

4906-17-04 **Project Area Analyses**

(A) SITE SELECTION STUDY

(1) General

Given the unique nature and constraints associated with the siting of wind energy facilities, the Applicant has requested a waiver from the requirement for a fully developed site alternative analysis,¹ but indicated that the Applicant would instead provide general information describing the relevant siting criteria used to identify the Facility location; this information is provided below.

(a) Siting Criteria

To develop a wind project, such as the Facility, that is both economically and technically feasible, IBR follows a step-wise siting process that evaluates specific siting criteria and alternatives – both at the level of general location and for micro-siting the specific layout.

Descriptions of the primary siting criteria used to identify general project locations are included in this section. The Project area must satisfy each of these criteria for a project to be technically and economically feasible.

(i) High Quality Wind Resource

Because large-scale wind energy facilities use wind as the fuel for generating electricity, their possible locations are constrained by the need for sufficient wind speeds on a regular basis throughout the year. The lack of a suitable wind resource would lead to a lower return on investment.

¹ The Applicant's waiver requests were filed with the OPSB on November 6, 2009, with clarification to motion for waivers received by OPSB November 24, 2009. OPSB Staff recommended that all of the Applicant's waiver requests be approved on November 27, 2009. These documents are provided in Appendix G.

The Applicant initially determined the Project area was suitable for wind development through an initial review of state wind resource maps and more detailed site-specific wind resource assessments.

(ii) Suitable Transmission

Any electricity generator must be located within a reasonable distance to an interconnection point on a transmission line having sufficient capacity for the economical delivery of power to customers on the transmission grid. A reasonable distance is determined in part by the capital cost of transmission line construction.

The Applicant determined the existing transmission infrastructure in the Project area was accessible. This determination was made through an initial, internal preliminary assessment and subsequent interconnection request filed with PJM (discussed in more detail in Section 4906-17-05(D), *Regional Electric Power Systems*). With the nearby presence of two AEP transmission lines, the Facility has excellent transmission access, both in terms of proximity and availability. The Facility would connect to the grid via a new 345 kV interconnection substation that would tie into the existing 345 kV AEP transmission line.

(iii) Available Land and Land Use

Land must be available for a large-scale wind energy project. Landowners also must be willing to negotiate lease agreements to allow the use of the land for wind turbines and associated facilities. Existing land uses must not conflict with wind energy facilities. Dense residential or urban lands, wilderness areas, wilderness study areas, national parks and monuments, and national conservation areas are examples of land uses that are not consistent with wind energy development.

Existing land use in the Project area is primarily agricultural. Wind energy is consistent with this land use, as siting of wind turbines in farm fields intensifies the use of the land. A wind lease can provide additional revenue for farmers while leaving the majority of their farm fields still available for their historical use: raising corn, soybeans, wheat, and other row crops. Additionally, landowners in the Project area have expressed interest and willingness in assisting in the development of the Facility as demonstrated by the success of the Applicant's lease program. Finally, the Project area includes an approximately 40,500-acre area of land that is potentially available – a large enough area for development of a large-scale wind energy project. The layout of the Facility would be located entirely on private land.

(iv) Environmental or Ecological Considerations

Large-scale wind energy projects are ideally located in areas that avoid significant environmental issues such as major bird migration pathways, areas of particularly sensitive habitats, or conflicting activities (for example, airports).

In 2008, the Applicant performed a due diligence study to assess potential environmental constraints, such as avian and bat, threatened and endangered species, environmentally sensitive habitats, aviation and other features in the general Paulding and Van Wert County areas. The results of the due diligence study were incorporated into project development decisions, and the Project area was further refined to avoid and minimize potential impacts to environmentally sensitive issues and features.

In early 2009, the Applicant began ecological and environmental studies in the Project area to further evaluate potential environmental issues. The studies performed include avian and bat, wildlife, aviation, wetlands and waterbodies, cultural resources (historic architecture and archaeology),

geotechnical, noise, and visual (including shadow flicker) studies. According to the USFWS, the ODNR and the OEPA, the Facility is expected to have minimal impact to ecological and environmental resources.

Once it was determined that the Project area was suitable for wind development, these same siting criteria were used to identify Facility constraints and to micro-site Facility components.

(b) Relevant Factors in the Site Selection Process

As described above, the relevant factors in the site selection process include areas with an adequate wind resource, suitable transmission in close proximity to the Project area, land availability, and minimal environmental or ecological constraints. Once the Project area was selected, the Applicant began to develop a layout within the boundaries of the Project area. Developing the layout is an iterative process, commonly referred to as micro-siting, and is dictated by detailed site-specific siting criteria/constraints. Micro-siting of the Facility continues throughout the entire development process and generally is completed once construction begins. The following discussion provides additional details considered during the development of this Facility, and includes some specific examples of the micro-siting conducted as part of the Facility development.

