Baron Winds Project

Case No. 15-F-0122

1001.9 Exhibit 9

Alternatives

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EXHIBIT 9 ALTERNATIVES

(a) Description of Reasonable Alternative Location Sites

In order to create an economically viable wind-powered electrical-generating facility, which will provide a significant source of renewable energy to the New York power grid, the Applicant proposes to take advantage of the available wind resource and bulk power transmission system in Steuben County, New York. Based on the System Reliability Impact Study (SRIS) prepared on behalf of the New York Independent System Operator (NYISO), the existing transmission system that will receive electricity from the Facility can accommodate the Applicant's proposed 300 megawatt (MW) of electric power generation and no other interconnections are proposed at the point of interconnection (POI) substation. Therefore, the preferred alternative is to construct a facility that can produce up to 300 MW of renewable energy.

The Applicant, as a private facility applicant, does not have (and does not anticipate having) eminent domain authority. Therefore, the identification and description of reasonably available alternative site locations to be addressed in the Article 10 Application will be limited to sites owned by or under contract/option to the Applicant. More generally, it is worth noting that the preliminary selection of wind turbine locations on a regional or statewide basis is constrained by several factors that are essential for the Facility to operate in a technically and economically viable manner. These factors include:

- adequate wind resource;
- adequate access to the bulk power transmission system, from the standpoints of proximity and ability of the system to accommodate the interconnection and accept and transmit the power from the Facility;
- contiguous areas of available land;
- compatible land use;
- willing landowner participants and host communities;
- limited population/residential development; and
- avoiding areas of statewide significance or high environmental sensitivity (e.g., Adirondack Park, Great Lakes shoreline).

The location selected for the Facility is suitable for large-scale wind energy production. Across New York State, the wind resource varies based on a number of factors (and the interaction of these factors) including topography, prevailing wind direction, and location. Large-scale wind power projects can only be sited in certain locations within the State that are conducive to wind energy production. The higher the wind speed at a site the more desirable a site is as the energy produced by a given turbine is a function of the cube of the wind speed. New York's modest wind resource is not evenly distributed throughout the State. Rather, the wind resource is limited to certain unique areas in the State, which generally include coastal areas, ridgelines, elevated plateaus, and mountain peaks. Assessments conducted by the Applicant indicate that the Facility Area has a sufficient wind resource to support a large-scale wind energy project. The Facility Area's proximity to an existing transmission line with adequate capacity also makes this location desirable.

The Applicant selected the proposed site for the Facility because of the presence of the wind resource, the presence of available land to site Facility components and willing landowners, the relative ease of access to the site for component delivery and Facility operation, and reasonable proximity and relative ease of connecting to the existing electric transmission grid. These factors combine to make the proposed site desirable from the standpoint of large-scale commercial wind power development.

(b) Comparison of Advantages and Disadvantages of Proposed and Alternative Locations

Given the unique nature and constraints associated with the siting of wind-powered electric generation facilities (i.e., need for adequate wind resource, willing landowner participants and host communities, and adequate access to the bulk power transmission system), the Applicant is not providing an evaluation of the comparative advantages and disadvantages of alternate locations. It is not practicable to procure land contracts, perform environmental and engineering studies, enter into and progress through multiple interconnection permit processes, and conduct community outreach for alternative locations. However, this section provides information regarding the general criteria used to evaluate the suitability of the site for the Facility.

(1) Environmental Setting

The Facility Site consists of all parcels that are hosting Facility components. The Facility is located within the Appalachian Plateau physiographic province of New York State. Elevations range between 1,400 feet to 2,100 feet above mean sea level. The Appalachian Plateau in Steuben County is characterized by many broad, deep, flat-bottomed valleys occupied by meandering streams. The areas between the valleys consist of rolling uplands and some flat-topped hills that formed partly because of the nearly horizontal bedding of the underlying bedrock (USDA, 1978). All of the bedrock in Steuben County is of Devonian age, and is generally formed from deltaic deposits. Most of the beds formed broad and open folds that trend to the northeast, and are about five to 10 miles apart. The bedrock underlying the Facility consists of members of the Canadaway, Java, and West Falls Group, all of the upper Devonian (Rickard and Fisher, 1970). See Exhibit 21 of this Application for more detailed information on the suitability of geology and soils at the Facility Site.

(2) Recreational, Cultural, and Other Concurrent Uses of the Site

The Applicant has identified several recreational facilities in the area including, but not limited to trails (e.g, hiking, snowmobile, biking), state and local parks, and state forests. A Phase 1A Historic Architectural Resources Survey and Work Plan was prepared during the development of the Preliminary Scoping Statement (PSS). The information and recommendations included in this report are intended to assist the Department of Public Service (DPS) and the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP) in their review of the proposed Facility. In a letter dated July 18, 2016, NYSOPRHP indicated concurrence with the proposed scope of work for the Historic Architectural Resources Survey. In addition, on July 25, 2016, NYSOPRHP provided a response to the Phase 1A Archaeological Survey Report and Phase 1B Fieldwork Plan, which concurred with the proposed Phase 1B Fieldwork Plan and APE for Direct Effects. See Exhibit 20 of this Application for more detailed information on recreational, cultural, and other concurrent uses of the Facility Site.

The proposed Facility is located in a rural portion of Steuben County. Land use at the Facility Site consists of agricultural fields, scattered residential development along area roadways, and large tracts of undeveloped second-growth forest. While both temporary and permanent impacts to land use will occur, these changes will affect a tiny percentage of leased lands, and the Facility will be compatible with the existing land uses that dominate the Facility Site and surrounding area. Only very minor changes in land use are anticipated within the Facility Site as a result of Facility operation, and no changes are predicted outside the Facility Site. Aside from occasional maintenance and repair activities, Facility operation will not interfere with ongoing land use (i.e., farming or forestry activities). See Exhibit 4 of this Application for more detailed information on land use at the Facility Site.

(3) Engineering Feasibility

A Preliminary Geotechnical Evaluation was conducted that included a literature review of publicly available information and data pertaining to surface and subsurface soil, bedrock, and groundwater conditions in the vicinity of the proposed Facility, as well as preliminary geotechnical investigations at select locations within the Facility Site to obtain additional information pertaining to the subsurface soil and bedrock features to assess the general constructability of the proposed Facility. The Assessment concluded that the Facility Site is generally suitable for the proposed Facility (GZA, 2016). The literature review and preliminary borings suggest that foundations for the proposed turbines can be constructed on shallow mat foundations. Due to the depth of bedrock, and its low rock quality, it does not appear that blasting will be required for the construction of the turbine foundations. It is expected that the excavations for the construction of the proposed Facility will be completed using conventional construction equipment including bulldozers, track hoes, and possibly pan excavators. Additional information regarding the

Geotechnical Assessment and the engineering feasibility of the Facility Site are presented in Exhibit 21 of this Application.

The Applicant has conducted a rigorous wind resource analysis for this Facility to optimize the turbine layout to maximize energy production within the context of the existing, site-specific constraints. As discussed in Exhibit 6, the detailed results of these analyses are proprietary and are retained as trade secrets; a copy of the wind meteorological analysis will be provided to DPS under separate confidential cover. The Applicant will seek 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. See Exhibit 6 of this Application for additional information about the wind resource at the Facility Site.

With respect to interconnections, see Section (b)(4) below.

(4) Reliability and Electric System Effects

As previously noted, a System Reliability Impact Study was completed in January 2015 to evaluate the impact of the Facility on the reliability of the New York State Transmission System and to identify alternatives to eliminate adverse reliability impacts, if any, resulting from the Facility. The SRIS evaluated a number of power flow base cases, as determined by the NYISO, including 2018 summer peak, winter peak, and light load. The Facility is not expected to result in adverse impacts to the transmission system. See Exhibit 5 of this Application for a more detailed description of the Facility's effects on the reliability of the regional transmission system.

