**	**Strata**
Narrow-leaf cattail	*Typha angustifolia*	Herb
Navel cornsalad	*Valerianella umbilicata*	Herb
Simpler's-joy	*Verbena hastata*	Herb
Wingstem	*Verbesina alternifolia*	Herb
Cow vetch	*Vicia cracca*	Herb

Palustrine Forested, Scrub-Shrub, and Emergent Wetland Areas

Wetlands identified within the Wetland Survey Area consist of PFO, PSS, PEM, and PUB habitats; similar habitats occur throughout the Project Area.

The deciduous forest within the Project Area is either completely PFO wetland or a mosaic of PFO wetland and upland deciduous successional hardwood forest. Forested areas within the Project Area are limited to isolated woodlots between crop areas and along roads and field edges. Although some forest patches are as large as 150 acres, the majority of patches within the Project Area range from 1 acre to 50 acres. Overstory vegetation in the forested areas commonly consists of silver maple; shellbark hickory (*Carya laciniosa*); pin oak; American beech (*Fagus grandifolia*); shagbark hickory (*Carya ovata*); and American elm (*Ulnus americana*). Understory and herbaceous vegetation generally consists of ash-leaf maple, American elm, Northern spicebush (*Lindera benzoin*), Eastern poison ivy, sensitive fern (*Onoclea sensibilis*), stinging nettle (*Urtica diocia*), reed canary grass, and various sedge species. Aggressive weedy species such as ground ivy (*Glechoma hederacea*), Japanese

honeysuckle *(Lonicera japonica*), pokeweed (*Phytolacca americana*), and Eastern poison ivy often occur along woodlot edges.

PSS wetlands typically occur in riparian habitats located along streams, and vegetation within these wetlands generally consists of black willow (*Salix nigra*), black elder (*Sambucus nigra*), and shrub-sized American elm and American sycamore (*Platanus occidentalis*).

The PEM wetlands generally occur in localized depressions within the agricultural fields, along riparian corridors, and on the edges of forested wetland areas. Vegetation within these wetlands generally consists of some row crop vegetation (corn or soy), reed canary grass, tall fescue, cattail (*Typha* spp.), sensitive fern, and various sedge species.

The PUB wetlands all correspond to existing farm ponds and have unconsolidated bottoms with little to no vegetation.

A summary of vegetation observed within wetland habitat is provided in Table 08-5.

TABLE 08-5
VEGETATION RECORDED WITHIN WETLAND HABITAT

Palustrine Forested, Scrub-Shrub, and Emergent Wetland Areas		
Common Name	**Scientific Name**	**Strata**
Ash-leaf maple	*Acer negundo*	Tree/Shrub
Red maple	*Acer rubrum*	Tree/Shrub
Silver maple	*Acer saccharinum*	Tree/Shrub
Sugar maple	*Acer saccharum*	Tree/Shrub
Single-vein sweetflag	*Acorus calamus*	Herb
White snakeroot	*Ageratina altissima*	Herb
Black bent	*Agrostis gigantea*	Herb
Tree-of-heaven	*Ailanthus altissima*	Tree/Shrub
Garlic-mustard	*Alliaria petiolata*	Herb

Palustrine Forested, Scrub-Shrub, and Emergent Wetland Areas		
Common Name	**Scientific Name**	**Strata**
European alder	*Alnus glutinosa*	Tree/Shrub
Field meadow foxtail	*Alopecurus pratensis*	Herb
Large sweet vernal grass	*Anthoxanthum odoratum*	Herb
Indian-hemp	*Apocynum cannabinum*	Herb
Jack-in-the-pulpit	*Arisaema triphyllum*	Herb
Paper birch	*Betula papyrifera*	Tree/Shrub
Gray birch	*Betula populifolia*	Tree/Shrub
Smooth brome	*Bromus inermis*	Herb
Fringed sedge	*Carex crinita*	Herb
Limestone-meadow sedge	*Carex granularis*	Herb
Gray's sedge	*Carex grayi*	Herb
Greater bladder sedge	*Carex intumescens*	Herb
Hop sedge	*Carex lupulina*	Herb
Shallow sedge	*Carex lurida*	Herb
Rosy sedge	*Carex rosea*	Herb
Pointed broom sedge	*Carex scoparia*	Herb
Short’s sedge	*Carex shortiana*	Herb
Squarrose sedge	*Carex squarrosa*	Herb
Stalk-grain sedge	*Carex stipata*	Herb
Twisted sedge	*Carex torta*	Herb
Common fox sedge	*Carex vulpinoidea*	Herb
Bitter-nut hickory	*Carya cordiformis*	Tree/Shrub
Pignut hickory	*Carya glabra*	Tree/Shrub
Shell-bark hickory	*Carya laciniosa*	Tree/Shrub
Shag-bark hickory	*Carya ovata*	Tree/Shrub
Chicory	*Cichorium intybus*	Herb
Poison-hemlock	*Conium maculatum*	Herb
Silky dogwood	*Cornus amomum*	Shrub
Flowering dogwood	*Cornus florida*	Tree/Shrub
Hawthorn	*Crataegus sp.*	Tree/Shrub
Chufa	*Cyperus esculentus*	Herb
Orchard grass	*Dactylis glomerata*	Herb
Queen Anne’s lace	*Daucus carota*	Herb
Deer-tongue rosette grass	*Dichanthelium clandestinum*	Herb
Fuller’s teasel	*Dipsacus fullonum*	Herb
Large barnyard grass	*Echinochloa crus-galli*	Herb
Common spike-rush	*Eleocharis palustris*	Herb
Tall scouring-rush	*Equisetum hyemale*	Herb

Palustrine Forested, Scrub-Shrub, and Emergent Wetland Areas		
Common Name	**Scientific Name**	**Strata**
Meadow horsetail	*Equisetum pratense*	Herb
American beech	*Fagus grandifolia*	Tree/Shrub
Green ash	*Fraxinus pennsylvanica*	Tree/Shrub
White avens	*Geum canadense*	Herb
Ground ivy	*Glechoma hederacea*	Herb
Honey-locust	*Gleditsia triacanthos*	Tree/Shrub
Floating manna grass	*Glyceria septentrionalis*	Herb
Soy	*Glycine max*	Herb
Common velvet grass	*Holcus lanatus*	Herb
Spotted touch-me-not	*Impatiens capensis*	Herb
Pale-yellow iris	*Iris pseudacorus*	Herb
Black walnut	*Juglans nigra*	Tree/Shrub
Lamp rush	*Juncus effusus*	Herb
Lesser poverty rush	*Juncus tenuis*	Herb
Rice cut grass	*Leersia oryzoides*	Herb
Northern spicebush	*Lindera benzoin*	Shrub
Sweet-gum	*Liquidambar styraciflua*	Tree/Shrub
Tuliptree	*Liriodendron tulipifera*	Tree/Shrub
Morrow's honeysuckle	*Lonicera morrowi*	Shrub
Japanese honeysuckle	*Lonicera japonica*	Herb
Twinsisters	*Lonicera tatarica*	Shrub
Creeping-Jenny	*Lysimachia nummularia*	Herb
Sensitive fern	*Onoclea sensibilis*	Herb
Golden groundsel	*Packera aurea*	Herb
Virginia-creeper	*Parthenocissus quinquefolia*	Herb
Virginia jumpseed	*Persicaria virginiana*	Herb
Reed canary grass	*Phalaris arundinacea*	Herb
Common Timothy	*Phleum pratense*	Herb
American pokeweed	*Phytolacca americana*	Herb
English plantain	*Plantago lanceolata*	Herb
American sycamore	*Platanus occidentalis*	Tree/Shrub
Mayapple	*Podophyllum peltatum*	Herb
Eastern cottonwood	*Populus deltoides*	Tree/Shrub
Oldfield cinquefoil	*Potentilla simplex*	Herb
Black cherry	*Prunus serotina*	Tree/Shrub
Northern white oak	*Quercus alba*	Tree/Shrub
Swamp white oak	*Quercus bicolor*	Tree/Shrub
Pin oak	*Quercus palustris*	Tree/Shrub

Palustrine Forested, Scrub-Shrub, and Emergent Wetland Areas		
Common Name	**Scientific Name**	**Strata**
Northern red oak	*Quercus rubra*	Tree/Shrub
Cursed buttercup	*Ranunculus sceleratus*	Herb
Staghorn sumac	*Rhus typhina*	Tree/Shrub
Multiflora rose	*Rosa multiflora*	Herb
Allegheny blackberry	*Rubus allegheniensis*	Herb
Green-head coneflower	*Rudbeckia laciniata*	Herb
Curly dock	*Rumex crispus*	Herb
Pussy willow	*Salix discolor*	Tree/Shrub
Sandbar willow	*Salix interior*	Shrub
Black willow	*Salix nigra*	Tree/Shrub
Black elder	*Sambucus nigra*	Shrub
Tall fescue	*Schedonorus arundinaceus*	Herb
Dandelion	*Taraxacum officinale*	Herb
Eastern poison ivy	*Toxicodendron radicans*	Vine
Red clover	*Trifolium pratense*	Herb
White clover	*Trifolium repens*	Herb
Narrow-leaf cattail	*Typha angustifolia*	Herb
Broad-leaf cattail	*Typha latifolia*	Herb
American elm	*Ulmus americana*	Tree/Shrub
Slippery elm	*Ulmus rubra*	Tree/Shrub
Stinging nettle	*Urtica dioica*	Herb
Navel cornsalad	*Valerianella umbilicata*	Herb
Simpler's-joy	*Verbena hastata*	Herb
Wingstem	*Verbesina alternifolia*	Herb
Rough cocklebur	*Xanthium strumarium*	Herb

Developed Areas

Scattered throughout the Project Area are buildings (e.g., homes, garages, barns); parking lots; paved and unpaved roads; railroads; and landscaped areas. Vegetation in these areas is generally either lacking or highly managed (i.e., ornamental plantings and managed lawns). In areas that are not intensely managed, various upland grasses and weedy

herbaceous species such as: dandelion (*Taraxacum officinale*); ground ivy; ragweed (*Ambrosia artemesifolia*); clover (*Trifolium* spp.); and common purslane (*Portulaca oleracea*) were commonly observed. A summary of vegetation observed within developed areas is provided in Table 08-6.

TABLE 08-6
VEGETATION RECORDED WITHIN DEVELOPED HABITAT

Developed Areas		
Common Name	**Scientific Name**	**Strata**
Ash-leaf maple	*Acer negundo*	Tree/Shrub
Norway maple	*Acer platanoides*	Tree/Shrub
Red maple	*Acer rubrum*	Tree/Shrub
Silver maple	*Acer saccharinum*	Tree/Shrub
Sugar maple	*Acer saccharum*	Tree/Shrub
Common yarrow	*Achillea millefolium*	Herb
Ohio buckeye	*Aesculus glabra*	Tree/Shrub
Common ragweed	*Ambrosia artemesifolia*	Herb
Common milkweed	*Asclepias syriaca*	Herb
Garden yellowrocket	*Barbarea vulgaris*	Herb
Paper birch	*Betula papyrifera*	Tree/Shrub
Gray birch	*Betula populifolia*	Tree/Shrub
Bitter-nut hickory	*Carya cordiformis*	Tree/Shrub
Shag-bark hickory	*Carya ovata*	Tree/Shrub
Northern catalpa	*Catalpa speciosa*	Tree/Shrub
Chicory	*Cichorium intybus*	Herb
Flowering dogwood	*Cornus florida*	Tree/Shrub
Hawthorn	*Crataegus sp.*	Tree/Shrub
Chufa	*Cyperus esculentus*	Herb
Orchard grass	*Dactylis glomerata*	Herb
Queen Anne’s lace	*Daucus carota*	Herb
Fuller's teasel	*Dipsacus fullonum*	Herb
Annual fleabane	*Erigeron annuus*	Herb
Fescue	*Festuca spp.*	Herb
White ash	*Fraxinus americana*	Tree/Shrub
White avens	*Geum canadense*	Herb
Ground ivy	*Glechoma hederacea*	Herb
Honey-locust	*Gleditsia triacanthos*	Tree/Shrub
Mother-of-the-evening	*Hesperis matronalis*	Herb

Developed Areas		
Common Name	**Scientific Name**	**Strata**
Common velvet grass	*Holcus lanatus*	Herb
Pale-yellow iris	*Iris pseudacorus*	Herb
Black walnut	*Juglans nigra*	Tree/Shrub
Ox-eye daisy	*Leucanthemum vulgare*	Herb
Sweet-gum	*Liquidambar styraciflua*	Tree/Shrub
Tuliptree	*Liriodendron tulipifera*	Tree/Shrub
Bird's-foot trefoil	*Lotus corniculatus*	Herb
Creeping-Jenny	*Lysimachia nummularia*	Herb
Common Timothy	*Phleum pratense*	Herb
Eastern white pine	*Pinus strobus*	Tree/Shrub
English plantain	*Plantago lanceolata*	Herb
Great plantain	*Plantago major*	Herb
Bluegrass	*Poa spp.*	Herb
Common purslane	*Portulaca oleracea*	Herb
Oldfield cinquefoil	*Potentilla simplex*	Herb
Black cherry	*Prunus serotina*	Tree/Shrub
Northern red oak	*Quercus rubra*	Tree/Shrub
Rambler rose	*Rosa multiflora*	Herb/Shrub
Allegheny blackberry	*Rubus allegheniensis*	Shrub
Common red raspberry	*Rubus idaeus*	Shrub
Pussy willow	*Salix discolor*	Tree/Shrub
Black willow	*Salix nigra*	Tree/Shrub
Black elder	*Sambucus nigra*	Tree/Shrub
Tall fescue	*Schedonorus arundinaceus*	Herb
Dandelion	*Taraxacum officinale*	Herb
Eastern poison ivy	*Toxicodendron radicans*	Vine
Red clover	*Trifolium pratense*	Herb
White clover	*Trifolium repens*	Herb

Species of Commercial or Recreational Value

Impacts to agricultural or commodity plants impacted by the Project will be compensated for through agreements with individual landowners. The only commercial plant species (other than those in managed agricultural areas) known to have the potential to occur within 0.25-mile of the Project is American ginseng (*Panax quinquefolia*), which could occur

in low numbers in area woodlots. It is a slow-growing perennial herb that grows in deciduous forests; American ginseng has no state or federal status. It can be found throughout Ohio, but its populations are often small and scattered. This species has been documented in Seneca County (USDA NRCS 2016). American ginseng has long been valued for the medicinal qualities of its roots, which are often harvested and sold to dealers who must hold a Ginseng Dealer Permit from ODNR. Ginseng harvesting is enforced by ODNR, with a digging season that extends from September 1 through December 31 each year, in order to prevent overharvesting. Because no Ginseng Dealer Permit holders are located in Seneca County, ginseng harvesting may not be a common pursuit in the area.

Special-Status Species

No federally-listed plant species have been identified by USFWS within the Project Area. Based on ODNR records for state-listed species, there are four state endangered, three state threatened, and seven state potentially threatened plant species known to occur in Seneca County. The state status and general habitat requirements for each are summarized in Table 08-7.

TABLE 08-7
STATE-LISTED PLANT SPECIES

Common Name	Scientific Name	General Habitat	Ohio Status
Swamp birch	*Betula pumila*	Open and forested wetlands	Threatened
Broad-winged sedge	*Carex alata*	Wet, marshy areas	Potentially Threatened

Common Name	Scientific Name	General Habitat	Ohio Status
Bebb's sedge	*Carex bebbii*	Meadows and fields, shores of rivers or lakes, swamps	Potentially Threatened
Little yellow sedge	*Carex cryptolepis*	Shores of rivers or lakes, edges of wetlands	Potentially Threatened
Slender sedge	*Carex lasiocarpa*	Fens, lakes or ponds, marshes, shores of rivers or lakes	Potentially Threatened
Northern bearded sedge	*Carex pseudocyperus*	Sunny wet areas	Endangered
Little green sedge	*Carex viridula*	Sunny wet areas	Threatened
White lady's slipper	*Cyoripedium candidum*	Sunny wet areas with basic substrates	Endangered
Engleman's spike-rush	*Eleocharis engelmannii*	Mudflats, lake and pond edges	Endangered
Few-flowered spike-rush	*Eleocharis quinquefolora*	Open, wet, calcareous sites	Threatened
American reed grass	*Phragmites australis ssp. americanus*	Brackish or salt marshes and flats, fens, fresh tidal marshes or flats, shores of rivers or lakes	Potentially Threatened
Grass-like pondweed	*Potamogeton gramineus*	Lakes, ponds, streams	Endangered
White beak-rush	*Rhynchospora alba*	Bogs, fens, edges of wetlands	Potentially Threatened
Shining ladies'-tresses	*Spiranthes lucida*	Man-made or disturbed habitats, meadows and fields, in rivers or streams, shores of rivers or lakes	Potentially Threatened

As shown in Table 08-7, the majority of state-listed plant species in Seneca County occur in wetland habitats, which have been largely avoided by the Project. None of the identified species were observed during field surveys conducted for the Project.

(ii) Fauna

Detailed investigations for birds and bats within the Project Area have been undertaken in consultation with USFWS and ODNR, as further

discussed in Section 4906-4-8(B)(1)(e). Other wildlife resources anticipated to occur within 0.25-mile of the Project Area are discussed in the sections below.

