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EXHIBITS

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1.0 DESCRIPTION OF PROPOSED ACTION

1.1 Project Summary / Introduction

The proposed New Grange Wind Farm (the Project) is located in the towns of Arkwright and Pomfret in Chautauqua County, New York as shown in Figure 1.1-1. The Project location was selected due to the energetic wind resource of the area and its proximity to the National Grid 115-kV transmission line, which gives the Project access to New York's electricity market.

The following definitions are used throughout this document to describe the proposed action.

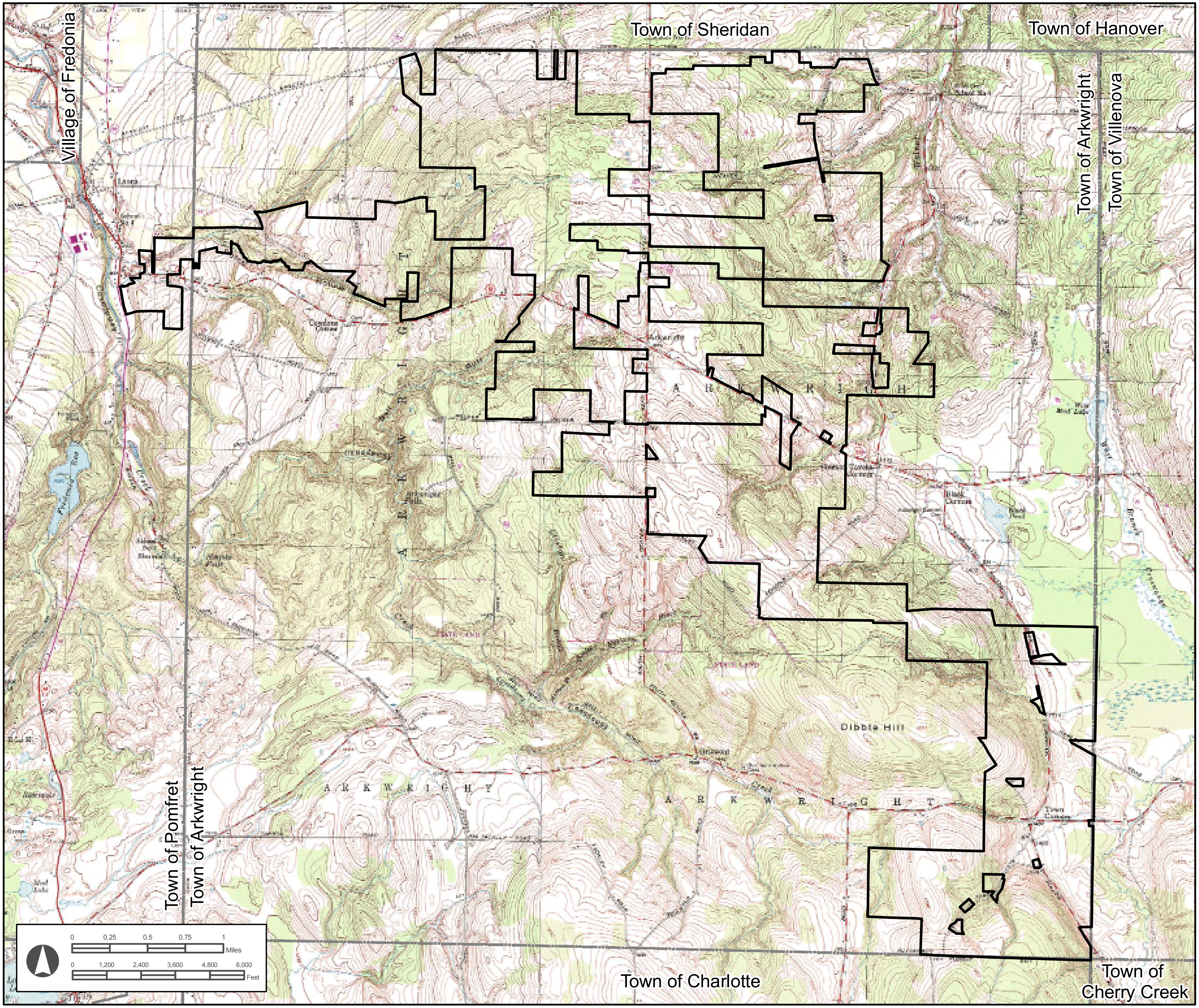
Applicant. Refers to New Grange Wind Farm LLC, formerly Pickett Brook Wind Farm LLC, a wholly owned subsidiary of Horizon Wind Energy.

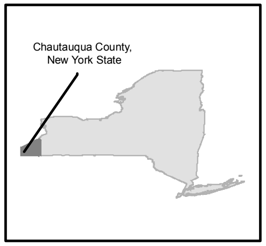
Project. Refers to all activities associated with the construction, operation, and individual components of the New Grange Wind Farm, including, but not limited to, turbines (including blades, towers, nacelle, foundations, etc.), electrical collection lines, access roads, crane pads, laydown areas, meteorological towers, and other facilities.

Project Site. Refers to the parcels of land where the Project will be placed. New Grange Wind Farm LLC has obtained consent from all landowners within the Project Site. This term is also used interchangeably with Wind Overlay Zone.

Project Area. Refers to the larger geographic study area including the Project Site and immediate vicinity.

The Project will consist of up to 47 wind turbine generators (WTGs), each with a nameplate capacity of 1.8 megawatts (MW) and a rotor diameter of 90 meters (295 feet), as shown in Exhibit 1.1-1. However, the Project will not deliver in excess of 79.9 MW to the electricity grid. Although New Grange Wind Farm LLC (the Applicant) currently plans to utilize the Vestas V-90, due to high demand placed on the turbine manufacturing industry, there is a possibility that this particular WTG may not be available at the time of procurement. The Applicant will utilize a WTG of similar specifications if the Vestas V-90 WTG is not available and will maintain compliance with the 420-foot height limit specified in the Arkwright local law. Other possible WTGs include the GE 1.5 sle MW turbine, which has a 77-meter rotor diameter and 80-meter tower, or the Vestas V-82 turbine, which has an 82-meter rotor and 80-meter tower. Although this Draft Environmental Impact Statement (DEIS) assumes that the Vestas V-90 will be used, the Applicant has conducted a noise analysis on both the Vestas V-90 and the GE 1.5 sle 1.5 MW WTG. Because rotor diameter of the GE 1.5 sle and Vestas V-82 are smaller, a visual analysis was conducted on the Vestas V-90 to provide a more conservative estimate of potential impact.





Project Site
Town Boundary

SOURCE:
USGS 7.5 MINUTE QUADRANGLES
DUNKIRK, 1978; FORESTVILLE, 1978;
CASSADAGA, 1978; HAMLET, 1978

NEW GRANGE WIND FARM

TETRA TECH EC, INC.

NEW GRANGE WIND FARM

CHAUTAUQUA COUNTY,
NEW YORK

FIGURE 1.1-1
PROJECT AREA

NEW GRANGE WIND FARM LLC
FEBRUARY 2008

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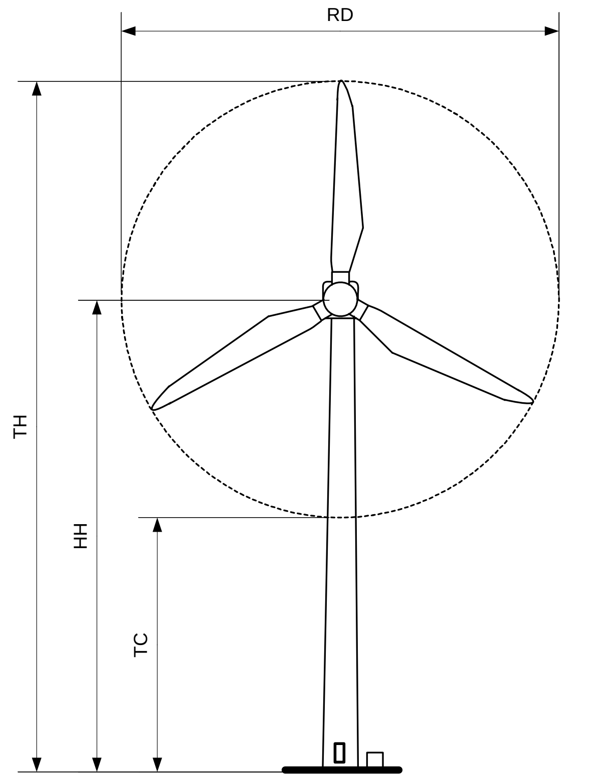
All of the proposed turbines will be the same make and model. In addition to WTGs, the Project will entail construction and operation of four permanent meteorological towers, a system of gravel access roads, electrical collection and communication cable networks, an operation and maintenance (O&M) building, and a substation and associated point-of-interconnect (POI) switchyard. In addition to the permanent components of the Project, the Project will require a temporary construction trailer site and construction work space, including, but not limited to, areas to store Project components (laydown yards), construction vehicle parking areas, and cleared areas for turbine assembly.

The entire Project Area is located in the northwestern corner of Chautauqua County in the towns of Arkwright and Pomfret. Project components will be spread across the Project Site, which consists of roughly 5,930 acres of leased private land within the Project Area; however, these facilities will temporarily impact only about 365 acres of land during construction and only approximately 85 acres during Project operations (Figure 1.1-1). A site layout map illustrating these key elements is provided in Figure 1.1-2, Proposed Project Layout.

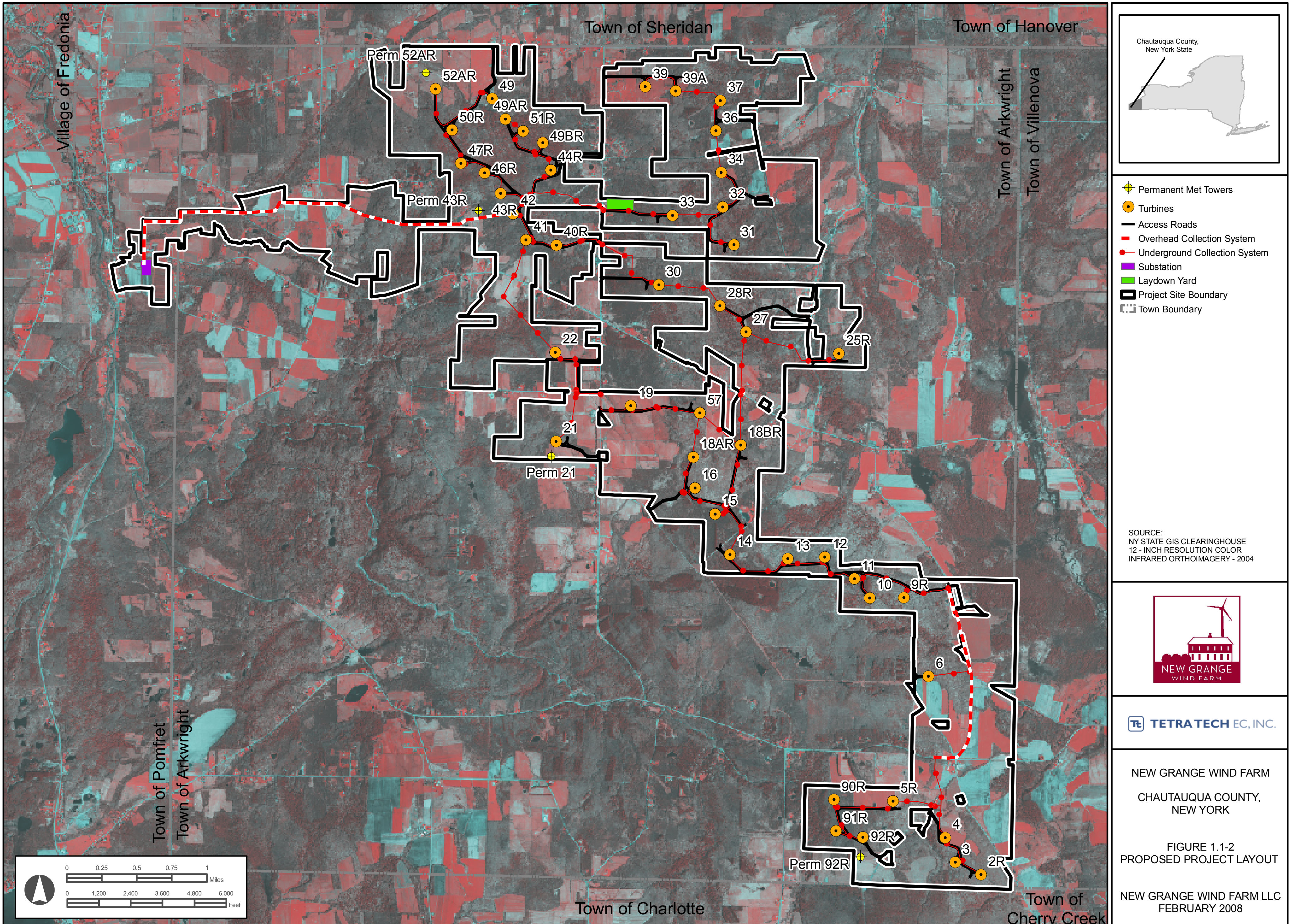


MIN	Dimension
80 m/262 ft.	Hub Height (HH)
90 m/295 ft.	Rotor Diameter (RD)
35 m/115 ft.	Tip Clearance (TC)
125 m/410 ft.	Tip Height (TH)

Exhibit 1.1-1 Wind Turbine Dimensions

The Project is designed to provide economical renewable electricity to meet New York State’s growing energy needs. The Project design and construction methodology were chosen to strike a balance between maximizing energy production, accommodating geological and environmental conditions, and limiting potential intrusions on the host community. Detailed descriptions of the types of activities required to construct the Project, and the plan for managing the Project during construction and operations, are contained in Section 1.6, Project Construction.

The Project is expected to be in service for at least 20 years. Well maintained wind power plants operating according to industry standard practices are capable of service lives longer than 20 years. Due to the rapid advancement in wind turbine technology, it is possible that during the Project’s service life, the turbines would be retrofitted or replaced under a re-powering program. Such retrofitting is not uncommon at older wind power projects in Europe and California.