(5) Environmental Impacts

The Facility will provide a source of clean, renewable energy without emitting any conventional air pollutants (which contribute to smog, acid rain and other pollution problems) or greenhouse gases (GHGs) (which contribute to global climate change). Operation of the Facility requires no water, fuel or other inputs and generates very little waste. Despite the obvious benefits anticipated as a result of the Facility, its construction and operation will necessarily result in certain unavoidable impacts to the environment. The majority of these environmental impacts will result from construction activities and will be temporary in nature. Long-term unavoidable impacts associated with operation and maintenance of the Facility are anticipated to be relatively limited, but will include distant turbine visibility, wildlife habitat changes and direct mortality to avian and bat species, and minor impacts to streams and wetlands.

The presence (i.e., visibility) of the turbines will likely result in a change in perceived land use from some viewpoints. Evaluation by registered landscape architects indicates that the Facility's overall contrast with the visual/aesthetic character of the area will generally be minimal to moderate. However, based on the contrast rating scores and comments, greater levels of contrast can be anticipated where open views of large numbers of turbines are available from, open water, and areas of concentrated human use/settlement. Conversely, contrast is reduced when turbines are partially screened, viewed at greater distances, seen in the context of a working agricultural landscape, viewed in a setting with existing visual clutter, or co-located with an operating project. According to the VIA, public reaction to the aesthetic qualities of the proposed Facility is unknown, but likely to be highly variable based on proximity to the turbines, the affected landscape, and personal attitude of the viewer regarding wind power. See Exhibit 24 of this Application for more detailed information on turbine visibility and visual impacts in the vicinity of the Facility Site.

The Facility layout was designed, in part, through an iterative process of identifying sensitive natural resources such as wetlands and forest, and siting Facility components to avoid and minimize impacts to these features wherever possible. This initiated in the summer of 2016 when a reconnaissance-level field investigation of the Facility layout was conducted, which at that time included 120 proposed turbine locations. This layout would have resulted in significantly more impacts to wetland and forest resources. See (c)(3) below for additional detail on the impacts of the 120-turbine layout. Regarding impact minimization and avoidance specific to the Facility layout set forth herein, the Applicant has committed to installing buried interconnect through horizontal direction drill (HDD) technology to further avoid/minimize impacts. Specifically, HDD installation will be used where buried interconnect crosses forested wetlands and NYSDEC-protected streams, and buried interconnect is the only component crossing such features. It is currently anticipated that HDD installation will be used in 11 unique crossing locations, which results in the avoidance of forest clearing/conversion and NYSDEC-protected stream impacts. Despite these efforts, some stream and wetland impacts are unavoidable. Where avoidance was not practicable, narrow and/or previously disturbed portions of the wetlands were chosen for crossing locations. Based on final impact calculations to wetlands and streams, the Applicant will implement compensatory mitigation that ultimately will satisfy the requirements of both the New York State Department of Environmental Conservation (NYSDEC) and U.S. Army Corps of Engineers (USACE). See Exhibit 22 and 23 of this Application for more detailed information on impacts to wetlands and streams at the Facility Site, along with specific proposed mitigation measures.

Facility components have been sited so as to minimize impact to undisturbed wildlife habitat. Many of the proposed turbines are sited in or adjacent to agricultural land, which generally provides habitat for only a limited number of wildlife species. In addition, these areas are already subject to regular periodic disturbance in the form of mowing, plowing, harvesting, etc. Approximately 440.1 acres of wildlife habitat (5.2% of the approximately 8,500 acre Facility Site) will be temporarily disturbed during construction, while permanent loss through conversion of natural habitat to built facilities will total 125.8 acres (1.5% of the approximately 8,500 acre Facility Site). On a landscape scale, there is abundant available habitat within the nearby landscape similar to that at the Facility Site. See Exhibit 22 of this Application for more detailed information on impacts to wildlife habitat within the Facility Site.

The proposed Facility will have long-term beneficial effects on the use and conservation of energy resources and climate change. The operating Facility will generate up to 300 MW of electricity without consuming cooling water or generating wastewater, and without emitting pollutants or heat-trapping GHGs. Electricity generated from zero-emission wind energy facilities can displace the electricity generated from conventional power plants, thereby reducing the emissions of conventional air pollutants, such as mercury and lead (air toxics); sulfur and nitrogen oxides (acid rain and/or ozone precursors); and carbon dioxide (CO2) (linked to global climate change). This conclusion is supported by a 2008 U.S. Department of Energy, National Renewable Energy Laboratory report that states, "Wind energy is a preferred power source on an economic basis, because the operating costs to run the turbines are very low and there are no fuel costs. Thus, when the wind turbines produce power, this power source will displace generation at fossil fueled plants, which have higher operating and fuel costs." On a long-term basis, wind generated power also reduces the need to construct and operate new fossil fueled power plants (Jacobsen & High, 2008, pp. 9-10). See Section (f) below for additional information on the benefits of wind power.

According to an extrapolation of 2012 data released in 2015 by the U.S. Environmental Protection Agency (USEPA) Emissions and Generation Resource Integrated Database (eGRID2012), the Facility is expected to displace approximately 546,127.1 tons of CO2 emissions from conventional power plants on an annual basis (USEPA, 2015), which represents approximately 1.7% of CO2 produced by the electricity generation sector in New York State (USEIA, 2017). See Exhibit 17 for additional information, including an explanation of how these displacements were calculated.

(6) Economic Considerations

The purpose of the Facility is to create an economically viable wind-powered electrical-generating facility that will provide a significant source of renewable energy to the New York power grid. As previously noted, the Facility Site has ample wind resource for the proposed Facility and is located in close proximity to the existing bulk power transmission system. See Exhibit 6 of this Application for additional information about the wind resource at the Facility Site, and see Exhibit 34 for additional information about the electric interconnection.

This Application provides an estimate of the total capital costs of the Facility in Exhibit 14. However, because capital cost information is considered proprietary and is retained as a trade secret, this data has been provided in the form of an internal work paper that also describes the assumptions in estimating the total capital costs. The Applicant is seeking the requisite trade secret protection for this information pursuant to NY Public Officer's Law Section 87(2)(d) and 16 NYCRR Section 6-1.3.

The proposed Facility will have a positive impact on the local economy. Construction will employ a total work force of approximately 148 on-site employees. Of these, 130 of the jobs will occur in construction labor, while 17 include engineers and other professional construction-related services. Operation and maintenance of the proposed Facility will generate approximately 12 jobs with combined estimated annual earnings of approximately $900,000. In addition to the jobs created and the wages paid to the work force, the Facility will have a direct economic benefit from the first round of buying/selling, which includes the purchase of goods from local sources (such as fuel), the spending of income earned by workers, annual labor revenues, and the income effect of taxes (including income taxes, sales tax and real property taxes). These direct effects will result in additional induced economic benefits in other sectors.

In addition, the Facility will result in direct payments to local landowners in association with the landowner agreements, which will provide a source of funds in addition to any income generated from the existing land use (e.g., agricultural production). These payments will have a positive impact on the region to the extent that landowners spend their revenue locally.