Mammals

It is anticipated that mammal species likely to occur in the area include white-tailed deer (*Odocoileus virginianus*); Eastern cottontail rabbit (*Sylvilagus floridanus*); Eastern chipmunk (*Tamias striatus*); coyote (*Canis latrans*); red fox (*Vulpes vulpes*); raccoon (*Procyon lotor*); Virginia opossum (*Didelphis virginiana*); woodchuck (*Marmota monax*); Eastern gray squirrel (*Sciurus carolinensis*); Eastern fox squirrel (*Sciurus niger*); striped skunk (*Mephitis mephitis*); American beaver (*Castor canadensis*); common muskrat (*Ondatra zibethicus*); American mink (*Mustela vison*); long-tailed weasel (*Mustela frenata*); big brown bat (*Eptesicus fuscus*); little brown bat (*Myotis lucifugus*); Indiana bat *(Myotis sodalis*); northern long-eared bat *(Myotis septentrionalis*); eastern red bat (*Lasiurus borealis*); hoary bat (*Lasiurus cinereus*); tri-colored bat (*Perimyotis subflavus*); evening bat (*Nycticeius humeralis*); and a variety of small mammals such as mice, moles, voles, and shrews.

Most of the mammal species likely to occur in the area are common and widely-distributed throughout Ohio. However, Indiana bat is both state- and federally listed as endangered, while northern long-eared bat is both state- and federally-listed as threatened. Bat studies completed for the Project are discussed in Section 4906-4-08(B)(1)(e).

Amphibians and Reptiles

Reptiles and amphibians expected to be present within the Project Area include small-mouth salamander (*Ambystoma texanum*), red-backed salamander (*Plethodon cinereus*), American toad (*Bufo americanus*); Fowler's toad (*Bufo fowleri*), Blanchard's cricket frog (*Acris crepitans*), spring peeper (*Pseudacris crucifer*), western chorus frog (*Pseudacris triseriata*), gray treefrog (*Hyla versicolor*), bullfrog (*Rana catesbeiana*), green frog (*Rana clamitans*), snapping turtle (*Clelydra serpentina*), midland painted turtle (*Chrysemys picta*), Eastern garter snake (*Thamnophis sirtalis*), common water snake (*Nerodia sipedon*), and Eastern milksnake (*Lampropeltis triangulum*). Most of the amphibian and reptile species likely to occur in the area are generally common and widely distributed throughout Ohio.

Aquatic Species

Fish species likely to occur in appropriate waterbodies within the Project Area include bigeye chub (*Notropis amblops*), black bullhead (*Ameiurus melas*), blacknose dace (*Rhinichthys atratulus*), blackside darter (*Percina maculata*), bluntnose minnow (*Pimephales notatus*), bluegill (*Lepomis macrochirus*), brown bullhead (*Ictalurus nebulosus*), common shiner (*Luxilus cornutus*), central mudminnow (*Umbra limi*), central stoneroller (*Campostoma anomalum*), creek chub (*Semotilus atromaculatus*), fathead minnow (*Pimephales promelas*), fantail darter (*Etheostoma flabellare*), golden shiner (*Notemigonus crysoleucas*), grass

pickerel (*Esox americanus*), green sunfish (*Lepomis cyanellus*), greenside darter (*Etheostoma blennioides*), Johnny darter (*Etheostoma nigrum*), largemouth bass (*Micropterus salmoides*), northern hogsucker (*Hypentelium nigricans*), pumpkinseed (*Lepomis gibbosus*), redfin shiner (*Lythrurus umbratilis*), rock bass (*Ambloplites rupestris*), sand shiner (*Notropis stramineus*), silverjaw minnow (*Notropis buccatus*), spotfin shiner (*Cyprinela spiloptera*), striped shiner (*Luxilus chrysocephalus*), white sucker (*Catostomus commersoni*), and yellow bullhead (*Ameiurus natalis*).

Mollusk species likely to occur in appropriate waterbodies within the Project Area boundary include creek heelsplitter (*Lasmigona compressa*), cylindrical papershell (*Anodontiodes ferussacianus*), fatmucket (*Lampsilis radiata*), giant floater (*Pyganodon grandis*), long fingernailclam (*Musculium transversum*), slippershell mussel (*Alasmidonta viridis*), striated fingernail clam (*Sphaerium striatinum*), and threehorn wartyback (*Obliquaria reflexa*).

Crayfish species likely to occur within appropriate waterbodies in the Project Area include big water crayfish (*Cambarus robustus*), devil crayfish (*Cambarus diogenes*), digger crayfish (*Fallicambarus fodiens*), Great Lakes crayfish (*Orconectes propinquus*), Ortmann's mudbug (*Cambarus ortmanni*), paintedhand mudbug (*Cambarus polychromatus*), papershell crayfish (*Orconectes immunis*), rusty crayfish (*Orconectes*

rusticus), Sanborn's crayfish (*Orconectes sanbornii*), and white river crayfish (*Procambarus acutus*).

These aquatic species are generally common and widely distributed throughout Ohio, although certain species are state-listed. Because the Project will avoid work in substantial waterbodies through the use of subsurface installation techniques, where necessary, no impact to aquatic species is anticipated.

Commercial and Recreational Species

Commercial species consist of those trapped or hunted for fur. The ODNR regulates the hunting and trapping of the following furbearers in Seneca County: common muskrat, raccoon, red fox, gray fox (*Urocyon cinereoargenteus*), coyote, American mink, Virginia opossum, striped skunk, long-tailed weasel, and American beaver.

Recreational species consist of those hunted as game. The ODNR regulates the hunting of the following species in Seneca County: white-tailed deer, gray squirrel, red squirrel (*Sciurus vulgaris*), fox squirrel, cottontail rabbit (*Sylvilagus* sp.), woodchuck, wild turkey (*Meleagris gallopavo*), ring-necked pheasant (*Phasianus colchicus*), American crow (*Corvus brachyrhynchos*), mourning dove (*Zenaida macroura*), and various waterfowl.

Red fox, white-tailed deer, gray squirrel, red squirrel, cottontail rabbit, woodchuck, striped skunk, Virginia opossum, American crow, mourning dove, and various waterfowl were observed while conducting

field reconnaissance in the Project Area. Racoon, coyote, beaver, and wild turkey are expected to be present within the Project Area, as field indicators, such as scat and tracks, were observed.

Listed Species

Based upon consultation of the USFWS' Information Consultation and Planning online tool, no National Wildlife Refuges, fish hatcheries, or designated critical habitats are located within the Project Area. Consultation with the USFWS and ODNR has occurred to define surveys Seneca Wind has conducted that are focused on bat and bird species, as discussed below.

(e) Additional Ecological Studies

The following is a summary of the methodology and results of the various wildlife surveys specifically completed or ongoing in association with the Project. Survey methodology was developed in accordance with the ODNR On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocols for Commercial Wind Energy Facilities in Ohio (ODNR 2009), the USFWS Land-Based Wind Energy Guidelines (USFWS 2012), and USFWS Eagle Conservation Plan Guidance (USFWS 2013). Copies of relevant studies are provided in Appendix N.

(i) Completed Bat Mist-Net and Telemetry Surveys

In 2009, Civil & Environmental Consultants, Inc. (CEC) completed a mist-net survey to determine the presence or probable absence of the Indiana bat and to document the overall composition of bat species in the Project Area (Appendix N-1). CEC completed 15 mist-net site surveys from

July 6 through 29, 2009. At each mist-net site, four net sets were erected and monitored for two nights each, resulting in 120 total net-nights for the study. The mist-net survey resulted in the capture of 399 bats at 15 mist net sites over 120 net-nights. Almost three-quarters of the bats captured were big brown bat (40.1 percent) and little brown bat (33.3 percent). Northern long-eared bat (15.5 percent) and eastern red bat (7.3 percent) were captured less frequently, while hoary bat (2.5 percent) and tri-colored bat (0.8 percent) were captured infrequently. No Indiana bats were captured during the survey; however, 62 federally threatened northern long-eared bats were captured during the survey.

In 2016, Western EcoSystems Technology, Inc. (WEST) completed presence/probable absence mist-net surveys for federally or state-listed bat species at the Project Area (Appendix N-2) in accordance with the ODNR Guidelines and the USFWS *2016 Range-Wide Indiana Bat Summer Survey Guidelines* (USFWS 2016), which, in addition to Indiana bats, is also approved by the USFWS to determine presence/probable absence of northern long-eared bats.

A total of 468 net-nights at 52 sites were surveyed to meet ODNR and USFWS guidelines. Surveys were completed between July 2 and June 24, 2016. A total of 651 bats were captured at 50 sites, including: 483 big brown bats, 144 eastern red bats, 19 hoary bats, two little brown bats, and one northern long-eared bat. The single non-reproductive female northern long-eared bat was fitted with a transmitter and foraging areas were

documented each night for the life of the transmitter; six full nights and one partial night of telemetry surveys were completed before transmitter failure. Based on the telemetry surveys, seven roost locations were located on parcels of land that were not under lease during surveys.

(ii) Completed Passive Bat Acoustic Surveys

In 2009, Applied Ecological Services (AES) completed passive bat acoustic monitoring using broadband acoustic detectors;[5] documentation of this survey can be found in Appendix N-3. These AnaBat detectors record the frequency of bat echolocation calls over time to compact flash cards. Detectors were calibrated and mounted on two communication towers located on private land near Tiffin, Ohio. Each tower was equipped with two detectors, installed at 5 m (16.4 feet) and 55 m (180.4 feet) above ground level. The 55-m (180.4-foot) height of the upper microphone was in the lower portion of the rotor-swept area of turbines likely to be installed at the Project. One microphone for each detector was placed in a waterproof casing[6] with a detector plate positioned at 45 degrees to reduce lower elevation noises. All microphones were positioned to face due north, opposite the prevailing wind direction. Each microphone was connected with a Teflon extension cable to the detector/recording system, which was housed at ground level in a weatherproof box. The detectors were powered by a 12-volt battery, recharged daily by a 10-watt solar panel attached to the

[5] AnaBat SD-1 zero-crossing ultrasonic detectors, Titley Electronics Pty Ltd, Ballina, NSW Australia.
[6] Bat-hat; EME Systems, Berkeley, California, USA.

tower at ground level. The detectors were programmed to record calls from between the hours of 1800 to 0600 daily from March 27 to November 19, 2009.

Downloaded bat calls were placed in labeled folders for analysis. A bat call was a series of ≥2 echolocation calls with duration of ≥10 milliseconds. Each call file was visually inspected to determine whether it was a bat pass. Bat passes were then identified to species, comparing minimum frequency and call shape to a library of vocal signatures. *Myotis* were identified only to genus level due to the difficulty in differentiating between species. Unidentifiable calls were labeled as being produced by high (≥35 kiloHertz [kHz]) or low (<35kHz) echolocating bats based on their minimum frequency. Once final analyses were made, data were sent to Dr. Allen Kurta at Eastern Michigan University for verification. To determine relative activity at a monitoring location, it is necessary to quantify the number of bat calls or call sequences per unit time. For individual species, the bat activity was calculated as the number of bat call files per night for each of the two microphone elevations.

During 238 consecutive survey nights, 3,022 bat calls were recorded. Bat activity was variable throughout the study period. Big brown bat was the most recorded bat species, followed by hoary bat, eastern red bat, tri-colored bat, and unidentified *Myotis*. No *Myotis* bats were identified to species.

(iii) Completed Large Bird/Eagle Use Surveys

In 2009, AES completed diurnal large bird and raptor migration surveys during spring and fall migration (also documented in Appendix N-3). Two diurnal bird/raptor migration fixed-points were selected based on good visibility and to provide geographic coverage. The surveys were conducted three days a week from March 15 to May 1, 2009 and September 1 to October 31, 2009. During spring, 118.5 hours of observation were completed and, during fall, 138 hours of observation were completed. Twenty unique species were identified, with turkey vulture (*Cathartes aura*; 76 percent) comprising most observations. Bald eagles (*Haliaeetus leucocephalus*) were recorded very rarely (less than one percent of all surveys) during surveys totaling 12 minutes of observation.

From 2016 to 2017, WEST completed large bird surveys to provide information on eagle and other large bird use of the Project area during all four seasons (Appendix N-4). Fixed-point large bird use surveys were conducted from August 16, 2016 through August 15, 2017 at 28 points established throughout the Project Area. A total of 2,758 birds were observed within 1,024 separate groups during the 359 60-minute surveys. Twenty-one unique species were observed; four species represented 74.9 percent of all observations and included: turkey vulture, Canada goose (*Branta canadensis*), mourning dove (*Zenaida macroura*), and American crow (*Corvus brachyrhynchos*). A total of 295 diurnal raptors, including eight species, were recorded during surveys. The most common raptor

observed in the Project Area was red-tailed hawk (*Buteo jamaicensis*; 130 observations), which was also the raptor species with the highest exposure index (0.21), a relative measure of species-specific risk of turbine collision accounting for the proportion of all initial flight height behaviors, but not for other possible collision risk factors, such as foraging or courtship behavior.

During surveys, 79 bald eagle (federally protected by the Bald and Golden Eagle Protection Act) observations were recorded. Bald eagles had the highest use of any diurnal raptor during the fall (0.31 birds/60-minute survey), and were also observed during the other three seasons with mean use ranging from 0.10 to 0.15 birds/plot/60-minute survey. In addition, 40 bald eagle observations were recorded incidental to the surveys. Incidental observations of bald eagle are a tally of all observations recorded between the large bird surveys and passerine migration surveys (discussed below). One state-listed endangered bird species, northern harrier (*Circus cyaneus*; 14 observations), was observed during surveys or incidentally primarily during the winter, spring, and fall. No nesting northern harriers were observed in the Project Area.

(iv) Completed Passerine Migration Surveys

In 2009, AES conducted passerine migration surveys to estimate the temporal and overall rate of use of the combined forest, shrub, and wooded wetland habitats in the Project Area by passerines during the spring and fall migration seasons (documented in Appendix N-3). Passerine migration

surveys were conducted during spring and fall 2009 (April 1 to May 31, 2009, and August 15 to November 15, 2009). Twenty-two surveys were conducted at each of 15 survey points. Surveys were conducted weekly between dawn and 1000. Survey points were located in suitable, accessible, forested habitats and provided a reasonable geographic distribution of points throughout Project Area. Point-counts lasted for 10 minutes. A total of 126 unique species were identified. Three species – American robin (*Turdus migratorius*), red-winged blackbird (*Agelaius phoeniceus*), and European starling (*Sturnus vulgaris*) – comprised 45 percent of all individuals observed. Thirty-four species identified were state-endangered, state-threatened, or an Ohio species of special concern.

In 2016 and 2017, WEST completed passerine migration surveys weekly during fall (August 17 – October 13, 2016) and spring (April 12 – May 31, 2017) (see Appendix N-5). Passerine migration surveys consisted of 10-minute counts at each point, in which all birds seen or heard within 200 m (656 feet) of the surveyor were recorded. Due to the scarcity of shrub/scrub or wooded wetland habitat, survey points were located along public roads adjacent to forested habitat.

A total of 8,114 individuals in 3,588 groups were observed during surveys, with passerines comprising the majority of birds observed. American robin, blue jay (*Cyannocitta cristata*), European starling, American goldfinch (*Spinus tristis*), red-winged blackbird, and brown-headed cowbird (*Molothrus ater*) were the most frequently observed species

during the study period. Mean use for the small birds group, which includes passerines, was higher in spring (18.88 birds/200-m/10-minute survey) than in fall (11.22 birds/200-m/10-minute survey), and small bird use was highest at survey point 10a (see Appendix N-5).

No federally or state-listed threatened or endangered species were observed during the 2017 passerine migration surveys; however, three state species of special concern – black vulture (*Coragyps atratus*), bobolink (*Dolichonyx oryzivorus*), and yellow-bellied sapsucker (*Sphyrapicus varius*) – and four state species of special interest – golden-crowned kinglet (*Regulus satrapa*), hermit thrush (*Catharus guttatus*), least flycatcher (*Empidonax minimus*), and red-breasted nuthatch (*Sitta canadensis*) – were recorded during surveys. All seven state special-status species were observed in limited numbers; bobolink (two groups of 10 individuals) and hermit thrush (nine groups of 10 individuals) were observed most often.

(v) Completed Raptor Nest Surveys

In 2009, AES completed raptor nest surveys on March 17 through 19 and March 24 through 26 (Appendix N-1). The Project Area and a 1-mile buffer were searched for nesting threatened and endangered raptors. One active and one inactive bald eagle nest were observed during the surveys. Two areas were identified as having potential northern harrier nesting activity; however, follow-up surveys documented no nesting activity.

In 2017, WEST completed a raptor nest survey (Appendix N-6) to identify raptor species nesting within 1.6 km (1 mile) of the Project Area

(consistent with USFWS guidance on Project surveys) that could be subject to disturbance and/or displacement effects from Project development and operation. One survey for raptor nests was conducted in late March and early April 2017. The survey effort focused on species that build large nest structures, such as bald eagle and red-tailed hawk. However, areas containing grassland were also surveyed for ground-nesting species, such as northern harriers.