(i) Wind Resource

The Project area was identified in 2006 as having the potential for a productive wind resource by studying state overview maps. The Applicant began scientifically studying the wind resource by erecting met towers in September 2007 and additional towers in early 2009. Through the initial and more detailed wind resource assessments, the Applicant determined that the Project area is suitable for wind development.

The wind data collected from the installed met towers was used to predict electrical production from each potential turbine location utilizing a variety of turbine models. From a wind resource perspective, the final turbine layout was determined by overlaying the most energetic locations for turbines with the most constructible designs, while also taking into account the other site constraints described in this Application.

(ii) Available Land and Land Use Constraints

The Project area consists primarily of agricultural land situated amongst the communities of Van Wert, Scott, Cavett, Haviland, and Convoy. Once the Project area boundary was roughly defined, the process of obtaining landowner agreements began. Additional research of the Project area, including an aeronautical study; topographic constraints (e.g., slope); turbine engineering (such as spacing to avoid wake loss); landowner considerations; and environmental and ecological considerations, led to a continuous narrowing of the Project area. The Facility layout incorporates numerous setbacks to comply with the OPSB's requirements and to minimize impacts on residents in the Project area.

The land within the Project area is almost entirely agricultural. The Facility layout has been designed to minimize impacts to active agricultural land and to use existing roads and farm lanes when possible for access to the Project area.

(iii) Environmental or Ecological Considerations

In 2008, the Applicant performed a due diligence study to assess potential environmental issues, such as threatened and endangered species, environmentally sensitive habitats, and other features in the general Paulding and Van Wert County areas. Environmental and ecological studies performed for the Facility include avian and bat, wildlife, aviation, wetlands and waterbodies, vegetative, cultural resources (historic

architecture and archaeology), geotechnical, as well as noise and visual (including shadow flicker).

The Applicant has also conducted multiple site visits and meetings with wildlife agencies, including the USACE, USFWS, OHPO, OEPA, ODNR, Paulding and Van Wert County Soil and Water Conservation Districts, Maumee Watershed Conservancy District, and the Audubon Society. A summary of public meetings and correspondence is provided in Section 4906-17-08(E), *Public Responsibility*. In addition, as detailed in Section 4906-17-08(B), *Ecological Impact*, ecological and environmental impacts have been minimized by avoidance of sensitive environmental areas and micro-siting.

The following provides an overview of potential environmental, ecological, and other primary constraints and how the Applicant incorporated these constraints into the Facility layout.

a) Avian and Wildlife

Because of concerns raised by the USFWS and ODNR for potential impacts to bats from the turbines, the Applicant has conducted bat acoustic monitoring within the Project area. The acoustic monitoring was conducted through mid-November 2009. A full report will be submitted in early February 2010.

Impacts due to the construction of the Facility are anticipated to be minimal and would likely be limited to incidental injury and mortality of sedentary or slow-moving species due to construction activity and increases in vehicular movement; habitat disturbance or loss associated with clearing and earth-moving activities; and displacement of wildlife due to increased noise and human activities. However, because most of the Facility is proposed to be sited in active agricultural land that provides limited wildlife

habitat, and which currently (and historically) experiences frequent agricultural-related disturbances, incidental injury and mortality impacts are expected to be minor. In addition, soil disturbance and exposure would likely occur in areas previously subjected to regular plowing, tilling, and harvesting. The majority of the habitat and vegetation disturbance and loss would be temporary in nature.

The Applicant would mitigate short-term construction disturbance by restoring disturbed areas to similar vegetation types in accordance with an E&SCP that would be prepared for the Facility. The Applicant also plans to conduct post-construction monitoring for birds and bats in order to monitor and track impacts to these species. Based on Project area siting within ODNR's MRA, the potential for impacts are expected to be low. The Applicant would monitor impacts to avian species and bats in accordance with an Avian and Bat Protection Plan, presented in Appendix H.

b) Aeronautical Study

An aeronautical study conducted in late 2008 and early 2009 identified areas where wind turbine tower height would be limited by the Van Wert County Regional Airport and Fort Wayne International Airport. The Project area boundary was reduced in size to have no impacts on local airports. Appendix I provides the aeronautical study.

c) Communication/Electromagnetic Interference

As detailed in Section 4906-17-08(E), *Public Responsibility*, of the application, the Applicant evaluated potential interference with

microwave, radio, television, cellular, and military/aviation communications. Summary discussions of findings are as follow:

