Baron Winds Project

Case No. 15-F-0122

1001.6 Exhibit 6

Wind Power Facilities

EXHIBIT 6 WIND POWER FACILITIES

(a) Statement of Setback Requirements/Recommendations

The primary goal of wind turbine siting and design is to maximize the capture of wind energy to assure economic viability, while providing a design that minimizes environmental impacts, meets turbine vendor site suitability requirements, takes local laws into consideration, and minimizes impacts at residential receptors related to sound and shadow flicker. As such, this is an iterative process with the final facility design reflecting a balance of these factors. The proposed location and spacing of the wind turbines and support facilities is initially based upon site constructability, landowner participation, wind resource assessment, environmental resource factors, proximity to existing transmission, and review of the facility's zoning constraints. Factors considered during preliminary and final placement of turbines and other facility components include the following:

- Wind resource assessment
- Distance from participating residences, non-participating residences, non-participating land parcels, roads, and other infrastructure
- Sufficient spacing between turbines
- Agricultural protection measures
- Biological and cultural resources
- Unusual landform areas
- Wetland avoidance
- Visual, shadow flicker and noise impacts

As indicated previously, the Facility is located in a rural area where the density of development is low and high density residential land use is not widespread. The Facility has been sited to avoid and/or minimize interaction with sensitive natural and cultural resources (e.g., wetlands, streams, archaeological sites) to the maximum extent practicable. More detailed discussion of the Facility's relationship to these features and other resources, such as schools, recreational lands, and historic properties, is provided in other sections of this Application. This section of the Application provides an evaluation of the Facility's turbine setbacks.

A setback is the distance which a wind turbine, building, or other structure must be set back from a road, residence, property line, or other location appropriate for a setback. Wind turbine setbacks are designed to prevent turbines from being erected in areas where sensitive resources would be located within a "fall zone" or "fall-down distance," which is the area directly under a wind turbine that could be subject to falling debris in the unlikely event of a blade failure, tower collapse, icing, or other mechanical problems. See Exhibit 15 for additional information about potential public safety

issues associated with wind energy facilities. In order to create a safe "fall-down distance," setbacks are often based on total turbine height (i.e., the height of the entire turbine, as measured from the tower base at the ground surface to the tip of the blade oriented in its highest position). Therefore, for a turbine whose total turbine height is 500 feet, the "fall-down distance" for that turbine would be 500 feet.

To ascertain proper setbacks it is necessary to identify the height of the turbines that will comprise the particular wind turbine project under review. Due to market factors such as availability and cost, a specific turbine model has not yet been selected for the Facility. Turbine models that have been determined to be suitable for the Facility include those identified in Table 6-1 below. The total height for these turbine models ranges from 476 to 492 feet. Consequently, a "fall-down distance" of 500 feet accounts for the heights of the full range of turbine models under consideration for the proposed Facility. The Applicant may select a turbine model not presented in this Application, provided that the turbine total height and sound power level output of the selected turbine is not greater than those analyzed in this Application. See Appendix K of this Application for turbine brochures containing additional information about wind turbine technology.

Table 6-1. Approximate Turbine Dimensions by Model

Turbine Model	Rated Power	Hub Height	Rotor Diameter	Total Height
Acciona AW-132	3.3 MW	84 meters (276 feet)	132 meters (433 feet)	150 meters (492 feet)
Gamesa G126	2.625 MW	84 meters (276 feet)	147 meters (482 feet)	147 meters (482 feet)
Gamesa G132	3.465 MW	84 meters (276 feet)	132 meters (433 feet)	150 meters (492 feet)
GE 3.2-130	3.2 MW	85 meters (279 feet)	130 meters (427 feet)	150 meters (492 feet)
Nordex N117	3.6 MW	91 meters (299 feet)	117 meters (384 feet)	150 meters (492 feet)
Nordex N131	3.9 MW	84 meters (276 feet)	131 meters (430 feet)	150 meters (492 feet)
Senvion MM122	3.4 MW	89 meters (292 feet)	122 meters (400 feet)	150 meters (492 feet)
Senvion MM140	3.6 MW	80 meters (262 feet)	140 meters (459 feet)	150 meters (492 feet)
Siemens SWT-2.625-120	2.625 MW	85 meters (279 feet)	120 meters (394 feet)	145 meters (476 feet)

