8.0 ALTERNATIVES

The following alternatives to the proposed action are described and evaluated: alternate turbine type, no action, alternative project siting, alternative project scale and magnitude, alternative project design, alternative technologies, and cumulative alternatives. These alternatives offer a potential range and scope of development for comparative analysis and consideration. The no action alternative, which is required for consideration under SEQRA, represents the environmental conditions that would exist if current land use and activities were to continue as is.

8.1 Geographic Scope

An analysis of potential alternatives to the proposed project must be limited in scope to a degree that makes sense. For the purposes of this alternatives analysis, the geographic scope under consideration is within the boundaries of the Towns of Ellenburg and Clinton. The Applicant does not consider an alternatives analysis outside of this geographic area valid due to the fact that the potential impacts of any alternative outside the proposed geographic area would be speculative in nature, and in some regards, the equivalent of the no action alternative.

8.2 Assessment of Alternate Wind Turbines

The types of wind turbine generators being considered for this Project are all MW-class, three-bladed, upwind designs with proven track records. The turbine proposed for the Project is the Gamesa G90. Based on preliminary data models, the G90's production characteristics best suit the local wind resource. However, the ultimate choice of turbine is dictated by two factors:

1. Cost of Energy – different turbines perform different in different conditions. A site's meteorological characteristics, e.g. wind speed, distribution and shear often favor one type of turbine over another.
2. Turbine Availability – The modern wind industry can be characterized by a lack of adequate supply of modern wind turbines. Often a developer is constrained to a particular type of turbine no matter what the site's wind characteristics due to a lack of available turbine options. This often results in a less than optimal production capacity.

The primary difference between larger turbines and smaller turbines is rotor blade length. The older generations of wind turbine had an average rotor diameter of 73 meters, whereas the newest, most productive generation of turbine has an average rotor diameter of approximately 83 meters. The productivity of a turbine is directly related to the size of the rotor swept area – thus turbines with a higher rotor swept area (i.e. longer blades) tend to be relatively more productive than their smaller cousins. This has supported the proposal to utilize the Gamesa G90 or equivalent turbine on the Project.

8.3 No Action

The no action alternative assumes that the Project area would continue to exist as active agricultural land, forest land, residential property and vacant land. This no action alternative would not affect current land use or zoning and would maintain economic and energy-generating conditions as they currently exist.

Under this alternative, no wind turbines or infrastructure (e.g., roads, interconnects, and substations) would be developed on the site. Consequently, none of the environmental impacts associated with project construction and operation would occur. In addition, no economic benefits would accrue to the area. These unrealized economic benefits would include income from construction jobs, lease payments to the landowners, annual tax revenues or PILOT payments to the affected towns and school boards. Annual revenues to the Towns of Ellenburg and Clinton are anticipated to be approximately $300,000-$400,000 per year. Under the no action alternative, neither these direct economic benefits, nor multiplier effects from these economic benefits would be realized. Furthermore, the benefits of adding approximately 218 MW of clean, renewable electric energy to the power grid would be lost, and a reliance on fossil-fuel-fired generators, which contribute to emissions of sulfur dioxide (a precursor of acid rain), nitrogen oxide (a smog precursor), and carbon dioxide (a greenhouse gas) would continue. Other, more minor benefits that would be lost include potential tourism to Clinton County and the North Country region. Given the short-term nature of anticipated construction impacts, and the generally minor long-term impacts of project operation, as compared to the significant economic benefits that the Project would generate, the no action alternative is not considered a preferred alternative.

8.4 Alternative Project Site Analysis

The selection of wind turbine locations is constrained by the need for an adequate wind resource to allow the Project to operate in a technically and economically viable manner. Consequently, wind turbines must be sited in locations where data indicate sufficient wind speeds at sufficient frequency and duration. The Applicant selected the proposed site for the Project because of the quality of the wind resource, the ease of access to the site, the proximity and ease of connecting to the transmission grid, and the relative lack of potential disturbance to sensitive ecological resources, cultural and visual resources, and landowners. These factors combined to make the proposed site desirable from the standpoint of wind power development. It is likely that other potential locations would not have the same combination of desirable features.