- Microwave – Analysis identified 57 microwave paths that intersect the Project area; Applicant included the microwave paths in constraints mapping and developed the current layout to avoid impacts to microwave paths intersecting the Facility.
- Radio – After reviewing Applicant’s plans for the Facility, National Telecommunications and Information Administration (NTIA) concluded that no impacts to radio (AM/FM) broadcast were identified.
- Television: No constraints regarding over-the-air television reception have been identified. Monitoring of television signal strength in the Project area is being performed to evaluate current reception quality near the Facility and to determine an area of potential degradation of reception. The Applicant expects no impact to cable or satellite television.
- Cellular: After reviewing Applicant’s plans for the Facility, NTIA concluded that no impacts to cellular/personal communication systems were identified.
- Military and Aviation Radar: Applicant coordinated with Department of Defense regarding potential concerns on military communications, and received determination from the Department of the Navy on May 6, 2009 that the Marine Corps is willing to adjust their microwave systems facilities for the Applicant’s proposed Facility to avoid

future impacts. Applicant plans to coordinate final Facility layout with the Department of Navy. The Applicant also retained Aviation Systems, Inc. (ASI), which reviewed potential impacts to military radar. The findings indicated that development of the Facility would be unlikely to affect Air Defense and Homeland Security radars, as well minimal to no impact to weather radar operations.

d) Cultural Resources

The Applicant performed an archaeological survey and architectural survey in Fall 2009. An archeological survey was undertaken within the areas of potential direct effects of the Facility. Additional survey activity is anticipated to take place in the Spring of 2010 to supplement the current investigation and to reflect final Facility design. The results of the current investigation will be submitted to the OHPO, with a copy to OPSB staff, in early February 2010. A summary of this investigation is presented in Section 4906-17-08(D), *Cultural Impact*.

Sites that were not found to be historic properties will not represent landmarks of cultural significance, as defined by OPSB regulations, and no avoidance or further archeological investigation will be necessary. For nine sites, avoidance is planned. If avoidance is not possible, Phase II archeological evaluation will be undertaken assess if the sites represent historic properties, as defined in 36 CFR 800.16(1), and therefore landmarks of cultural significance, as defined by OPSB regulations. During construction, an unanticipated finds plan would be implemented in accordance with OHPO requirements, and discussions with OPSB staff.

A reconnaissance-level architectural survey was conducted within a 5-mile (8-km) radius of each wind turbine identified as of September 2009 (architectural reconnaissance survey area). The architectural reconnaissance survey area is identified and discussed in the architectural reconnaissance survey report (submitted to the OHPO on November 19, 2009 and is summarized in Section 4906-17-08(D), *Cultural Impact*). Additional survey activity is anticipated to take place in the Spring of 2010 to supplement the current investigation and to reflect final Facility design.

No direct impacts resulting from the physical removal or alteration of historic properties are anticipated. Visual impacts related to potential historic properties are anticipated in varying degrees within the architectural reconnaissance survey area. The Facility will introduce elements to the surrounding area that will affect the quality of setting, as defined by the National Register guidelines. It is anticipated that adverse visual impacts will be addressed through a formal mitigation plan designed to promote the preservation and continued meaningfulness of historic resources. Such a plan, developed in consultation with OHPO, OPSB Staff, and interested parties, such as the Van Wert County Historical Society, may be formalized through the negotiation of a formal Memorandum of Agreement that specifies mitigation measures, responsibilities, and implementation schedules.

e) Geotechnical

The Applicant performed a preliminary geotechnical investigation of the Project Area in order to determine soil and bedrock conditions, obtain geotechnical design data, and undertake a preliminary foundation design. This geotechnical investigation included hollow stem auger drilling, rock coring, cone penetration

testing (CPT), a dilatometer sounding (DMT), and a preliminary karst risk evaluation. This investigation included both non-intrusive and intrusive investigation in limited areas to minimize pre-construction impacts. Section 4906-17-05(A)(4), *Geology and Seismology*, provides more detail of the investigation.

Final geotechnical investigations will be undertaken in advance of construction and will be focused on specific locations of the final design. These investigations will allow planning for any unusual foundations conditions.

f) Wetlands

The Applicant conducted a jurisdictional wetland and waterbody survey in Fall 2009. No wetlands or waterbodies were delineated near any of the proposed turbine locations; however, potential impacts to wetlands or waterbodies may occur during the installation of the electrical collection system and access roads. It is the intent of the Applicant to keep total wetland impacts less than 0.5 acres so the USACE Nationwide permit program can authorize the Facility.

The construction of the proposed access roads would require the installation of culverts across some ditches and would result in localized, permanent impacts to the wetlands or streams crossed. To the extent possible, access roads have been sited to avoid larger stream crossings and any impacts to woodlands, including wooded wetlands.