The proposed Facility will also have a significant positive impact on the local tax base, including local school districts and other taxing districts that service the area where the proposed Facility is to be located. Taxing districts within the Facility Area include Steuben County, the Towns of Cohocton, Dansville, Fremont, and Wayland, and the Arkport, Avoca, and Wayland-Cohocton Central School Districts and the Hornell City School District. The affected county, towns and school districts will receive $31.8 million (in 2017 dollars) of Payments in Lieu of Taxes (PILOT) over a 20-year period. In addition, each of the host towns will receive additional payments under Host Community Agreements (HCA) totaling approximately $22.5 million (in 2017 dollars) cumulatively for the four towns over 30 years. At the same time, the proposed Facility will make few, if any, demands on local government services. Therefore, the payments made to local taxing jurisdictions will be net positive gains and represent an important economic benefit to the local area. See Exhibit 27 of this Application for more detailed information on the socioeconomic effects of the proposed Facility.

(7) Environmental Justice

No environmental justice areas occur within the Facility Site, and the Facility is not expected to impact any environmental justice areas. See Exhibit 28 for additional information about the closest environmental justice areas to the Facility Site.

(8) Security, Public Safety, and Emergency Planning

Overall safety and security risks associated with the Facility are anticipated to be minimal. To ensure the safety of construction and operations personnel, as well as the security of the Facility overall, the Applicant has developed, and will implement plans for site security, worker safety, and emergency action, which are described in Exhibit 18 of this Application.

Of particular note, the Applicant has developed a Preliminary Site Security Plan (Appendix X) that outlines the measures the Applicant plans to take to secure the Facility Site during construction and operation, addressing such issues as access control (fencing, gates, sign-in procedures), electronic security, and lighting. The Applicant also has developed a Preliminary Emergency Action Plan (EAP) (Appendix W) in conjunction with local emergency service providers that will be made available to the employees of the Applicant and any visitors or workers at the Facility Site to inform them of the procedures to follow in the event of an emergency. In addition, the Applicant has prepared a Preliminary Health and Safety Plan (Appendix V), which includes measures to be implemented during Facility construction to ensure security. A discussion of site security, emergency action, and health and safety plans is provided in Exhibit 18 of this Application.

Risks to the community posed by wind projects such as the Facility are minimal because the turbines themselves are safe and because they are located in rural locations, away from heavily populated areas. Moreover, those risks theoretically posed by wind power—ice shedding, tower collapse, blade failure, and fire in the turbines—are readily addressed through the proposed setbacks. See Exhibit 15 for details about public safety.

(9) Public Health

The Facility is not expected to have any public health impacts. Claims of health impacts related to sound and shadow flicker have been considered, but all significant, scientifically reviewed studies on the subject have found those claims to be largely unfounded. The design of the Facility adequately considered any reasonable standards and is not expected to result in any public health concerns. Additional detail about public health concerns generally is presented in Exhibit 15 of this Application; noise impacts are discussed in detail in Exhibit 19.

(10) Vulnerability to Seismic Disturbances and Climate Change Impacts

Based on the 2014 New York State Hazard Map (USGS, 2014), the Facility is located in an area of relatively low seismic hazard, with a 2% or less chance that peak ground acceleration in a 50-year window is between 8% and 10% of standard gravity. The only recorded earthquake in Steuben County since 1950 had a magnitude of 3.2 on the Richter scale, and occurred near Bath, New York (about 10 miles southeast of the Facility) in 2001 (USGS, 2015). Furthermore, the USGS Earthquake Hazards Program does not list any young faults, or faults that have had displacement in the Holocene epoch, in the vicinity of the Facility Site. See Exhibit 21 of this Application for a more detailed description of the Facility's potential vulnerability to seismic disturbances.

With respect to climate change, as stated above, electricity generated from zero-emission wind energy can displace the electricity generated from conventional power plants, thereby reducing the emissions of conventional air pollutants, such as sulfur and nitrogen oxides (acid rain and/or ozone precursors), mercury, and carbon dioxide (linked to global climate change). Displaced emissions occur because renewable electric generation sources have low marginal operating costs (i.e., fuel). Therefore, renewable energy sources become first option sources, displacing generation at fossil fuel plants that have higher marginal operating costs. The proposed Facility is anticipated to have significant, long-term beneficial effects on the use and conservation of energy resources. The operating Facility will generate up to 300 MW of electricity without consuming cooling water, discharging wastewater, or emitting air pollutants.

The Facility Site is located along upland ridges in the New York Southern Tier, far from coastal areas. As a result, the Site is not expected to be vulnerable to rising sea levels. More frequent intense precipitation events could lead to more frequent flooding in low-lying areas. Review of Federal Emergency Management Agency (FEMA) flood insurance rate maps indicate that a 100-year floodplain is mapped within the Facility Site, along portions of Neils Creek. However, the turbines are located in upland areas, well away from the floodplain. The crossing of Neils

Creek by a section of collection line is the only Facility component proposed to be located within the floodplain. The transmission line poles will be located outside the floodplain to the extent practicable.

Temperature increases will drive many changes in species composition and ecosystem structure across the State (NYSERDA, 2011). For example, forest composition is expected to slowly change, with oak-hickory forests becoming dominant in many areas currently occupied by maple-beech forests (Iverson et al., 2008). However, ecological communities most vulnerable to climate change (e.g., boreal spruce-fir forests, high elevation alpine tundra communities, etc.) do not occur at the Facility Site.

(11) Objectives and Capabilities of the Applicant

With respect to capabilities, the Applicant is a wholly owned subsidy of EverPower Wind Holdings, Inc. ("EverPower"). Headquartered in Pittsburgh, Pennsylvania, EverPower is a developer of utility grade wind projects. Since its founding in 2002, EverPower has used a unique approach to wind power development by partnering with landowners and communities to establish itself as a premier developer, owner, and operator of wind projects in the U.S. To date, EverPower has seven operational wind facilities with a nameplate capacity of approximately 752 MW, including the Howard Wind Project in Steuben County, New York. The Howard Wind Project has a total generating capacity of 55.35 MWs and uses 27 Repower MM92 turbines. The first 25 turbines became commercially operational in 2011, and the two-turbine second phase became operational in 2012.

The objective of the Facility is to create an economically viable wind-powered electrical-generating facility that will provide a source of renewable energy to the New York power grid to:

- Satisfy regional energy needs in an efficient and environmentally sound manner;
- Supplement and offset fossil-fuel electricity generation in the region, with emission-free, wind-generated energy;
- Reduce the amount of electricity imported into New York State;
- Realize the full potential of the wind resource within Steuben County;
- Provide energy that is not susceptible to fluctuations in commodity prices;
- Produce electricity without the generation of carbon dioxide or other GHGs that contribute to climate change;
- Promote the long-term economic viability of rural areas in New York; and
- Assist New York State in meeting its proposed Renewable Portfolio Standard and State Energy Plan goals for the consumption of renewable energy in the State.

(c) Description of Reasonable Alternatives to the Proposed Facility at the Proposed Location

Unlike state or municipal entities, private developers do not have the power of condemnation or eminent domain. Consequently, the Applicant does not have the unfettered ability to locate projects in any area or on any parcel of land. Facilities can only be sited on private property where the landowner has agreed to allow such construction, and is further constrained by the factors described in (c)(4) below.

(1) General Arrangement and Design

The general arrangement and design of the Facility is influenced by a number of factors, as discussed in detail in (c)(4) below. See Exhibit 3 for additional information regarding the arrangement and design of the Facility Site.

(2) Technology

Private landowner agreements strictly limit the use of land to a wind power project, and as such, do not allow for the siting of other alternative energy production facilities (e.g., solar, hydro, biomass, or fossil fuel). Accordingly, other power generation technologies are not reasonable alternatives, and do not warrant consideration in the Article 10 Application.