Few other areas in the state of New York have as strong and reliable wind as the Churubusco Plateau. This, in combination with the lack of Forest Preserve lands, the sparse population, and the dominant agricultural and managed forest land use, make the Towns of Clinton and Ellenburg uniquely suitable for development of a large-scale wind power project. The current project layout is sited so as to maximize the productivity of the proposed wind farm by using the most energetic (windy) sites along with the land where wind turbines would have the least environmental or residential impact. Areas to the west and east have both reduced wind velocities and a significantly

greater extent of wetland as well as greater residential population densities. Areas to the south are not considered viable due to their location within the Adirondack Park and areas to the North are not viable due to the fact that they lie within Canada, which does not provide for access to the New York State Power grid. Thus, relocating the Project elsewhere within the Towns of Clinton or Ellenburg would both reduce its economic viability and potentially increase its environmental impacts.

The same factors that make the Project site desirable were considered in siting individual turbines. Individual turbines were sited in a manner that sought to minimize or avoid adverse environmental impacts while maximizing the utilization of wind resources and, hence, the commercial viability of the proposed project. The proposed wind turbines and associated facilities on the site have been located so as to minimize loss of active agricultural land and/or interference with agricultural operations. Turbines have also been sited to minimize impacts to forests, wetland, and adjacent landowners. Furthermore, the original siting configurations have been modified to reduce potential visual impacts to the residents along Patnode Road and to comply with the wind ordinances in the Town of Clinton, which require a 1200-foot setback from adjacent residences and a 2500-foot setback from the church in Churubusco.

8.4.1 Alternative Project Scale and Magnitude

Project components of alternative size and number were considered. A project of significantly more, or fewer, turbines would pose challenges to the technical or economic feasibility of the Project. If the proposed number of turbines were significantly reduced, the economic feasibility of the Project would be jeopardized and the maximum benefit of the available wind resource would not be realized.

The Applicant considered seriously a smaller project. Horizon Wind Energy originally planned a smaller project of 67 1.68 MW turbines within the Towns of Clinton and Ellenburg. While a smaller project does result in fewer construction and operational impacts, the economic benefits to the Town also decrease proportionately.

Further, there were multiple companies proposing projects within the Towns of Clinton and Ellenburg. The cumulative impacts of the smaller projects proposed by Horizon Wind Energy and NY Windpower, respectively, were greater than the potential impacts of a single, jointly developed project, as is currently proposed. One reason for this is that a jointly developed project allows for flexibility and economies of scale to the Applicant. By joining efforts, the project sponsors (Horizon Wind Energy and AES-Acciona NY Windpower) were able to leverage their experience and reputation in the wind energy industry to procure the technology that provides for the most efficient project within the two Towns. Further, a joint development allows for a single sub-station, a single O&M facility and a single underground collection system, thus decreasing the temporary and permanent impacts of the proposed project. Most importantly, the flexibility gained by joining forces has allowed the Applicant the ability to site turbines in the least environmentally sensitive areas while maintaining economic viability. Finally, the Project's proposed 109 wind turbines is significantly less than the cumulative number of turbines that

would have been proposed were there two smaller projects (i.e. two smaller projects were originally proposed to be 50 turbines and 78 turbines, respectively – for a total of 126 turbines – 19 more than the current proposal).

The Applicant is doing business in a wholesale electric market that is highly competitive and extremely price-sensitive. Commercial wind farms produce two products: a) the commodity electric energy, and b) Renewable Energy Certificates (RECs) that convey the "environmental attributes" that are generated along with each unit of electricity produced from renewable sources. The power produced is sold directly to the power grid through an hourly auction, essentially guaranteeing that the lowest price always wins the auction (and thus assuring New York rate-payers the most competitive electricity rates). The emphasis of this "merchant" market place is on low cost. Thus, for a wind power project to be economically viable and maintain its financial commitments designated within the PILOT and Host community agreements, it must be able to sell its electricity in the merchant market place. The high fixed costs of developing and constructing a wind farm dictate that the larger a project can be, the more competitive it is likely to be. Given the increased competition from in-state wind projects, the Applicant has concluded that a smaller project is unlikely to be economically feasible.

Alternatively, a larger project would result in location of wind turbine towers in areas that are less windy, and would also force installation of more turbines in areas with larger and more abundant wetlands. Further, the Applicant has concluded that the transmission line on which the Project will interconnect has limited capacity, which would decrease the efficiency of a larger project.