NEW GRANGE WIND FARM

CHAUTAUQUA COUNTY,
NEW YORK

FIGURE 1.1-2
PROPOSED PROJECT LAYOUT

NEW GRANGE WIND FARM LLC
FEBRUARY 2008

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Preconstruction activities, such as clearing, improvement of laydown areas, and road grading could commence as early as fall 2008 with construction of the Project commencing as early as spring 2009. More information on the proposed construction schedule is presented in Table 1.6-1. Construction will commence when the Applicant obtains the required permits and when any necessary offtake agreement(s) for the Project's renewable power and/or financing arrangements are in place, until which point a final construction schedule cannot be produced.

1.2 Project Location

The proposed Project is located in Chautauqua County, as depicted in Figure 1.1-1. The Project Site includes approximately 5,930 acres of leased private land within the towns of Arkwright (5,830 acres) and Pomfret (100 acres). It is located about 9.5 miles southeast of the southern shore of Lake Erie, approximately 8 miles southeast of the City of Dunkirk, 6 miles southeast of the Village of Fredonia, 6 miles southwest of the Village of Forestville, and 5.5 miles northeast of the Village of Cassadaga (as measured from the geographic center of the Project Area to the center of each municipality). The Project Area is bordered at its northern extent by the Arkwright-Sheridan town line and Straight Road; at its eastern extent by the Arkwright-Villenova town line; at its southern extent by the Arkwright-Charlotte town line; and at its western extent by State Highway 60 (located in the Town of Pomfret, approximately 0.5 mile west of the Arkwright-Pomfret town line). The proposed site for the Project substation and POI switchyard is located in Pomfret near the western extent of the property, between State Highway 60 and the Arkwright-Pomfret town line. No WTGs will be located in the Town of Pomfret.

The Project Area is primarily situated at the western end of the Allegheny Plateau, north of the Canadaway Creek Wildlife Management Area. This area is characterized by topography with elevations ranging from approximately 750 feet above mean sea level to 1,900 feet above mean sea level. The land cover within the Project Area consists mainly of deciduous and mixed forests and agricultural pastures, with predominantly rural residential, agricultural, and recreational land use.

1.2.1 Project Participation

Eighty-three landowners own the 117 land parcels that make up the Project Site. The Applicant has secured sufficient acreage under lease and easement option agreements to construct the Project and is concluding negotiations on additional neighboring parcels.

Figure 1.1-2 illustrates the Project layout on a topographic map.

1.3 Project Facility Owner/Developer/Operator

New Grange Wind Farm LLC is a wholly owned indirect subsidiary of Horizon Wind Energy (Horizon). Horizon develops, constructs, owns, and operates wind farms throughout the United States. Horizon-developed wind farms operate in New York, Iowa, Illinois, Pennsylvania, Oklahoma, Texas, Oregon, Minnesota, and Washington. Horizon plans to construct projects in

Minnesota, Kansas, Washington, Iowa, Illinois, and New York in 2008. Operating assets in New York include the Maple Ridge Wind Farm on Tug Hill in Lewis County, NY (50 percent owned by Horizon and 50 percent owned by PPM Energy) and the Madison Wind Farm in Madison County, NY. At the time this report was prepared, Horizon had roughly 10,500 MW under development and expects to own approximately 2,000 MW of operating wind energy capacity at the end of 2008. In July 2007, Horizon was acquired by Energias de Portugal, a worldwide leader in development and operation of wind energy projects. Horizon is now in its ninth year in New York, with two operating projects, four New York development offices, and extensive experience in development, construction, and operation.

1.4 Project Purpose, Need and Benefit

The purpose of the proposed Project is to create a profitable, economically viable wind-powered energy facility that will provide a significant source of clean and renewable energy to the New York power grid.

The impetus for clean renewable energy in New York comes predominantly from the Public Service Commission (PSC) "Order Approving Renewable Portfolio Standard Policy," issued on the 24th of September 2004. This Order calls for an increase in renewable energy used in the state to 25 percent (from the then level of 19 percent) by the year 2013. This renewable energy policy was identified in the 2002 State Energy Plan (New York State Energy Planning Board 2002) and the Preliminary Investigation into Establishing a Renewable Portfolio Standard (RPS) in New York (NYSERDA 2003). The New York State Energy Research and Development Authority (NYSERDA) 2003 preliminary report found that an RPS can be implemented in a manner that is consistent with the wholesale and retail marketplace in New York and that an RPS has the potential to improve energy security and help diversify the state's electricity generation mix.

One of PSC's goals in designing the solicitation process and RPS eligibility criteria was to ensure that renewable energy is procured at the lowest possible cost to the state's electricity consumers. As of January 2007, close to 8,000 MW of New York-based wind energy projects have requested to interconnect to the New York electric grid. Most of these projects, including this Project, are expected to participate in one of NYSERDA's renewable energy auctions. In addition, other renewable energy projects (biomass, small hydro, solar, landfill gas, etc.) in New York and adjoining states/provinces can compete in such auctions. On the other hand, a report prepared by GE Energy on behalf of NYSERDA and issued in February 2004 (Preliminary Reliability Assessment Report) concludes that wholesale energy prices are likely to decline by approximately $362 million annually once the targets of the RPS are met. Subsequent New York State Assembly Hearing testimony has indicated that the decline may be more than $500 million (Parella 2006).

In addition to the benefit of the RPS in helping New York reduce its reliance upon fossil fuels, increasing the state's renewable energy consumption to 25 percent should reduce statewide air emissions of nitrogen oxide (NO_x) by 6.8 percent, sulfur dioxide (SO_2) by 5.9 percent, and carbon dioxide (CO_2) by 7.7 percent by 2013. The Project alone is expected to reduce annual air emissions of NO_x by 104 tons, SO_2 by 441 tons, and CO_2 by 86,100 tons.

Beyond meeting the goals of the RPS, the benefits of the Project include positive impacts on socioeconomics (e.g., increased employment, increased revenues to local municipalities and lease revenues to participating landowners and neighbors), air quality (through reduction of emissions from fossil-fuel-burning power plants), and climate (reduction of greenhouse gases that contribute to global warming). By eliminating pollutants and greenhouse gases, the Project will also benefit ecological and water resources and human health. Additional information on the air quality and socioeconomic benefits of the proposed Project is included in Sections 2.4 and 2.9.

1.5 Project Facility Layout and Components

1.5.1 Facility Layout Criteria

The proposed location and spacing of the wind turbines and support facilities were determined based on a wind resource assessment prepared by AWS Truewind, experts in this field, a review of the Project Site's land use constraints identified by NEA Environmental Consultants, and the locations of currently existing sensitive environmental and cultural resources (see agency correspondence in Appendix A). During Project planning, several factors were considered, including the following:

Wind Resource Assessment: The Applicant used computerized modeling software incorporating meteorological data gathered both on- and off-site, topographic information, and environmental information collected in the Project Area. The wind turbines are sited to optimize exposure to wind from all directions to the extent practicable given environmental and other constraints, with emphasis on exposure to the prevailing southwesterly winds in the Project Area.

Distance from Residences and Other Buildings, Non-participating Land Parcels, Roads, and Other Infrastructure: A detailed house study was performed to determine the exact location of houses, outbuildings, roads, transmission lines, and other existing infrastructure within the Project Area. A setback constraints map was created indicating areas that were available for turbine placement. The Project setbacks are based upon requirements in the applicable local laws and ordinances for each town, internal and external guidelines, and standard wind industry practices. The purpose of the setbacks is to minimize visual and sound effects of the turbines on neighbors and enhance the safety of the operating Project. The following setbacks were utilized in the development of the Project layout:

- Maintain a minimum setback of at least 1,200 feet between the center of any tower foundation and the nearest outer wall of existing participating or non-participating occupied residences in the Town of Arkwright;
- Maintain a minimum setback of at least 500 feet from the Project Site boundary lines;
- Maintain a minimum setback of at least one and a half times the total tip-height (615 feet) of the tower between proposed turbine locations and “non-WECS structures,” such as non-dwelling structures, such as barns and camps, and existing above ground utilities;
- Maintain a minimum setback, as measured from the centerline of the tower foundation, of at least 500 feet from all local roads in the Town of Arkwright;
- Maintain a minimum setback of at least 100 feet from state-identified wetlands;
- Maintain a minimum setback of at least 500 feet from gas wells;
- Maintain a minimum setback of at least 1,200 feet from the boundaries of Chautauqua County’s existing or proposed trails, trail facilities, and recreation areas; and
- Avoidance of microwave Worst Case Fresnel Zones (WCFZ).

<u>Sufficient Spacing</u>: In siting turbines within the setback constraints discussed above, turbines must maintain sufficient spacing from one another. Siting individual turbines or rows of turbines too close to one another can result in decreased electricity production due to the creation of wake losses and in increased maintenance due to wind turbulence between and among the turbines. The first step in modeling the wake effects of a given wind Project layout is to calculate the wake created by a single turbine. Immediately downstream of the rotor, there is a momentum deficit with respect to free-stream conditions (i.e., a shelter zone). The area of the shelter zone is directly related to the size of the rotor. As the airflow proceeds downstream, the shelter zone expands in size but shrinks in intensity as free-stream conditions gradually prevail. If turbine rows are sufficiently far apart (typically 5 to 10 rotor diameters), energy losses between turbine rows can be reduced. However, wind direction at a Project Area varies and, as rotors pivot on their towers, turbines can cast a shelter zone at downwind turbines within the same row. Project siting must carefully evaluate the direction of the most energetic winds to understand the prevalent direction of a turbine’s shelter zone.

In addition to energy losses due to siting a downwind turbine in a shelter zone, turbines sited on the margins of the shelter zone can be impacted. At the edge of the shelter zone, airflow mixes with free-stream flow to create turbulence. Turbulent airflow provides less available energy for a turbine to capture and introduces transient forces on the rotor causing the blades to flex more than usual. If turbulence is persistent and severe, it can shorten the useful life of turbine blades. Usually turbines within a row are sited closer together (typically 3 to 5 rotor diameters) in order to reduce the length of associated roads and collection lines (and subsequent potential, environmental impacts, and capital costs) as well as the footprint of the overall Project Area.

Project planning must include a careful balance between required setbacks, other applicable siting constraints, construction and aesthetic impacts, and the need to minimize turbulence-related energy losses and maintenance impacts.

Agricultural Protection Measures: In keeping with the wind energy facility siting guidelines developed by the New York State Department of Agriculture and Markets (Ag & Markets) after eight years of reviewing wind farm site plans, the Applicant has worked closely with all participating landowners and Ag & Markets to design a layout that minimizes impacts on normal farming operations. The proposed layout maximizes the use of existing farm lanes, logging roads, and gas well access roads for access roads to the turbines. As frequently as possible, new access roads and turbines have been sited along the edge or in between fields. For a more detailed discussion of avoidance and mitigation factors employed to minimize agricultural impacts, refer to Section 2.13, Land Use and Zoning.

Biological and Cultural Resources: Through consultation with local, state, and federal agencies, as well as through independent, in-depth desktop and field investigations, the Applicant has developed a solid understanding of sensitive plant and animal species in the Project Area, as well as other sensitive biological, cultural, and architectural resources. The Applicant has also thoroughly investigated and characterized avian and bat usage of the Project Area to determine the relative risks posed to resident and migrating species. Similarly, the Applicant has inventoried known historical structures and cultural resources and has provided reasonable buffer areas from proposed Project components to avoid or minimize potential impacts. For a more detailed discussion of avoidance of biological and cultural resources, refer to Section 2.3, Biological Terrestrial and Aquatic Ecology, and Section 2.6, Historical, Cultural, and Archeological Resources.

Unusual Landform Areas: Special consideration is typically given to siting Project components to avoid unusual land forms within the Project Area. After desktop and field study, no unusual landforms have been identified within the Project Area boundary. For a more detailed discussion of the geotechnical and landform features in the Project Area, refer to Section 2.1, Geology, Topography, and Soils.

Wetland Avoidance: Special consideration was given to siting the Project to avoid or minimize impact to wetlands within the Project Area. A desktop analysis of the U.S. Fish and Wildlife National Wetland Inventory Maps and New York State Department of Environmental Conservation (NYSDEC) Freshwater Wetlands Maps was conducted. Additionally, a field wetland inventory has been performed. Prior to construction, the Applicant will submit an application for and obtain any wetland permits that may be required for the Project. Wetland delineations according to U.S. Army Corps of Engineers (USACE) and NYSDEC delineation guidelines will be conducted in the spring/summer of 2008 field delineation in order to meet permit application requirements. For a more detailed discussion of the wetland and surface water features in the Project Area, refer to Section 2.2, Water Resources.

Visual and Noise Impacts: Special consideration was given to siting the proposed turbines in order to minimize the potential visual impact on residents, such as by avoiding the most populated areas like Cable Road and Route 83, to the extent practical given the height of the WTGs. The Applicant also conducted extensive shadow flicker and sound analyses. Based upon these studies, the Applicant has proposed turbine sites designed to minimize impacts on residents within and around the Project Area. For more detailed discussion of the visual and noise impact assessments performed for the Project, please refer to Section 2.5, Aesthetic and Visual Resources, and Section 2.7, Sound, as well as Section 4.0, Alternatives Analysis.

The Applicant has proactively applied all the above factors to the development of the Project layout. The proposed location of all Project components is illustrated in Figure 1.1-2. These components are described individually below.

1.5.2 Roads and Civil Construction Work

Project Site access roads will be designed to allow for oversized heavy equipment to be transported to the Project Site, and will be used throughout the life of the Project to allow access to and from the wind turbines, substations, and meteorological monitoring towers. In order to facilitate the erection of wind turbines and towers, a crane pad, which is a flat work area approximately 60 feet by 100 feet, will be cleared of topsoil, compacted, and graveled as necessary adjacent to each turbine location. The Project also entails a gravel parking area at the operations and maintenance (O&M) facility and a gravel surfaced equipment laydown yard. The laydown yard will be located on approximately 10 acres of land off of Center Road in the northeastern part of the Project Site near turbine 33 as shown on Figure 1.1-2. The location of the O&M facility and parking lot has not been determined yet but will be built over the site used during construction for the laydown yard if possible. All proposed roads and transportation facilities locations have been sited to minimize ground disturbance in general and disturbance to agricultural lands, wetlands, and cultural resources in particular.