The turbines proposed for the Facility will utilize the latest in wind power generation technology to enhance project efficiency and safety. Each wind turbine consists of three major components: the tower, the nacelle, and the rotor. The nacelle sits atop the tower, and the rotor hub is mounted to the front of the nacelle. “Hub height” is the height of the center of the rotor, as measured from the base of the tower (excluding the subsurface foundation), while 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. Descriptions of each of the turbine components are provided below.

Tower: The tubular towers used for megawatt-scale turbines are tubular conical steel structures manufactured in multiple sections. Each tower will have an access door in the base section and internal lighting, along with an internal ladder and/or mechanical lifts to access 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, as light colors contrast sharply against the dark-colored ground. The color also has the benefit of reducing visibility from ground vantage points by making them difficult to see against the pale background of the sky.

Nacelle: The main mechanical components of the wind turbine are housed in the nacelle. These components include the drive train, gearbox, and generator. The nacelle is housed in a steel reinforced fiberglass shell that protects internal machinery from the environment and dampens noise emissions. The housing is designed to allow for adequate ventilation to cool internal machinery. The nacelle is equipped with an external anemometer and a wind vane that signals wind speed and direction information to an electronic controller. Attached to the top of some of the nacelles, per specifications of the FAA, will be a single, medium intensity aviation warning light. The nacelle is mounted on a yaw ring bearing that allows it to rotate ("yaw") into the wind to maximize wind capture and energy production.

Rotor: A rotor assembly is mounted to the nacelle to operate upwind of the tower. Each rotor consists of three (3) composite blades that will be up to 68.5 meters (225 feet) in length, with a maximum rotor diameter of up to 140 meters (459 feet). The rotor attaches to the drive train at the front of the nacelle. Hydraulic motors within the rotor hub feather each blade according to wind conditions, which enables the turbine to operate efficiently at varying wind speeds. The rotor can spin at varying speeds to operate more efficiently. Depending on the turbine model selected, the wind turbines will 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 maximum wind speeds of 25 m/s (55.9 mph).

Due to market factors such as availability and cost, a specific turbine model has not yet been selected for the Facility. Table 9-1 presents the dimensions for each of the alternative turbine models under consideration for the Facility.

Table 9-1. 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)	126 meters (413 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 (491 feet)
Nordex N131	3.9 MW	84 meters (276 feet)	131 meters (430 feet)	150 meters (491 feet)

Turbine Model	Rated Power	Hub Height	Rotor Diameter	Total Height
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)
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)

These turbine models represent suitable turbines under consideration for the Facility at the time of this Application. The final turbine selected for the Facility may be one of these, or may be another equivalent turbine model. If a different turbine model is selected, it will not have a greater total height, rotor swept area, or sound power level output than those analyzed in this Application. See Appendix K of this Application for turbine brochures containing additional information about wind turbine technology.

(3) Alternative Turbine Layouts

The proposed location and spacing of the wind turbines is directly related to several factors, including landowner participation, the wind resource assessment, environmental resource factors, and the consideration of any potential zoning constraints. Factors considered during the layout design process for the Facility include the following:

- *Wind Resource Assessment*: Through the use of on-site meteorological data, topographic and surface roughness data, wind flow modeling, and wind plant design software, the wind turbines will be sited to optimize exposure to wind from all directions, with emphasis on exposure to the prevailing southwest wind direction at the Facility Site.
- *Topograph*y. Elevation is a key component of maximizing the capture of wind energy, and higher elevations typically correspond to an improved wind resource. In addition, turbine manufacturers require certain elevation and topography criteria be met (i.e., not locating a turbine on too steep of a slope or on too narrow a ridge), or else they will not certify the turbine location as suitable and the turbine cannot be constructed. To ensure turbines were placed in suitable locations, all potential turbine sites were evaluated to meet elevation and topography criteria.

- *Sufficient Turbine Spacing*. Siting turbines too close to one another can result in decreased electricity production and excessive turbine wear due to the creation of wind turbulence between and among the turbines. Each operating wind turbine creates downwind turbulence in its wake. As the flow proceeds downwind, there is a spreading of the wake and recovery to free-stream wind conditions. The Facility turbines will be located with enough space between them to minimize wake losses and maximize the capture of wind energy.
- *Local Zoning*. The Towns of Cohocton, Dansville[1], Fremont, and Wayland have adopted or are in the process of adopting Wind Energy Laws. In addition, the towns have adopted zoning and other local laws that are potentially relevant to the Facility. These regulations specify criteria under which applications for commercial wind energy conversion systems will be evaluated. The Facility will be consistent with all Town zoning ordinances and Wind Energy Regulations.
- *Wetlands and Waterbodies.* Facility components will avoid and/or minimize impacts to wetlands and streams to the greatest extent practicable.
- *Communication Interference*. Turbines will be sited outside of known microwave pathways or Fresnel zones to minimize the effect that they may have on existing communications.
- *Recreational Resources*. Turbines will be sited in such a way that does not cause any material adverse effect to the Towns' or County's existing or proposed trails, trail facilities, and recreation areas.
- *Cultural Resources*. Facility construction will be conducted in such a way that does not cause any significant impact to prehistoric or historic archeological resources.

As previously mentioned, the Facility evaluated in the Article 10 Application consists of up to 76 wind turbine sites. Table 9-2 identifies the position of all turbine sites. See also Figure 2-2.

Table 9-2. Turbine Coordinates, Proposed Facility

Turbine ID	Latitude	Longitude	Turbine ID	Latitude	Longitude
T1	42.46938131	-77.51330213	T52	42.45652444	-77.52342848
T2	42.50258847	-77.53797449	T53	42.44391	-77.55906914
T3	42.5090137	-77.55195146	T55	42.44594568	-77.561061
T4	42.48071597	-77.5121988	T59	42.46010481	-77.54435662
T5	42.50728349	-77.54796203	T60	42.45704569	-77.51651761
T6	42.48096787	-77.53469113	T61	42.43928924	-77.5919618
T7	42.50438468	-77.53086673	T62	42.43527387	-77.58514644

[1] The Town of Dansville is in the process of adopting a local wind law and the process is expected to be completed in 2017.

Turbine ID	Latitude	Longitude	Turbine ID	Latitude	Longitude
T8	42.46262985	-77.50208595	T63	42.39651795	-77.59380809
T9	42.46673546	-77.51814655	T64	42.42913468	-77.56862976
T11	42.47700293	-77.51561451	T65	42.40955128	-77.58252164
T13	42.50459504	-77.52091991	T66	42.43453078	-77.5777611
T14	42.47512718	-77.54792145	T67	42.39347839	-77.56079623
T15	42.47785522	-77.5075467	T68	42.41973346	-77.57503974
T17	42.48400613	-77.52964317	T69	42.41073324	-77.57642121
T18	42.50743691	-77.52558607	T70	42.39080741	-77.59028063
T19	42.46546015	-77.5003135	T71	42.39340993	-77.59227077
T21	42.48223981	-77.54879418	T72	42.4418877	-77.59333341
T22	42.47398763	-77.52904478	T73	42.39739684	-77.57199954
T24	42.48816591	-77.54957026	T74	42.46309327	-77.54481824
T26	42.46938287	-77.5324475	T75	42.43193734	-77.56813647
T28	42.47873836	-77.54872497	T76	42.42144376	-77.5794731
T29	42.48870546	-77.54271772	T77	42.40167856	-77.57461674
T32	42.38964079	-77.60162743	T78	42.43574549	-77.56818264
T33	42.48527396	-77.54882009	T79	42.42345374	-77.58857421
T34	42.46992261	-77.53857538	T80	42.39146163	-77.580844
T35	42.4299406	-77.60432773	T81	42.44966895	-77.58133692
T37	42.47701273	-77.53843635	T82	42.39475384	-77.5778081
T38	42.37419326	-77.59594502	T83	42.44568346	-77.58914937
T40	42.42656762	-77.60336147	T84	42.38227831	-77.57915578
T42	42.38493194	-77.59642827	T85	42.39732583	-77.5787639
T43	42.46853058	-77.50115341	T86	42.44690371	-77.58056672
T44	42.45711671	-77.54428422	T87	42.42062266	-77.58713289
T45	42.41033558	-77.59165566	T88	42.46143079	-77.55881004
T46	42.45827162	-77.5599461	T89	42.43998475	-77.58189958
T47	42.45463113	-77.5410461	T90	42.39448472	-77.58575462
T49	42.47232168	-77.54125117	T91	42.43747434	-77.57861125
T50	42.37958128	-77.5849483	T92	42.39379199	-77.56891224
T51	42.37955852	-77.57876504	T93	42.40138997	-77.56701102