During the 2017 survey, three active bald eagle nests, eight active red-tailed hawk nests, one active Cooper's hawk (*Accipiter cooperii*) nest, one great horned owl (*Bubo virginianus*) nest, and 17 inactive unknown raptor species nests were observed within the Project vicinity. An additional four active red-tailed hawk nests, one active great horned owl nest, and 13 inactive unknown raptor species nests were observed within the 1-mile buffer of the Project. The inactive unknown raptor species nests were likely constructed by red-tailed hawks, based on their size and the relative abundance of this species in the Project and the 1-mile buffer. However, the inactive nests could also have been used by other raptor species, such as Cooper's hawk or great horned owl. No northern harriers were observed during the raptor nest survey.

(vi) Completed Waterfowl Survey

In spring 2018, Shoener Environmental conducted waterfowl surveys per ODNR recommendations along the Honey Creek/Sandusky River and near the Silver Creek Wildlife Area from September 2017

through April 2018 (Appendix N-7). Each month, two surveys were completed at each of six points (four pre-existing large bird use/eagle use survey points, one new point along Honey Creek, and one point near the Silver Creek Wildlife Area). At the four pre-existing point locations, one of the two monthly surveys was conducted concurrently with the Year 2 eagle use surveys (described below).

A total of 293 individuals of 10 species were observed. No state- or federally-listed or non-listed species of concern were observed. Canada goose was the waterfowl species that had the greatest number of observations (248 individuals or 84.6 percent of all observations), followed by wood duck (*Aix sponsa*; 16 or 5.5 percent). Most (157 or 53.5 percent) of the observations were recorded in December. Point 12 had the highest number (107 or 36.5 percent) of waterfowl observations, followed by Point 25 (91 or 31.1 percent), although many of the observations at both points 12 and 25 were Canada geese flying over the Project. Point 29, located at the Silver Creek Wildlife Area, had the third-highest number of waterfowl observations (46 or15.7 percent), and the greatest diversity of the species.

(vii) Completed Nocturnal Marsh Bird Survey

In spring 2018, Shoener Environmental conducted nocturnal marsh bird surveys (Appendix N-8) to determine whether protected marsh bird species are present in the Project Area during the breeding season. A playback-response survey was conducted at six points within or adjacent to the Project Area weekly between May 20 and June 15, 2018. During

surveys, the calls of the following species were played, in the order below, for 30 seconds each, spaced by a 30-second silent "listening" period. Species include: least bittern (*Ixobrychus exilis*), sora (*Porzana carolina*), Virginia rail (*Rallus limicola*), king rail (*Rallus elegans*), and American bittern (*Botaurus lentiginosus*). During the playback and listening periods, the biologist listened for responses by individuals of any of the aforementioned species. The number of individuals, by species, responding to each sequence was recorded.

A total of 15 birds were observed during the surveys. Species observed included 8 mallard (*Anas platyrhynchos*), 5 great blue heron (*Ardea herodias*), 1 sora, and 1 great egret (*Ardea alba*). Of the species observed during the surveys, only the sora and great egret are listed as state species of special concern.

(viii) Ongoing Year 2 Large Bird/Eagle Use Surveys

Shoener Environmental is continuing large bird/eagle use surveys from August 2017 to August 2018 at 28 survey points. Surveys are following the same methodology as Year 1 surveys.

(ix) Ongoing Passive Bat Acoustic Survey

In 2017, Shoener Environmental initiated passive bat acoustic surveys to monitor bat activity at each Project meteorological tower location using a microphone deployed at 5 m and another deployed in the rotor swept

zone (approximately 50 m). One bat detector system[7] was deployed at the single meteorological tower in August 2017 and bat activity was monitored through November 15, 2017 and again from March 15 through August 14, 2018. Monitoring of a second meteorological tower that was installed in the Project area in April 2018 was initiated on approximately May 18 and will continue through November 15, 2018.

File analysis is being conducted by a biologist experienced in identifying bats from acoustic recordings using SonoBat Version 4.2, with the Great Lakes Filter. Every acoustic file is first processed through the SonoBat Batch Scrubber application set to a "medium" setting. The medium setting "accepts all but poor quality calls; accepts noise with some tonal content." This application removes poor quality acoustic files that do not pass the "medium" setting constraints.

Acoustic files not removed by the Batch Scrubber application are being processed using the SonoBatch application. The SonoBatch application has been programmed to the following settings: maximum of eight calls considered per file; 0.60 acceptable call quality; 0.20 acceptable quality to tally passes; 0.99 decision threshold; and species determinations appended to filenames. The SonoBatch application classifies each acoustic file to species or as containing High (HiF) or Low (LoF) frequency calls, or as containing unidentifiable calls. Once the SonoBatch application is

[7] Wildlife Acoustics SM3BAT® detector, an external 12-volt battery, wires, a power control system, a 55-watt solar panel, two omnidirectional Wildlife Acoustics SMM-U1® microphones, microphone mounting posts, and a stock of maintenance equipment.

finished processing the files, the biologist manually vets the species determination for only those call files where a species name was appended.

For this study, a bat pass is defined as "a continuous series of at least two call notes produced by an individual bat with no pauses between call notes of more than one second." The number of bat passes is simply the number of acoustic files classified as containing calls for a given species over a given series of nights. The HiF, LoF, and total number of bat passes by species are being tallied for each night and each microphone height. The mean bat activity will be calculated in total and for each frequency class.

(x) Ongoing Eagle Nest Monitoring

In 2018, eagle nest monitoring is occurring at two active eagle nests where proposed turbines are located within 2.6 km (1.6 miles), which will document the eagles' spatial distribution and intensity of use associated with each nest. The data collected during eagle utilization surveys will be incorporated into the *Eagle Conservation Plan*, and will be intended to refine knowledge of use of particular areas to better inform turbine siting decisions and/or risk assessment.

Utilization distribution surveys are conducted in accordance with the USFWS Eagle Conservation Plan Guidance (USFWS 2013). This nest monitoring effort will include establishing one observation point where eagle movements from the nest will be observed. Surveys are being conducted twice per month from May 14 through July 31, 2018, and one visit in early August that coincides with the varying fledgling states to

document adult and fledgling flight patterns near the two nests. Each visit includes a 4-hour-long survey of each nest.

The data collected during utilization distribution surveys include flight directions, feeding behaviors and patterns, and general utilization of the Project Area. WEST biologists are recording all eagles seen during each survey, regardless of distance to the observer. Biologists are also recording the date, plot number, start and end time of observation period, number of individuals, sex and age class (if possible), and weather information (i.e., temperature, wind speed, wind direction, precipitation, and cloud cover).

For each eagle observation, biologists record behavior and habitat during each 1-minute interval the bird is within view, per agency guidance. Behavior categories include: soaring flight; flapping-gliding; hunting; kiting-hovering; swooping/diving at prey; swooping or diving in an antagonistic context with other bird species; perched; being mobbed; undulating/territorial flight; auditory and other (noted in comments). Habitat categories include: shrub, cropland grassland, forest/woodlot, riparian, rocky outcrop, open water, and other (noted in comments). Any unusual observations are noted during these surveys.

(2) Potential Construction Impact

(a) Ecological Resource Impact Evaluation

A key objective for Seneca Wind is to minimize wetland impact and tree clearing. Upon completion of the study provided in Appendix L, the Seneca Wind team examined areas where impact to woodlands and delineated wetlands would

occur using the work space assumptions reflected in Table 03-1, and refined the layout further to meet this objective. The turbines are sited in upland, open fields that lack diversity due to active agricultural use; no wetland impact or tree clearing is associated with the turbines themselves.

Temporary work space, access roads, and collector lines were scrutinized to optimize locations and consider designs that would reduce impacts to the greatest extent possible. This included use of HDD and/or overhead poles for collector lines when traversing woodlands and forested wetlands to span these areas and avoid disturbance, to the greatest extent practicable. As shown in Figure 08-10, the majority of aquatic resource and forest areas have been avoided.

Approximately 0.5-acre of temporary wetland impacts are expected. The temporary impacts are associated with turbine work space (Turbines 13, 27, and 42), as well as small impact areas associated with access roads (to Turbines 30 and 47; Turbine 59; Turbine 88; and Turbine 93). The work space is a temporary use, although would result in conversion from PFO to PSS habitat; permanent wetland fill is expected to be less than 0.1 acre.

Several temporary stream crossings may occur along the collector line routes; once installed, these areas would be restored to original conditions. Depending on each crossing's individual setting, these may be avoided (through the use of HDD or by spanning). It is expected that six crane walks will also require temporary stream crossings; many of these can be crossed with crane mats in a fairly short period of time. A total of 11 stream crossings have been identified in

associate with turbine access, with most reflecting a crossing distance of 20 linear feet or less in each location.

Estimates of tree clearing could range from a maximum of 13 acres (if all collector line corridors are cleared) to less than 5 acres. Note that, in each of these impact areas, more detailed delineations and optimization of work space will be conducted that could adjust the impacts further, with a continued goal of avoiding or minimizing tree clearing as well as wetland impact.

Where temporary wetland intrusion is necessary to facilitate construction, measures such as swamp mats will be used to reduce compaction and minimize impact. Potential indirect impacts to wetland and aquatic species will be avoided through the use of BMPs and erosion control measures such as filter sock and/or silt fencing. Approval will be obtained from the USACE under the NWP program prior to work in wetland areas.

Installation of buried electrical collector lines will use either open trench or HDD construction techniques, depending on the characteristics of the resource. Tree clearing that may be necessary will be consistent with USFWS seasonal restrictions. Any support poles, should aboveground collector lines be used, will be located outside of wetlands and other sensitive habitats. Where access roads must cross streams, impact to the stream channel will be minimized and provisions made to maintain adequate water flow.

Once construction is complete, temporarily-displaced wildlife is expected to recolonize the Project Area, and temporary impact areas will be restored. The

permanent footprint of the Project will be limited to less than 1 percent of the Project Area.

(b) Mitigation

The following mitigation measures are reflected in both siting/design as well as implementation in order to reduce impacts during construction:

- Impact Minimization Reflected in Project Design: Project components, including wind turbine generators, meteorological towers, and the substation have been sited to avoid wetlands and surface waters and to minimize the need for tree clearing. In addition, the number and overall impacts due to access road wetland and stream crossings were minimized by routing around wetlands and streams whenever practicable, and using existing crossings where they are available.
- Avoidance of Adverse Impact to Listed Species: Adverse impacts to endangered or threatened species are not expected. Preconstruction surveys have occurred and are ongoing, and mitigation programs will be developed to avoid significant impact to birds or bats. In addition, no significant construction-related impacts are expected to recreational or commercial species.
- Seasonal Restrictions: To avoid potential impact to listed bat species, the limited tree clearing will be completed between August 1 and March 31 if located within 150 feet of a documented northern long-eared bat roost; and between October 1 and March 31 if located within 2.5 miles

of a documented Indiana bat roost, or within 5 miles of a documented Indiana bat capture per USFWS requirements.

- Demarcation of Surface Waters: Surface waters and wetlands near work areas will be flagged for easy identification and avoidance by construction workers and equipment, except where impact will be specifically permitted.
- Stream Crossing Impact Minimization: Underground collector lines will be installed using techniques appropriate to each stream's size in order to minimize construction-related impacts to surface waters. In certain locations, this may involve the use of HDD. This widely-used trenchless technique allows installation without disturbance of the aquatic resource. Because, on occasion, HDD installations have inadvertently released non-toxic drilling fluids into the surface environment (known as a "frac out"), a Frac-Out Contingency Plan will be developed prior to implementation of use of HDD techniques. The plan will incorporate various measures, including: inspections, training, response procedures, ensuring appropriate containment materials are present, and implementation plans for prompt cleaning up of inadvertent releases.
- Sediment and Erosion Control: A SWPPP will be developed prior to initiating Project construction. The plan will detail temporary stormwater management features, as necessary, as well as silt fencing or other erosion control devices proposed to limit off-site transport of sediment. Plans associated with appropriate dewatering discharge,

including measures to limit erosive forces, will also be addressed. In addition, a Notice of Intent will be filed with the Ohio EPA for coverage under the NPDES General Construction Stormwater Permit.

- Dust and Particulate Control: During excavation and grading activities, dust may be generated as exposed soils dry. Water sprays or other non-toxic dust suppression methods will be employed on areas of exposed soils to minimize dust generation.
- Revegetation: Portions of the Project Area temporarily impacted by construction activities will be revegetated as soon as possible following completion of construction to stabilize exposed areas of soil. Species proposed for the seeding will be selected to ensure compatibility and suitability with surrounding agricultural areas. Outside of agricultural areas, temporarily-impacted areas will be revegetated with native plant species to prevent the spread of invasive species.
- Tree and Brush Disposal: Although the majority of Project-related activities will occur in agricultural fields, some limited tree clearing may be required. Trees cleared from the work area will be cut into logs and either left for the landowner or removed, while limbs and brush will be buried, chipped, or otherwise disposed of as directed by the landowner and as allowed under federal, state, and local regulations.

(3) Potential Operation and Maintenance Impact

(a) Ecological Resource Impact Evaluation

Operation of the Project is not expected to result in disturbance to plants, vegetative communities, wetlands, or surface bodies water with the exception of minor disturbance associated with routine maintenance and occasional repair activities. Because the Project components will be located on leased private land, it will not result in physical disturbance or impacts to recreational areas, parks, wildlife areas, nature preserves, or other conservation areas as identified in Section 4906-4-08(B)(1)(a), other than visibility (which is addressed in Sections 4906-4-08(D)(3) and (4).

Operational impacts to wildlife are expected to be limited to possible displacement of wildlife due to the presence of the operating wind turbines, and some level of avian and bat mortality as a result of collisions with the wind turbines. Additional information is provided below.

(i) Disturbance/Displacement

The developed footprint of the Project accounts for less than 1 percent of the Project Area, and is not expected to significantly disturb or displace wildlife. Although the operation of the wind turbines could affect wildlife use in the immediate proximity, studies of displacement at wind farms appear to indicate that, while impacts vary with different species, influence is typically relatively minor. Some study results are summarized below:

- At the Wolf Ridge wind farm in Cooke County, Texas, a 2014 study found no evidence of grassland bird displacement within 500 or 750 m (1,640 to 2,460 feet) during the first three breeding seasons following construction (Hale et al. 2014). However, an earlier study at this wind farm found displacement of the wintering Le Conte's sparrow up to 400 m (1,312 feet) from turbines (Stevens et al. 2013).
- At three operating wind energy facilities in North Dakota and South Dakota, grasshopper sparrow (*Ammodramus savannarum*) showed displacement effects in the areas adjacent to turbines, but western meadowlarks (*Sturnella neglecta*) did not (Johnson & Shaffer 2008). Most of the nine grassland bird species studied showed some displacement at least one of the three facilities, although vesper sparrow (*Pooecetes gramineus*) and killdeer (*Charadrius vociferous*) did not (Shaffer & Buhl 2016).
- At the Noble Wethersfield Windpark facility in western New York, bobolink showed an effect of turbine displacement following construction, with significantly fewer bobolinks within 75 m (246 feet) of turbines situated in hayfields, but savannah sparrows (*Passerculus sandwichensis*) did not show a significant difference in abundance based on distance from turbines (Kerlinger & Guarnaccia 2010).

- At the Stateline facility in Oregon and Washington, horned lark (*Eromophila alpestris*) and savannah sparrow showed increased usage post-construction, while grasshopper sparrow and western meadowlark showed decreased use within 50 m (164 feet) of turbine strings; areas further away from turbines did not exhibit reduced bird use (Erickson et al. 2004).
- At the Buffalo Ridge facility in Minnesota, overall bird density was lower within 80 m (262 feet) of wind turbines, but at distances of 180 m (590 feet) from the turbines, bird density did not differ from grasslands with no turbines (Leddy et al. 1999). Leddy at al. (1999) specifically recommended that wind turbines be placed within cropland to reduce displacement impacts to grassland passerines. Given that the Project turbines will be located within cultivated croplands as opposed to grasslands, birds using these areas are generally common and accustomed to disturbance. Therefore, displacement effects to grassland birds are not expected.

The potential impacts of the Project on waterfowl, including foraging Canada geese, are not expected to be significant, even though migrating waterfowl can be expected to forage in the farm fields in the vicinity of the Project Area. This has been demonstrated at facilities such as the Top of Iowa Wind Farm (Worth County, Iowa), where the high level of use by waterfowl (over 1.5 million duck and goose use-days per year) was

not affected by presence of the wind turbines (Koford et al. 2005). Another study, at the Buffalo Ridge facility in Minnesota (Johnson et al. 2000), found the abundance of several bird types – including shorebirds and waterfowl – significantly lower with the turbines in place, but concluded that the area of reduced use was limited primarily to within 100 m (328 feet) of the turbines. Therefore, the Project is not anticipated to have a significant, long-term displacement effect on resident or migrating waterfowl.

Non-avian species are expected to quickly habituate to wind turbine presence as they are typically common resident species adapted to agricultural and edge habitats.

(ii) Avian Collision Mortality

Avian risk assessments at wind energy facilities are based on pre-construction indices and indicators of risk (avian use surveys), along with post-construction monitoring data from operating facilities.

Passerines, with their generally larger populations, are typically the most common fatalities documented at wind farms. Diurnal raptors, known for being longer-lived species with relatively smaller populations and slower reproductive rates, have also been identified during post-construction monitoring studies, most frequently in the Western U.S. (i.e., California's Altamont Pass).

A 2014 review of data from 116 post-construction monitoring studies at 70 wind energy facilities throughout the U.S. and Canada showed low levels of collision fatality at most projects (Erickson et al. 2014).