Most of the electrical collection system would be installed underground generally utilize an open-cut method. Where the electrical collection system crosses farmed or linear wetlands, the wetlands would be restored to their pre-construction conditions

following installation, so that the impacts to wetlands would be temporary. At larger stream crossings, such as Blue Creek, Dry Creek, or Hagerman Creek, the underground collection lines would be installed using horizontal directional drilling to avoid impacts to these streams.

g) Noise

No existing national, state, or local regulations limit noise levels at wind energy facilities. Potential noise from the Facility was evaluated for 167 G-90 wind turbines on 328-foot (100-meter) tall towers and the associated electrical substations. The expected operational noise levels are anticipated to range between less than 30 dBA to 53 dBA. These noise levels are representative of the Facility noise levels. An overall reduction in Facility noise levels should be realized through the micro-siting process. Section 4907-17-03(A)(2), *Noise*, presents the findings of the noise assessment. Mitigation measures that may be utilized include:

- Using 1,200 feet for a minimum residential setback instead of the OPSB-mandated 750 feet;
- Turbine micro-siting to minimize projected impacts;
- Publishing a phone number for the Plant Manager so area residents can report excessive noise that might be caused by malfunctioning turbines; and
- Good Neighbor Agreements (GNAs) to offer compensation to affected residents.

h) Visual

The Applicant conducted a VIA in Fall 2009. To maximize the visual integration of the Facility into the overall pattern of the

Project area landscape, the Applicant would incorporate BMPs related to Facility appearance. These measures are presented in more detail in the VIA Report (Appendix J) and include use of turbines with uniform appearance, use of muted gray or white colors, and placement of as much of the Facility's electrical collection system underground, as practicable. These measures would be incorporated into Facility design to ensure an attractive appearance and good integration into its landscape setting.

A shadow flicker analysis was performed for 167 G-90 wind turbines on 328-foot (100-meter) tall towers to evaluate the extent of potential shadow flicker experienced at each residence and primary transportation corridors in the Project area. The Applicant plans to use a number of mitigation measures to reduce projected shadow flicker impacts to these affected residences (Appendix K).

Mitigation measures that may be utilized include:

- Turbine micro-siting to minimize projected impacts;
- GNAs to offer compensation to affected residents; and
- Window blinds, window awnings, and vegetative plantings to be offered to affected residents, including those with and without GNAs.

(iv) Site Accessibility

The site is accessible using an existing network of public roads and is near the confluence of U.S. Highways 30, 127 and 224. Active rail lines are also present near the Project area. Access roads required within the Project area would be designed and constructed to avoid to the extent possible deep drainage ditches. Studies have been undertaken to plan and avoid to the extent possible impacts to waterways and bridges, and to maximize convenience for the Facility and landowners. The Applicant

has coordinated with federal, state, and local permitting agencies, and will obtain the appropriate federal, state, and local permits.

(v) Community Support

The Applicant initiated lease discussions with private landowners in March 2007. In November 2008, the Applicant held a meeting with all engaged landowners and received a very favorable response to the Facility. In addition, the Applicant advertised for, and hosted, a public meeting in January 2009 to provide an overview of the proposed Facility. To date, several other meetings and presentations have taken place within the community. Based on these meetings that involved hundreds of local residents, the community appears to support the Facility, as demonstrated by the success of the Applicant's leasing program, strong positive comments toward the Facility at many of the public meetings (especially the 2009 Van Wert County Fair), and a complete absence of negative comments towards the Facility. The Applicant will continue to meet with various participating landowners to review the Facility layout and meet landowner considerations.

(2) Constraint Map

A Constraint Map showing setbacks from residences, property lines, and public rights-of-way is provided as Figure 4-1. Based on IBR's experience with 3,500 MW in 20 states, IBR has developed the following nationwide setbacks that will be implemented for the Facility:

- Setback from residences: 1,200 feet; and
- Setback from public roads and other public rights-of-way: 1.31 times the turbine height (476 feet) for a setback of 624 feet (assuming use of the G-90 turbine).

Additional setbacks may be considered because of site-specific noise and shadow flicker studies completed during the micro-siting process.

(B) SUMMARY TABLE OF EVALUATED SITES

The site analyses described in Section 4906-17-04(A), *Site Selection Study*, above provide a qualitative and quantitative assessment of the site selection process undertaken by the Applicant. In summary, the Applicant evaluated the wind resources in the Project area, availability of suitable transmission lines, land availability and land use, environmental and ecological considerations (for example, avian, wildlife, aviation, cultural, geotechnical, and wetlands), and community support.