Turbine Model	Rated Power	Hub Height	Rotor Diameter	Total Height
Siemens SWT-3.6-130	3.6 MW	85 meters (279 feet)	130 meters (427 feet)	150 meters (492 feet)
Vestas V126	3.6 MW	87 meters (285 feet)	126 meters (413 feet)	150 meters (492 feet)
Vestas V136	3.6 MW	82 meters (269 feet)	136 meters (446 feet)	150 meters (492 feet)

(1) Manufacturer's Setback Specifications

The Applicant is not aware of any manufacturer's setback specifications for any of the turbine models under consideration for the Facility. Manufacturer's siting guidelines are typically focused on technical issues such as the available wind resource at a given site (i.e., on selecting the appropriate technology/ turbine model) rather than on land use/zoning issues such as setbacks.

(2) Applicant's Recommended Internal Setback Standards

The Applicant's recommended internal setback standards ensure the safety of the public and neighboring properties by siting turbines away from non-participating property lines, roads, and other public infrastructure at a distance of at least the maximum blade tip height (see Exhibit 15(e) for a detailed discussion of Facility safety standards) and minimize impacts related to sound or shadow flicker. See Exhibits 19 and 24, respectively, for a detailed discussion of Facility impacts related to sound and shadow flicker.

The Applicant's recommended internal setback standards for Facility turbines are summarized in Table 6-2 below. Given the range of turbine models and associated heights under consideration (476 to 492 feet), setback distances were calculated for the proposed Facility assuming a total turbine height of 500 feet.

Table 6-2. Applicant's Recommended Setback Standards for Facility Turbines

Feature	Setback Calculation	Setback Distance
Substation	1.5x total turbine height	750 feet
Transmission Line[1]	1.5x total turbine height	750 feet
Natural Gas Pipeline	1.1x total turbine height	550 feet
Oil and Natural Gas Well	Total turbine height	500 feet
Public Road	1.1x total turbine height	550 feet
Non-Residential Structure	1.1x total turbine height	550 feet

Feature	Setback Calculation	Setback Distance
Non-Participating Residence	3x total turbine height	1,500 feet
Non-Participating Seasonal Residence	2x total turbine height	1,000 feet
Participating Residence	2x total turbine height	1,000 feet
Participating Seasonal Residence	1.1x total turbine height	550 feet
Non-Participating Parcel	1.1x total turbine height	550 feet
Wetland	100 feet	100 feet

[1]This setback applies to larger transmission lines (i.e., 115 kV and greater) and is to be measured from the edge of the right-of-way.

(3) Turbine Setbacks Required by Local Law or Ordinance

Zoning jurisdiction within Steuben County is at the town level. The proposed turbines will be sited in the Towns of Cohocton, Dansville, Fremont, and Wayland. As of the filing date this Application, each of these towns except Dansville had adopted laws specific to wind energy development. Dansville has drafted a law specific to wind energy development that is expected to be adopted prior to the construction of the Facility. Therefore, the Applicant has also included Dansville's proposed setbacks in this analysis. Table 6.3 provides a summary of the turbine setbacks, where applicable, for each town where turbines are proposed. See Exhibit 31 of this Application for additional information on local laws.

Table 6-3. Turbine Setback Requirements for the Towns of Wayland, Cohocton, Fremont and Dansville

Setback Requirement	Town of Wayland	Town of Cohocton	Town of Fremont	Town of Dansville (Proposed as of Nov. 2017)
Off-Site Boundaries	1.5x total turbine height	Total turbine height plus 100 feet	1.5x total turbine height, minimum of 500 feet	1.5x the total turbine height
Public Roads	n/a	Total turbine height plus 100 feet	1.5x total turbine height, minimum of 500 feet	1.5x total turbine height from right of way of all public roads
Off-Site Residences	n/a	1,500 feet from adjacent dwellings	1,000 feet from nearest off-site residence existing at time of application	1,500 feet from off-site residences, measured from the exterior of such residence
Aboveground Utility	1.5x total turbine height from aboveground utility lines	Total turbine height plus 100 feet	n/a	1.1x total turbine height from above-ground utilities

Setback Requirement	Town of Wayland	Town of Cohocton	Town of Fremont	Town of Dansville (Proposed as of Nov. 2017)
Structures	1.5x total turbine height from pre-existing structures	1,500 feet from areas or structures customarily used by the public	1.5x total turbine height, minimum of 500 feet from any lodging facility, public building, church or other institution	1.5x total turbine height from off-site existing structures
Wetlands	n/a	n/a	100 feet from state-identified wetlands	100 feet from state-identified wetlands

(b) Explanation of the Degree to which the Facility Layout Accommodates Turbine Setbacks.