Approximately 62.5 percent of documented collisions with wind turbines were attributed to small passerines (i.e., perching birds or songbirds). By region, the eastern and prairie avifaunal biomes generally have higher fatality rates than those documented in northern forests and various western biomes (Erickson et al., 2014); however, these are well below levels that would be likely to adversely affect any particular species' population.

Annual mean diurnal raptor use at the Project is within the range of mean annual use documented at 47 other wind energy facilities in the U.S. that implemented similar protocols and had data covering similar seasons, which ranged from approximately 0.1 to 2.3 raptors/800-m plot/20-minute survey.

Collision risk to resident waterbirds (waterfowl, long-legged waders, shorebirds, rails, etc.) in the Project Area is likely to be low to very low. The risk of collision is generally low for migrating waterbirds because these species typically migrate at high altitudes far above wind turbines. Small wetlands in the Project Area and vicinity may attract some waterbirds; however, very few waterbirds, waterfowl, or shorebirds have been documented as collision fatalities with wind turbines or other tall structures (Erickson et al. 2001; Gue et al. 2013; Koford et al. 2005). Therefore, waterbirds are not likely to be at significant risk of colliding with wind turbines in the Project Area.

Documented raptor mortality associated with turbines has similarly been low at most operating wind power projects in the U.S. outside of

California (Whitfield & Madders 2006; Chamberlain et al, 2006; Kerns & Kerlinger 2004; Gruver et al. 2009; Derby et al. 2007; Jain 2005). Even where concentrated hawk migration does occur around wind energy sites, evidence suggests that risk to migrating raptors is not great, and not likely to be biologically significant (de Lucas et al. 2004). Therefore, the low impacts expected by the Project are not likely to affect local or regional populations.

The studies conducted to date indicate that bird collisions with wind turbines are relatively uncommon events. Raptors, waterfowl, and shorebird fatalities are only occasionally documented. The majority of the fatalities at wind turbines documented in the Midwestern and Eastern regions of the U.S. have been nocturnal migrants (i.e., songbirds). Given that songbird populations are generally large relative to other groups of birds, the documented level of fatalities has not been out of proportion to the source populations of these species. Post-construction monitoring studies of avian mortality at operating wind farms suggest that collisions with wind turbines account for only 1 to 12 avian fatalities annually per turbine when adjusted (Poulton 2010; Jain et al. 2009; Erickson et al. 2001).

Avian use surveys conducted for the Project revealed no indicators of elevated risk; therefore, collision risk to birds in the Project Area is likely to be consistent with other wind sites in the Midwestern U.S. Based on

national estimates[8] of 2.6 to 2.8 bird fatalities per installed megawatt per year (Loss et al. 2013, Erickson et al. 2012), the Project could be expected to result in a total of 551 to 594 bird deaths per year. The fatalities would be distributed across many species, and the individuals affected represent a fraction of a percent of the populations that migrate through the area, which would not reasonably be considered a biologically significant impact.

Bird deaths at wind farms have been minor when compared to other human-caused sources of avian mortality. In order of severity, predation by domestic cats, collisions with building windows, collision with vehicles, use of agricultural pesticides, collisions with power lines, collisions with communication towers, and poisoning in oil pits cause exponentially more bird deaths than wind turbines (Erickson et al. 2005, 2014; Loss et al. 2013, 2014; Longcore et al. 2012). In addition, a 2009 review by Sovacool estimated that in the U.S., avian deaths related to operations of fossil-fueled plants were responsible for 17 times more bird mortality than wind turbines.

(iii) Bat Collision Mortality

As with avian risk, bat risk assessments are based on pre-construction indices and indicators of risk (e.g., acoustic surveys), along with post-construction monitoring data from operating facilities.

Bat use documented at the Project from 2017-2018 shows no indicators of elevated risk (e.g., landscape position). Therefore, collision

[8] Excludes California where fatality rates are significantly higher due largely to high mortality in the Altamont Pass.

risk to bats in the Project Area is likely to be consistent with other wind energy projects in agricultural landscapes in the Midwestern U.S. Arnett and Baerwald (2013) conducted an overview of post-construction mortality studies conducted in the U.S. and Canada from 2000 to 2011 and estimated that annual bat fatality rates in the Midwestern deciduous forest-agricultural region (where the proposed Project is located) ranged from 4.9 to 11.0 bats per installed megawatt, averaging 7.9 bats per installed megawatt. The overview found that bat mortalities generally occur in greater frequency during the fall migration period, during which time the Project has committed to raising cut-in speeds to reduce impacts to bats. Using Arnett and Baerwald's estimates, the Project could result in an estimated total of 1,039 to 2,332 bat deaths per year. However, many of the wind energy facilities at which the post-construction studies were conducted operate without any curtailment designed to minimize bat mortality. Most bat fatalities occur during relatively low-wind conditions during bat migration periods (Arnett et al. 2008). Studies have shown that altering blade angles to either stop or slow rotor movement in low wind speeds (i.e., feathering) below the manufacturer's cut-in speed ($\geq$3.5 m/s, or 7.8 mph) is expected to reduce overall bat mortality by a minimum of 35 percent (Good et al. 2012; Young et al. 2011; Baerwald et al. 2009). Arnett et al. (2011) found that nightly reductions in bat fatality ranged from 44 to 93 percent when turbine cut-in speed was raised from 3.5 m/s to either 5.0 m/s (11.2 mph) or 6.5 m/s (14.5 mph).

As summarized below in Section 4906-4-08(B)(3)(b), the proposed Project will operate under a strict curtailment regime developed in consultation with the USFWS and ODNR that will significantly reduce bat fatalities. Consequently, actual mortality at the proposed Project is expected to be much lower than the above predictions based on average mortality across the Midwestern deciduous forest-agricultural region.

(b) Mitigation

Disturbance to plants, vegetation, wetlands or streams is not anticipated in association with the Project's operation and maintenance other than minor impacts associated with routine maintenance and occasional repair activities. Therefore, no mitigation measures are proposed.

The anticipated short-term and long-term operational impacts of the Project on wildlife are expected to be minor. The Project has been designed to minimize bird and bat collision mortality by implementing the following recommendations from USFWS:

- Towers will be tubular structures (rather than lattice) to prevent perching and nesting by birds.
- Lighting of turbines and other infrastructure will be minimized to the extent allowed by the FAA, and will follow specific design guidelines to reduce collision risk. Lighting installed at the O&M facility will be focused downward to minimize potential attraction of insects, birds, and other species.
- Turbines have been sited to avoid bald eagle nests and areas of

concentrated eagle use to the greatest extent practicable.

- Turbines will be curtailed at or below wind speeds of 6.9 m/s during the spring, summer, and fall from 30 minutes before sunset to 30 minutes after sunrise. During spring and fall, this would apply to all turbines; for summer, this would apply to those turbines within the 2.5-mile buffer for documented Indiana bat roosts.

(c) Post-Construction Monitoring of Wildlife Impacts

A post-construction avian and bat fatality monitoring program will be implemented, consistent with ODNR and USFWS guidelines. Results of these studies will be discussed with ODNR and USFWS to evaluate impacts and determine if additional monitoring or changes in operational protocols is appropriate.

(C) LAND USE AND COMMUNITY DEVELOPMENT

(1) Land Use

(a) Land Use Mapping

Figure 08-12 presents land use within a 1-mile radius of the Project Area, showing the Project, incorporated areas, and population centers. Seneca County land use categories, defined by the Assessor's Office, include:

- Agriculture;
- Commercial;
- Exempt Property (which includes such properties as schools, parks, churches, cemeteries, housing authorities, and property owned by a government entity);
- Industrial;

- Mineral Lands and Rights;
- Public Utilities;
- Residential;
- Special Tax Abatement; and
- Other.

As outlined in Table 08-9, and shown on Figure 08-12, the Project Area covers approximately 56,900 acres and is primarily in agricultural use, with intermittent residential use.

TABLE 08-9
LAND USE WITHIN THE PROJECT AREA

Land Use	Approximate Acres	Percentage of Total Area
Agricultural	53,450	94%
Commercial	310	0.5%
Exempt Property	400	0.7%
Industrial	590	1.0%
Mineral Lands and Rights	0	0%
Public Utilities	20	0.03%
Residential	1,805	3.2%
Special Tax Abatement	0	0%
Other	325	0.6%
Total	**56,900**	**100%**

Within the Project Area, sensitive land uses include: the Seneca East High School, located at 13343 US-224 in Attica; the Bloomville United Church, located at 31 N Marion Street in Bloomville; and the Republic United Church, located at 312 S Madison Street in Republic. Within the 5-mile study area, additional sensitive land uses include a cemetery, churches, libraries, and various recreational facilities. Silver Creek Wildlife Area, a 42-acre ODNR-protected area composed of marshland, grassland, and brushland, is located within the Project Area, at the

junction of State Route 19 and E Township Road 58. Forrest Nature Preserve, a 47-acre Seneca County park which includes improved trails, fishing, canoeing, kayaking, and picnic tables, is located within the Project Area, at the junction of Infirmary Road and County Road 6. Garlo Heritage Nature Preserve, a 292-acre Seneca County park which includes fishing, hiking trails, equestrian trails, a picnic shelter, a butterfly garden, a nature center, and a restored blacksmith shop and log home, is located within the Project Area, along State Route 19. Republic Park, an 11-acre public park that includes three baseball diamonds, a basketball court, and playground equipment, is located adjacent to the Project Area, just north of E Jefferson Street.

(b) Existing Structures

In accordance with OAC 4906-4-08(C)(1)(b), the location and lease status of all structures and property boundaries within 1,500 feet of the generating equipment has been determined. As outlined in Appendix O (Table O-1) there are 259 structures within 1,500 feet of a proposed turbine (Figure 08-13). For each structure within 1,500 feet of a proposed turbine, Table O-1 identifies the structure type; distance and direction to the nearest turbine; and the lease status of the underlying parcel. Of the existing structures located within 1,500 feet of a proposed Project turbine location (which include houses, garages, barns, trailers, tanks, and outbuildings), 81 are located on a non-participating parcel.

There are 253 structures within 250 feet of a non-generating Project component, such as a collection line or substation; access road; laydown yard; or O&M building (Figure 08-14). For each structure within 250 feet of a non-

generating Project component, Appendix O (Table O-2) identifies the structure type; the distance and direction to the nearest Project component; and the lease status of the underlying parcel. A total of 138 existing structures (which include houses, garages, barns, trailers, tanks, a business, a municipal building, a tower, and outbuildings) are located on a non-participating parcel within 250 feet of a non-generating Project component.

The lease status for each property within the Project Area is reflected in Figure 03-2. As illustrated, there are several non-participating properties located within 1,500 feet of the proposed location of Project generating equipment.

(c) Land Use Impacts

Project-related impacts to land use were calculated based on the impact assumptions provided in Table 03-1 of this Application, as adjusted for wetland and tree clearing minimization. A shapefile was placed over each Project component to determine the component's total impact area. To differentiate between permanent and temporary impacts associated with turbines a 0.05-acre permanent impact area was used for each turbine tower. The length associated with access roads and collection lines were multiplied by the expected impacts also listed in Table 03-1 to determine both the total and permanent impact areas. A sum of the permanent impact values was then subtracted from the sum of the total impact values to determine the temporary impacts. Table 08-10 presents the proposed land use impacts.

TABLE 08-10
LAND USE IMPACTS

Land Use	Temporary Disturbance (acres)	Permanent Alteration (acres)
Agricultural		
Wind Turbines and Workspace	286.3	4.7
Access Roads	158.1	75.5
Underground Electrical Collection Cable	259.5	--
O&M Building & Storage Yard	5.2	5.2
Laydown Yards & Crane Paths	98.2	--
Substation	12.4	12.4
Meteorological Towers	0.1	<0.1
Residential		
Wind Turbines and Workspace	--	--
Access Roads	0.5	0.3
Buried Electrical Collection Cable	--	--
O&M Building	0.3	--
Laydown Yards	--	--
Substation	--	--
Meteorological Towers	--	--
Total (overlap removed)	776.3*	97.8*

*Because the impact areas for each component sometimes overlap with each other, the total cannot be derived by summing its parts.

Operation of the Project is anticipated to result in only very minor impacts to land use within the Project Area, and no impacts to land use are anticipated outside the Project Area. The proposed location of the turbines, collection substation, and other ancillary structures will result in the conversion of approximately 97.8 acres of land from its current use, which is less than 1 percent of the approximately 56,900-acre Project Area. During operation, additional impacts on land use from the Project should be nominal and intermittent. Aside from occasional maintenance activities, Project operation should not affect on-going land uses, such as agricultural production.

Most of the proposed impacts from construction and operation of the Project will occur on land currently in agricultural use. While impacts to land use could occur, these impacts should only affect a small portion of the Project Area; the Project will be compatible with the existing land uses within the Project Area. During construction, the temporary use of equipment and materials could impact agricultural operations; however, these impacts should be temporary and limited to the properties of participating landowners. The construction guidelines developed by Seneca Wind, described in Section 4906-4-8(E)(2)(b), reflecting considerations for Project-related activities occurring on agricultural land, should minimize impacts to existing agricultural activities within the Project Area.

(d) Structures to be Removed or Relocated

No existing structures will be removed or relocated due to construction or operation of the Project.

(2) Project Design

Figure 03-2 illustrates the proposed Project and existing residences and parcel boundaries within 0.5-mile of the Project Area; each parcel is shaded to indicate whether it is owned by a participating or non-participating landowner. Figure 03-2 also illustrates the proposed turbine setback in relation to existing property lines, structures, electric transmission lines, natural gas pipelines, natural gas distribution lines, hazardous liquid pipelines, and state and federal highways.

(a) Distance from Turbine Base to Property Line

In accordance with OAC 4906-4-08(C)(2)(a), the distance from each turbine to the boundary of the Project Area will be at least 1.1 times the total height

of the structure, as measured from the turbine's base (excluding the subsurface foundation) to the highest blade tip. As shown on Table 03-2, the maximum height of the tallest turbine model planned for use is 649 feet; therefore, the minimum setback from a turbine to the boundary of the Project Area is 714 feet.

(b) Distance from Blade to Property Line

In accordance with OAC 4906-4-08(C)(2)(b), the turbine will 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 the certification application. As shown in Table 03-2, the maximum rotor diameter for the turbine models under consideration is 417 feet; therefore, the minimum setback from the nearest adjacent property line is 1,334 feet.

(c) Distance from Easements

In accordance with OAC 4906-4-08(C)(2)(c), the distance from a turbine to any utility or transportation easement (e.g., an electric transmission line, natural gas pipeline, natural gas distribution line, hazardous liquids pipeline, or public road) will be at least 1.1 times the total height of the turbine, as measured from the turbine's base (excluding the subsurface foundation) to the highest blade tip. As shown on Table 03-2, the maximum height of the tallest turbine model under consideration is 649 feet; therefore, the minimum setback from a utility or transportation easement is 714 feet.

(3) Setback Waivers

Owners of adjacent properties to the Project Area may waive the minimum setback requirements, as outlined in OAC 4906-4-08(C)(2)(a), by signing a waiver. A number of

waivers have been signed or are pending for the Project; such properties are considered participating for the purposes of various Project analyses.

(a) Content of Waiver

Consistent with OPSB requirements, setback waivers obtained from an adjacent property owner:

- Are in writing;
- Provide a brief description of the proposed Project;
- Notify the applicable property owner(s) of the statutory minimum setback requirements;
- Describe the adjacent property subject to the waiver through a legal description;
- Describe how the adjacent property is subject to the statutory minimum setback requirements; and
- Advise all subsequent purchasers of the adjacent property subject to the waiver that the waiver of the minimum setback requirements shall run with the land.

(b) Required Signature

Any setback waiver received from an adjacent property owner will be signed by Seneca Wind and the applicable property owner(s) and indicate consent to construct Project-related structures without complying to the minimum setback requirements outlined in OAC 4906-4-08(C)(2)(a). Figure 03-2 indicates the parcel status, including properties for which Seneca Wind has obtained a waiver.

(c) Recordation of Waiver

Seneca Wind acknowledges that, in accordance with OAC 4906-4-08(C)(3)(c), any setback waiver received from an adjacent property owner has been or will be recorded in the Seneca County Recorder's office.

(4) Land Use Plans

(a) Formally Adopted Plans for Future Use

The Project Area is located entirely within Seneca County. Within the 5-mile study area of the Project lies Huron, Crawford, and Wyandot counties, as well as the City of Tiffin. Several of these communities have adopted plans to guide future land use; each of these are summarized below:

- 2011 Seneca County Comprehensive Economic Development Strategy: This plan focuses on establishing Seneca County as a "redevelopment area," as defined by the Ohio Economic Development Association (Ohio EDA), and, therefore, eligible for Ohio EDA Public Works programs. This plan outlines assumptions, goals, and strategies for the County's overall economic development and summarizes a targeted strategy to improve the economy of Seneca County (Seneca County 2011).
- 2017 Huron County Comprehensive Land Use Plan: Adopted in 2007 and last revised in 2017, this plan aims to cohesively guide future development within Huron County. A key goal of this plan is to promote development within Huron County while supporting existing businesses (Huron County 2017).

- 2016 City of Tiffin Downtown Strategic Growth and Development Plan: This plan complements the 2010 Strategic Downtown Tiffin Plan, which identified urban design solutions and policy recommendations to revitalize the community (City of Tiffin 2016). This plan recommends that future development employ alternative energy whenever possible and support the growth of local green industries.