Road access to the Project Site will be provided by a number of existing public roads, as described in Section 2.8, Traffic and Transportation. The Applicant has developed a transportation, or delivery plan, that examines the feasibility of transporting large or heavy Project components to and around the Project Site. It is currently estimated that several miles of existing public roads will be improved to facilitate Project construction. A typical gravel access road is displayed in Exhibit 1.5-1.

Exhibit 1.5-1 Typical Wind Power Project Gravel Road

1.5.2.1 Project Site Roads

The road design has been prepared to minimize the overall ground disturbance footprint and avoid erosion risks. Wherever practical, the Project layout uses existing farm lanes and/or gas well access roads to minimize new ground disturbance. Where this is not possible, new roads will be constructed to access turbine locations during construction and operation. Approximately 18 miles of access roads will be constructed and/or improved for the turbines.

1.5.2.2 Road Design

The road design will be finalized by an experienced and state-licensed civil engineer based on the results of a detailed geotechnical investigation of the surface and subsurface conditions at the Project Site. The Project's geotechnical engineer will specify the standards for road construction and road rock specifications that are adequate for safe and reliable Project construction and on-going operations. The access road leading to the first turbine in a string will generally consist of a 20-foot-wide compacted graveled surface and a 2-foot-wide shoulder on either side to blend with the surrounding contours and allow for proper drainage. The roads between contiguous turbines in a string will be 34 feet wide to accommodate the safe movement of large crane equipment between the individual turbine sites. Access roads will be constructed to follow the existing contours of the land. In areas of steeper grades, a cut and fill design will be used to ensure grades are kept below 12 percent to facilitate access and help prevent erosion. Detailed 2-foot topographic contour maps will be prepared to aid final design prior to construction. The detailed contour maps will be used to clarify special cut and fill areas. They will also be used to prepare a detailed Storm Water Pollution Prevention Plan (SWPPP) and a set of best management practices (BMPs), which will be implemented to prevent erosion during construction and operations. The Applicant will be responsible for maintenance of any new private roads. All access road entrances will be designed to provide safe access of emergency vehicles. The Applicant will consult with local emergency providers to ensure adequate access to Project components while maintenance is being performed.

1.5.3 Turbine Tower Foundations

The Project Site provides solid subsurface conditions for the turbine foundations. A geotechnical investigation will be performed at each tower location prior to construction with a drill rig. The foundation may be either a concrete caisson or a spread footer or equivalent, as specified by the Project geotechnical/civil engineer. It is currently anticipated, however, that the spread foot foundation design, similar to the one shown in Exhibit 1.5-2, will be used.

The foundation design will be tailored to suit the soil and subsurface conditions at the various turbine sites. The foundation design will be certified by an experienced state-registered structural engineer. The foundation will be designed in accordance with applicable requirements of the NYS Building Code, as well as Minimum Design Loads for Buildings and Other Structures (ASCE 7-05), whichever are greater. Each foundation will require roughly 330 cubic yards of concrete, much of which must be provided in continuous pours. Concrete for the foundations will be provided by an off-Site batch plant. The Applicant will contract with a local provider prior to construction.

Exhibit 1.5-2 Spread Footing Type Foundation

1.5.4 Wind Turbine Generators and Central Control System

The WTG proposed for this Project is the 1.8/2.0 MW Vestas V-90 (or equivalent WTG). Information regarding the characteristics and general operation of this turbine is included in Appendix B. Each wind turbine consists of three major mechanical components, which are the tower, nacelle, and the rotor. The height of the tower proposed for this site, or "hub height" (height from foundation to top of tower), is approximately 80 meters (262 feet). The nacelle sits atop the tower, and the rotor hub is mounted to the drive shaft within the nacelle. The diameter of the turbine blade is 90 meters (295 feet). The total turbine height (i.e., height at the highest blade tip position) is approximately 125 meters (~410 feet), including any grading and pedestal height. Descriptions of each of the turbine components are provided in Section 1.5.4.1.

Although the Applicant currently plans to utilize the Vestas V-90, due to high demand placed on the turbine manufacturing industry, there is a possibility that this particular WTG may not be available at the time of procurement. The Applicant will utilize a WTG of similar specifications. Other possible WTGs include the GE 1.5 sle MW turbine, which has a 77-meter rotor diameter and 80-meter tower, or the Vestas V-82 turbine, which has an 82-meter rotor and 80-meter tower.

<u>Wind Turbine Type Certification:</u> European manufacturers have been required, for many years, to meet rigid standards verifying their design criteria, operational characteristics, supervision of construction, transportation, erection, commissioning, testing, and servicing. In Europe, Germanischer Lloyd, Det Norske Veritas, Wind Test GmbH, and Risø (Denmark) are independent testing laboratories, which administer regulations for the design, approval, and certification of wind energy conversion systems.

The testing processes involved in the approval of design documentation include safety and control system concepts, static and dynamic load assumptions, and associated load case definitions. Once approved, specific components, such as blades, drive trains (hubs, gearing, bearings, and generators, etc.), safety systems, towers, yaw systems, foundations, and electrical installations, will be reviewed and approved according to minimum standards established by these testing agencies. In addition to operating characteristics and design features, the testing agencies review construction supervision procedures, including materials testing, quality assurance (QA) reports and procedures, corrosion protection, and others. They also review and set standards for supervision during the transportation, erection, and commissioning of the turbines.

Operational testing performed by the agencies includes measurement of power curves, noise emissions, as well as loads and stresses, including wind loads imposed on the tower, foundation, drive train, blades, nacelle frame, power quality, etc. Test data are evaluated for plausibility, and compared with the original calculations and mathematical models used for the design.

None of the independent laboratories will issue its certification unless the turbine design has met minimum design standards and performance levels, both calculated and measured. The approval process also applies to the manufacturers' processes and procedures through ISO 9001.

Due to this arduous approval process, wind turbines designed to European standards have proven to be the most reliable wind energy systems over the past two decades. In Europe, certification pursuant to these standards is mandatory for both permitting and financing. Partly due to these verification programs, lenders in Europe view wind energy equipment in the same way lenders in the United States might view the purchase of heavy construction equipment.

Equipment Selection: Equipment is selected with an emphasis on safety, reliability, suitablity to the available wind resources, and competitive pricing. This results in a project that delivers energy safely and reliably at the most competitive cost possible over time. A very rigorous approach has been taken to pre-qualify all key potential equipment suppliers for the Project, especially the wind turbine and component manufacturers.

1.5.4.1 Wind Turbine Basic Configuration

Wind turbines consist of three main physical components that are assembled and erected during construction: the tower, the nacelle (machine house), and the rotor (three blades).

Tower: The WTG tower is a tubular conical steel structure that is manufactured in multiple sections depending on the tower height. Towers for the Project will be fabricated, delivered, and erected in three or four sections. The towers are slightly tapered, with diameter of approximately 4.15 meters (16 feet) at ground level. A service platform at the top of each section allows for access to the tower connecting bolts for routine inspection. Each tower will have an access door and an internal ladder that runs to the top platform of the tower just below the nacelle. A nacelle ladder extends from the machine bed to the tower top platform allowing nacelle access independent of its orientation. The tower is equipped with interior lighting and a safety glide cable alongside the ladder. Towers will be painted off-white to make the structure less visually obtrusive and to provide corrosion protection.

The tower design is certified by experienced and qualified structural engineers who have designed several generations of turbine towers that have proven themselves well in some of the most aggressive wind regions of the world. The towers and foundations are designed for the appropriate wind-loading requirements in accordance with International Engineering Standards. The relevant standard is the IEC Standard 61400-1. For the cold-weather winter conditions on the Project Site, special material specifications are set to ensure that materials are designed for the brittle transition temperature.

Nacelle: Exhibit 1.5-3 shows the general arrangement of a typical nacelle that houses the main mechanical components of the WTG. The nacelle sits atop the tower and consists of a robust machine platform mounted on a roller bearing sliding yaw ring. An externally mounted wind vane and anemometer at the rear of the nacelle relay real-time wind data to the controller which signals yaw motors to rotate (yaw) the nacelle and keep the turbine pointed into the wind to maximize energy capture. The main components inside the nacelle are the drive train, a gearbox, and the generator. On the Vestas V-90, the step-up transformer is situated at the rear of the nacelle, which eliminates the need for a pad-mounted transformer at the base of the tower. A fully enclosed steel reinforced fiberglass or all steel shell protects internal machinery from the environment and dampens noise emissions. The shell is designed to allow for adequate ventilation to cool internal machinery such as the gearbox and generator. Attached to the top of some of the nacelles, per specifications of the Federal Aviation Administration (FAA), will be a single, medium intensity aviation warning light. These flashing red aviation warning lights will be operated only at night. A lighting plan is included as Appendix S.

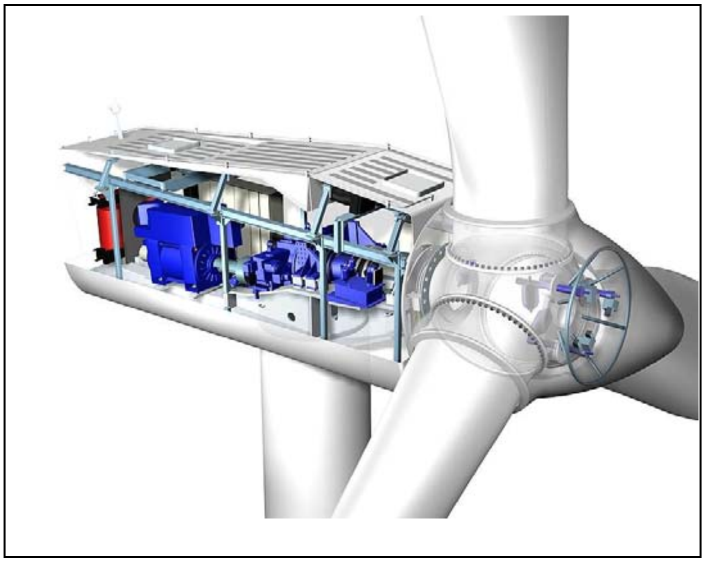


Exhibit 1.5-3 Typical WTG Nacelle

Drive Train: The rotor blades are all bolted to a central hub. The hub is bolted to the main shaft on a large flange at the front of the nacelle. The main shaft is independently supported by the main bearing at the front of the nacelle. The rotor transmits torque to the main shaft that is coupled to the gearbox. The gearbox increases the rotational speed of the high speed shaft that drives the generator to provide electrical power at 60 Hertz (Hz).

Rotor: The Vestas V-90 has 3-bladed rotors that are 90 (295 feet) in diameter, with a blade length of approximately 44 meters (144 feet), and a hub width of 2 meters (6.5 feet). Exhibit 1.5-4 illustrates a rotor assembly, which includes the rotor hub – the frame onto which the blades are attached, the turbine blades, and the nose cone. The rotor hub attaches to the drive train emerging from the front of the nacelle. The rotor blades are typically made from a glass-reinforced polyester composite similar to that used in the marine industry for sophisticated racing hulls. Much of the design and materials experience comes from both the marine and aerospace industries, and has been developed and tuned for wind turbines over the past 25 years. The blades are non-metallic, and are equipped with a sophisticated lightning suppression system which is discussed below in Section 1.5.7, Project Grounding System. The Vestas V-90 operating rotor assembly turns slowly, typically within the range of 9 to 14.9 RPM. Hydraulic motors within the rotor hub rotate the angle of each blade according to wind conditions, which enables the turbine to operate efficiently at varying wind speeds and reduces wear and tear on the blades and drive train in higher wind conditions. Vestas V-90 rotors typically begin generating electricity in winds as low as 5.6 mph and reach their nominal rated output in winds of 27 to 29 mph. If wind gusts exceed a wind speed of typically 56 mph, Vestas V-90 WTGs shut down.

Exhibit 1.5-4 Rotor Assembly

Turbine Control Systems: Wind turbines are equipped with sophisticated computer control systems which are constantly monitoring variables such as wind speed and direction, air and machine temperatures, electrical voltages, currents, vibrations, blade pitch, and yaw angles, etc. The main functions of the control system include nacelle operations, as well as power operations. The nacelle functions include yawing (or rotating) the nacelle into the wind, pitching the blades, and applying the brakes, if necessary. Power operations controlled at the bus cabinet inside the base of the tower include operations of the main breakers to engage the generator with the grid, as well as control of ancillary breakers and systems. The control system is always running and ensures that the machines are operating efficiently and safely.

Heat Dissipation: Air cooling of the operating machinery inside the wind turbines, such as the generator and gearbox, is necessary. Heat dissipation is minimal. The proposed facility uses wind, not thermal energy, as its source of energy production, and therefore, water sources are not used in the process of heat dissipation.

Central Supervisory Control and Data Acquisition (SCADA) System: Each turbine is connected to a central SCADA System (shown schematically in Exhibit 1.5-5) through a network of underground fiber optic cable or copper signal wire. When copper signal wire is used, the interfaces to the wind turbine and other signal processors are optically isolated in order to prevent stray surges. The SCADA system allows for remote control and monitoring of individual turbines and the wind plant as a whole from the central host computer or from a remote computer. In the event of faults, the SCADA system can also send signals to a fax, pager or cell phone to alert operations staff.