In many cases, a wind-powered facility's turbine layout is partially a function of the turbine model that will ultimately be used. In other words, the actual number of turbines to be constructed typically depends on the capacity of the turbine model selected and the total generating capacity approved for interconnection. For example, at a hypothetical facility with a 100 MW interconnection, 40 turbines would be constructed if a 2.5 MW turbine were selected, while 30 turbines would be construction if a 3.3 MW turbine were selected, and 25 turbines would be constructed if a 4.0 MW turbine were selected. In this case, however, the Applicant seeks approval to construct 76 turbines, regardless of which turbine model selected from among those listed above (or higher capacity turbine models). As discussed below, the Applicant originally contemplated constructing a 120-turbine facility. However, environmental, constructability, setback and landowner participation constraints prompted the Applicant to reduce the Facility to the proposed 76 turbine locations. The trend in the industry is tower higher capacity (e.g. higher MW turbines), so by the time the Facility is ready to be constructed, the Applicant believes there will be many more turbine models to select from that would allow for turbine build-out to the 300 MW interconnection request.

<u>Taller Turbine Alternative</u>

As previously noted, the Towns of Cohocton, Dansville, Fremont, and Wayland have local wind laws or are in the process of adopting wind laws. See Exhibit 31 of this Application for information on local laws and ordinances. As shown above in Table 9-1, the total heights of the turbine models under consideration range from 476 to 492 feet and the turbine ultimately selected for the Facility will be of similar height and dimension.

For illustrative purpose, two alternative layouts to the proposed Facility will be discussed in greater detail herein: (1) the use of taller turbines at the same 76 locations as the proposed layout, and (2) an alternate 120-turbine layout using turbines in the 476 to 492 foot height range proposed for the Facility. See Figure 3-1.

The taller turbine alternative explores the option of utilizing one of the largest onshore wind turbine models available, the 7.58 MW Enercon E-126. With a hub height of 135 meters (443 feet) and a rotor diameter of 127 meters (417 feet), the Enercon E-126 has a total height of 198 meters (650 feet). This turbine model would begin generating energy at wind speeds as low as 3 m/s (6.7 mph) and has storm control features that allow it to continue generating power at high wind speeds, cutting out at wind speeds of 28 to 34 m/s (62.6 to 76.1 mph).

The Taller Turbine Alternative presents several major obstacles from a legal and practical perspective. As a preliminary matter, the 650-foot height of the taller turbines exceeds the height allowed by the towns of Cohocton, Dansville, Fremont and Wayland under the applicable wind laws (500 feet for Cohocton, Fremont, and Wayland and 600 feet for Dansville). As a result, the Applicant would be required to obtain waivers from the towns to construct the Facility using taller turbines.

Moreover, the taller turbines would require larger setbacks causing many turbine locations to violate locate setback limits. The local wind laws proposed or adopted in the Towns of Cohocton, Dansville[2], Fremont, and Wayland contain requirements for various distances that turbines must be set back from residences, site boundaries, public roads, and other infrastructure. Many of these setbacks are based on turbine height. See Exhibit 6 for more information about the setbacks prescribed by local laws. The Facility was designed so that the turbine sites meet or exceed the setback requirements set forth in the Towns of Cohocton, Dansville, Fremont, and Wayland wind laws. Given the range of turbine models under consideration (476 to 492 feet), setback distances were calculated from the proposed Facility assuming a total height of 500 feet. Table 9-3 compares the setback distances derived from the Applicant's internal setback standards with those for the Taller Turbine Alternative, calculated assuming a total turbine height of 650 feet. In certain instances, the actual setbacks required by a particular town wind law may be more or less than the Applicant's internal setbacks. In those cases, the Applicant has committed to comply with the stricter requirement.

Table 9-3. Comparison of Applicant's Internal Height-Based Setback Distances for 500-foot vs. 650-foot Turbines

Applicant's Internal Setback		Setback Distance	
		500-foot Turbines	650-foot Turbines
Substation	1.5x total turbine height	750 feet	975 feet
Transmission Line[1]	1.5x total turbine height	750 feet	975 feet
Gas Well	Total turbine height	500 feet	650 feet
Public Road	1.1x total turbine height	550 feet	715 feet
Non-Residential Structure	1.1x total turbine height	550 feet	715 feet
Non-Participating Residence	3x total turbine height	1,500 feet	1,950 feet
Participating Residence	2x total turbine height	1,000 feet	1,300 feet
Non-Participating Parcel	1.1x total turbine height	550 feet	715 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.

All 76 proposed turbine sites that are the subject of this Application meet the applicable setback standards for each of the turbine models under consideration as set forth in Exhibit 6. These standards are based either on the Applicant's internal setback requirements or on town laws, whichever is stricter. Because many of the setbacks are based on turbine height, the use of a taller turbine would result in greater setback distances for the Taller Turbine Alternative. The first five setbacks listed above in Table 9-3 are strictly resource-based (i.e., substation, transmission line, gas well, public road, and non-residential structures). The setback distances for these features are calculated based on a simple distance offset from the given resource, and are not dependent on the lease

[2] The Town of Dansville is in the process of adopting a local wind law and the process is expected to be completed in 2017.

status of the landowner. The distances for the remaining setbacks, to residences and parcel boundaries, are status-based. The setback distances for these features are based on the lease status of the landowner (participating vs. non-participating).

Assuming a turbine height of 650 feet, 15 of the 76 proposed turbine sites would not be in compliance with at least one of the Applicant's resource-based setbacks. Specifically, with the use of taller turbines, 10 turbine sites would not comply with the public road setback (T6, T9, T14, T17, T34, T37, T43, T44, T47, T72). This number is even greater when considering the setbacks required for the local towns, as some towns have stricter public road setbacks (i.e. 1.5x turbine height versus 1.1x turbine height feet). In addition, five turbine sites would not comply with the non-residential structures setback (T34, T75, T78, T80, T93), and one turbine (T46) would not comply with the transmission line setback. All 76 proposed turbine sites would still be in compliance with the setbacks for substations and gas wells with the use of the taller turbines.

With regard to status-based setbacks, one way to illustrate the differences between the alternatives is to compare the number of leases that must be signed. In order to comply with the Applicant's setbacks, the landowners of any parcel within 1.1x total turbine height of a proposed turbine site must be project participants (i.e., they must have signed a landowner agreement, easement setback waiver, or Good Neighbor Agreement). As shown above in Table 9-3, this means the landowners of all parcels located within 550 feet of a proposed Facility turbine or within 715 feet of a Taller Turbine Alternative turbine must be project participants. In order to comply with the setback to non-participating parcels for the proposed Facility, the Applicant will sign landowner agreements allowing the use of 119 parcels. For the Taller Turbine Alternative, the Applicant would need to sign landowner agreements allowing use of 146 parcels, an increase of more than 22%.