(b) Applicant Plans for Concurrent or Secondary Use of the Site

Seneca Wind has no plans for concurrent or secondary use of the Project Area. Permanent features of the Project are proposed on land leased from participating land owners. The Project has been designed to minimize impacts to, and maximize compatibility with, existing uses. Existing land uses within the Project Area, such as agricultural operations, will continue concurrently with Project operations.

(c) Impact to Regional Development

The regional economy surrounding the Project Area is shaped, in large part, by the agricultural nature of Seneca County. Although not the largest employment sector in the County, agriculture is the primary land use, with a focus on cash grain and livestock farming (Seneca County 2011). The 5-mile study area around the Project Area is predominantly rural, with the City of Tiffin, located within the 5-mile study area, northwest of the Project Area, as the most proximate metropolitan region. All four counties within the 5-mile study area are primarily agricultural in nature. The regional context within which this Project is proposed is described below, concentrating on five primary aspects: housing; commercial

and industrial development; schools; transportation; and other public services and facilities. The compatibility of the proposed Project with the regional developmental plans, outlined in Section 4906-4-08(C)(4)(a), is discussed in Section 4906-4-08(C)(4)(d).

(i) Housing

Like other sectors, the regional housing market has felt the impact of population loss, further described in Section 4906-4-08(C)(4)(e). Owner-occupied vacancy rates in the four counties within which the 5-mile study area lies range from 0.7 percent to 2.1 percent, comparable to the statewide average of 1.8 percent (ACS 2016). The rental vacancy rates in Seneca Count (8.8 percent) and Huron County (10.3 percent) are substantially higher than the statewide average of 6.0 percent, while the rental vacancy rates in Crawford County (5.0 percent) and Wyandot County (3.8 percent) are slightly less than the statewide average (ACS 2016).

It is estimated that there were approximately 8,293 housing units within Seneca, Huron, Crawford, and Wyandot counties that were vacant in 2016 (ACS 2016). Given these figures and the recent population trend in the region, as described in Section 4906-4-08(C)(4)(e), it is not expected that construction or operation of the Project will have a significant impact on the regional housing market. The Project is also not expected to represent a significant increase in the regional renter population such that it would have a destabilizing effect on existing renters.

(ii) Commercial and Industrial Development

As shown in Table 08-10, the area within 1 mile of the Project Area has limited commercial and industrial development (0.5 percent and 1 percent of the total land use within that area, respectively). The Project provides a unique opportunity to provide diversity of the local economy while retaining consistency with the agricultural use within the Project Area.

(iii) Schools

The Project will have a significant positive impact on the local tax base, including the local school district(s) that serve the Project Area, and no significant impact on schools or other educational facilities is anticipated. The Project should not have a significant effect on the surrounding municipalities, as local employees will be hired, to the extent possible. If non-residents are hired, they would likely commute or stay in regional transient housing or motels and would not bring their families.

(iv) Transportation

The region surrounding the Project Area features numerous Interstate highway; U.S. and State highways; and county and local roadways, as well as freight rail lines and small airports. The main transportation route to the Project Area is State Route 224 (Benjamin Franklin Highway), which generally runs east-west through the Project Area. Other roadways that cross the Project Area include Columbus-Sandusky Road, State Route 19, and S Kilbourne Street. Interstate 80/90

lies approximately 14 miles north of the Project Area, and Interstates 75 and 71 lie approximately 25 miles west and 28 miles southeast of the Project Area, respectively.

Workers traveling to and from the Project Area will most likely enter via State Route 224 from east and west, and Columbus-Sandusky Road from the north and south. Construction traffic bound for the substation and O&M building will likely use County Road 67 as the primary route, as the two are proposed adjacent to each other. The proposed Project is not expected to cause any substantial disruption to major transportation corridors serving the Project Area or the 5-mile study area.

Freight rail lines connect several of the municipalities throughout the 5-mile study area. CSX and Norfolk Southern operate the majority of Ohio's freight rail system, although smaller operators such as Ashland Railway, Northern Ohio and Western Railway, and Wheeling and Lake Erie Railway also operate in the area. Municipalities within the 5-mile study area are connected to freight rail lines include the cities of Tiffin, Sycamore, Chatfield, and Willard, the villages of Bloomville and Republic, and the town of Attica. The rail system may be used for the transportation of a very small number of turbine component and equipment suppliers, but Seneca Wind does not anticipate making any modifications to the existing system.

The Project Area is also in proximity to the Seneca County Airport, Freefall Field, Schulzes Airport, Willard Airport, Bandit Field Airdrome, and Weiker Airport. However, as indicated in Section 4906-4-07(E)(1), no

airports are located within the Project Area, and only Seneca County Airport and Freefall Field are located within 5 miles of the Project Area. The Project will be designed, constructed, and operated in accordance with FAA standards and, as such, is not expected to result in any adverse impacts to the regional air transportation network. Seneca Wind has filed with the FAA for each proposed turbine site to confirm that the Project will not cause any adverse impacts to air navigation (Appendix F).

(v) Other Public Services and Facilities

The Project is not expected to affect the regional population; therefore, no significant impact on local public services and facilities is anticipated. Local employees will be hired, to the extent possible. Hiring of non-residents will only occur when residents with the required skills are not available or competitive. It is expected that non-residents would commute or stay in regional transient housing or motels, and not require new housing, and would not bring families that might require family healthcare or additional school facilities.

Workers will commute to the Project Area daily. The primary impact on public services from the Project would be a temporary increase in traffic on roads leading to and from the Project Area, due to worker commutes or deliveries during construction.

(d) Compatibility with Current Regional Plans

As discussed in Section 4906-4-08(C)(3)(a), several of the municipalities within the 5-mile study area have adopted regional plans to guide future development; compatibility with each of these plans is discussed below:

- 2011 Seneca County Comprehensive Economic Development Strategy: The Project is compatible with Seneca County's priority action to improve the local economy and implement alternative energy. Recently, the County approved a resolution to make Seneca County an AEZ, making it eligible for state tax incentives associated with the development of renewable energy. The Project is compatible with the County's priority action as it will have a positive impact on the local economy and represents a large-scale alternative energy installation.
- 2017 Huron County Comprehensive Land Use Plan: A key goal of this plan is to promote Huron County as a development destination and to retain and expand existing business. While the Project is not proposed within Huron County, it is compatible with this goal due to the positive impacts it will create for the local economy.
- 2016 City of Tiffin Downtown Strategic Growth and Development Plan: While the Project does not directly impact the downtown area of the city of Tiffin, it is compatible with the strategic plan through its diversification of the region's energy resource portfolio, adding resilience and reliability to the supply of energy resources to local businesses. The Project also offers an opportunity for the use of local

goods and services, including those provided by businesses located in the downtown area of the city of Tiffin.

The Project is proposed in a primarily rural area, with most Project-related impacts proposed on land currently in agricultural use. In addition to the economic benefits of the proposed Project, and its overall compatibility with agricultural practices, it will support and aid in the preservation of local farming operations. Furthermore, jobs and economic development created by the Project may help to create new local employment opportunities while retaining existing opportunities. Therefore, the development of this Project is compatible with the goals and strategies of existing local and regional plans.

(e) Demographic Characteristics

Census data reveal that these communities have experienced a varied history of population growth and decline over the past two decades. Table 08-11 presents the population trends for the State of Ohio and counties within 5 miles of the Project Area. The state population increased (by 6.4 percent) from 1990 to 2010, as did Huron County (by 6.0 percent) and Wyandot County (by 1.6 percent). Meanwhile, Seneca and Crawford counties experienced a notable decrease in population from 1990 to 2010, declining by 5.1 percent and 8.5 percent, respectively.

TABLE 08-11
POPULATION TRENDS

Area	1990 Population	2000 Population	2010 Population	% Change 1990 - 2010
Seneca County	59,779	58,683	56,745	-5.1%
Huron County	56,240	59,487	59,626	6.0%
Wyandot County	22,254	22,908	22,615	1.6%
Crawford County	47,870	46,966	43,784	-8.5%
State of Ohio	10,847,115	11,353,140	11,536,504	6.4%

Source: U.S. Census Bureau (2018), 2000, and 1020 Decennial Census

Table 08-12 presents population estimates for 2016, and population projections for 2020 and 2030 for each census-designated area (CDA) that lies within 5 miles of the Project Area. Populations with these CDAs experienced a similar varied history of population growth and decline over the past two decades. The largest changes include the Melmore CDA, which experienced a 22.9 percent decline in population from 2000 to 2016, and the Chatfield CDA, which experienced a 17 percent increase in population over the same time period. The estimated total population for the area surrounding the Project Area was calculated by adding up the total populations of each CDA that overlaps with the 5-mile study area; as shown in Table 08-12, the population of the surrounding area remained largely unchanged between 2000 and 2016.

In general, the recent trends experienced by each community are expected to continue regardless of whether the proposed Project is built. Over the next two decades, the total population within the 5-mile study area is projected to increase

slightly by 0.4 percent from 2010 to 2030, from 28,969 to 29,071; compared to the projected statewide increase of 5 percent over the same time period. Meanwhile, county population projections are expected to decline over the same time period. Seneca County is projected to experience the greatest decrease in population (20.6 percent) from 2010 to 2030, while Huron County is projected to experience only a 4.1 percent decline in population over the same time period.

TABLE 08-12
EXISTING AND PROJECTED POPULATIONS

Census-Designated Area	Population			% Change 2000 – 2016	Estimated Population		% Change 2010 - 2030
	2000	2010	2016		2020	2030	
Attica Village	955	899	1,018	6.6%	1,085	1,157	28.7%
Bloomville Village	1,045	956	915	-12.4%	802	702	-26.6%
Chatfield Village	218	189	255	17.0%	298	349	84.7%
Holiday Lakes[9]	-	749	658	-12.1%	578	508	-32.2%
McCutchenville[10]	-	400	389	-2.8%	378	368	-8.0%
Melmore[11]	-	153	118	-22.9%	91	70	-54.2%
Republic	614	549	612	-0.3%	614	608	10.7%
Sycamore	914	861	1,054	15.3%	1,215	1,401	62.7%
Tiffin City	18,135	17,963	17,701	-2.4%	17,276	16,862	-6.1%
Willard City	6,806	6,236	6,105	-10.3%	6,734	4,912	-21.2%
Total[12]	28,687	28,955	28,825	0.5%	28,969	29,071	0.4%

Source: U.S. Census Bureau, 2000 and 2010 Decennial Census and American Community Survey 1-Year Estimates 2010 – 2016

[9] This entity did not exist as currently structured at the time of the 2000 Census. Percent change is calculated from 2010-2016
[10] This entity did not exist as currently structured at the time of the 2000 Census. Percent change is calculated from 2010-2016
[11] This entity did not exist as currently structured at the time of the 2000 Census. Percent change is calculated from 2010-2016
[12] Totals calculated by formula; may reflect rounding errors.

Although Project construction employment will be substantial, it is relatively short-term, and is not expected to result in the permanent relocation of construction workers to the region. Therefore, the Project should not cause significant population growth within the 5-mile study area. The potential short- and long-term employment opportunities associated with construction and operation of the Project are further discussed in Section 4906-4-06(E)(2).

(D) CULTURAL AND ARCHAEOLOGICAL RESOURCES

The cultural resources records review was prepared to meet the requirements of OAC Chapter 4906-4-08(D), which states that the applicant shall identify any registered landmarks of historic, religious, archaeological, scenic, natural, or other cultural significance within 10 miles of the Project Area. Landmarks are defined per OAC 4909-4-08(D)-1 as, "those districts, sites, buildings, structures, and objects that are recognized by, registered with, or identified as eligible for registration by the national registry of natural landmarks, the state historical preservation office, or the Ohio department of natural resources." The OAC 4906-4-08(D) also requires that the applicant evaluate impacts of the proposed Project on the landmarks and describe plans to mitigate any adverse impacts.

The cultural resources records review was completed for a 10-mile buffer around the Project Area and comprises approximately 576,122 acres (900.2 square miles). The cultural resources review report provided in Appendix P documents the findings of previous surveys and summarizes the results of a literature review.

(1) Cultural Resource and Recreational Area Mapping

Figure 08-15 encompass the following six U.S. Geological Survey 7.5-minute series topographic maps: Attica, Bloomville, Centerton, Fireside, Lykens, and Tiffin South.

These figures depict formally-adopted land and water recreation areas and registered landmarks (historic, religious, archaeological, scenic, natural, etc.) within a 10-mile radius of the Project.

Based on the results of the records review, there are three NRHP DOE resources within the Project Area. An additional 66 listed or eligible resources are located within 10 miles of the Project Area. The historical plats, atlases, and topographic maps reveal that the character of the Project Area has historically been rural, and has not changed significantly through time.

Based on the existing land use throughout the area, characterized by agricultural use with pockets of industrial development, transportation corridors, and utilities, the proposed Project is not anticipated to result in any impact to historic sites (Appendix P).

(2) Estimated Impacts on Cultural Resources or Landmarks

Seneca Wind has committed to avoiding direct impacts to aboveground cultural resources (i.e., historic structures and cemeteries), and will work with the Ohio Historic Preservation Office (OHPO) to conduct archaeological surveys within proposed work areas (including temporary work spaces) to confirm that no significant archaeological resources will be impacted.

The potential for indirect impact to historic resources would be limited to potential visibility. Many of the historic structures within the Project Area and within 10 miles are located within more densely settled areas, where existing structures would limit direct line-of-sight toward the Project. Seneca Wind will work with the OHPO to identify any historic structures requiring more detailed assessment to determine potential effect and, to the

extent necessary, develop appropriate mitigation measures. The Visual Impact Analysis that has been completed for the Project is addressed in Section 4906-4-08(D)(4).

(3) Recreational Areas

There are 53 identified parks, golf courses, wildlife refuges, and recreational areas within 10 miles of the Project Area. The majority of these resources are located outside of the Project Area, although the Silver Creek Wildlife Area, Garlo Heritage Nature Preserve, and Forrest Nature Preserve are located within the Project Area. Silver Creek Wildlife Area (42 acres) and Garlo Heritage Nature Preserve (292 acres) are adjacent to each other. Silver Creek Wildlife Area is 0.65 miles from the closest turbine, and Garlo Heritage Nature Preserve is 0.9 mile from the closest turbine. Forrest Nature Preserve (47 acres) is 0.3 mile from the closest turbine. A portion of Mohawk Golf and Country Club, an 18-hole golf course encompassing approximately 150 acres, also lies within the Project Area, approximately 1.4 miles from the nearest turbine.

There is one state-owned recreational area within 10 miles of the Project. The Willard Marsh Wildlife Area, an approximately 1,617-acre recreational area, is located approximately 3.7 miles southeast of nearest turbine. The wildlife area is a popular public deer hunting area and has been modified to provide habitat for waterfowl. As a wildlife management area, shooting, trapping, and other hunting occurs regularly, with small upland fowl and fur bearers common hunting targets.

The Sandusky River is a state-designated scenic river located 2.4 miles at its closest point to a turbine. Because the river corridor is heavily vegetated with trees, views from the river are expected to be limited, if available at all.

None of these recreational areas are in immediate proximity to turbines, access roads, crane walks or planned transportation routes, and no impact to recreational activities in these areas is anticipated to result from construction or operation of the Project.

(4) Visual Impacts

(a) Project Visibility

A Visual Impact Analysis (Appendix Q) has been conducted by a qualified professional in accordance with standing policies, procedures, and guidelines in established visual impact assessment methodologies that describes: the character of the surrounding landscape; the appearance of visual components of the Project; the viewers and circumstances under which the Project will be visible; an assessment of potential Project visibility; identification of viewing locations for visual simulations; and a discussion of the Project's visual impacts.

The analysis addresses potential visual impact for an area that is 10 miles from the Project Area. Even within the Project Area, only limited development will occur in association with the Project, although the height of the proposed turbines and the relatively flat terrain in the region will likely make them visible even at a considerable distance, where intervening structures or vegetation does not screen direct view. However, the effect of the Project's turbines is moderated by distance.

(b) Existing Landscape

Just as is the case within the Project Area, the area within 10 miles is also predominantly agricultural in nature. Details of the existing landscape, including its flat terrain, open agricultural fields, and scattered forest areas are provided in Appendix Q. The Visual Impact Analysis also provides details regarding the

scattered residential uses, more densely developed settlements, and various parks, waterbodies, and other cultural features that characterize the setting.

The Visual Impact Analysis identifies and maps Landscape Similarity Zones that, for this location, are defined as: rural residential/agricultural zone, city/village zone, transportation corridor zone, water/waterfront zone, recreational zone, and industrial/commercial zone. As noted through this Application, rural residential/agricultural is the dominant classification. This results in open vistas and the ability to see greater distances than within most other Landscape Similarity Zones, with foreground (0 to 0.5 miles), midground (0.5 to 3.5 miles), and background views (greater than 3.5 miles) typically available unless screened by intervening windrows or forest patches.

(c) Landscape Alterations

The Project will introduce tall, moving structures where currently there are none. Navigation lighting will be visible at night on turbines, but only on occasion as the Applicant will install an ADLS on the turbines.[13] The particular change in view, however, will be specific to the individual location, as well as distance to turbines(s). Where existing structures (as would particularly be the case within denser settlements) or vegetation have the potential to block line-of-site, no view or limited view would result. In other locations, a direct view may be available.