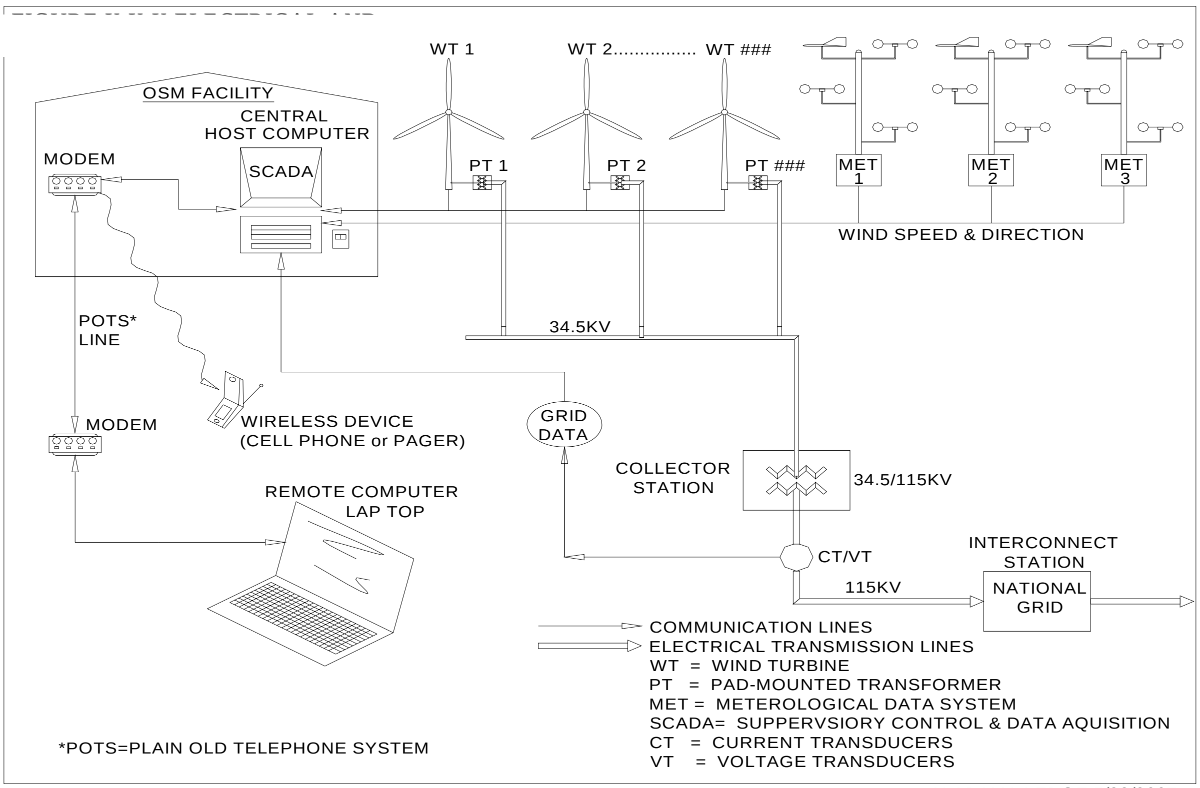


Exhibit 1.5-5 Electrical and Central Control System

Safety Systems: All turbines are designed with several levels of built-in safety and comply with the codes set forth by strict European standards (such as ISO 9001) as well as Federal Occupational Safety and Health Administration (OSHA) and American National Standards Institute (ANSI) standards.

Braking Systems: The turbines are equipped with two fully independent braking systems that can stop the rotor. The braking systems are designed to be fail-safe, allowing the rotor to be brought to a halt under all foreseeable conditions. The system consists of aerodynamic braking by the rotor blades and by a separate hydraulic disc brake system. Both braking systems operate independently such that, if there is a fault with one, the other can still bring the turbine to a halt. Brake pads on the disc brake system are spring loaded against the disc and power is required to keep the pads away from the disc. If power is lost, the brakes will be mechanically activated immediately. The aerodynamic braking system is also configured such that if power is lost, it will be activated immediately. This is usually done using back-up battery power or the nitrogen accumulators on the hydraulic system, depending on the turbine's design.

After an emergency stop is executed, remote restarting is not possible. The turbine must be inspected in-person and the stop-fault must be reset manually before automatic operation can be re-activated.

The turbines are also equipped with a parking brake that is generally used to "park" the rotor for routine maintenance or inspections that require a stationary rotor.

Climbing Safety: Normal access to the nacelle is accomplished with a ladder inside the tower. Towers are equipped with standard safety hardware, including lanyards and safety belts for service personnel. All internal ladders and maintenance areas inside the tower and nacelle are equipped with safety provisions for securing lifelines and safety belts and conform to or exceed ANSI 14.3-1974 (Safety Requirements for Ladders). During operations of the Project, maintenance personnel always work in pairs inside the wind turbines as part of standard safety practice.

Turbine Design Life: The Project will use proven utility grade equipment with a minimum design life of 20 years. The most vulnerable pieces of equipment are the wear and tear components of the wind turbines. The Project will utilize only well-proven designs that have been approved by independent testing laboratories listed earlier. Modern wind turbines of the type being proposed for the Project (3-bladed, upwind) have been developed over the past 25 years and have been proven over several generations of equipment. Over the past ten years, the industry has developed and built turbines of this type with nameplate capacities of over 1 MW. The basic configuration of the 3-bladed up-wind turbine is the best proven and understood turbine configuration available in the industry, and the vast majority of all new wind power generation facilities planned, or under construction, in the world utilize this technology. The wind turbine technology used for the design of the Project has proven to be very reliable, efficient, and lower in electrical energy production cost than other commercially available wind power technologies.

Over the past 25 to 30 years, more than 90,000 wind turbines have been installed around the world for an installed nameplate capacity of about 60,000 MW. More than 23,000 wind turbines (about 11,000 MW) are installed in the United States and there were roughly 270 units (430 MW) of wind turbines operating in New York State as of January 2008.

1.5.5 Electrical Collection System Infrastructure

Electrical Collection System Overview: Electrical power generated by wind turbines is transformed and collected through a network of underground and overhead cables. Groups of turbines are connected along individual electrical circuits that terminate at the Project substation. At the substation, the voltage level is increased from 34.5 kV to 115 kV. The Proposed Project Layout in Figure 1.1-2 shows the general routing paths of the underground and overhead electrical collection lines as well as the proposed substation and POI switchyard locations. Exhibit 1.5-5 illustrates the overall electrical collection system schematically.

Nacelle/Pad Mounted Transformers and Underground Cable: The transformers will be interconnected on the high voltage side to underground cables that connect all of the WTGs together electrically. The underground cables are installed in trenches primarily along the access roads that are a minimum of 4 feet in depth in agricultural areas as shown in Exhibit 1.5-6. Alongside the electrical cables will be buried a fiber optic or copper communication line which will tie all of the turbines back to the central control computer as illustrated in Exhibit 1.5-5. A clean fill material, such as sand or fine gravel, will be used to cover the cable before the native soil and rock are backfilled over the top to prevent damage to buried cables from compaction. The Project will require approximately 21 miles of underground cable to connect all the turbines into as many as five circuits, which will run directly to the substation.

Exhibit 1.5-6 Typical Underground Cable Trench

The transformer for the Vestas V-90 turbine proposed for this project is located within the nacelle. Pad-mounted transformers are used for the GE 1.5 MW and Vestas V-82 turbine that may be used if the Vestas V-90 is not available. Exhibit 1.5-7 shows a typical pad mounted transformer. The pad transformers are generally a loop feed, dead front configuration with bayonet and current limiting fuse systems for protection and safety. Each transformer will be sized to carry its respective load without exceeding a 65°C temperature rise. The step-up transformer impedance will be optimized based on the facility power output requirements, and feeder circuit breaker interrupting ratings and internal fuses. Protection to the transformer and turbine generator is provided by a switchable breaker at the turbine bus cabinet electrical panel inside the turbine tower.

Exhibit 1.5-7 Typical Pad Mount Transformer
(shown during construction before terminations landed)

Collection System Overhead Line: The Applicant proposes to integrate up to 1.4 miles of overhead 34.5-kV power lines into the collection system design to minimize or avoid disturbance to environmentally-sensitive sites or in areas of safety concern or construction constraints in the southeast portion of the Project Site. The Project will also require approximately 3.3 miles of overhead 34.5-kV electrical power lines to collect all of the power from the turbines to terminate at the substation facility in Pomfret. The Project will also require 2 roughly 200-foot (maximum) spans of overhead 115-kV electrical power lines that will connect the substation and POI switchyard with the existing electric grid. These lines, commonly referred to as loop-in/loop-out lines, are discussed further in the next section.

1.5.6 Interconnection Substation Facilities

The Project substation facilities will consist of a collection system station and a POI switchyard to be located in the Town of Pomfret. The two components of the substation are separated by an internal fence and will ultimately have separate owners. The Transmission Owner (National Grid) will take possession of the POI switchyard, while the collection system station will remain with the Project.

The POI switchyard will be designed according to functional specifications issued by National Grid. All detailed designs will be reviewed and approved by National Grid. Final adjustments to the detailed interconnect plans will be made during design review with the interconnecting utility and their system protection engineers to accommodate for conditions on the grid at the time of construction.

The Project's electrical system will be designed and constructed in accordance with the guidelines of the National Electric Safety Code (NESC), National Fire Protection Agency (NFPA), and utility requirements. The general schedule for construction of the substation and POI switchyard will be coordinated with the construction of the rest of the Project and the outage requirements of National Grid and the NYISO.

Collection System Station: The main function of the collection system station is to step up the voltage transported through the collection lines and to provide fault protection. The basic elements of the collection system station are a control house, a main transformer, outdoor circuit breakers, capacitor banks, relaying equipment, high voltage bus work, metal clad switchgear, steel support structures, an underground grounding grid, and overhead lightning suppression conductors. In a typical collection substation design, as shown in Exhibit 1.5-8, the collection system cables enter the collection station and terminate at the 34.5-kV switchgear. The switchgear includes circuit breakers and protection devices for each individual collection line circuit, as well as the bus bars and the main 34.5-kV to 115-kV main step-up transformer. These protection systems allow the Project operator to isolate a circuit or substation component for service. The switchgear also contains the control house service transformer, which provides the low-voltage electricity to power the control house.

From the switchgear, an underground cable connects to the main step-up transformer, which converts power from the 34.5-kV collection system to the 115-kV level of the grid. The transformer will be filled with mineral oil on-site, as it is delivered without oil in the tank. The main transformer is filled and tested during the commissioning process. The station design will incorporate an oil containment system consisting of a perimeter containment trough, large enough to contain the full volume of transformer mineral oil with a margin of safety to be determined by the manufacturer's suggestion and based on ANSI/IEEE C57.12.26 design standards, surrounding the main substation transformer. The trough will be poured as part of the transformer concrete foundation, be set on a bentonite base, or will consist of a heavy oil resistant membrane buried around the perimeter of the transformer foundation. The trough and/or membrane will drain into a common collection sump area equipped with a sump pump designed to pump rain water out of the trough to the surrounding area away from any natural drainages. In order to prevent the sump from pumping oil out to the surrounding area, it will be fitted with an oil detection shut-off sensor which will shut off the sump when oil is detected. A fail-safe system with redundancy is built to the sump controls since the transformers are also equipped with oil level sensors. If the oil level inside a transformer drops due to a leak in the transformer tank, it will also shut off the sump pump system to prevent it from pumping oil, and an alarm will be activated at the station and at the main Project control SCADA system.

Exhibit 1.5-8 Typical Collection System Portion of Substation Facilities

Immediately off the high side of the main step-up transformer is a set of lightning arrestors, as well as a 115-kV circuit breaker connected with an air insulated bus. The 115-kV bus crosses over the fence that is also the demarcation between the POI switchyard owned by the Transmission Owner and the collection system station owned by the Project.

All of the main outdoor electrical equipment and control house will be installed on concrete foundations that are designed for the soil conditions at the substation site. The footprint of the substation will be approximately 100 feet by 170 feet, the POI switchyard will be 160 feet by 200 feet, and beakers will be finalized during the Facility Study process overseen by the NYISO.

<ins>POI Switchyard</ins>: In general appearance, the POI switchyard will be very similar to the collection system station, except that it will not have a load step-up transformer. In addition, the POI switchyard will have more steel pole structures and more high voltage switch breakers. The main function of the POI switchyard is to connect the Project feeder lines to the utility grid and to provide fault protection. The basic elements of the POI switchyard are a control house, outdoor

circuit breakers, capacitor banks, relaying equipment, high voltage bus work, steel support structures, an underground grounding grid, and overhead lightning suppression conductors. The control house contains the protection and control systems for the 115-kV lines. All of the main outdoor electrical equipment and control house will be installed on concrete foundations that are designed for the soil conditions at the substation sites. The POI switchyard and protection will be designed in accordance with National Grid standards and with the Northeast Power Coordinating Council Criteria for Bulk Power Stations and criteria set forth by Homeland Security. These design criteria require that the entire POI switchyard is sited outside of the prescriptive easement of the existing electrical grid. As such, connecting the POI switchyard with the electric grid involves cutting the existing power lines and running short spans of overhead 115-kV electric lines known as loop-in/loop-out lines from the grid to the substation. The exact footprint of the POI switchyard will depend largely on National Grid requirements and the grid line characteristics at the point of interconnection.

Stand-By Power Consumption: The Project will generate power output approximately 80 to 90 percent of the time and will consume a tiny amount of power from the grid during periods of low wind. Unlike traditional power plants, the Project does not consume a large amount of power for start-up. Each wind turbine comes on line at random, depending upon the local wind speed at each turbine location, and power consumption is generally that used for the auxiliary systems at each turbine. As with any power plant, the transformers and auxiliary systems at the substation consume some power to stay energized. The turbines also consume some electricity to maintain power to the hydraulic systems, pumps, heaters, fans, controller electronics, lighting, etc. Overall, the Project will consume less than 1 percent of what it generates to support auxiliary systems with stand-by power.

Substation Transformers: The transformers will be liquid-type with cooling fins and fans. The transformer will be sized to carry its respective load without exceeding a 65°C temperature rise.

Capacitor Banks and Power Factor/Voltage Control: Capacitor banks will be installed at each wind turbine in a bus cabinet inside the base of each tower, as well as in a central bank at the substation. The capacitor banks at the substation will be sized and configured depending on National Grid's requirements and needs for switching and control. Generally, a remote terminal unit (RTU) is installed which allows the utility to switch banks on or off depending on the requirements at their systems operations center.