Moreover, the examples provided above are based on the Applicant's internal setback standards for the Facility. However, as previously noted, certain towns have adopted setback standards that are stricter than the Applicant's standard. The Applicant has committed to complying with these stricter standards in deference to the Town's requirements and to avoid the requirement to obtain a waiver from the Siting Board. As a result, the difficulties associated with complying with the setback requirements will be even greater than those outlined above. Looking at the Town of Fremont—the Town with the largest number of turbines of the four that comprise the Facility Area—complying with the Town-mandated setbacks under the Tall Turbine Alternative would be extremely difficult.

The environmental impacts of constructing Enercon E-126 turbines would be greater than those from constructing the proposed Facility. Because turbines, access roads, and collection lines would be sited in the same locations, wetland and stream impacts would be very similar because turbine sites were selected to avoid impacts to these resources. However, permanent soil, vegetation, land use, and agricultural impacts would be somewhat greater, because the Enercon E-126 turbine has a larger tower diameter at the base and requires a larger foundation. Temporary soil, vegetation, land use, and agricultural impacts would also be somewhat greater because the turbine workspaces would need to be larger, and turning radii on delivery routes and access roads would need to be larger to accommodate the longer turbine blades.

The Taller Turbine Alternative is not preferred because the greater height results in proportionally larger setbacks, which would make it extremely difficult to reach a total generating capacity of 300 MW. As set forth above, the taller turbines would require the Applicant to negotiate numerous additional agreements with landowners in order to meet the applicable setback requirements. Moreover, the 650-foot height would violate the maximum total turbine height restriction in the Towns of Cohocton, Dansville, Fremont, and Wayland, necessitating issuance of waivers. Finally, the Taller Turbine Alternative would increase permanent soil, vegetation, land use and agricultural impacts.

<u>120-Turbine Alternative</u>

This alternative explores the option of utilizing 120 turbine sites instead of the 76 turbine sites proposed, using the same range of turbine models under consideration for the Facility. When the Facility was initially being developed, up to 120 turbine locations were contemplated based on early conversations with landowners and desktop environmental and constructability analyses. Some of the turbine sites in the 120-Turbine Alternative are located in the same general areas as proposed Facility turbine sites (due to the availability of wind resources), while others are located along completely different ridgelines. Table 9-4 identifies the position of the 120-Turbine Alternative turbine sites. See also Figure 3-1.

Table 9-4. Turbine Coordinates, 120-Turbine Alternative

Turbine ID	Latitude	Longitude	Turbine ID	Latitude	Longitude
T1	42.5030	-77.5383	T61	42.4601	-77.5444
T2	42.5095	-77.5517	T62	42.4565	-77.5234
T3	42.5073	-77.5480	T63	42.3908	-77.5903
T4	42.4694	-77.5133	T64	42.3934	-77.5923
T5	42.4810	-77.5347	T65	42.4570	-77.5165
T6	42.5048	-77.5309	T66	42.4704	-77.6018
T7	42.4785	-77.5149	T67	42.4095	-77.5825
T8	42.4667	-77.5182	T68	42.4352	-77.5843
T9	42.5046	-77.5209	T69	42.3829	-77.5583

Turbine ID	Latitude	Longitude	Turbine ID	Latitude	Longitude
T10	42.4779	-77.5075	T70	42.4473	-77.6050
T11	42.4739	-77.5285	T71	42.4291	-77.5686
T12	42.4150	-77.5225	T72	42.4157	-77.5521
T13	42.4751	-77.5479	T73	42.4633	-77.6104
T14	42.5074	-77.5256	T74	42.4406	-77.5557
T15	42.4629	-77.5022	T75	42.4459	-77.5611
T16	42.4168	-77.5024	T76	42.4726	-77.6045
T17	42.4840	-77.5296	T77	42.4439	-77.5591
T18	42.4697	-77.5324	T78	42.4570	-77.6058
T19	42.4822	-77.5488	T79	42.3832	-77.5252
T20	42.4226	-77.5337	T80	42.4111	-77.5201
T21	42.4887	-77.5427	T81	42.4127	-77.5512
T22	42.4866	-77.5239	T82	42.4197	-77.5750
T23	42.4680	-77.5008	T83	42 .4847	-77.6066
T24	42.4882	-77.5496	T84	42.4107	-77.5764
T25	42.4787	-77.5487	T85	42.4631	-77.5448
T26	42.4868	-77.6111	T86	42.4351	-77.5773
T27	42.4731	-77.5163	T87	42.3898	-77.5599
T28	42.4329	-77.6045	T88	42.4214	-77.5795
T29	42.4302	-77.6018	T89	42.3825	-77.5518
T30	42.4143	-77.5079	T90	42.3890	-77.5450
T31	42.4160	-77.5145	T91	42.3915	-77.5808
T32	42.4450	-77.5362	T92	42.3823	-77.5792
T33	42.4853	-77.5488	T93	42.4234	-77.5880
T34	42.4547	-77.6119	T94	42.4319	-77.5681
T35	42.4699	-77.5386	T95	42.4014	-77.5742
T36	42.4770	-77.5384	T96	42.3951	-77.5774
T37	42.4313	-77.5533	T97	42.4037	-77.5080
T38	42.4285	-77.5540	T98	42.3977	-77.5720
T39	42.4037	-77.5372	T99	42.4393	-77.5920
T40	42.3758	-77.5208	T100	42.3979	-77.5785
T41	42.4746	-77.6077	T101	42.4206	-77.5871
T42	42.4170	-77.5393	T102	42.3854	-77.5535

Turbine ID	Latitude	Longitude	Turbine ID	Latitude	Longitude
T43	42.4153	-77.5346	T103	42.3806	-77.5237
T44	42.3796	-77.5849	T104	42.4469	-77.5805
T45	42.4723	-77.5413	T105	42.4497	-77.5813
T46	42.4571	-77.5443	T106	42.3904	-77.5676
T47	42.3796	-77.5788	T107	42.3945	-77.5858
T48	42.3779	-77.5231	T108	42.4400	-77.5819
T49	42.4546	-77.5410	T109	42.4357	-77.5691
T50	42.4650	-77.5070	T110	42.3928	-77.5610
T51	42.4103	-77.5917	T111	42.4419	-77.5933
T52	42.4108	-77.5982	T112	42.4457	-77.5891
T53	42.4594	-77.5834	T113	42.4011	-77.5676
T54	42.4642	-77.5821	T114	42.4617	-77.5588
T55	42.4418	-77.6015	T115	42.4381	-77.5785
T56	42.4583	-77.5597	T116	42.3924	-77.5254
T57	42.4446	-77.6036	T117	42.4376	-77.5709
T58	42.3965	-77.5938	T118	42.3938	-77.5689
T59	42.4590	-77.6093	T119	42.3919	-77.5158
T60	42.4830	-77.6045	T120	42.3950	-77.5204

Because the setbacks are height-based, the same setback distances for the proposed Facility would also apply to the 120-Turbine Alternative.

All 120 alternative turbine sites would be in compliance with the resource-based setbacks (i.e., the setbacks for non-residential structures, public roads, substations, transmission lines, and gas wells) in Table 9-3. As previously noted, however, in order to comply with the setback requirement for non-participating parcels, the owners of all parcels located within 550 feet of a turbine must be project participants. To achieve this for the 120-Turbine Alternative, the Applicant would need to sign agreements/waivers/easements allowing the use of 208 parcels. This represents an increase of more than 76% when compared to the 118 landowner agreements required to comply with the setbacks for non-participating parcels for the proposed 76-turbine Facility.