(d) Visual Impacts

The effect of visual change can be very personal. However, visual assessment methodologies consider the degree to which areas exist in the

[13] Pending FAA approval.

surroundings that are especially designated as a park or other cultural feature for which changes to the viewscape would cause harm. The Visual Impact Analysis considers the type of viewers within the area. No National Parks, National Forests, National Wildlife Refuges, National Natural Landmarks, federally designated scenic rivers or trails are located in the visual study area. The Sandusky River and more proximate nature preserves are heavily treed, and therefore, are unlikely to experience a notable change. With guidance from OPSB requirements, locations were selected to reflect the typical viewers within the area, through travelers on local roads and highways, and residents of the local communities.

(e) Photographic Simulations

Photographic simulations have been completed that meet the requirements of OAC 4906-4-09(C)(6) by providing at least one vantage point in each area of 3 square miles within the Project Area, showing views to the north, south, east, and west. As can be seen in those simulations (provided in Appendix Q), representation of the visual effect of the turbine is provided for a range of distances as well as within variable settings. The impact also varies; in some locations the change in view appears insignificant, while in other locations the change is more marked.

Visual effect decreases with distance. When turbines are in the foreground, strong scale and line contrast increases the effect of visibility unless softened by vegetative screening. At distances of approximately 1.5 miles, the midground views begin to be more heavily screened with less contrast, and begin to transition to a background element of the landscape. At the 3.5-mile defined background distance, turbines are still visible but considerably more blending occurs into the

backdrop. Attitudes to visible wind turbines, whether in the foreground or a distant element of the landscape, affect viewer response; some viewers find them graceful reflections of a trend toward renewable energy, while others have more adverse reactions.

(f) Proposed Mitigation Measures

The characteristics of the Project and its setting limit mitigation options. Minimizing lighting, and locating the turbines with adequate setbacks from surrounding residences will contribute to mitigation. The white or off-white color of the turbines, which is required by the FAA to eliminate the need for daytime lighting, minimizes contrast, especially when viewed from a distance against the horizon.

(E) AGRICULTURAL DISTRICTS

(1) Agricultural Land Mapping

As shown on Figure 08-16, and outlined in Table 08-13, agricultural land (specifically, cultivated crops) is the dominant land use in the Project Area. Most of the Project Area is in active agricultural use, and there are 13,964 acres of agricultural district land within the Project Area, as designated by Seneca County.

(2) Potential Impact to Agricultural Land

Impacts to land in active agricultural use have been avoided and minimized through careful and deliberate Project design. Each proposed wind turbine location, along with the proposed location for associated infrastructure, will be field-inspected to identify drainage tiles in order to minimize impact. With the Project in place, agricultural uses will be able to continue, limiting impact to agricultural land.

(a) Acreage Impacted

Table 08-13 quantifies the proposed temporary and permanent impacts to agricultural land from the proposed Project. Note that the impacts to Agricultural District land is a subset of the total agricultural land, and not reflective of additional impacts.

TABLE 08-13
PROPOSED PROJECT IMPACTS TO AGRICULTURAL LAND

Land Use[1]	Temporary Disturbance (acres)	Permanent Installation (acres)
Agricultural Land		
Turbines	286.3	4.7
Access Roads	158.1	75.5
Crane paths	67.8	--
Underground Electrical Collection System	259.5	--
O&M Building and Storage Yard	5.2	5.2
Substation	12.4	12.44
Laydown Areas	30.4	--
Meteorological Towers	0.1	0.008
Agricultural District Land		
Turbines	70.1	1.2
Access Roads	36.4	17.6
Crane paths	14.9	--
Underground Electrical Collection System	60.6	--
O&M Building and Storage Yard	--	--
Substation	--	--
Laydown Areas	9.8	--
Meteorological Towers	0.03	0.002

(b) Impact of Project Activities

As outlined in Table 08-13, construction of the Project will result in the disturbance of 1,176.88 acres of agricultural land. Although most of these impacts will be temporary, approximately 82.15 acres of agricultural land will be converted to developed area in support of the Project.

Of the impacts proposed on agricultural land, 291.29 acres of disturbance are proposed within an agricultural district, as designated by Seneca County. Most of the impacts are temporary in nature; however, approximately 18.64 acres of agricultural district land will be converted to developed area in support of the Project. This permanent conversion represents approximately 0.13 percent of the agricultural district land within the Project Area.

In addition to these specific temporary and permanent areas of impact, movement of equipment and materials during Project construction could result in damage to growing crops, fences, and gates, and possibly create temporary access limitations to certain agricultural fields. However, as described below, the Project has been designed to minimize the loss of active agricultural land and minimize interference with on-going agricultural operations.

Since irrigation systems are not in prevalent throughout the Project Area, potential interference to irrigation operations is anticipated to be very limited and coordination with affected landowners should alleviate potential for significant disruption.

Construction of the Project could result in damage to subsurface drainage systems. The Project will be designed to avoid damaging drainage systems, and

mitigation measures will be implemented, as further detailed in Section 4906-4-08(E)(2)(c).

The Project does not involve physically impacting any existing agricultural structures within the Project Area.

The Project has been designed to be compatible with existing agricultural practices. The Project will support the long-term economic viability of the affected farms by supplementing the income of participating farmers. The presence of wind turbines should help to preserve existing agricultural land and avoid conversion to other land uses.

(c) Agricultural Mitigation Practices

Mitigation practices have been incorporated to Project design in order to reduce impacts to agricultural land within the Project Area. These practices will be employed during Project construction, operation, and maintenance.

(i) Drainage Field Tile Systems

Where Project components are proposed to cross active agricultural fields, an attempt will be made to determine the location of any subsurface drainage tiles through consultation with the landowner and/or review of public records.

Any drainage tiles damaged during construction will immediately be identified, documented, and repaired. It is anticipated that a local drain tile contractor or the farmer tending the land will be involved in repair activities.

(ii) Topsoil

Mitigation measures to protect and restore agricultural soils have been incorporated into the siting of Project components. For example, wind turbines and other structures have been located along field edges to the greatest extent practicable, so as to minimize adverse impacts on agricultural land and farming operations. Permanent access road width is limited to 16 feet or less. Where practicable, access roads and collector lines follow hedgerows and field edges to minimize loss of agricultural land. To the extent practicable, existing fields have been kept intact, rather than broken up into smaller, irregularly shaped fields that are more difficult to farm. Parking areas, the laydown yards, and other temporary and permanent support facilities have been located outside of active agricultural fields where practicable.

(iii) Additional Mitigation Measures

Additional measures to reduce impacts to agricultural land will be undertaken during Project construction, operation, and maintenance. These mitigation measures, grouped by associated Project component, are summarized below.

Temporary laydown yards will be returned to their former use following construction. The following measures will be employed:

- All topsoil will be removed from areas proposed for vehicular traffic. The removed topsoil will be stockpiled on the same property from which it was removed.

- Construction materials will primarily be stored on disturbed ground, or on undisturbed ground only if their placement and removal can be accomplished without significant disturbance.
- Upon completion of construction, all mats will be removed, and soils will be de-compacted and restored.

Access roads will be permanent features, but will have a smaller developed area once construction is completed. The following measures will be implemented to avoid unnecessary compaction and to prevent impact to surrounding agricultural lands:

- Vehicular traffic will be minimized until permanent access roads have been constructed.
- Work area boundaries will be delineated with features such as orange construction fencing, stockpiled topsoil, or other temporary barriers. No equipment will be permitted outside the designated work areas.
- As practicable, impacts from road construction, particularly across agricultural fields, will be minimized.
- Topsoil will be stripped from the work area and stockpiled. Temporarily stockpiled topsoil will be segregated from other excavated material, such as rock and/or subsoil.
- Final road surfaces will be leveled with adjacent field surfaces. During restoration, stockpiled topsoil will be used to create a smooth transition, so as not to impede farm equipment.

- Where necessary, culverts or water bars will be installed to maintain natural surface water drainage patterns. Such culverts or water bars will be installed in a manner that prevents concentration of water runoff and soil erosion.
- Throughout construction, access roads will be maintained to avoid impediment to farm machinery. Maintenance will be performed to repair rutting to avoid impacting the natural drainage of the area or preventing use by the landowner.
- All vehicle traffic and parking will be confined to the access roads, designated work areas, and designated parking and material laydown yards. All pull-offs and parking areas will be developed outside of active agricultural fields.

When excavation is proposed within agricultural land, measures will be implemented to disturb the minimum amount necessary and to stockpile topsoil for reuse. Measures to meet these objectives and avoid unnecessary impact to adjacent agricultural land include:

- The boundaries of all rights-of-way and work areas will be delineated with orange construction fencing or another temporary barrier. No vehicles or equipment shall be allowed outside the work area.
- Topsoil stripping will occur in all areas to be disturbed by excavation, grading, or piling of excavated subsoil/rock.

Stripped topsoil will be segregated from subsoil and stockpiled in temporary storage areas on the property from which it was removed.

- All areas to be disturbed by excavation and backfilling will be enclosed within silt fencing or other temporary barrier to define the allowable limits of disturbance.
- Excavated subsoil and rock will not be stockpiled on active agricultural land outside the work area.
- Excess excavated subsoil and rock that is not suitable for backfill will be removed from the site. On-site disposal will only occur with permission from the landowner.
- Temporary fencing will be installed around open excavation areas in active pastureland. All existing fences and gates will be maintained or relocated, as necessary. Following construction, any relocated fencing will be restored to "like new" condition in its original location (or as otherwise agreed upon with the landowner).
- Water pumped from excavations will be directed into temporary sediment traps prior to discharge. Pumping will be done in a manner that minimizes adverse effects on agricultural crops and operations.
- Buried electric lines in active agricultural fields will be at least 3 feet deep, unless bedrock is encountered. If bedrock is

encountered, the buried lines will be placed completely below the bedrock surface.

- Whenever possible, backfill will utilize excavated subsoil and rock. If this material is unsuitable, select granular fill will be used. In active agricultural fields, no rock backfill will be used in the top 24 inches.

The turbine foundations will displace agricultural soils and use for the life of the Project. When foundations are being excavated and constructed the following measures will be used:

- At all times, concrete trucks will be restricted to designated access roads and crane pads.
- Excess concrete will be disposed of off-site, unless otherwise approved by the landowner. Under no circumstances will it be buried or left on the surface of active agricultural areas.
- Concrete trucks will be washed in foundation holes, or outside of active agricultural areas, in locations approved by the landowner.
- In active pasture areas, foundations treated with concrete curing compound or sealer shall be temporarily fenced.

Once the turbines are in place, their impact on agricultural land would be modest; however, the installation process requires additional work space and equipment. In order to minimize impact to agricultural land during turbine erection, the following measures will be implemented:

- Grading will be confined to the designated work area around each foundation.
- Erection cranes will be restricted to designated access roads and work pads. Crane set-up and break-down activities will not occur outside these areas.
- Crane paths across active agricultural land will be improved to the extent necessary to protect agricultural soils. If leveling is required, it will be minimized, and topsoil will not be mixed with subsoil. If significant rutting or soil disturbance could occur, temporary roads will be developed to accommodate crane movements.
- Development of temporary roads, if necessary, across agricultural land will involve stripping and stockpiling of topsoil and may involve placement of gravel over a geotextile mat. Following use by the crane, any gravel and matting will be removed, and soils restored.
- The contractor will immediately pick up and dispose of any pieces of wire, bolts, staples or other small metallic objects that fall to the ground.

Once construction is complete, restoration will occur within temporary work spaces to allow each location to be returned to its former use or other purpose, as each individual landowner desires. The following restoration measures will be implemented:

- Following completion of construction, excess gravel/fill will be removed and disposed of off-site.
- Exposed subsoils will be de-compacted to a minimum depth of 18 inches. Soil de-compaction shall be paid for by Seneca Wind.
- Following de-compaction, the surface will be picked over to remove all large rocks. Stockpiled topsoil will then be returned to all disturbed agricultural areas. To the extent possible, topsoil will be re-graded to match original depth and contours.
- The re-graded topsoil will be disked, and any large rocks will be removed. Restored topsoil will be stabilized with seeding and/or mulching, unless other arrangements have been made with the landowner.
- All access roads will be re-graded, as necessary, to create a smooth travel surface to allow crossing by farm equipment and prevent interruption of surface drainage.
- Temporary water bars and culverts will be removed if they are no longer necessary.
- Restored agricultural areas will be stabilized with seed and/or mulch, as agreed to with the landowner.
- Any surface or subsurface drainage features, fences or gates damaged during construction shall be repaired or replaced as necessary.

- All construction debris will be removed and disposed of off-site at the completion of restoration.
- Seneca Wind will review restored agricultural land with the landowner during the subsequent growing season to identify and correct any Project-related problems that may not have been immediately apparent.

4906-4-09 Regulations Associated with Wind Farms

The following sections outline Seneca Wind's commitment to comply with requirements identified by the OPSB as appropriate for an economically significant wind farm and a major utility facility consisting of wind-powered electric generating units. In some instances, requirements have been met by the Project; where this is the case, references are provided to the relevant information provided. For other requirements, Seneca Wind affirms its commitment to future actions.

(A) CONSTRUCTION, LOCATION, USE, MAINTENANCE, AND CHANGE

(1) Adherence to Other Regulations

Construction and operation of the Project will be consistent with applicable state and federal requirements, including applicable safety, construction, environmental, electrical, communications, and FAA requirements. The Application identifies, where applicable, specific environmental resources for which consultation and/or permitting is anticipated to be required. In addition, Seneca Wind will incorporate the commitment to adhere to applicable regulations and requirements into its construction contracts.

(2) Construction, Operations, and Maintenance Safety

(a) Equipment Safety

Safety is a top priority for Seneca Wind. The Project will comply with the manufacturer's most current safety manual, as provided in Appendix D and discussed in Section 4906-4-08(A)(1)(c), unless such safety manual conflicts with OAC 4906-4-08(C)(2). The Project will maintain copies of applicable safety manuals in the O&M building.

(b) Geological Features

An initial geotechnical study is discussed in Section 4906-4-08(5)(c) and provided in Appendix I, which reflects subsurface soil properties, static water level, rock quality description, percent recovery, and depth and description of the bedrock at each turbine location know at the time of the survey. The geotechnical report includes final design and construction recommendations for specific wind turbine foundation locations. The geotechnical boreholes were filled, in accordance with state and local requirements, upon completion of the investigation. As a result of this initial geotechnical program and other design factors, certain locations for proposed turbines have been adjusted.

A final geotechnical study will be completed to update the findings for the final turbine locations, as well as the final location of the transformer substation and interconnection substation. The supplemental report, including copies of geotechnical boring logs, will be provided to the OPSB and to the Ohio Department of Geological Survey at least 60 days prior to the Project's preconstruction conference.

(c) Blasting

Based upon the initial geotechnical program, Seneca Wind does not expect to conduct blasting in association with the Project, as discussed in Section 4906-4-03(B)(2)(a).

Should blasting be required, however, a blasting plan will be submitted to the OPSB and the local community at least 30 days prior to the start of blasting. Also at least 30 days prior to initiation of blasting, notification in writing, and an offer of a

pre-blast survey, would be provided to residences or owners of dwellings or other structures within 1,000 feet of the proposed blasting site(s); a pre-blast survey would be conducted unless waived by the resident or property owner. In accordance with the requirements of 4906-4-09(A)(2)(c), the plan would: identify the drilling and blasting company contact information; provide details of the blasting plan, including blasting times, blasting signs, warnings, access control, control of adverse effects, and blast records; and a plan for liability protection and complaint resolution. Should blasting be required, appropriate licenses and permits will be obtained and submitted to the OPSB within 7 days of receipt. The results of pre-blast surveys would be submitted to the OPSB at least 10 days before blasting begins in a given location. Two blasting seismographs will be used to measure ground vibration and air blast for each blast, with one placed beside the nearest dwelling and the other placed at the discretion of the blasting contractor.

(3) Location

As discussed in Section 4906-4-08(C)(2), the Project will comply with applicable Project design provisions. Where applicable setbacks cannot be met, waivers will be obtained from applicable landowners prior to construction.

(4) Maintenance and Use

(a) Equipment Maintenance

Maintaining equipment in good condition is critical not only for safety but to maximize performance. As discussed in Section 4906-4-08(A)(1)(b), equipment maintenance will follow the manufacturer's recommended preventative maintenance schedule to ensure continued reliability. Maintenance will include

painting and structural repairs, as necessary, to preserve the generating equipment structures, as well as maintenance of security measures to continue to prevent inappropriate public access.

(b) Construction and Maintenance Access Plan

Before beginning construction, Seneca Wind will develop a Construction and Maintenance Access Plan (CMA Plan) based on final Project plans. The CMA Plan will identify the location of stream, ditch, and wetland resources, as well as any other known sensitive ecological resources in relation to the proposed work. To the extent practicable, these sensitive areas will be avoided. Where this is not practicable, the Plan will document how impacts will be minimized during construction, operation, and maintenance, including illustrating the location where erosion control measures will be used.

Where access for construction or maintenance vehicles cannot avoid crossing a waterbody or wetland resource, the CMA Plan will contain specific information on the proposed crossing methodology and post-construction site restoration for the disturbed area. The description of restoration methods will include a discussion of any long-term stabilization required along permanent access routes.