Protective Relaying: The control houses in both the collection system substation and POI switchyard generally house all of the protective relaying devices. Protective relays are used for switchyard control, indication, metering, recording, instrumentation, and annunciation. The relays provide protection for both the National Grid's and the Project's electrical systems by automatically detecting and acting to isolate faulted, or overloaded, equipment and lines. This protection will help to minimize equipment damage and limit the extent of associated system outages in the event of electrical faults, lightning strikes, etc.

Lighting: The substation will be equipped with night-time and motion sensor lighting systems to provide personnel with illumination for operation under normal conditions, and for egress under emergency conditions. Emergency lighting with back-up power is also designed into the substation to allow personnel to perform manual operations during an outage of normal power sources.

1.5.7 Project Grounding System

The Project has an extensive grounding system. In order to achieve a strong level of grounding, a number of provisions are engineered into the Project's grounding system and the electrical system design.

Turbine Grounding and Lightning Protection System: The earthing system at each WTG consists of a buried grounding ring of bare copper around the outer perimeter of the tower connected to four grounding rods driven down into the ground at diametrically opposed points outside of the foundation. As shown in Exhibit 1.5-9, this ring is connected to the tower base. The Vestas V-90 uses a nacelle-mounted transformer. Both nacelle-mounted and pad transformers would link the WTG grounding ring to an additional grounding ring with one to two grounding rods buried around the base of the adjacent pad transformer. The transformers are generally a grounded "Wye" type unit. The neutral of each transformer is connected to the grounding rings and also to the grounding system of the wind turbine. If the soil is too rocky for the grounding rods, a hole is drilled, the rod is placed in the hole and it is filled with a designated bentonite mix to ensure a surrounding ground contact. Resistance of the grounding system is measured prior to commissioning and must not exceed 10 Ohms to provide a firm grounding path to divert harmful stray surge voltages away from the WTG.

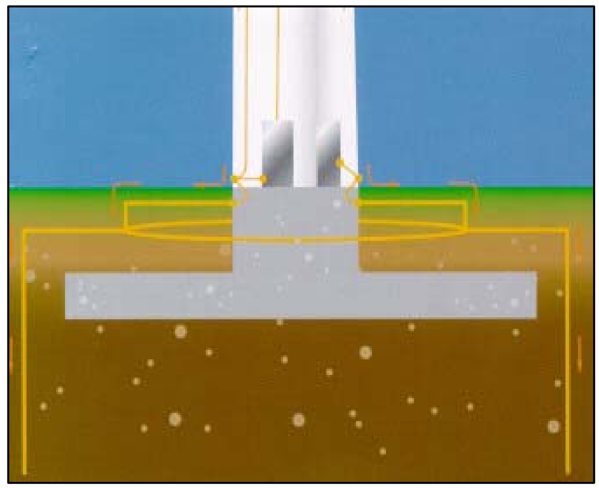


Exhibit 1.5-9 Turbine Earthing System at Tower Base

The WTGs are equipped with an engineered lightning protection system that connects the blades, nacelle, and tower to the earthing system at the base of the tower. As depicted in Exhibit 1.5-10, typical lightning protection schemes safeguard all major WTG components. Both the rear lightning rod and blades have conductive paths to the nacelle bed frame that, in turn, connects to the tower. The tower base is connected to the earthing system at diametrically opposed points.

The controllers and communication interfaces of the Project's SCADA system that link WTGs with the operations and maintenance facility utilize fiber optic cables and optical signal conversion systems that are poor electrical conductors thereby protecting these systems from stray surges.

Exhibit 1.5-10 Typical WTG Lightning Diversion Paths

Underground Collection System Grounding: The underground 34.5-kV cables will have concentric neutral conductor shielding or will be buried with a bare copper wire in the trench to act as the neutral. The neutrals on the cable runs are terminated to the ground terminal at each transformer and, pursuant to National Electric Code (NEC) requirements, are tied to buried grounding rods at every ¼ mile. Additionally, at the junction boxes, pad switches and at the substation and switchyard, the underground cable neutrals are tied to the common grounding system. In effect, the grounding system ties the tips of the blades of each turbine back to an extensive grounding network all the way back to the substation grounding grid. The detailed geotechnical investigation performed prior to final design will include testing to measure the soil's electrical and insulation properties to ensure that the grounding system and electrical design is adequate.

Substation Grounding System: Electrical systems are susceptible to ground faults, lightning, and switching surges that could constitute a hazard to site personnel and electrical equipment, including protective relaying equipment. As such, the collection system and POI switchyards will be designed and constructed to have a robust grounding grid which will divert stray surges and faults. Generally, the substation and switchyard grounding grid consists of heavy gauge bare copper conductor buried in a grid fashion and permanently bonded to a series of multiple underground grounding rods. Direct lightning strike protection will be provided by the use of overhead shield wires and lightning masts connected to tops of the steel dead-end structure poles, which run to the switchyard ground grid. Overhead shield wires will be high strength steel wires arranged to provide shield zones of protection.

1.5.8 Meteorological Monitoring Station Towers

The Project design includes four permanent meteorological (met) towers similar to that shown in Exhibit 1.5-11. The met towers will be fitted with multiple sensors to track and monitor wind speed, direction, and temperatures. These wind data support performance testing of the WTGs. The met towers will be connected to the wind plant's central SCADA system as shown in Exhibit 1.5-5. These met towers have been sited in accordance with the Town's Local Law as shown in Figure 1.1-2.

The Applicant anticipates that each permanent 80-meter (262-foot) tall, self-supporting (unguyed) met tower will be a galvanized conical steel structure, with wind monitoring instruments suspended at the end of booms attached perpendicular to the tower. Red aviation warning lighting will be mounted at the top of all towers. Electrical lines will connect each tower directly to a power source at the nearest NYSEG distribution line and provide the power necessary to run the warning lights and wind testing equipment. The meteorological towers will be sited upwind of the prevailing wind direction within the Project Area. Towers will be permitted according to local and state requirements. Each met tower will also have a grounding system similar to that of the WTGs, with a buried copper ring and grounding rods, which will all be tied to the lightning dissipaters or rods installed at the top of the towers. This will provide an umbrella of protection for the upper sensors.

Exhibit 1.5-11 Met Tower

1.5.9 Operations and Maintenance Facility

The O&M facility will include a main building with offices, a storage yard for spare parts and maintenance equipment, restrooms, a workshop area, outdoor parking facilities, a turnaround area for larger vehicles, outdoor lighting, and a gated access with partial or full perimeter fencing. The O&M facility area will be leveled and graded and will serve as a central base for Project operation. The main O&M building will house the command center of the Project's SCADA system. The building will be linked by fiber optic cables to each of the WTGs through the SCADA system, which allows an operator to control critical functions and the overall performance of each WTG. The main O&M building is anticipated to be 5,000 to 8,000 square feet in size overall and the O&M facility will require up to 5 acres of disturbance area. The final design and architecture of the O&M facility will comply with all required building standards and codes and be determined prior to its construction. The Applicant anticipates locating the O&M building near the middle of the Project Site to reduce the travel time for a maintenance crew to reach any turbine. In final site selection, the Applicant will avoid environmentally and culturally sensitive locations and will give preference as a potential O&M location to those sites that have already been disturbed during construction, such as an area that has been used as a construction laydown yard.

<u>Water Storage Tanks and Septic System</u>: The O&M facility will include one to two on-site storage tanks approximately 5,000 gallons in size suitable for potable water to supply the building for domestic use. The O&M building will also have a septic tank, which will be permitted through the appropriate processes.

1.6 Project Construction

The construction of the Project will be performed in a manner that will incorporate the impact mitigation methods outlined in other sections of this document, including, but not limited to sediment and erosion control measures (see Section 2.2, Water Resources); emission controls (see Section 2.4, Climate and Air Quality); surface water control measures (see Section 2.2, Water Resources); spillage prevention and control measures (see Section 2.10, Public Safety); traffic control measures (see Section 2.8, Traffic and Transportation); and other construction practice measures (see Section 2.11, Community Facilities and Services) that will minimize the Project's impact on the environment and the surrounding area. Protocols for managing erosion and runoff during Project construction will also be described in a SWPPP, which will be prepared and implemented in accordance with the New York SPDES General Permit for the Project.

The Project is expected to be constructed in a single year, with the exception of some punchlist, restoration, and possible warranty work that will be done in the following year. Preconstruction activities such as clearing, improvement of laydown areas, and road grading could commence as early as fall 2008 with construction of the Project facilities commencing as early as spring 2009, although construction may not commence until 2010 or later. The various aspects of construction, as sequenced, include:

- Site mobilization;
- Construction environmental and safety training;
- Grading of the field construction office and substation areas;
- General clearing and construction of access roads, crane pads, and turnaround areas;
- Installation of sediment and erosion controls;
- Public road improvements;
- Construction of turbine access roads, tower foundations, and associated transformer pads, if necessary;
- Installation of the electrical collection system;
- Assembling and erection of the wind turbines;
- Assembling and erection of the permanent met towers;
- Construction and installation of the collection system substation;
- Construction and installation of the POI switchyard, in coordination with the Transmission Owner;
- Plant commissioning and energization;
- Final grading and drainage; and
- Restoration activities.

Table 1.6-1 provides an estimated Project schedule based on a field start date of spring 2009. This schedule is subject to permitting and an updated construction schedule will be provided prior to construction.

Table 1.6-1. Preliminary Construction Schedule

Task/Milestone	Duration (Weeks)	Commencement
Preliminary Activity		
Reserve Turbines	-	Mid 2008
Order Substation Transformer	-	Mid 2008
Fabricate Turbines	30	Fall 2008
Fabricate Substation Transformer	50	Fall 2008
Grading of Substation Areas/POI Switchyard	6	Fall 2008/Spring 2009
Construction		
Estimated Mobilization Date	1	May 1, 2009
Environmental and Safety Training	1	May 2009
Road Construction	23	May 2009
Substation and Switchyard Construction	30	May 2009
Foundation Construction	23	June 2009
Electrical Collection System Construction	23	June 2009
Wind Turbine Assembly and Erection	13	August 2009
Switchyard and Substation Energization and Commissioning	4	September 2009
Energization and Commissioning of Turbines	10	October 2009
Final Grading	10	October 2009
Projected Substantial Completion Date	-	December 2009
Restoration Activities	10	Spring 2010

Note 1: Above table assumes construction in 2009.
Note 2: Many of the above activities will occur simultaneously.

The Project has been planned based on recent experience constructing wind power projects in New York and elsewhere in the United States. This recent experience was used to generate the impact assumptions included in Table 1.6-2. However, during detailed engineering design, additional needs and constraints may be identified that require site specific plans be developed. In those situations, the area of impact required may deviate slightly from the assumptions in Table 1.6-2.

Table 1.6-2. Impact Assumptions and Calculations

Project Components	Typical Area of Vegetation Clearing	Area of Total Soil Disturbance (temporary and permanent)	Area of Permanent Soil Disturbance
Wind Turbines and Workspaces	250-foot radius per turbine	250-foot radius per turbine	50-foot radius 60 feet x 100 feet crane pad
Access Roads	100 feet wide per linear foot of road	54 feet wide per linear foot of road	34 feet wide per linear foot of road a/
Buried Electrical Interconnects	75 feet wide per linear foot of cable	35 feet wide per linear foot of cable plus 10 feet per additional circuit	None
Overhead Electrical Interconnects	150 feet wide per linear foot of cable	Minimal at each pole location	Minimal at each pole location
Meteorological Towers	1 acre per tower	1 acre per tower	0.10 acre per tower
O&M Building and associated site (5,000-8,000 square feet)	5 acres	5 acres	5 acres
Staging Areas	10 acres	10 acres	None
Collection Substation/POI Switchyard	4 acres each	4 acres each	4 acres each
Crane Paths b/	75 feet wide per linear foot (in non-public road or access road areas only)	35 feet wide per linear foot (in non-public road or access road areas only)	None

a/ Permanent road width in agricultural lands will be 16 feet with permanent disturbance of 22 feet per Agricultural Protection Measures outlined in Appendix C.
b/ Crane paths are designed to walk the crane from turbine to turbine during construction only. After construction, if and when a crane is needed, it will be trucked in using the access roads and erected at the turbine.

The following sections describe the various activities that will occur as part of Project construction.

1.6.1 Pre-construction Activities

The Applicant has conducted numerous pre-construction activities, including field topographic and wetland surveys and substantial land title research in an effort to characterize existing conditions within the Project Area. Before construction can commence, a site survey will be performed to stake out the exact location of the WTGs, access roads, electrical lines, and access entryways from public road and substation areas.

1.6.1.1 Geotechnical Surveys

Once the surveys are complete, a detailed geotechnical investigation will be performed to identify subsurface conditions, which will dictate much of the design specifications for the access roads, foundations, underground trenching, and electrical grounding systems. Typically, the geotechnical investigation involves a drill rig, which bores to the engineer's required depths, and a backhoe to identify the subsurface soil and rock types and strength properties by sampling and lab testing. Testing is also done to measure the soil's electrical properties to ensure proper grounding system design. A geotechnical investigation is generally performed at each WTG location, at the substation location, along the access roads, and at the O&M building site.

Many parts of the Project Area contain subsurface drainage infrastructure, mainly in the form of drain tiles in agricultural fields. The Applicant will contact and work closely with all affected individuals, the Chautauqua County Soil and Water Conservation District, the Natural Resources Conservation Service, and the Ag & Markets to identify, and avoid or minimize to the maximum extent practical, crossings of drain tiles with Project components. The Applicant will further conduct a survey of the gas well activity in the area and coordinate with the associated private companies to minimize the impacts on these facilities.

1.6.1.2 Design and Construction Specifications

Using all of the data gathered for the Project, including geotechnical information, environmental conditions, title information, utility infrastructure locations, and site topography, the Applicant will establish a set of site-specific construction specifications for the various portions of the Project. The design specifications will be based on well proven and established sets of construction standards set forth by the various standard industry practice groups, including, but not limited to:

- American Concrete Institute (ACI)
- International Building Code (IBC)
- International Electrotechnical Commission (IEC)
- Institute for Electrical and Electronic Engineers (IEEE)
- National Electric Code (NEC)
- National Fire Protection Agency (NFPA)
- Construction Standards Institute (CSI)
- National Grid (NG)
- New York Independent Service Operator (NYISO)

The design and construction specifications will be custom tailored for site-specific conditions by qualified technical staff and engineers. The Project engineering team will ensure that all aspects of the specifications, as well as the actual on-site construction, comply with all applicable federal, state, and local codes and good industry practice.