8.4.2 Alternative Project Design

Over the past 12 months various turbine totals and layouts have been evaluated in an attempt to maximize energy efficiency while minimizing adverse environmental impacts. The project layout as proposed has been engineered to capture the area's high wind energy, while minimizing wake effects on downwind turbines and utilizing the abundance of local and private roads to minimize impact. Location of turbines and associated facilities, as currently proposed, reflects input and guidance received from landowners and project cultural resource, noise, and ecological consultants, as well as agency personnel who have visited the site (e.g., New York State Department of Agriculture & Markets and NYSDEC). The layout as proposed, results in a carefully achieved balance of energy production and environmental protection. Relocation of any of the turbines at this point would have a ripple effect, in that the location of other turbines would have to be reexamined and possibly changed to maintain an efficient/workable project design. Therefore, reduction of environmental impacts in one location could result in increased impact in another location and/or reduced power generation. In the case of visual impact, removal or relocation of one or two individual turbines from a 109-turbine layout is unlikely to result in a significant change in project visibility and visual impact from most locations.

As to turbine selection, as stated in Section 8.2, the wind industry is generally moving toward the use of larger wind turbine generators, since they are generally more cost-effective (i.e., have a

more favorable ratio of the rotor "swept area" to the generator size). Use of smaller turbines would not significantly reduce environmental impacts. If installed at the same density, the number of tower sites, length of access road, and length of electric interconnect would not be reduced. Thus, impacts are roughly equal, while potential power generation is significantly reduced through the use of smaller turbines. To maintain an equivalent level of power generation, more of the smaller turbines would be required. This would increase temporary and permanent disturbance to soils, vegetation, and water resources as the number of towers and the length of required access road and interconnect increases. Potential operational impacts (e.g., noise, avian mortality) would also likely increase with a larger number of smaller machines. In terms of visibility and visual impact, smaller turbines are only marginally less visible. They would still be very tall structures and their higher density/greater number could actually increase the Project's visual impact. For example, to achieve 218 MW of total nameplate capacity with a 1.5 MW (MW) generator (the latest version of the older generation of wind turbine technology) would require about 145 towers (12% increase in potential impact). This would result in greater visual impact and likely greater wetland and noise impact (although the increase in impact would still be relatively slight).

The project site, as with most places in New York State, has positive wind shear, which means that the average wind velocity increases along with the height of the wind turbine tower. Eighty-meter towers are the highest towers now commercially available; use of a smaller tower would substantially increase the cost of energy from the facility. As mentioned previously, lower towers (e.g., 65 to 70 meters) would not reduce impact associated with road and interconnect construction, and would only marginally reduce visual impact.

In terms of other project components, the Project is using tubular steel towers instead of lattice, and free-standing meteorological towers instead of guyed structures. Both of these alternatives are believed to reduce potential avian collision impacts. Pending results of geotechnical investigations, an alternative tower foundation design may be employed to reduce the quantity of concrete required (and thus concrete truck traffic to the site) and the extent of soil disturbance at each tower site.

Currently 100% of the collection system is proposed to be underground. A potential alternative would be to install some of the collection system as overhead line. There are associated pros and cons with such an alternative. The pros include a potentially more efficient collection system (due to less wire) and lower cost, as well as potentially fewer wetland impacts due to decreased soil disturbance. The cons of an overhead collection system include greater visual impact and greater risk of operational interruption due to fallen or broken collection lines.

The Applicant has considered a mixture of overhead and underground collection systems as an alternative which could prove to be beneficial to the Project efficiency and hence the Project stakeholders (landowners, municipalities, etc.). Given feedback from the Town and local residents, the Applicant would consider pursuing this alternative if interested agencies (i.e. Town Board, NYSDEC, etc.) deemed the alternative superior to the current proposal.

Permanent access road widths will be the minimum necessary to maintain the Project (anticipated to be 16 feet wide in most places) and have been sited in accordance with New York State Department of Agriculture & Markets guidance to minimize loss of agricultural land and impacts on farming operations. Due to the Applicant's efforts to minimize the amount of access road while at the same time avoiding and/or minimizing wetland impacts, it can be assumed that the only alternative for access roads would be to increase the length and/or width, which is not a desirable outcome for any stakeholders (Town, land owner, Applicant).

Consequently, alternative project designs are likely to pose equal or greater risk of adverse environmental impacts while yielding equal or less electrical output, and thus were rejected.