(c) Vegetation Management Plan

Before beginning construction, Seneca Wind will develop a Vegetation Management Plan (VMP) identifying where vegetation clearing is proposed, specifying the extent of the clearing, and describing the steps to be taken to minimize woody vegetation removal (particularly mature trees and woody

vegetation in wetland, woodlands, and riparian areas). The VMP will identify where impacts can be minimized by allowing low-growing trees and shrubs to be retained.

Where clearing is necessary for structures, access roads, construction staging areas, and other Project-related features, the VMP will outline measures taken to minimize impact, including seasonal restrictions; measures for protecting vegetation in the proximity that will not be cleared; and methods for material disposal. In considering methods for disposing of downed trees, brush, and other vegetation, Seneca Wind will consider strategies that minimize movement of heavy equipment and other vehicles to minimize the potential for secondary impacts. As discussed in Section 4906-4-08(B)(2)(b), trees cleared from the work area will be cut into logs and either left for the landowner or removed, while limbs and brush will be buried, chipped, or otherwise disposed of as directed by the landowner and as allowed under federal, state, and local regulations.

The VMP will also address plans during Project O&M to prevent damage of remaining trees and shrubs surrounding Project-related features, including access roads. Vegetation maintenance procedures, including limited herbicide application, are addressed below.

(d) Limitation of Herbicide Use

The Project will avoid herbicide use near surface waters and wetlands, as discussed in Section 4906-4-08(B)(2)(b). This commitment will be incorporated in the VMP discussed above.

(e) Post-Construction Site Restoration

As reflected in the SWPPP, temporary work areas will be restored and stabilized. Restoration plans documented in the SWPPP will include removal of temporary gravel, other staging materials, and temporary access road materials, unless otherwise reflected in the agreement with the landowner. No gravel or other construction material will be disposed of by spreading the material on agricultural land. All construction debris and contaminated soils generated from Project construction will be disposed of in accordance with Ohio EPA regulations.

(5) Change, Reconstruction, Alteration, or Enlargement

(a) Amendment to a Wind Farm Certificate

Should an amendment be required for Seneca Wind following issuance of the Certificate, applicable procedures reflected in OAC 4906-3-11 will be followed.

(b) Modification(s)

Modifications of Seneca Wind that are minimal in nature and would be adequately addressed by the conditions of the issued Certificate, will not be considered to be amendments unless otherwise ordered by the OPSB or administrative law judge.

(c) Review of Proposed Modification(s)

Seneca Wind may seek review of a proposed modification(s) sought under OAC 4906-4-09(A)(5)(b) by filing the proposed modification(s) in the public docket of the Certificate case, and providing written notification of such filing to OPSB staff and all landowners immediately adjacent to the location of the proposed modification(s). The notification will reference and include a copy of the language

found at 4906-4-09(A)(5)(b); present the rationale for seeking the proposed modification(s); and demonstrate that 4906-4-09(A)(5)(b) is satisfied. OPSB staff or any interested person may file objections to Seneca Wind's proposal within 21 days. If no objections are filed within the 21-day period, Seneca Wind may proceed with the proposed modification(s). If objections are filed within the 21-day period, OPSB staff may subsequently docket its recommendation on the matter. The OPSB will process proposed modification(s) under the suspension process set forth for accelerated applications as outlined in OAC 4906-6-09.

(B) EROSION CONTROL

Seneca Wind will include, in its SWPPP, procedures for inspection and repair of erosion control measures, including the erosion and sedimentation control measures, construction methods, and best management practices addressed in the following sections when working near environmentally-sensitive areas or when in close proximity to any watercourses.

(1) Stabilization with Seeding

During Project construction, all disturbed soil will be seeded within 7 days of final grading, except within actively cultivated agricultural fields. Denuded areas, including spoils piles, will be seeded and stabilized if they will be undisturbed for more than 21 days, in accordance with an approved SWPPP. Re-seeding will be conducted in accordance with Seneca Wind's approved SWPPP, as necessary, until sufficient vegetation in all areas has been established.

(2) Erosion Control Inspection and Repair

Erosion control measures will remain in place until permanent vegetative cover has been established on disturbed areas. In addition to routine inspections, all erosion control

measures will be inspected and repaired (as necessary) after each rainfall event of 0.5 inch or greater over a 24-hour period.

(3) Delineation of Watercourses During Construction

All watercourses and other wetlands immediately adjacent to work areas will be marked by fencing, flagging, or other prominent means to avoid accidental intrusion. For resources outside of participating landowner property, the extent of the work area may be indicated to allow for similar protection.

(4) Avoidance of Wetland and Watercourses by Construction Equipment

Construction equipment will not enter watercourses, including wetlands, except at specific locations where construction has been approved, as discussed in Section 4906-4-08(B)(1)(b).

(5) Avoidance of Materials Storage in Wetlands or Watercourses

The CMA Plan and SWPPP will prohibit storage, stockpiling, or disposal of equipment and materials in wetland or watercourse areas. As discussed in Section 4906-4-07(D), solid waste generated throughout the lifecycle of the facility will be handled and disposed of properly.

(6) Avoidance of Placing Structures in Wetlands or Watercourses

No structures will be placed within wetlands or watercourses unless they have been specifically authorized by the USACE or as addressed in Section 4906-04-08(B)(2).

(7) Storm Water Management

Appropriate stormwater management measures will be used in accordance with the Ohio Rainwater Manual to limit the potential for erosion and sedimentation and/or increases in peak rates of runoff, as will be detailed in the Project's construction SWPPP. Stormwater

runoff will be diverted away from fill slopes and other exposed surfaces to the greatest extent possible and directed to appropriate catchment structures, sediment pond, or other control measures using diversion berms, temporary ditches, check dams, or similar measures.

(C) AESTHETICS AND RECREATIONAL LAND USE

(1) Abatement of Vandalism

In the event of vandalism, Seneca Wind will immediately remove or abate the damage.

(2) Prohibition of Commercial Signage or Advertisements

No commercial signage or advertisement will be displayed on any turbine, tower, or related infrastructure, except for reasonable identification of the manufacturer or operator of the wind farm. Additional signage related to Project safety issues may also be posted.

(3) Lighting

All structures that require lighting by the FAA and/or ODOT Division of Aviation, including construction equipment, will be lit with the minimum lighting required. Lighting associated with the remaining elements of Seneca Wind, such as the O&M building, switchyards, and access roads, will be limited to that required for safety and operational purposes and will be angled downward and reasonably shielded from adjacent properties.

(4) Structure Surface Finish

The visible surfaces of wind farm structures will be a non-reflective, matte finished, non-obtrusive, and neutral color such as white, off-white, gray, or beige.

(5) Avoidance of Adverse Impacts on Landmarks

Impacts to landmarks (districts, sites, buildings, structures, and objects that are recognized by, registered with, or identified as eligible for registration by the National

Registry of Historic Landmarks, the OHPO, or the ODNR) are discussed in Section 4906-4-08(D). As noted in that section, no adverse impact to landmarks are anticipated that would require mitigation. Prior to construction, Seneca Wind will conduct location-specific archaeological assessments consistent with OHPO standards and requirements in order to confirm that no adverse effect to archaeological resources will occur. An Unanticipated Discoveries Plan will be prepared and implemented during construction that will outline procedures to be undertaken in the event that previously unidentified archaeological deposits or artifacts are discovered during construction of the Project.

(6) Visual Simulations

Visual simulations (either photographic or an artist's pictorial sketch) are required from at least one vantage point in each 3-square-mile area, showing views in each primary compass direction under conditions conducive to visibility. A visual impact study was completed and visual simulations from the north, south, east and west are provided in Section 4906-4-08(D)(4). Unless a change in layout were to be proposed reflecting a change sufficient to require an Amendment, these simulations are anticipated to represent the range of anticipated views and visibility for the Project within its proposed setting.

(D) WILDLIFE PROTECTION

(1) Coordination with State and Federal Agencies

Seneca Wind has coordinated with USFWS and ODNR to identify appropriate surveys and to determine if any actions are necessary to avoid impacts to federal or state listed and protected species or other species which may be impacted; applicable information has also been provided to OPSB staff in Section 4906-4-08(B). Prior to construction, Seneca

Wind will provide agency concurrence with recommendations to the OPSB Staff to be implemented in order to avoid and/or minimize impact to listed species.

(2) Listed Species Encounter During Construction

Seneca Wind will contact OPSB staff within 24 hours if federal- or state-listed species are encountered during construction activities. Construction activities that could adversely impact the specifically identified plant and/or animal will be halted until an appropriate course of action has been agreed upon between Seneca Wind, OPSB staff, and other applicable agencies, or the animal has moved (under its own power) outside of the active disturbance area.

(3) Restricted Dates/Restricted Habitats

Seneca Wind will avoid construction in federal- or state-listed and protected species' habitats during seasonally restricted dates, or in restricted habitat types, as specified by the ODNR and USFWS, unless coordination efforts with the ODNR and USFW allow a different course of action. This will include:

- Limiting tree clearing between August 1 and March 31 if located within 150 feet of a documented northern long-eared bat roost; and between October 1 and March 31 if located within 2.5 miles of a documented Indiana bat roost, or within 5 miles of a documented Indiana bat capture;
- Commercially reasonable avoidance of native vegetation removal; and
- Avoidance of active nests for migratory birds during the nesting season.

(4) Post-Construction Avian and Bat Monitoring

Seneca Wind will submit a post-construction avian and bat monitoring plan to the OPSB following approval by the USFWS and ODNR. The post-construction avian and bat

monitoring plan will describe routine monitoring procedures, establish estimated incidental take levels, and identify steps necessary for developing a mitigation plan if documented to birds or bats mortalities significantly exceed estimated levels.

(5) Operational Curtailment Periods

At least 60 days prior to the first turbine becoming operational, Seneca Wind will describe plans for maintaining turbine blades in a stationary or nearly stationary stance during low-wind-speed conditions at night during bird and bat migratory seasons.

(6) Mitigation or Adaptive Management

As will be outlined in the post-construction avian and bat monitoring plan, should significant adverse impact occur to federal- or state-listed and protected species, Seneca Wind will develop and implement a mitigation plan or adaptive management strategy.

(E) ICE THROW

(1) Ice Throw Analysis

The ice throw analysis provided in Section 4906-4-08(A)(8) discusses the probability of ice throw impacts at property boundaries and public roads.

(2) Potential Impact Minimization

As discussed in Section 4906-4-08(A)(8), Seneca Wind will minimize potential impacts from ice throw by:

- Restricting public access to the Project area with appropriately placed warning signs or other necessary measures;
- Instructing workers on the potential hazards of ice conditions on wind turbines; and

- Installing and utilizing an ice warning system to include an ice detector installed on the roof of the nacelle, ice detection software, warranted by the manufacturer to detect ice, for the wind turbine controller, or an ice sensor alarm that triggers an automatic shutdown.

(3) Ice Throw Safety Metric

The potential impact from ice throw will be presumed to satisfy safety considerations if, in addition to the use of the safety measures enumerated in Section 4906-4-09(E)(2), the probability of 1 kilogram of ice landing beyond the statutory property line setback for each turbine location is less than 1 percent per year. Because all Project turbines are well over the 410-foot maximum distance reported in literature to experience ice throw, no ice throw safety issues are expected at non-participating properties or roadways.

(F) NOISE

(1) Construction Noise Requirements

Construction noise is discussed in Section 4906-4-08(A)(3)(a). As reflected in that section, Seneca Wind will restrict general construction activities to between 6:00 a.m. to 7:00 p.m., or until dusk when sunset occurs after 7:00 p.m. Impact pile driving, hoe ram, and blasting operations, if required, will be limited to the hours between 10:00 a.m. to 5:00 p.m., Monday through Friday. Construction activities that do not increase noise levels above ambient levels at any occupied building are permitted outside of daylight and weekday hours when necessary. Such items as concrete pours, where they must be continuous, or rotor fly, where it is safer to complete this work during nighttime hours, may be conducted at night.

Seneca Wind will notify property owners or affected tenants (within the meaning of OAC 4906-3-03(B)(2)) of upcoming construction activities, including potential for nighttime construction activities.

(2) Operational Noise Requirements

Operational noise is discussed in Section 4906-4-08(A)(3)(b). As reflected in that section, the Project will be operated so that its noise contribution does not increase noise levels at any non-participating sensitive receptor within 1 mile of the Project Area by more than 5 dBA above the Project Area ambient nighttime average sound level (L_{eq}) presented in this Application. During daytime operation only (7:00 a.m. to 10:00 p.m.), the Project's sound level will be restricted to the greater of: the Project area ambient nighttime L_{eq} plus 5 dBA (as noted above); or the ambient L_{eq} plus 5 dBA at the location of the sensitive receptor. After commencement of commercial operation, Seneca Wind will maintain a complaint resolution procedure (similar to the plan provided in Appendix D) through which review of potential future issues will be addressed.

(G) BLADE SHEAR

The Project's potential impact from blade shear will be minimal, as discussed in Section 4906-4-08(A)(7). As discussed in that section, Seneca Wind will restrict public access with appropriately placed warning signs, and will instruct workers on the potential hazards. Additional measures to minimize potential impact will include the following:

- All wind turbine generators will be equipped with:
    - Two independent braking systems, which may include aerodynamic overspeed controls and mechanical brakes operated in a fail-safe mode, but shall not include stall regulation;

- A pitch control system;
- A lightning protection system; and
- Turbine shutoffs in the event of excessive wind speeds, uncontrolled rotation, excessive blade vibration, stress, or pressure on the tower structure, rotor blades, and turbine components;

- Bypass or override of wind turbine safety features will be prohibited; and
- The wind turbine generators will, at a minimum, conform to industry standards, including those of the American National Standards Institute, the International Electrotechnical Commission, or an equivalent industry standard. Seneca Wind will submit certificates of design compliance obtained by the equipment manufacturers from Underwriters Laboratories, Det Norske Veritas, Germanischer Llloyd Wind Energies, or other similar certifying organizations.

(H) SHADOW FLICKER

(1) Shadow Flicker Impact Metric

As discussed in Section 4906-4-08(A)(9), the Project layout and design results in shadow flicker of less than 30 hours per year at the majority of non-participating receptors within 1,000 meters. For a total of 22 non-participating receptors, impacts are above that value. Seneca Wind is committed to reducing shadow flicker impacts to meet the OPSB requirements. For each of the 22 non-participating residences that currently show impacts greater than that standard, additional investigation and/or coordination will occur to determine the most effective approach. This may include refined analyses that incorporate the potential for vegetation to block line-of-sight and/or to refine window exposures; and consideration of mitigation measures such as window shades or other screening measures.

As decisions are made regarding which specific turbine locations will be constructed, flicker modeling may be revised, as contributing turbines (if not to be constructed) may be skewing the results higher than will be actually experienced. If necessary, curtailed operation under certain conditions may also be considered. Therefore, the Project will avoid unreasonable adverse shadow flicker effect

(2) Complaint Resolution Plan

After commencement of commercial operation, Seneca Wind's complaint resolution process (Appendix D) will be used to address potential shadow flicker issues and determine the need for any mitigation.

(I) DECOMMISSIONING AND REMOVAL

(1) Decommissioning Plan

Preliminary information regarding decommissioning is discussed in Section 4906-4-06(F)(5). As reflected in that section, Seneca Wind will provide a final decommissioning plan to the OPSB and the Seneca County engineer at least 30 days prior to the pre-construction conference. The final decommissioning plan will:

- Indicate the intended future use of the land following reclamation.
- Describe the engineering techniques and major equipment to be used in decommissioning and reclamation; a drainage plan and measures to avoid or minimize impacts to surface and ground water resources and wetlands; and a plan for backfilling, soil stabilization, compacting, and grading; and
- Provide a detailed timetable for the accomplishment of each major step in the decommissioning plan, including the steps to be taken to comply with

applicable air, water, and solid waste laws and regulations and any applicable health and safety standards in effect as of the date of submittal.

(2) Five-Year Updates

Seneca Wind will file a revised decommissioning plan with the OPSB and the Seneca County engineer every 5 years from the commencement of construction. The revised plan will reflect advancements in engineering techniques and reclamation equipment and standards, as well an updated decommissioning cost estimate.

(3) Timing of Decommissioning

Seneca Wind will complete Project decommissioning, or decommissioning of individual wind turbines, within 12 months after the end of the useful life of the Project or individual wind turbines. If no electricity is generated for a continuous period of 12 months, or if the OPSB deems the Project or an individual turbine to be in a state of disrepair warranting decommissioning, the wind farm or individual wind turbines will be presumed to have reached the end of their useful life. Seneca Wind may appeal to the OPSB to extend the useful life period for good cause. Decommissioning of individual turbines could also be required by the OPSB due to health, safety, wildlife impact, or other concerns that prevent the turbine from operating within the terms of the Certificate.

(4) Removal and Restoration Requirements

Decommissioning will include removing and transporting the wind turbines and towers off site. Decommissioning will also include removing buildings, cabling, electrical components, access roads, and any other associated facilities, unless otherwise mutually agreed upon between Seneca Wind and the landowner. All physical material pertaining to the Project and associated equipment will be removed to a depth of at least 36 inches beneath

the soil surface and transported off site. The disturbed area will be restored to the approximately same physical condition that existed before construction of the Project, unless otherwise agreed with the property owner. Damaged field tile systems, if any, will be repaired to the satisfaction of the property owner.

(5) Material Recycling and Disposal

During decommissioning, all recyclable materials, salvaged and non-salvaged, will be recycled to the furthest extent practicable. All other non-recyclable waste materials will be disposed of in accordance with state and federal law.