In order to comply with the setback to non-participating residences for the 120-Turbine Alternative, the owners of all residential structures located within 1,500 feet of a turbine must be project participants. In order to comply with the setback to non-participating residences for the proposed Facility, the Applicant would need to sign agreements with the owners of any residences within 1,500 feet of a turbine site (making them project participants). There are no non-participating permanent residences within 1,500 feet of a proposed turbine in the 76-Turbine Facility layout. In contrast, there are three non-participating permanent residences within 1,500 feet of three turbines in the 120-Turbine Alternative (T31, T50, T81).

In order to comply with the setback to participating residences for the 120-Turbine Alternative, no turbine sites can be located within 1,000 feet of a residential structure. There are no residential structures within 1,000 feet of a proposed Facility turbine site under the 76-Turbine Facility layout. By comparison, one 1 turbine site (T50) would not comply with the 1000-foot participating residence setback under the 120-Turbine Alternative.

Field reconnaissance and associated analysis conducted on the 120-turbine layout determined that wetland impacts would be significantly greater under this scenario. In order to approximate the impacts associated with this early 120-turbine layout, the location of wetlands were estimated based on field notes taken during the reconnaissance level site review, and standard impact assumptions were applied to the various project components. This analysis resulted in approximately 68 acres of temporary wetland impact and 11.5 acres of permanent wetland impact associated with the initial 120-turbine layout. See Exhibit 22 of this Application for more detailed information on impacts to wetlands from the proposed Facility, which have been significantly reduced (i.e., 0.32 acre of total temporary and permanent impact).

The Facility layout was also designed, in part, to avoid and minimize impacts to forest. This also initiated in the summer of 2016 when a reconnaissance-level field investigation of the initial 120-turbine layout was conducted. This layout would have resulted in significantly more impacts to forest resources, and as such the reconnaissance level review provided recommendations for avoidance/minimization of impacts. The 120-turbine layout would have resulted in a total of approximately 402 acres of impact to forest, whereas the current 76-turbine layout is calculated to result in a total of approximately 162.5 acres of impact to forest. In addition, the 120-turbine layout included 53 turbines sited in forest, whereas the current 76-turbine layout has only 23 turbines sited in forest. In other words, of the 44 turbines removed from the 120-turbine layout, 30 were removed from forest. See Exhibit 22 for additional information.

In addition, it appears that impacts to archaeological resources could not be entirely avoided with the 120-Turbine Alternative. This is because when siting a larger number of turbines, there is less opportunity for avoiding impacts to sensitive resources (e.g., wetlands, cultural resources) without creating wake effects between turbines or impacting other sensitive resources. Visual, sound, and shadow flicker impacts also could not be minimized with the 120-Turbine Alternative to the extent that they have been with the proposed 76-Turbine Facility layout.

While the 120-Turbine Alternative would provide the Applicant with additional turbine locations to select from for construction of the Facility, the 120-Turbine Alternative is not preferred because the impacts from this layout are so much greater. The smaller layout associated with the proposed Facility significantly minimizes impacts to nearby residents, as well as to sensitive resources such as wetlands, streams, forestland, and cultural resources, as compared to the 120-Turbine Alternative.

Alternative Layout Within Facility Area to Achieve Compliance with Local Laws

The Applicant has designed a Facility layout that complies with local laws and is not required to request a waiver from any local laws in order to construct the proposed Facility. As a result, it has not provided an alternative layout within the Facility Area that would achieve compliance with local laws.

(4) Timing of In-service Date in Relation to Other Capacity Changes to the Electric System

As previous noted, ABB Incorporated prepared a System Reliability Impact Study for the Facility on behalf of the NYISO in 2015. The SRIS is Appendix F to this Application, but will be filed under confidential cover, as NYISO requires the SRIS to remain confidential consistent with Critical Energy Infrastructure Information (CEII) regulations (18 CFR § 388.113).

The SRIS evaluated a number of power flow base cases as provided by the NYISO, including 2018 summer peak, winter peak, and light load. In base case normal operating conditions, the power flow steady state analyses indicate that the Facility will cause no thermal violations on the transmission system in the study area for summer peak and winter peak case loadings. Under contingency operating conditions with the Facility, the winter peak and summer peak cases show some overloads on the 115 kV and 34.5 kV lines under several contingencies. However, the Facility also reduced loading on a few facilities.

For the winter peak case, the Facility caused an adverse impact of about 53.7% on the Hickling – West Erie 115 kV line. Simulations showed that the tripping of the line and associated West Erie 115/34.5 kV transformer, or tripping of Sullivan Park – West Erie 115 kV line would mitigate the overloads. An overloading of the 115 kV North Waverly – East Sayre 115 kV line was caused by the Facility, with the overload increasing by 18%. There is a special protection system (SPS) that trips this line by over-current protection for actual overloads. The tripping of the branch does not cause an unacceptable impact on local reliability. It is worth noting that these two branches were already overloaded with all of the wind farms around this area at 10% of their outputs and the overloads in the study could be aggravated if all of the wind farms are at their full output.

For the summer peak case, the Facility caused overloads on the Hickling – West Erie 115 kV lines; however, the loadings on the facilities are within their limits for the single outage. Under Minimum Interconnection Standard (MIS), no System Upgrade Facilities (SUFs) are required. Additional overloads were seen at the Meyer – Moraine 115 kV, South Perry – Meyer 115 kV, and several 34.5 kV facilities; however, these overloads did not have an adverse impact, can be easily mitigated, or were not associated with the interconnection of the Facility. A Power Factor Testing for the Facility was also conducted in accordance with NYISO guidelines, and the Facility meets the Power Factor Requirement.

Based upon the findings in the SRIS, this Facility is not anticipated to have any adverse effects on the New York State power grid. See Exhibit 5 of this Application for a more detailed discussed of electrical system effects.

(5) Scale or Magnitude

As mentioned previously, various siting constraints dictate the size and layout of a wind power project. These constraints make a significantly larger number of turbines than what is proposed within the Facility Site highly unlikely. The Applicant is doing business in a wholesale electric market that is highly competitive and extremely price-sensitive. Given the economies of scale involved in the development and construction of a wind project, all other things being equal, a larger scale project produces lower cost energy. Since the Baron Winds Project has a 300 MW interconnection request with the NYISO, the preferred alternative is to construct a facility that has the ability to produce up to 300 MW. A facility with significantly smaller production capacity would pose challenges to the technical and/or economic feasibility of the Facility, and would not meet the stated objectives of the Facility.

If the proposed generating capacity were significantly reduced, the maximum benefit of the available wind resource would not be realized. Furthermore, construction cost economies of scale are realized for a larger generating capacity because of the fixed costs to mobilize expensive equipment such as erection cranes to the Facility. As with most land disturbance-based environmental impacts, economic benefits to the community would be reduced proportionately with a smaller project. In particular, PILOT payments and payments under HCAs to local taxing jurisdictions (which are typically developed per MW) would be greatly reduced, as would construction expenditures in the community and landowner lease payments.

(d) Why the Proposed Location Best Promotes Public Health and Welfare

The proposed location is best suited to promote public health and welfare because it properly balances the siting constraints discussed above with the public health benefits of wind energy generation. Air pollution has both short-term and long-term effects on public health. Electricity generated from zero-emission wind energy facilities like the proposed Facility can displace the electricity generated from conventional power plants, thereby reducing the emissions of conventional air pollutants, such as mercury, sulfur and nitrogen oxides, and GHGs, such as carbon dioxide. Less fossil fuel combustion thus improves public health and welfare both locally and globally.