The Facility will be designed to meet the setback requirements as recommended by the Applicant and as set for in the in the zoning regulations for the Towns of Wayland, Cohocton, and Fremont and as proposed by the Town of Dansville. The Applicant is not proposing uniform setbacks across Towns, as each Town has different requirements, and all of Towns' requirements ensure the safety of the public and neighboring properties. Instead, the Facility will be designed to meet or exceed all turbine setback requirements as recommended by the Applicant (Table 6-2) and/or the setback requirements in each town's local law (Table 6-3), or written consent will be obtained from affected property owners.

The Applicant's proposed setback standards from occupied structures, property lines, existing overhead transmission lines (115kV and greater), and roads in each town are shown on the site plans submitted as part of Exhibit 11 (Figure 11-1).

(c) Third-party Review and Certification of Wind Turbines

Equipment reliability is an important criterion in turbine selection. As previously noted, the Applicant has not made a final determination of the wind model or manufacturer, but is presenting in this Application a range of turbine models determined to be suitable for the Facility. The Applicant may select a turbine model not presented in this Application provided that the turbine total height and sound power level output of the selected turbine is not greater than those analyzed in this Application. Based on preliminary evaluations, 2.625 to 3.9 MW represent the range of turbine size types suitable for this Facility. Turbine models are independently certified as meeting international design standards by independent product safety certification organizations such as Germanischer Lloyd and Underwriters Laboratories. These certifications require that the wind turbines have a design life of at least 20 years for the specified wind regime. The wind regime considers factors such as weather extremes, average wind speed, wind gusts, and turbulence intensity.

A third-party certification for one of the turbines under consideration for the Facility is being submitted concurrently with this Application, but under seal due to the confidential nature of this document. The Applicant will ultimately select a turbine that has achieved the necessary third-party certification, and proposes to submit this certification information to the Siting Board as a post-Certification compliance filing. The Applicant will provide updates to the information submitted in response to this Item as appropriate throughout this proceeding.

(d) Wind Meteorological Analyses

Wind resource analyses were performed in order to optimize the turbine layout for maximum energy production within the context of the existing, site-specific constraints and support the estimated capacity factor for the Facility. During the course of the wind analysis, micro-scale wind modeling tools WAsP (www.wasp.dk) and WindSim CFD (Computational Fluid Dynamics - www.windsim.com) were utilized to develop the energy yield analysis for the Facility layout. The WAsP model is a linear flow model that was used to determine the resultant wind regime at all turbine positions given data from on-site meteorological towers and high-resolution terrain from a digital elevation model. Two temporary meteorological towers were erected at the Facility Site to generate the site-specific data necessary for modeling purposes. A preliminary turbine layout was then devised utilizing the resulting wind resource map from the WAsP model. The WindSim CFD model is a more advanced wind flow model and was used to validate WAsP model results in areas of more complex terrain within the Facility Site. WindSim was also used to maximize turbine efficiency utilizing multiple turbine wake models in order to determine the most productive turbine array due to wake loss. The turbine layout presented in this Application was determined by correlating the most energetic layouts with the most constructible and logistically economical designs, while also factoring in siting constraints and impact avoidance measures.

The detailed results of these analyses are proprietary and are typically retained as trade secrets. Therefore, a copy of the wind meteorological analysis is not being provided with this Application, but rather will be provided to the New York State Department of Public Service under separate cover. The Applicant is seeking the requisite trade secret protection for this information pursuant to New York Public Officer's Law § 87(2)(d) and 16 NYCRR § 6-1.3.

Publicly available wind resource maps suggest a suitable wind resource along ridgetops at the Facility Site (AWS Truewind, 2007; NREL & AWS Truepower, 2010). The Baron Winds Project will have a nameplate capacity of up to 300 MW, and is expected to operate at an annual net capacity factor of approximately [redacted]%. This means that over the course of a full calendar year the Facility will produce up to [redacted] megawatt hours (MWh) of energy (i.e., 300 MW x 24 hrs/day x 365 days x [redacted]%). This is enough electricity to meet the average annual consumption of between

approximately 81,974 and 125,847 households, based on the average annual electric consumption of 10.9 MWh for the U.S. and 7.1 MWh for New York State, respectively (USEIA, 2015).