(6) Avoidance of Electric Grid Disruption

Seneca Wind will not remove any improvements made to the electrical infrastructure if doing so would disrupt the electric grid, unless otherwise approved by the applicable regional transmission organization and interconnection utility.

(7) Costs

At least 7 days prior to the pre-construction conference, and every 5 years thereafter, Seneca Wind will provide an estimate of the total decommissioning cost in current dollars, without regard to salvage value of the equipment. The estimate will be converted to a per-turbine basis calculated by dividing the number of turbines in the most recent Project engineering drawings from the total decommissioning cost. This estimate will include:

- An identification and analysis of the activities necessary to implement the most recent approved decommissioning plan including, but not limited to, physical construction and demolition costs assuming good industry practice and based on publication or guidelines approved by OPSB staff;
- The cost to perform each of the activities: and

- An amount to cover contingency costs, not to exceed 10 percent of the above calculated reclamation cost.

(8) Performance Bond

Seneca Wind will post and maintain, a performance bond in an amount equal to the per-turbine decommissioning costs multiplied by the sum of the number of turbines constructed and under construction (a turbine is considered to be under construction at the commencement of excavation for the turbine foundation). The form of the performance bond will be mutually agreed upon by the OPSB and Seneca Wind. The performance bond will be to ensure the faithful performance of all requirements and reclamation conditions of the most recently filed and approved decommissioning and reclamation plan.

At least 30 days prior to the pre-construction conference, Seneca Wind will provide an estimated timeline to post decommissioning funds based on the construction schedule for each turbine. Prior to beginning construction, Seneca Wind will provide a statement from the performance bond holder that demonstrates adequate funds have been posted for the scheduled construction. Once the performance bond is provided, Seneca Wind will maintain such funds or assurance throughout the remainder of the applicable term. Seneca Wind will obtain a new performance bond every 5 years, reflecting the updated decommissioning cost estimate from its engineer and revised decommissioning plan.

(9) Repair of Public Roads and Bridges

Seneca Wind will repair damage to government-maintained (public) roads and bridges caused by decommissioning activity. Any damaged public roads and bridges will be repaired promptly to their pre-decommissioning state by Seneca Wind under the guidance of the appropriate regulatory agency and with appropriate financial assurance. The terms will

be defined in a road use agreement between Seneca Wind and the Seneca County engineer prior to Project construction. The road use agreement will contain provisions for the following:

- A pre-decommissioning survey of the condition of public roads and bridges conducted within a reasonable time prior to decommissioning activities;
- A post-decommissioning survey of the condition of public roads and bridges conducted within a reasonable time after decommissioning activities;
- An objective standard of repair that obligates Seneca Wind to restore the public roads and bridges to the same or better condition as they were prior to decommissioning; and
- A timetable for posting of the decommissioning road and bridge bond prior to the use or transport of heavy equipment on public roads or bridges.

(10) Release of Performance Bond

The performance bond will be released by the holder of the bond when Seneca Wind has demonstrated, and the OPSB concurs, that decommissioning has been satisfactorily completed, or upon written approval of the OPSB, in order to implement the decommissioning plan.

REFERENCES

ACS 2016. American Community Survey. Comparative Housing Characteristics 2012-2016 American Community Survey 5-Year Estimates.

Arnett et al. 2008. Patterns of Bat Fatalities at Wind Energy Facilities in North America. Journal of Wildlife Management 72: 61-78.

Arnett et al. 2011. Changing wind turbine cut-in speed reduces bat fatalities at wind facilities. Frontiers in Ecology and the Environment Volume 9, Issue 4: 209-214. Available at: https://doi.org/10.1890/100103.

Arnett and Baerwald 2013. *Impacts of Wind Energy Development on Bats: Implications for Conservation*. Pages 435-456 in R.A. Adams and S.C. Pederson (editors): Bat Evolution, Ecology, and Conservation. Springer Science Press, New York. Available at: https://www.deepdyve.com/lp/elsevier/ecological-impacts-of-wind-farms-on-birds-questions-hypotheses-and-PGG0sliy0d?key=elsevier.

ASCE/AWEA 2011. *Recommended Practice for Compliance of Large Land-based Wind Turbine Support Structures.* American Society of Civil Engineers and American Wind Energy Association. December 25, 2011. Available at: http://www.asce.org/uploadedFiles/Technical_Areas/Wind_Engineering/Content_Pieces/ASCE-AWEA-RP2011-Public-Release.pdf

Baerwald et al. 2009. A large-scale mitigation experiment to reduce bat fatalities at wind energy facilities. Journal of Wildlife Management 73: 1077-1081.

Baring-Gould et al. 2012. *Wind Energy in Cold Climates*. Expert Group Study on Recommended Practices, Submitted to the Executive Committee of the International Energy Programme for Research, Development, and Deployment on Wind Energy Conversion Systems. May 22, 2012.

British Epilepsy Association 2018. Information Web Page on Photosensitive Epilepsy. British Epilepsy Association. http://www.epilepsy.org.uk/info/photo_other.html. Accessed July 2018.

Cattin et al. 2007. *Wind Turbine Ice Throw Studies in the Swiss Alps*. European Wind Energy Conference Milan, May 2007.

Cattin et al. 2008. *Two Years of Monitoring of a Wind Turbine Under Icing Conditions.* Proceedings of DEWEK, Bremen, Germany. November 26-27, 2008.

Cattin et al. 2009. *Four Years of Monitoring a Wind Turbine Under Icing Conditions*. IWAIS XIII, Andermatt, September 8 to 11, 2009.

Chamberlain et al. 2006. The effect of avoidance rates on bird mortality predictions made by wind turbine collision risk models. March 2006. Available at: https://doi.org/10.1111/j.1474-919X.2006.00507.x.

City of Tiffin 2016. Downtown Tiffin Strategic Growth & Development Plan. Available at: https://senecasuccess.files.wordpress.com/2016/05/tiffin-gd-plan_05-17-16.pdf. Accessed June 2018.

de Lucas et al. 2004. The Effects of a Wind Farm on Birds in a Migration Point: The Strat of Gibraltar. Biodiversity and Conservation, 13: 395-407.

Derby et al. 2007. Post-Construction Monitoring Report for Avian and Bat Mortality at the NPPD Ainsworth Wind Farm. Unpublished report prepared by Western EcoSystems Technology, Inc., Cheyenne, WY, for the Nebraska Public Power District.

Ellenbogen et al. 2012. Wind Turbine Health Impact Study: Report of Independent Expert Panel. Prepared for Massachusetts Department of Environmental Protection and Massachusetts Department of Public Health. January 2012. Available at: http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf.

Erickson et al. 2001. *Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Collision Mortality in the United States*. Prepared for the National Wind Coordinating Committee, Avian Subcommittee, Washington, DC.

Erickson et al. 2004. *Stateline Wind Project Wildlife Monitoring Final Report: July 2001 - December 2003*. Technical Report for and Peer-Reviewed by FPL Energy, Stateline Technical Advisory Committee, and the Oregon Energy Facility Siting Council. Prepared by Western EcoSystems Technology, Inc. and Northwest Wildlife Consultants. December 2004.

Erickson et al. 2005. *A Summary and Comparison of Bird Mortality from Anthropogenic Causes with an Emphasis on Collisions*. USDA Forest Service, General Technical Report PSW-GTR-191.

Erickson et al. 2012. *Assessing the Impact of Wind Energy Facilities on North American Songbirds*. In: Proceedings of the Wind-Wildlife Research Meeting IX. Broomfield, CO. November 28-30, 2012. Prepared for the Wildlife Working Group of the National Wind Coordinating Collaborative by the American Wind Wildlife Institute, Washington, DC.

Erickson et al. 2014. *A Comprehensive Analysis of Small- Passerine Fatalities from Collision with Turbines at Wind Energy Facilities*. PLoS ONE 9(9): e107491, 1-18.

Garrad Hassan 2007. *Recommendations for Risk Assessments of Ice Throw and Blade Failure in Ontario*. Prepared for the Canadian Wind Energy Association. Document No. 38079/OR/01. May 31, 2007.

Garrad Hassan 2010. *Turbine Failure Literature Review and the Wind Turbine Certification Process*. Prepared for Green Mountain Power Corp. November 2010.

Gipe 2013. A Summary of Fatal Accidents in Wind Energy. Available at: http://www.wind-works.org/cms/index.php?id=43&tx_ttnews[tt_news]=414&cHash=5a7a0eb3236dd3283a3b6d8cf4cc508b. Last updated May 1, 2013.

Global Wind Energy Council. 2014. *Wind Power FAQs*. Available at: http://www.gwec.net/faqs/how-many-windturbines-World

Good et al. 2012. *Bat Monitoring Studies at the Fowler Ridge Wind Farm, Benton County, Indiana: April 1 – October 31, 2011*. Prepared for the Fowler Ridge Wind Farm by Western EcoSystems Technology, Inc. WEST, Bloomington, Indiana. January 31, 2012.

Gruver et al. 2009. Post-Construction Bat and Bird Fatality Study at the Blue Sky Green Field Wind Energy Center, Fond Du Lac County, Wisconsin July 21 – October 31, 2008 and March 15 – June 4, 2009. Unpublished report prepared by Western EcoSystems Technology, Inc., Cheyenne, WY. December 17, 2009.

Gue et al. 2013. The effects of a large-scale wind farm on breeding season survival of female mallards and blue-winged teal in the Prairie Pothole Region. *The Journal of Wildlife Management* 77(7): 1360-1371.

Huron County 2017. Huron County Comprehensive Land Use Plan. Available at http://www.huronswcd.com/uploads/2/7/9/7/27972647/2017_comp_land_use_plan_for_website.pdf (Accessed May 2018).

Jain 2005. Bird and bat behavior and mortality at a northern Iowa windfarm. Thesis. Iowa State University, Ames, IA.

Jain et al. 2009. Annual Report for the Maple Ridge Wind Power Project Post-Construction Bird and Bat Fatality Study - 2008. Report by Curry & Kerlinger LLC. pp 80.

Johnson et al. 2000. *Avian Monitoring Studies at the Buffalo Ridge, Minnesota Wind Resource Area: Results of a Four-Year Study*. Prepared for Northern States Power Company. September 22, 2000.

Johnson & Shaffer 2008. Displacement Effects of Wind Developments on Grassland Birds in the Northern Great Plains. January 2008.

Johnson, D.H., and J.A. Shaffer. 2012. *Avoidance of Wind Turbines by Grassland Birds*. In: Proceedings of the Wind-Wildlife Research Meeting IX. Broomfield, CO. November 28-30, 2012. Prepared for the Wildlife Working Group of the National Wind Coordinating Collaborative by the American Wind Wildlife Institute, Washington, DC.

Kerlinger & Guarnaccia 2010. *Grassland Nesting Bird Displacement Study – 2010, Noble Wethersfield Windpark, Wyoming County, New York*. Prepared for Noble Environmental Power, LLC. Prepared by Curry & Kerlinger, LLC, Cape May Point, NJ.

Kerns & Kerlinger 2004. A Study of Bird and Bat Collision Fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: Annual Report for 2003. Prepared for: FPL Energy and Mountaineer Wind Energy Center Technical Review Committee. Prepared by: Curry & Kerlinger, LLC – Jessica Kerns and Paul Kerlinger. February 14, 2004.

Koford et al. 2005. *Avian Mortality Associated with the Top of Iowa Wind Farm.* Report Prepared by the Iowa Cooperative Fish & Wildlife Research Unit, Iowa State University, and the Iowa Department of Natural Resources.

Leddy et al. 1999. *Effects of Wind Turbines on Upland Nesting Birds in Conservation Reserve Program Grasslands*. Wilson Bulletin 111:100-104.

Longcore et al. 2012. An Estimate of Avian Mortality at Communication Towers in the United States and Canada. PLoS ONE 7(4): e34025. https://doi.org/10.1371/journal.pone.0034025.

Loss et al. 2013. Estimates of Bird Collision Mortality at Wind Facilities in the Contiguous United States of America. Biological Conservation, 168, 201-209.

Morgan et al. 1998. *Assessment of Safety Risks Arising from Wind Turbine Icing*. BOREAS IV. March 31 – April 2, 1998. Hetta, Finland.

NHMRC 2010. Wind Turbines and Health: A Rapid Review of the Evidence. National Health and Medical Research Council. Australian Government. July 2010.

NREL 2006. *The Wind/Water Nexus*. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. DOE/GO-102006-2218. April 2006.

ODNR 1998. Physiographic Regions of Ohio. State of Ohio, Department of Natural Resources, Division of Geological Survey. April 1998.

ODNR 2009. On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocols for Commercial Wind Energy Facilities in Ohio.

Ohio Department of Taxation 2018. Total State and Local Sales Tax Rates by County. Effective January 1, 2018. Available online at: https://www.tax.ohio.gov/.

Pavey et al. 1999. "Known and Probably Known Karst in Ohio." Ohio Division of Geological Survey Map EG-1.

Poulton 2010. Summary of Post-Construction Monitoring at Wind Projects Relevant to Minnesota, Identification of Data Gaps, and Recommendations for Further Research Regarding Wind-Energy Development in Minnesota. Prepared for: State of Minnesota Department of Commerce. December 10 Western EcoSystems Technology, Inc. Cheyenne, Wyoming. Available: https://tethys.pnnl.gov/sites/default/files/publications/Poulton-2010.pdf.

Rogers et al. 2006. *Wind Turbine Acoustic Noise*. Prepared by the Renewable Energy Research Laboratory, University of Massachusetts. Amherst, MA.

Seneca County 2011. Seneca County Comprehensive Economic Development Strategy. Available at https://senecasuccess.files.wordpress.com/2014/11/economic-plan-ceds-2011.pdf. Accessed May 2018.

Seneca County Commissioners' Office. 2011. In the Matter of: Designating Seneca County as an Alternative Energy Zone; Approving all Applications Submitted by the Depart of Development; Requiring Annual Service Payments and Additional Service Payments; and Specifying the Time and Manner of Such Payments. October 17.

Shaffer & Buhl 2016. *Effects of Wind-Energy Facilities on Breeding Grassland Bird Distributions*. Conservation Biology 30(1): 59-71.

Siefert et al. 2003. *Risk Analysis of Ice Throw from Wind Turbines*. Proceedings from BOREAS VI, Phyä, Finland. April 9-11, 2003.

States Committee for Pollution Control 2002. Notes on the identification and Evaluation of the Optical Emissions of Wind Turbines. Available at: http://www.umwelt.sachsen.de/umwelt/download/laerm_licht_mobilfunk/WEA-Schattenwurf-Hinweise_LAI.pdf.

Stevens et al. 2013. *An Analysis of Displacement from Wind Turbines in a Wintering Grassland Bird Community*. Biodiversity and Conservation 22:1755–1767.

U.S. Census Bureau (2018), 2000, and 1020 Decennial Census

USDA 1980. Soil Survey of Seneca County, Ohio. United States Department of Agriculture, Soil Conservation Service in cooperation with Ohio Department of Natural Resources, Division of Lands and Soil, and Ohio Agricultural Research and Development Center. Issued September 1980.

USDA NRCS 2016. *Plants Profile for Panax quinquefolius L. American Ginseng.* Available at: http://plants.usda.gov/core/profile?symbol=PAQU.

USEPA. 1971. Technical Document NTID300.1, Noise from Construction Equipment and Operations, US Building Equipment, and Home Appliances. Prepared by Bolt Beranek and Newman for USEPA Office of Noise Abatement and Control, Washington, DC. December 1971.

USEPA 1980. *Construction Noise Control Technology Initiatives*. Technical Report No. 1789. Prepared by ORI, Inc. Prepared for USEPA, Office of Noise Abatement and Control. September 1980. Available at: http://www.nonoise.org/epa/Roll5/roll5doc22.pdf..

USFWS 2012. *Land-Based Wind Energy Guidelines*. U.S. Fish and Wildlife Service. March 23, 2012. OMB Control No 1018-0148. Available at: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf.

USFWS 2013. *Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy, Version 2.* U.S. Fish and Wildlife Service, Division of Migratory Bird Management. April 2013. Available at: https://www.fws.gov/migratorybirds/pdf/management/eagleconservationplanguidance.pdf.

USFWS 2016. *2016 Range-Wide Indiana Bat Summer Survey Guidelines*. U.S. Fish and Wildlife Service. April 2016. Available at: https://www.fws.gov/midwest/endangered/mammals/inba/surveys/pdf/2016IndianaBatSummerSurveyGuidelines11April2016.pdf.

Whitfield & Madders 2006. A review of the impacts of wind farms on hen harriers *Circus cyaneus* and an estimation of collision avoidance rates. Natural Research Information Note 1 (revised). Natural Research Ltd, Banchory, UK. Available at: https://utahcbcp.org/ou-files/tallstructureinfo/pub__8961698.pdf.

Wiser and Bolinger 2017. *2016 Wind Technologies Market Report*. U.S. Department of Energy Efficiency and Renewable Energy, Office of Energy Efficiency and Renewable Energy. DOE/GO-102917-5033. August 2017.

Young et al. 2011. Nedpower Mount Storm Wind Energy Facility post-construction avian and bat monitoring. Report prepared for NedPower Mount Storm, LLC, Houston, TX. Report prepared by Western Ecosystems Technology, Inc., Cheyenne, WY.