Construction Environmental Compliance Plan and Notification Procedures: To assure compliance with various environmental protection commitments and permit conditions, the Applicant will prepare a construction environmental compliance plan (see Section 2.2 for additional detail). In order to implement that plan, the Applicant will hire at least one environmental inspection firm to help plan for environmental compliance during construction, and oversee construction (and post-construction) activities. Prior to beginning work at the construction site, all work crews will be trained in the environmental compliance program and in the Project safety rules. Prior to the commencement of construction, sensitive environmental and/or cultural resources, such as wetlands, will be flagged in the field. No metal pin flagging will be used for this effort.

Prior to the start of construction, the contractor will mark the location of underground facilities through the one-call system (Dig Safely New York). In the event that any excavation work will encroach upon such facilities, under the Applicant's supervision, the construction contractor will work closely with the local utilities to ensure the protection of underground facilities. Prior to starting excavation work at the site, the construction contractor will review the location of underground facilities with site personnel to promote protection of underground facilities. The construction contractor will designate a qualified person at the job site to maintain the contact information of all natural gas facility owners and the one-call center, in the unlikely event that a situation arises that requires immediate notification of those parties. The construction contractor will adhere to all applicable federal and state safety regulations, which include training regarding the protection of underground facilities. Construction crews will be taught best practices and regulations applicable to the protection of underground facilities prior to starting work.

About one week prior to the start of construction at any given site, an environmental monitor, the contractor, and any subcontractors will conduct a walk-over of areas to be affected, or potentially affected, by proposed construction activities. These pre-construction walk-overs will occur regularly and are intended to identify sensitive resources to avoid (e.g., wetlands, archaeological or agricultural resources), location of buried natural gas infrastructure, limits of clearing, proposed stream crossings, location of drainage features (e.g., culverts, ditches), and the layout for sedimentation and erosion control measures. Upon identification of these features, specific construction procedures will be reviewed, and any modifications to construction methods or locations will be agreed upon before construction activities begin. Landowners and agency representatives will be consulted or included on these walk-overs as needed.

1.6.2 Construction Initiation

Project construction will be initiated by clearing woody vegetation (as necessary) from all tower sites, access roads, collection routes, and other areas where Project improvements will occur.

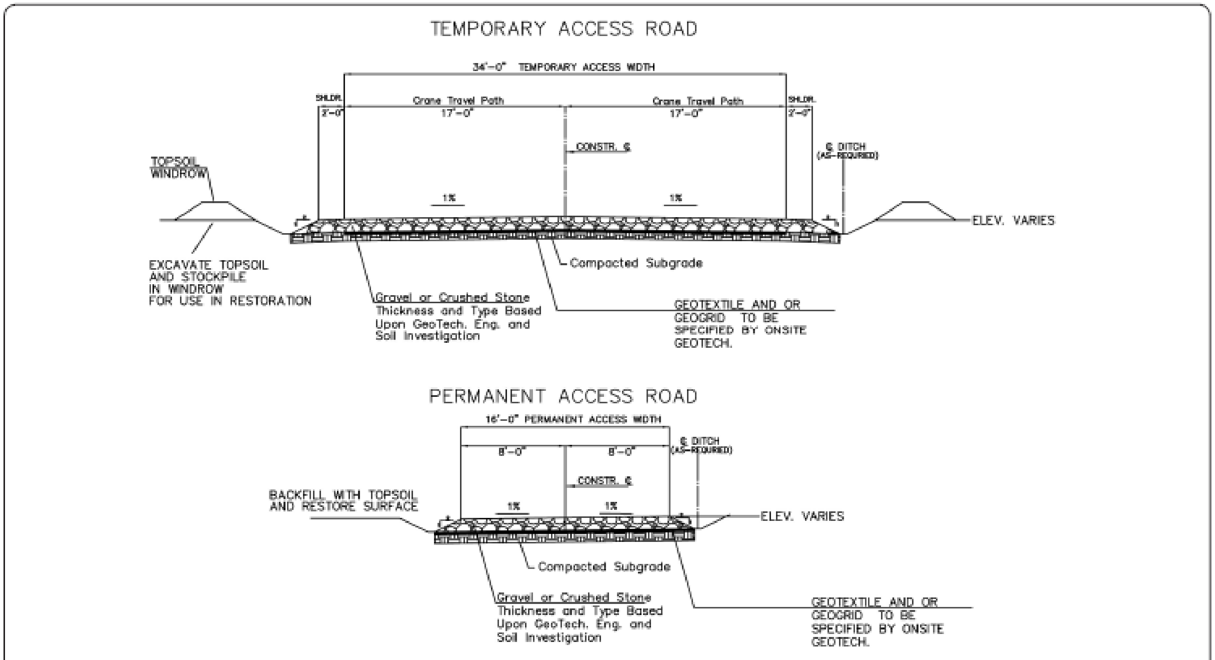
Valuable trees cleared from the work area will be disposed of as agreed to between the Applicant and the owner of the timber; such trees will likely be cut into logs and piled at the edge of the work area, while other trees, limbs, and brush will chipped and spread on-site in upland non-agricultural areas to be approved by the landowner, the Applicant, and the environmental inspector. For the purposes of this DEIS, it is assumed that an approximately 250-foot radius will be cleared around each tower, a maximum 100-foot-wide corridor may be cleared of vegetation along access roads, a maximum 75-foot-wide corridor will be cleared along underground collection line routes, and a maximum 150-foot-wide corridor will be cleared along overhead collection line routes. Initial construction activities will involve installation of civil infrastructure, including roads, foundations, buried cable, and overhead lines. Details of specific construction activities are described below.

1.6.3 Construction Staging Area

Construction of the Project will require the development of one main material laydown/ construction staging area and secondary staging areas as necessary. As shown in Figure 1.1-2, the main laydown/construction staging area to serve the Project during construction has been sited on privately owned land. Additional usage details for these areas will be identified in consultation with the Project construction contractor upon selection, and it is anticipated that approximately 10 acres of land will be required for the staging area. A temporary construction trailer headquarters will be assembled at the main staging location. Construction of the Project will also require the creation of temporary construction access, construction parking areas, soil, rock, and slash disposal areas, improvements to public roads to facilitate construction traffic, and other similar uses and improvements associated with construction. These areas will require site preparation work potentially including installation of erosion and sediment control measures, stripping and stockpiling the topsoil if on agricultural land, grading and compacting the subsoil, installation of geotextile fabric (as needed), and placement of gravel to create a level storage yard. The Applicant will prepare a SWPPP that addresses erosion and runoff control methodologies associated with site preparation work. The Applicant will obtain necessary approval of the SWPPP prior to starting site preparation work. Electric and communication lines will be brought in on overhead poles to allow connection with construction trailers. Fencing or lighting of the staging area will occur only if necessary. At the end of construction, all utilities, gravel, and geotextile fabric will be removed, and the site will be restored to its preconstruction condition unless the Applicant is otherwise directed by the landowner. These construction mobilization activities may occur prior to the Applicant getting its notice to proceed for construction of the complete Project.

1.6.4 Access Road Installation

Existing roads, logging paths, farm drives, and/or gas well access paths will be upgraded for use as Project access roads in order to minimize impacts to both active agricultural areas and wetland/stream areas. Where an existing road or farm drive is unavailable or unsuitable, new gravel-surfaced access roads will be constructed to accommodate the construction of the turbine foundation and provide ample room for a large crane to erect the WTG components, as shown in Exhibit 1.6-1. Road construction will typically involve installation of soil erosion and sediment control measures, topsoil stripping in agricultural lands and grubbing of stumps, as necessary. Stripped topsoil will be stockpiled along the road corridor for use in site restoration. Any grubbed stumps will be chipped and spread, buried in upland non-agricultural areas, or otherwise appropriately disposed of with the approval of the landowner, Applicant, and environmental inspector. Exhibit 1.6-1 provides typical access road details.



Source: Horizon Wind Energy

Exhibit 1.6-1 Typical Access Road Details

Following removal of topsoil, subsoil will be graded and compacted. As needed, geotextile fabric or grid will be laid down to provide additional support to overlaying rock. Once rough grade is achieved, base rock will be spread and compacted to create a road base. A capping rock will then be spread over the road base and roll-compacted to finished grade. Once heavy construction is complete, a final pass will be made with the grading equipment to level-out road surfaces and more capping rock will be spread and compacted in areas where needed. Project road construction will involve the use of several pieces of heavy machinery, including bulldozers, track-hoe excavators, front-end loaders, dump trucks, motor graders, water trucks, and rollers for compaction.

It is the intent of the applicant to build all access roads along field edges in agricultural areas where possible, but there may be instances where bisecting a field is more practicable. The applicant will work with Ag & Markets to determine these locations, if they are necessary. In agricultural areas, topsoil will be stripped and stockpiled along the access road to prevent construction vehicles from driving over undisturbed soil and adjacent fields. Maximum permanent road width, including graded side-slopes, will be finalized during the civil engineering design phase, and it is expected that the permanent road impacts, including side slopes, will not exceed 34 feet. The portions of access roads leading from public roads to the crane assembly points will be up to 24 feet wide with occasional wider pull-offs on narrow roads to accommodate passing vehicles. Permanent road width in agricultural lands will be 16 feet, with permanent disturbance of 22 feet per consultation with Ag & Markets and the Agricultural Protection Measures outlined in Appendix C. Once construction is complete, any temporarily disturbed areas will be restored, soil de-compacted up to depths of 18 inches as necessary, and rocks greater than 4 inches removed from agricultural areas, and pre-construction contours reestablished. No restoration activities will occur in agricultural areas after October 1st.

As will be described in the SWPPP to be prepared for this Project, appropriately sized culverts will be placed in any wetland/stream crossings in accordance with state and federal permit requirements. In other locations, culverts may also be used to ensure that the roads do not impede cross drainage. Where access roads are adjacent to, or cross, wetlands, streams or drainage ditches/swales, appropriate sediment and erosion control measures (e.g., silt fence) will be installed according to the SWPPP.

1.6.5 Foundation Installation

The Project will require numerous foundations, including bases for each WTG, junction boxes, the substation equipment, and the O&M facility. Often, separate subcontractors are mobilized for each type of foundation they specialize in constructing.

Wind turbine installation will typically involve installation of sediment and erosion control followed by stripping and stockpiling topsoil within a 250-foot radius (or less) around each tower. Stabilization measures for stockpiled topsoil will be developed in consultation with Ag & Markets.

In limited areas where existing topography creates construction constraints or safety concerns, or in areas where additional vehicular turnaround space is needed, a maximum workspace of 250-foot radius may be needed. Once a WTG workspace is prepared, foundation construction occurs in several stages including hole excavation, outer form setting, rebar and bolt cage assembly, casting and finishing of the concrete, removal of the forms, backfilling and compacting, and foundation site area restoration.

Excavation and foundation construction will be conducted in a manner that will minimize the size and duration of excavated areas required to install foundations. Portions of the work may require over excavation and/or shoring. Foundation work for a given excavation will commence after excavation of the area is complete. Backfill for the foundations will be installed immediately after approval by the engineer's field inspectors. The Applicant plans on using on-site excavated materials for backfill to the extent possible. In agricultural areas, excavated subsoil and rock will be segregated from stockpiled topsoil and stabilization measures will be developed in consultation with Ag & Markets. If bedrock is encountered, it is anticipated construction crews can “rip” it and excavate it with backhoe. If the bedrock cannot be ripped, it will be excavated by pneumatic jacking or hydraulic fracturing. No blasting is anticipated; however, should field conditions require blasting, a blasting plan will be submitted to the Town and neighbors will receive notice of the blasting schedule. No blasting will occur without submission of a separate blasting plan and receipt of written approval from the Town or their designated engineer.

The foundation work requires the use of several pieces of heavy machinery, including track-hoe excavators, drill rigs, front-end loaders, dump trucks, transportation trucks for materials, cranes and boom trucks for off-loading and assembly, compactors, concrete trucks, concrete pump trucks, de-watering equipment, backhoes, and small skid-steer type loaders.

The foundation may be either a concrete caisson or a spread footer or equivalent, as specified by the Project geotechnical/civil engineer. It is currently anticipated that the spread foot foundation will be used. This foundation is approximately 10 to 12 feet deep and approximately 50 to 60 feet in diameter. Each foundation requires approximately 330 to 400 cubic yards of concrete. As discussed in Section 1.5.3, the Applicant does not anticipate using an on-site concrete batch plant and will obtain concrete from an outside vendor for foundation construction. Once the foundation is cured, it will be buried and backfilled with the excavated on-site material. The top of the foundation is an 18-foot diameter pedestal that may be either flush with the ground surface or may extend 6 to 8 inches above grade.

1.6.6 Buried Electrical Collection System Installation

The proposed layout of the interconnect system is illustrated in Figure 1.1-2. As mentioned previously, electrical collection line routes will generally follow Project access roads and field edges wherever possible, but due to site topography, the lines will sometimes cut directly across fields and woods. Where buried electrical lines are proposed to cross active agricultural fields, the location of any subsurface drainage (tile) lines will first be determined (through consultation with the landowner) to minimize the possibility that these lines are damaged during cable installation. If a tile is damaged, the tile will be repaired prior to construction to a condition that is at least equal to the original condition. Prior to construction, a plan will be developed for unanticipated excavation of drain tiles.

Installation of underground cables begins once the roads and WTG foundations are complete for a particular row of WTGs. For turbines with pad-mounted transformers, the high voltage underground cables are fed through the trenches and into conduits at the pad transformers at each WTG. The cables run to the pad transformers’ high voltage (34.5 kV) compartment and are connected to the terminals. Low voltage cables are fed through a set of underground conduits from the transformer at each turbine to the bus cabinet inside the base of the wind turbine tower. The low voltage cable will be terminated at each end and the whole system will be inspected and tested prior to energization.