As discussed above, commercial scale wind power projects can only be sited in certain locations that are conducive to wind energy production. The Applicant selected the proposed site for the Facility because of the presence of the wind resource and available land and willing landowners, the relative ease of access to the Site for construction purposes, and the proximity and relative ease of connecting to the existing electric transmission grid. Moreover, the Facility can be constructed on the Facility Site without significantly interfering with existing uses of the Site (e.g., agriculture and forestry). These factors combined to make the proposed Facility Site best suited for wind power development and the associated beneficial impacts to air quality.

(e) Why the Proposed Facility Best Promotes Public Health and Welfare

The benefits of the Facility are anticipated to include positive impacts on socioeconomics (e.g., increased employment, increased revenues to local municipalities and revenues to participating landowners), air quality (through reduction of emissions from fossil-fuel-burning power plants), and climate (reduction of GHGs that contribute to global warming). By eliminating pollutants and GHGs, the Facility will also benefit ecological and water resources and human health.

The proposed technology, scale, and timing of the Facility are best suited to promote public health and welfare. The turbines proposed for the Facility will utilize the latest in wind power generation technology to enhance project efficiency and safety, and minimize impacts such as noise. If the scale of the proposed Facility (i.e., generating capacity) were significantly reduced, the maximum benefit of the available wind resource would not be realized, thereby reducing economic and public health benefits, and potentially rendering the project non-viable. As discussed above, significantly increasing the proposed turbines above the 76 sites evaluated in this Application would significantly increase the impact of the Facility on agricultural and forested land and wildlife habitat. Moreover, the Applicant would need more land area to meet the siting criteria, which is not feasible because the Applicant does not have additional land under lease option.

Regarding timing, the State Energy Plan calls for reducing GHG emissions 40% from 1990 levels and generating 50% of electricity from renewable energy sources by 2030 (NYSEPB, 2015). These are aggressive targets that will require significant new sources of renewable energy to be brought online as soon as possible. Furthermore, New York State is already experiencing adverse impacts from climate change, including rising temperatures and sea levels, decreased winter snow cover, more intense precipitation events, more extreme summer heat waves, and more widespread vector-borne infections and diseases. However, according to the NYSDEC, it is not too late to address the problem. "If we reduce emissions in the near future, future risk from climate change will be lower. Failure to reduce emissions now will compound future change, making impacts even more disruptive and costly" (NYSDEC, 2016c). Therefore, the timing of the Facility best promotes public health and welfare.

(f) No Action Alternative

The no action alternative assumes that the Facility Site would continue to exist as is. This no action alternative would not beneficially or adversely affect current land use, ambient noise conditions, traffic or public road conditions, television/communication systems, and would maintain the area's community character, socioeconomic, and energy-generating conditions as they currently exist.

The No Action Alternative is not best suited to promote public health and welfare, because it would deprive the State and the region of a major source of clean, pollutant-free electricity. The operating Facility will generate up to 300 MW of electricity without emitting pollutants or heat-trapping GHGs. Air pollution has both short-term and long-term adverse effects on public health. Short-term exposure to air pollution caused by fossil-fueled electricity generation may result in headaches, nausea, allergic reactions, asthma exacerbation, and irritation to the eyes, nose and throat. Long-term exposures can lead to cancer, as well as a variety of adverse reproductive, development, respiratory, and cardiovascular effects (NYSDEC, 2016a).

According to the NYSDEC,

> *For a sustainable future, we need an efficient energy system that taps clean sources to let us enjoy energy's benefits, but use less and pay less. Solar and wind energy, geothermal heat and other renewable resources can power our lives with no cost for fuel and no harmful emissions. An efficient system with reliable and affordable clean energy already is demonstrating its potential to support an abundant and sustainable New York:*
>
> - *Energy efficiency improvements and renewable sources are cutting consumers' carbon footprints, making communities cleaner and healthier, and supporting local economies.*
> - *Electricity from renewable sources is helping to create a more resilient and flexible power grid with less reliance on expensive peaking power.*
> - *New York businesses that provide clean energy products and services are responding to growing markets with expanded offerings and good jobs.* (NYSDEC, 2016b)

As indicated above, electricity generated from zero-emission wind energy facilities like the proposed Facility can displace the electricity generated from conventional power plants, thereby reducing the emissions of conventional air pollutants, such as mercury; sulfur and nitrogen oxides (acid rain and/or ozone precursors); and carbon dioxide (linked to global climate change). On a long-term basis, increasing the production of wind generated power will reduce the need to construct and operate new fossil fueled power plants (Jacobsen & High, 2008).

The No Action Alternative is not best suited to promote public welfare, because it would deprive the State of a new source of renewable energy that would help achieve the objectives of the State Energy Plan, the Governor's Reforming the Energy Vision (REV) initiative, and the Clean Energy Standard (CES). The 2015 State Energy Plan contains a series of policy objectives to increase the use of energy systems that enable the State to significantly reduce GHG emissions while stabilizing energy costs. The State Energy Plan commits to achieving a 40% reduction in GHG emissions from 1990 levels by 2030 and reducing total carbon emissions 80% by 2050. In addition, the State Energy Plan calls for 50% of generation of electricity from renewable energy sources by 2030 (NYSEPB, 2015). The No Action Alternative would not help advance the objectives of the State Energy Plan (i.e., it would not contribute toward reducing GHG emissions or assist the State in achieving the 50% renewable energy generation objective).

REV is a strategy to build a clean, resilient, and affordable energy system for all New Yorkers. The Public Service Commission (PSC) issued their *Order Adopting Regulatory Policy Framework and Implementation Plan* on February 26, 2015 that outlines issues and tasks to resolve the technical, marketplace, and regulatory challenges necessary to achieve the REV plan and goals. As stated by the PSC in the REV Order, "A significant increase in the penetration of renewable resources is essential to meeting our objectives, state goals and proposed federal requirements" (PSC, 2015). The REV Order recognizes that large-scale renewables (LSR), such as the proposed Facility, will be critically important to meeting GHG emissions reduction goals. On December 2, 2015, Governor Andrew Cuomo directed the Department of Public Service to develop a CES, which would change the targets identified in the State Energy Plan to required mandates. The No Action Alternative would not contribute to State policy objectives, because it would not provide additional electrical capacity produced by renewable energy.

(g) Energy Supply Source Alternatives

Because different energy supplies do not meet the objectives or capabilities of the Applicant, no alternative energy supply sources have been identified. Therefore, alternative energy supply sources will not be evaluated in this Application.

(h) Comparison of Advantages and Disadvantages of Proposed and Alternative Energy Sources

Because source and demand-reducing alternatives do not meet the objectives or capabilities of the Applicant, no alternatives have been identified. Therefore, source and demand-reducing alternatives will not be evaluated in this Application.

(i) Why the Proposed Project Best Promotes Public Health and Welfare

The Applicant has designed the Facility layout to optimize the balance between energy generation and the protection of agricultural, environmental, and aesthetic resources, as well as public health and welfare. The design of the Facility has evolved through an iterative process that incorporates various siting constraints, including wind resource; landowner considerations; stream, wetland, cultural resources, and visual impact avoidance/minimization; noise and shadow flicker minimization; and protection of agricultural lands. Each of these issues are discussed in detail in this Application (e.g., see Exhibits 15, 19, 20, 22, 23, and 24). Alternative layouts at the same Facility Site were evaluated above, and the Facility, as proposed, is the best suited to promote public health and welfare.

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