8.4.3 Alternative Technologies

The turbines proposed for the Marble River Wind Farm project will utilize the latest in wind power generation technology to enhance project efficiency and safety and minimize impacts such as noise and bird collisions. Alternative power generation technologies, such as fossil-fuel and biomass combustion, would pose more significant adverse environmental impacts, particularly on air quality but also on land use, aesthetics, and water resources. Combustion turbines also require significant amounts of water to operate, the use of which may pose impacts to surface water or groundwater resources. Nuclear power plants have not been constructed in the U.S. for over 25 years, due primarily to public opposition, high cost, and concerns over the safe storage and disposal of nuclear waste. These plants also present potential public safety and security/terrorism concerns. Hydroelectric plants, while utilizing a renewable resource, have significant impacts on terrestrial and aquatic resources, land use, and aesthetics. They can also only be developed in places with appropriate water volumes and topographic conditions (which generally do not exist in the proposed project boundary. Other renewable energy technologies, such as solar power and hydrogen, are still either cost-prohibitive or in development. Aside from cost constraints, utility-scale solar power is not feasible in an area such as Northern New York, where available sunshine is limited. Power generated from wind turbine generation facilities can help meet energy needs without the emission of greenhouse gases and other environmental impacts that alternative power generation technologies would create.

8.5 Cumulative Alternatives

The existence of two other proposed wind generation facilities, one in Clinton (Noble Clinton Wind Park) and one in Ellenburg (Noble Ellenburg Wind Park) present some potential cumulative alternatives. Aside from the fact that the Applicant is an independent entity and has no relation to the developer of the Noble Wind Parks in Ellenburg or Clinton, and thus no legal standing on which to recommend potential joint alternatives, it is a worthwhile exercise for the lead agency and interested agencies to understand the potential cumulative alternatives of the three proposed wind farms:

1) Marble River 109 turbines for 218 MW (20 in Ellenburg and 89 in Clinton)

2) Noble Ellenburg 53 turbines for 79.5 MW
3) Noble Clinton 68 turbines for 102 MW

8.5.1 Joint Project

Given the proximity of the proposed Noble wind farms to the Marble River Wind Farm, a potential alternative would be to join all three projects together as one. This alternative is potentially beneficial in the short term, in that greater cooperation during the construction period could reduce the temporary impact to the Towns of Ellenburg and Clinton. However, the completed joint project would not have a significantly smaller operational impact from a visual and/or wetlands impact standpoint due to the fact that a combination does not result in significantly fewer turbine sites.

Further, the process of siting and developing a productive wind farm is complex. The Applicant, by virtue of the experience of its project sponsors, has sited the proposed WECS to maximize long-term productivity. The Applicant considers the prospect of a single joint project as not feasible due to the highly concentrated WECS layout for both Noble Ellenburg and Clinton Wind Parks.

8.5.2 Mutual Limited Project Size

A potential alternative to the current proposed project would be for the Town Boards to cap project size (i.e. limit the number of turbines within the Towns). It is anticipated that such an alternative would have negative effects on the individual projects in terms of economic viability. Due to the rapid influx in wind power being developed within the New York State over the next few years (mostly in western regions), the economic viability of a project depends very much on the ability of a developer to cooperate with Town officials to maximize efficiency while minimizing impact and negative public sentiment. Past examples (outside of New York) where local governments attempted to cap the size of wind projects often ended up unnecessarily handicapping the ability for the Project to compete in the open market. Thus, the alternative of "capping" the size of individual projects directly increases the risk that each project might be unable to compete effectively in the open market. The economic benefits to the Towns and landowners would thus also be at greater risk.

8.5.3 Joint Project Components

Given that the turbines and access roads of the three projects are in separate and exclusive locations, hosted by landowners that are exclusive to each project developer, it is unlikely that any alternative of joint turbines or access roads is feasible, or provides any benefit in terms of impact reduction. Thus, this alternative was not considered.

Each of the three projects will have its own project substation and interconnection facility though it is likely that the Noble Wind Farms of Ellenburg and Clinton will be combining their two

substations into one. A possible alternative would be to join the substations of the three projects into one joint substation. This alternative could have the beneficial effects in terms if decreasing permanent impact of each wind project by decreasing the number of substations from two to one. The decrease in fixed cost to each project could also be beneficial to the economic viability of each project, and thus to the fiscal participation of the local landowners and Towns. While the Applicant has considered this alternative, there are extenuating circumstances outside of the Applicant's control that will dictate the likelihood of such an alternative. These circumstances include the fact that the NYPA and the NYISO must approve substation design. Currently the NYPA and NYISO have consulted only on designs of independent substations and interconnect points, and so the feasibility of this alternative is unknown. Furthermore, each individual project has an optimal location for a substation, a joint substation would imply that one (or both) of the proposed substations would not be in its optimal position, thus unnecessarily increasing the development risk to one, or both, of the developers.