Direct burial methods via cable plow, rock saw and/or trencher will be used during the installation of underground interconnect lines whenever possible. Direct burial via a cable plow will involve the installation of bundled cable (electrical and fiber optic bundles) directly into the ground via a “rip” created by the plow blade. The rip disturbs an area approximately 12 inches wide with bundled cable installed to a minimum depth of 48 inches. An area 15 to 25 feet wide on either side must be cleared of tall-growing woody vegetation and will be partially disturbed by the tracks of the installation machinery. However, this disturbance does not involve excavation of the soil; therefore, no stockpiling or segregation of soils is required. Generally, no restoration of the rip is required, as it closes in on itself following installation. Similarly, surface disturbance associated with the passage of machinery is typically minimal. Should surface restoration be required, it will closely follow the installation via a restoration Bobcat or small bulldozer, which will ride over the rip, smoothing the area.

Direct burial via a trencher or rock saw involves the installation of bundled cable in a similar fashion to cable plow installation. The trencher or rock saw uses a large circular blade or “saw” to excavate a small open trench. The trencher blade creates an approximately 14-inch-wide trench with a sidecast area immediately adjacent to the trench. Similar to cable plow, this direct burial method installs the cable a minimum of 48 inches and requires only minor clearing and surface disturbance (up to 15 to 25 feet wide from the installation machinery and any stockpiled brush). In active agricultural land, up to two parallel collection line circuits can be installed by trenching without the need to strip and segregate topsoil in accordance with Agricultural Protection Measures. Rock saw trenching equipment will be utilized in areas where bedrock has been identified and tested for strength during a geotechnical investigation. Based on the results of the investigation, the appropriate rock saw trencher will be utilized. Sidecast material will be replaced via a Bobcat or small bulldozer fitted with an inverted blade. All areas will be returned to pre-construction grades, and restoration efforts will be as described above for cable plow installation. Although not anticipated in the current collection system layout, running more than two circuits in parallel through active agricultural fields would require stripping the topsoil as associated stockpiling/segregation, replacement, re-grading, and stabilization by seeding and mulching following installation. Any tile lines that are inadvertently cut or damaged during installation of the buried cable will be repaired as part of the restoration effort.

Installation of utility lines via an open trench will be used in areas where the previously described direct burial methods are not practicable. Areas appropriate for open trench installation will be determined at the time of construction and may include areas with unstable slopes, excessive unconsolidated rock, areas of known drain tiles, and standing or flowing water. Open trench installation will be performed with a backhoe and will generally result in a disturbed trench 36 inches wide and a minimum of 48 inches deep. The overall temporary footprint of vegetation and soil disturbance may be a maximum of 15 to 25 feet due to machinery dimensions, stockpiled brush, and backfill/spoil pile placement during installation. In agricultural areas, all topsoil within the work area will be segregated from excavated subsoil. Replacement of spoil material will occur immediately after installation of the buried utility. In cases of particularly rocky soil conditions, clean fill will be placed above and below the cables for the first several inches of fill to prevent cable pinching. Once the clean fill is covering the cables, subsurface soil will be replaced around the cable, and topsoil will be replaced at the surface. Any damaged tile lines will be repaired, and all areas adjacent to the open trench will be restored to original grades and surface condition. Restoration of these areas will be completed through seeding and mulching of all exposed soils.

Buried underground infrastructure associated with the Project will be installed with safety markings as required by law, and the locations of the facilities will be on file with the one-call service so as to enable safe continued other infrastructure in the Project Area. All excavation, trenching, and electrical system construction work will be done in accordance to a formal SWPPP for the Project as outlined in Section 2.2, Water Resources.

1.6.7 Overhead Collection Line

Portions of the collection system will be installed aboveground in areas where below ground installation is not practicable from an engineering or economic point of view, or when it could result in significant safety or environmental impacts. These runs of overhead pole collector line will require a detailed field survey to determine the exact pole locations. Once the survey and design work are done, the installation of poles and cross-arms to support the conductors can commence. The poles are first assembled and fitted with all of their cross-arms, cable supports, and insulator hardware on the ground at each pole location. Holes for each pole will then be excavated or drilled and the poles will be erected and set in place using a small crane or boom truck. Once set in place, concrete will be poured in place around the base of the pole, or more likely a clean fill will be compacted around the tower base according to the engineer's specifications. The overhead lines will connect to underground cables at each end through a switchable, visible, lockable riser disconnect with fuses.

1.6.8 Wind Turbine Assembly and Erection

The wind turbines consist of three main components: the towers, the nacelles (machine house), and the rotor blades. Other smaller components include hubs, nose cones, cabling, control panels, and tower internal facilities such as lighting, ladders, etc. All WTG components will be delivered to the Project Site on flatbed transport trucks and main components will be off-loaded at the individual WTG sites. A large erection crane based on a gravel rectangular crane pad approximately 100 feet by 60 feet will erect the turbine. Turbine erection is performed in multiple stages including setting of the bus cabinet and ground control panels on the foundation, erection of the tower (in three to four sections), erection of the nacelle, assembly and erection of the rotor, connection and termination of the internal cables, and inspection and testing of the electrical system prior to energization.

Turbine assembly and erection involves mainly the use of large track mounted cranes, smaller rough terrain cranes, boom trucks, rough terrain fork-lifts for loading and off-loading materials and equipment, flat bed and low-boy trucks for transporting materials to site.

The erection crane(s) will move from one tower to another along a designated crane path. This path will generally follow Project access roads and only cross or minimally use existing public roads (where permitted and practical). In some places, the crane will be partially disassembled and carried from one tower site to another by a specialized flatbed tractor-trailer. Upon departure of the crane from each tower site, all required site restoration activities will be undertaken. Restoration of crane paths will include removal of all temporary materials. In agricultural fields, restoration will also include subsoil de-compaction (as necessary) and rock removal, spreading of stockpiled topsoil, and reestablishing pre-construction contours. Exposed soils at restored tower sites and along roads and crane paths will be stabilized by seeding and/or mulching, or as required by the Agricultural Protection Measures and SWPPP.

1.6.9 Interconnection Substation Facilities

The construction of the Project collection system substation and POI switchyard involves several stages of work including, but not limited to, grading of the area, the construction of several foundations for the transformers, steel work, breakers, control houses, and other outdoor equipment, the erection and placement of the steel work and all outdoor equipment, and electrical work for all of the required terminations. All excavation, trenching and electrical system construction work will be done in accordance with a formal SWPPP for the Project. Once physical completion is achieved, a rigorous inspection and commissioning test plan is executed prior to energization of the substation.

The substation and switchyard construction work requires the use of several pieces of heavy machinery, including a bulldozer, drill rig and concrete trucks for the foundations, a trencher, a back-hoe, front-end loaders, dump trucks for import of clean back fill, transportation trucks for the materials, boom trucks and cranes for off-loading of the equipment and materials, concrete trucks for areas needing slurry backfill, man-lift bucket trucks for the steel work and pole-line work, etc.

The construction schedule for the interconnection substation facilities is largely dictated by the delivery schedule of major equipment such as the main transformers, breakers, capacitors, outdoor relaying equipment, the control house, etc. National Grid will be heavily involved in the design and the construction of the POI switchyard, as it will own and maintain it.

1.6.10 Plant Energization and Commissioning (Start-Up)

Commissioning follows mechanical completion of the Project. Commissioning of the Project will commence with a detailed plan for testing and energizing Project component with locks and tags on breakers to ensure safety and allow for fault detection prior to the energization of any one component of the system. Once the switchyard and substations are energized, collection lines will be brought on-line one-by-one and then individual turbines will be tested extensively, commissioned, and brought on-line one-by-one. Commissioning does not require any heavy machinery to complete.

1.6.11 Operation and Maintenance Facility Construction

Construction of the O&M facility will commence with the preparation and pouring of its foundation, framing the structure and roof trusses, installing the outer siding, installing plumbing and electrical work, and finishing the interior carpentry.

Construction of the O&M facility will require the use of concrete trucks, boom trucks for roof truss installation, and light trucks for transportation of materials.

1.6.12 Project Construction Clean-Up

Since Project clean-up generally consists of landscaping and earthwork, it is very weather and season sensitive. Landscaping clean-up is generally completed during the first allowable and suitable weather conditions after all of the heavy construction activities have been completed. Disturbed areas outside of the graveled areas will be reseeded to control erosion by water and wind. All construction clean-up work and permanent erosion control measures will be done in accordance to a formal SWPPP for the Project and Ag & Markets guidelines.

Other Project clean-up activities include finishing of the O&M building, landscaping around the switchyard and substation area, painting of scratches on towers and exposed bolts, as well as other miscellaneous tasks that are part of normal construction clean-up.

Construction clean-up will require the use of a motor grader, dump trucks, front-end loaders, and light trucks for transportation of any waste materials, packaging, etc.

1.7 Operations and Maintenance

The wind turbine models being considered for the Project, including the Vestas V-90, begin to generate electricity at wind speeds of roughly 2.5 to 3.5 meters per second (m/s) (5.6 to 8 mph) and have a normal operational speed range of 9 RPM to 14.9 RPM. Depending on the model, turbine blades will pitch/feather when winds reach roughly 13 to 15 m/s (29 to 34 mph) and will turn 90 degrees to the wind, and the generator will shut down when wind speeds continuously exceed 25 m/s (56 mph). Each wind turbine has a computer to control critical functions, monitor wind conditions, and report data back to a SCADA system. The SCADA system continually monitors and evaluates turbine operations. In many cases, turbine adjustments and fine-tuning of operations can be accomplished remotely using the automated SCADA system. The facility is expected to be generating power about 80 to 90 percent of the time, with an average annual capacity equivalent to roughly 30 percent of the installed capacity, which is competitive for commercial wind farms in New York. Total green electricity expected to be delivered to the grid is anticipated to be approximately 210,000 megawatt-hours (MWh) per annum, equivalent to the annual consumption of approximately 35,000 homes.

1.7.1 Operating Schedule

Operation of the wind turbines and associated components is almost completely automated. However, the operating facility will require a staff of 10 to 15 administrative, operations and maintenance, and environmental personnel. The Project will be in operation 24 hours per day, 365 days per year. The O&M team will staff the Project during core operating hours 8 hours per day, 5 days per week, from 8:00 a.m. to 5:00 p.m. with weekend shifts and extended hours as required. The Project's central SCADA system stays on-line full-time, 24 hours per day, 365 days per year. In the event of turbine or plant facility outages, the SCADA system will send alarm messages to on-call technicians via pager or cell phone to notify them of the outage. The Project will always have a local, on-call local technician who can respond quickly in the event of any emergency notification or critical outage. Operating technicians will rotate the duty of being on-call for outages.

1.7.2 Facility Availability

A power plant's availability is defined as the amount of time the Project is ready and capable of producing power. The Project will utilize heavy-duty, utility grade equipment. Other wind power projects with similar configurations and grades of high quality, reliable and proven equipment have demonstrated operating availability figures in the mid 95 to 99 percent range over the past decade. The availability of wind power projects rivals that of conventional power plants, which are generally in the low to mid-90 percent range for gas-fired power plants and in the 80 to 90 percent range for nuclear and coal plants. The Project is expected to operate consistently with an availability in the mid to high-90 percent range. Facility unavailability is due to several factors and generally is classified as scheduled (planned) or unscheduled (forced) outages.

1.7.3 Scheduled Maintenance – Planned Outages

The amount of downtime due to scheduled maintenance is generally very predictable from year to year. The proposed Project operating plan includes a planned outage schedule cycle that consists of WTG inspections and maintenance after the first 3 months of operation, a break-in diagnostic inspection, and subsequent services every 6 months. The 6-month service routines generally take a WTG off-line for just one day. The 6-month routines are very rigorous and consist of inspections and testing of all safety systems, inspection of wear-and-tear components such as seals, bearings, bushings, etc., lubrication of the mechanical systems, electronic diagnostics on the control systems, pre-tension verification of mechanical fasteners and overall inspection of the structural components of the WTGs. Blades are inspected and, if heavily soiled, rinsed once per year to maintain overall aerodynamic efficiency. Based on operational experience at other New York wind projects, blade washing may likely be necessary to remove insect debris and grime that can diminish the Project's aesthetics.

Individual WTGs are taken off-line for maintenance, leaving the remaining WTGs in that string fully operational. Electrical equipment such as breakers, relays, transformers, etc. generally require weekly visual inspections, which do not affect overall availability, and testing or calibrations every 1 to 3 years which may force outages.

To the extent practical, the short-term off-line routine maintenance procedures are coordinated with periods of little or no generation (i.e., low wind) as to minimize the impact to the amount of overall generation.

1.7.4 Unscheduled Maintenance – Forced Outages

Modern wind power projects generally operate with availabilities in the 95 to 99 percent range. Several components and systems of an individual wind turbine can be responsible for forced, non-routine outages such as the mechanical, electrical, or computer controls. Most of the outages are from auxiliaries and controls and not the heavy rotating machinery. Most developing heavy machinery failures are found prior to failure, during the frequent inspections, so that the failing part is replaced prior to complete failure.

Although the newer control systems have added a high level of detection and diagnostic capability, they normally require frequent minor adjustments in the first few months of operation. As a result, availabilities of a wind power project are generally lower in the first few months until they are fully tuned. Once a wind plant is properly tuned, unplanned outages are generally very rare and downtime is generally limited to the routine service schedule.

The O&M facility is always stocked with sufficient spare parts to support high levels of availability during operation. The modular design of modern wind turbines results in the majority of parts being "quick-change" in configuration, especially in the electrical and control systems. This modularity and the fact that all of the turbines are identical allows for the swapping of components quickly between turbines to quickly determine root causes of failures even if the correct spare part is not readily available in the O&M building. As part of their supply agreements, major turbine equipment vendors guarantee the availability of spare parts for 20 years.

1.8 Decommissioning

Megawatt-scale wind turbine generators available on the market today have a life expectancy of more than 20 years. The tubular steel towers supporting the generators are of simple design and, with basic routine maintenance, will serve many years beyond the life expectancy of the generators.

As the turbine generators to be installed for the Project approach the end of their expected life, technological advances may make available more efficient and cost-effective generators that will economically drive the replacement of the existing generators and thus prolong the economic life of the Project. In the event that this doesn't happen and the WTG needs to be decommissioned, the following sections provide a description of the decommissioning work and the estimated costs associated with that work.

1.8.1 Estimated Cost of Decommissioning

The estimated decommissioning costs per WTG were prepared using available information from a variety of credible industry sources. As provided in Table 1.8-1, the current cost of decommissioning is estimated to be approximately $54,000 per turbine in 2007 dollars, taking into consideration the scrap value of the steel and generator components. The actual cost of decommissioning is likely to be lower than this estimate, because the wind turbines are likely to have a salvage value in excess of their pure scrap value. An estimate of decommissioning costs associated with the substation will be prepared once final substation designs have been developed. Pursuant to the Town of Arkwright (Local Law No 2 of 2007), this estimate will be reevaluated periodically for changes in costs of decommissioning and restoration as well as adjusted for inflation.

Table 1.8-1. Estimated Cost of Decommissioning Per Turbine a/

Decommissioning cost per tower (in current dollars)		
Removal of a Tower:	270 man-hours x $85/hour	$22,950
	Cranes (2), 5 days use x $6,000/day	$30,000
Removal of concrete to 36 inches below grade:	150 man-hours x $85/hour	$12,750
	Equipment, 3 days use x $2,500/day	$7,500
Removal Collection System (average of 2,112 feet/turbine):	100 man-hours x $85/hour	$8,500
	Equipment, 2 days use x $3,500/day	$7,000
Seeding and Re-vegetation (average of ~2 acres/turbine including collection system):	3 man-hours x $85/hour	$255
	Total Removal Costs	**$88,955**
Salvage value per unit:	Scrap value of tower steel (200 tons x $150/ton):	$30,000
	Scrap value of generator components:	$5,000
	Total Salvage Value	**$35,000**
	Estimated cost of decommissioning, minus salvage value b/	**$53,955**

a/ Costs estimated using a variety of credible industry sources, the *Blue Book of Building and Construction,* current market prices, and current dollar value.

b/ The costs associated with decommissioning and restoration will be studied by an independent licensed engineer on a cycle beginning after the operations date of the wind farm and every three years thereafter for the life of the wind farm.

1.8.2 Ensuring Decommissioning and Site Restoration Funds

The Applicant will continuously maintain a surety bond or equivalent financial security instrument payable to the Town(s) for the removal of non-functioning WTGs and appurtenant facilities, in a form and amount approved by the Town Boards for the period of the life of the Project.

The costs associated with decommissioning and restoration will be studied by an independent licensed engineer retained by the Applicant on a cycle beginning after the operations date of the wind farm and every year thereafter for the life of the wind farm. A report of each study will be submitted to the Town Board. Any adjustment in the security value recommended by the engineer's report will be made within 60 days of delivery of the report to the Town Board.

1.8.3 Decommissioning Process Description

All decommissioning and restoration activities will adhere to the requirements of appropriate governing authorities, and will be in accordance with all applicable federal, state, and local permits.

The decommissioning and restoration process comprises removal of aboveground structures; removal of belowground structures to a depth of 36 inches; restoration of topsoil, re-vegetation and seeding; de-compaction; and a two year monitoring and remediation period. Access roads, fencing and residual minor improvements will not be removed unless the underlying landowner requests that they be removed.

Above-ground structures include the turbines, transformers, and overhead collection lines, Project-owned portions of the substation, maintenance buildings, and access gates. Below-ground structures include turbine foundations, collection system conduits, and drainage structures.

The process of removing structures involves evaluating and categorizing all components and materials into categories of recondition and reuse, salvage, recycling, and disposal. In the interest of increased efficiency and minimal transportation impacts, components and material may be stored on-site in a pre-approved location until the bulk of similar components or materials are ready for transport. The components and material will be transported to the appropriate facilities for reconditioning, salvage, recycling, or disposal.

1.8.4 WTG Removal

Access roads to turbines may be widened temporarily to sufficient width to accommodate movement of appropriately sized cranes or other machinery required for the disassembly and removal of the turbines. High value components will be stripped. The remaining material will be reduced to shippable dimension and transported off-site for proper disposal. Control cabinets, electronic components, and internal cables will be removed. The blades, hub, and nacelle will be lowered to grade for disassembly. The tower sections will be lowered to the ground where they will be further disassembled into transportable sections. The blades, hub, nacelle, and tower sections will either be transported whole for reconditioning and reuse or dissembled into salvageable, recyclable, or disposable components. The area will be thoroughly cleaned and all debris removed.

1.8.5 WTG Foundation Removal

Topsoil will be removed from an area surrounding the foundation and stored for later replacement. Turbine foundations will be excavated to a depth sufficient to remove all anchor bolts, rebar, conduits, cable, and concrete to a depth of 36 inches below grade. After removal of all noted foundation materials, the hole will be filled with clean sub-grade material of quality comparable to the immediate surrounding area. The sub-grade material will be compacted to a density similar to surrounding sub-grade material. All unexcavated areas compacted by equipment used in decommissioning shall be de-compacted in a manner to adequately restore the topsoil and sub-grade material to the proper density consistent and compatible with the surrounding area. The area will be thoroughly cleaned and all debris removed.

1.8.6 Underground Electrical Collection System

The cables and conduits contain no materials known to be harmful to the environment. All cable and conduit buried greater than 36 inches will be left in place and abandoned.

1.8.7 Overhead Collection Lines

The conductors will be removed and stored in a pre-approved location. Switches and other hardware will be removed and delivered to a processing company for recycling. The supporting poles will be removed and the holes filled in with compatible sub-grade material. In areas where environmental damage from complete removal may outweigh the benefits, the poles will be sawed flush with the surrounding grade (determined by appropriate governing authority). The poles will be stored in a pre-approved location. Stored conductors and poles will be later removed and transported to appropriate facilities for salvage or disposal. The area will be thoroughly cleaned and all debris removed.

1.8.8 Substation Removal

Disassembly of the interconnection facilities will include only the areas owned by the Applicant (i.e. the POI switchyard and areas to secure will remain in place). Any system upgrades and attachment facilities installed by or on behalf of the Applicant and conveyed to the Transmission Owner, or any improvements made to the National Grid local distribution system, will remain in place. Steel, conductors, switches, transformers, etc., will be reconditioned and reused, sold as scrap, recycled, or disposed of appropriately depending upon market value. Foundations and underground components will be removed to a depth of 36 inches and the excavation filled, contoured, and re-vegetated. All unexcavated areas compacted by equipment used in decommissioning shall be de-compacted in a manner to adequately restore the topsoil and sub-grade material to the proper density consistent and compatible with the surrounding area. The area will be thoroughly cleaned and all debris removed.

Improvements to town and county roads that were not removed after construction at the request of the town or county will remain in place.

1.9 Project Cost and Funding

The estimated capital cost to construct the Project ranges from $140 to $180 million dollars. The Applicant to date has committed to investing millions of dollars of at risk capital to option the land and associated wind rights of area landowners, as well as to conduct initial Project feasibility studies. The Applicant anticipates investing between $2 and $5 million dollars to complete the engineering and permitting studies necessary to finalize the Project's design. The Applicant will provide all of the investment capital necessary to take the Project up to construction and operation. The Project will receive no public funding from the federal, state, or local governments during development or construction. The current federal production tax credit program expires on December 31, 2008, but will likely be extended such that the Project will receive tax credits worth $20 for each MWh of power it delivers to the electrical grid for the first 10 years of its operation.

New York State's RPS creates a market for the green energy attributes of wind power that is separate from the market value of the underlying electricity. These attributes, referred to as renewable energy credits (RECs), are generated according to the number of MWh of power the Project produces. The Project must bid for the right to sell its RECs under the State RPS, however, and must compete with all bidders from across New York and adjacent states or provinces. Since January 2007, wind energy projects representing close to 8,000 MW of power have filed interconnection requests with the NYISO. In April 2007, NYSERDA awarded 10-year REC contracts to 9 wind projects totaling roughly 758 MW of nameplate capacity. The average REC price in that April 2007 round of awards was $15/MWh.

The Applicant anticipates bidding in future rounds of REC auctions and/or offering its renewable energy credits to other potential buyers in the region. If the Project is not initially selected, the Applicant can bid the Project again in subsequent auctions. Based upon prevailing electricity prices, the Applicant does not anticipate initiating construction of the Project until it wins a REC award or secures an alternative contract for the offtake of electricity and RECs.

1.10 Permits and Approvals Required

Implementation of the Project will require numerous permits, approvals, and consultations with local, state, and federal agencies. The permits and approvals that are expected to be required are listed in Table 1.10-1.

Table 1.10-1. Permits and Approvals for the New Grange Wind Farm

Agency	SEQRA Agency Status	Description of Permit or Approval Required
Towns		
Town of Arkwright Town Board	Lead	Wind Overlay Zone and Special Use Permit approval SEQRA Lead Agency SEQRA Findings Approval of Town Road Agreements Mitigation Host Agreement License Agreement
Town of Pomfret Town Board	Involved	Issuance of SEQRA Findings Approval of Town Road Agreements
Town of Arkwright Departments (Public Works, Codes, etc.)	Involved	Issuance of Building Permits Review and Approval of Highway Work Permits Review of Town Road Agreements
Town of Pomfret Departments (Public Works, Codes, etc.)	Involved	Issuance of Building Permits Review and Approval of Highway Work Permits Review of Town Road Agreements
Chautauqua County		
Highway Department	Involved	Highway Work Permits SEQRA Findings
Chautauqua County Industrial Development Agency (IDA)	Involved	Potential Funding through payment-in-lieu of tax (PILOT) Agreement Issuance of SEQRA Findings
[List the involved School Districts here]	Interested	Participation in PILOT agreement
New York State		
Department of Environmental Conservation (NYSDEC)	Involved	New York Environmental Conservation Law (NYECL) Article 24 Permit for Disturbances to State Regulated Wetlands NYECL Article 15 Permit for Disturbance of Protected Streams SPDES General Permit Section 401 Water Quality Certification Issuance of SEQRA Findings
Department of Transportation (NYSDOT)	Involved	Special Use Permit for Oversize/Overweight Vehicles Highway Work Permit Issuance of SEQRA Findings
New York State Department of Agriculture and Markets (Ag & Markets)	Interested	Consultation
Public Service Commission (PSC)	Interested	Consultation

Agency	SEQRA Agency Status	Description of Permit or Approval Required
New York State Energy Research and Development Authority (NYSERDA)	Interested	Possible Funding through Renewable Portfolio Standard Auction
New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP)	Interested	Consultation pursuant to NY Parks, Recreation, and Historic Preservation Law (PRHPL) § 14.09 and Section 106 of the National Historic Preservation Act (NHPA)
Federal		
Federal Aviation Administration (FAA)	N/A	Lighting Plan and Clearances for Potential Aviation Hazard
U.S. Army Corps of Engineers (USACE)	N/A	Section 404 Individual Permit for Placement of Fill in Federal Jurisdictional Wetlands/Waters of the U.S. NEPA Compliance. Compliance with Section 106 of the NHPA. Compliance with Section 7 of the Endangered Species Act
U.S. Fish and Wildlife Service (USFWS)	N/A	Consultation under Section 7 of the Endangered Species Act, Associated with the Aforementioned Section 404 Permit

1.11 Public and Agency Involvement

As the Applicant proceeds through the New York State Environmental Quality Review (SEQR) process, continuing communications with Project neighbors will be a major focus for the Project. Given the large scale of commercial turbines, the Project will have visual and aesthetic impacts on these individuals that are disproportionate to those experienced by the community at large prior to the advent of large wind farms. The Applicant established a website (www.newgrangewind.com) to share general Project information, as well as SEQR documentation, with the public and will periodically mail neighboring households Project information brochures. The Project will also hold public information meetings in 2008 to further educate the public on the Project and on the SEQR process.

Since 2004, the Applicant has conducted an extensive outreach and educational program in the area. The Applicant has conducted multiple open houses and landowner dinners. The Applicant has participated in forums sponsored by local groups, including the county and regional town and planning boards. The applicant has further conducted tours of other existing wind farms to educate the community about wind power and offer the community an opportunity to visit an existing project. The Applicant expects to continue educational and outreach efforts as the Project goes forward and after the Project is complete.

The Applicant is committed to pursuing voluntary non-disturbance agreements with neighbors who own residences within 2,500 feet of proposed turbines. These agreements are designed to share the benefits of the Project with neighbors by paying an amount roughly equivalent to an average upstate New York household electric bill.

Other future public education and outreach efforts will include circulation of newsletters and information pieces to the local residents, as well as presentations to area civic groups aimed at apprising residents of Project developments and affording opportunities to receive answers to their questions.

1.12 SEQRA Process

On January 10, 2008 a Joint Application for the Wind Overlay Zone and Special Use Permit, which included a Full Environmental Assessment Form (EAF) Part 1 that addressed the proposed Project, was submitted by the Applicant to the Town of Arkwright Town Board pursuant to the State Environmental Quality Review Act (SEQRA).

The remaining SEQRA process for the Project will include the following actions and anticipated time frames:

- DEIS accepted by Lead Agency (Town of Arkwright Town Board);
- File notice of completion of DEIS and notice of public hearing and comment period;
- Public hearing on DEIS (must be held at least 14 days after public notice is published);
- 30-day public comment period;
- Revise DEIS as necessary to address relevant comments received;
- Complete Final Environmental Impact Statement (FEIS); document accepted by lead agency;
- File notice of completion of FEIS;
- 10-day public consideration period;
- Lead Agency issue Findings Statement, completing the SEQRA process; and
- Involved agencies issue Findings Statements.

This DEIS, along with a copy of the public notice, will be distributed for review and comment to the public, will be posted on the website (www.newgrangewind.com), and circulated to the agencies and parties listed in Table 1.10-1.

1.12.1 Agency and Public Review

Opportunities for detailed agency and public review will continue to be provided throughout the SEQRA process, as well as in conjunction with the review of applications for the other permits and approvals needed for the Project, many of which have their own public comment periods. With respect to the completion of the SEQRA process, the DEIS will be available for public review and agency comment as outlined above.