

## Considerations for ORC Section 4906.10(A)(2)

### **NATURE OF PROBABLE ENVIRONMENTAL IMPACT**

Pursuant to ORC Section 4906.10(A)(2), the Board must determine the nature of the probable environmental impact of the proposed facility. Staff has found the following with regard to the nature of the probable environmental impact:

#### **Socioeconomic Impacts**

##### *Demographics*

The demographics of the project area are not expected to change significantly over the next 20 years. The 2012 estimated population density of Champaign County is 93 persons per square mile, compared to 282 persons per square mile statewide. The population of Champaign County is projected to increase by 11.3 percent over the next 20 years, while the population of townships within five miles of the project area is projected to increase by a total of 3.9 percent. The total population of the 14 townships within five miles is estimated to be 61,042 persons for 2012. The project is unlikely to limit future population growth or have a significant impact on the demographics of the region.

##### *Land Use*

Agriculture is the predominant land use within the project area, which consists primarily of croplands, farmsteads, meadows, and scattered woodlots. Agricultural land accounts for approximately 97 percent of all land that would be impacted by construction of the proposed facility. Construction of wind turbines, access roads, substations, and other ancillary structures would temporarily disturb approximately three percent (392.6 acres) of land within the project area, while less than one percent (68.1 acres) of this land would be permanently converted into built facilities.

Construction-related activities could lead to temporary reductions in farm productivity by directly damaging crops, compacting soil, breaking drainage tiles, and reducing available space for planting. However, the Applicant is committed to minimizing impacts to agricultural land by siting facility components along field edges, keeping agricultural tracts intact, and restoring temporarily-impacted farmland to its original condition. Furthermore, the Applicant intends to repair or replace all damaged subsurface drainage features, remove construction debris, and compensate farmers for lost crops. After construction, only the agricultural land associated with turbines and access roads would be removed from farm production.

With the exception of one abandoned building that is slated for demolition, the Applicant does not anticipate the removal or relocation of any existing structures during construction of the proposed facility. Operation of the facility would not interfere with surrounding agricultural uses.

Residents in the project area are likely to experience temporary noise and traffic impacts associated with project construction activities. Long-term operational impacts to residents are discussed later in this report.

Four recreational areas are within one mile of the project area: Woodland Golf Club, Urbana Country Club, Indian Springs Golf Club, and Goshen Memorial Park. Woodland Golf Club is a public, 18-hole golf course located on Swisher Road to the northwest of the project area. The nearest turbine location is approximately 0.3 miles (1,584 feet) from the course boundary. Urbana Country Club is located along U.S. Highway 36 just east of Urbana, to the west of the project area. The club consists of an 18-hole golf course, swimming pool, tennis courts, golf

shop, restaurant, and club house. The nearest wind turbine location is 0.5 miles (2,640 feet) from the edge of the course. Indian Springs Golf Club is a public, 18-hole golf course located along State Route 161 just north of Mechanicsburg, to the east of the project area. The closest turbine location to the club is 0.7 miles (3,696 feet). Goshen Memorial Park is located to the southeast of the project area within Mechanicsburg, along Parkview Road. Park amenities include baseball fields, tennis courts, a horseshoe pit, playground, picnic area, multipurpose building, and natural amphitheater. The nearest turbine location is 0.8 miles (4,224 feet) from the park.

Wind turbines would be visible from multiple vantage points at all recreational areas. While visual impacts would be reduced to varying degrees by topographical and vegetative screening, the size of the turbines limits the extent to which they can be obscured from view.<sup>14</sup> Recreational areas may also be impacted by shadow flicker and wind farm noise, which are discussed later in this report. The wind farm would not alter the land use of any recreational land.

Regional land use plans call for conservation of farmland and economic diversity. The development of a wind farm in the region is consistent with those goals. Demand for temporary housing and retail services would increase during construction of the wind farm, but the project would not have a long-term impact on housing or commercial demand.<sup>15</sup>

#### *Cultural and Archaeological Resources*

The Applicant conducted a literature review for the area within a five-mile radius of the project. There are 32 historic properties listed in the National Register of Historic Places (NRHP), four historic districts, and no National Historic Landmarks located within the study area. The historic districts are located in the cities of Urbana and Mechanicsburg and not within the Area of Potential Effect.<sup>16</sup> There are two individual properties within the project area determined eligible for listing in the NRHP. Within the five-mile study area, 791 previously-identified historic structures are recorded in the Ohio Historic Inventory. The Applicant asserts that each of the identified sites was considered and all facility components have been sited to avoid them. Additionally, the Applicant determined that the indirect visual impact from the project would not alter or affect the qualities or attributes that contribute to the historical or architectural significance of each identified landmark or NRHP-listed and NRHP-eligible structure.

In addition to the literature review, the Applicant conducted an architectural survey of the area. The survey includes 1,475 individual properties in rural areas and crossroad communities, as well as 44 blocks of Mechanicsburg and 283 blocks of Urbana. Based on the survey, the Applicant asserts that the agricultural heritage of the survey area is what makes the historic landscape unique, and that the historic farmsteads and farmhouses, one-room schoolhouses, churches, cemeteries, and crossroad communities are character-defining property types that contribute to the area's historic landscape. The Applicant concludes that the number and size of proposed turbines could affect the perception of the traditional rural historic landscape.

Avoiding or minimizing these types of impacts for wind generation projects is not practical in most cases. Therefore, Staff recommends a requirement for the Applicant to develop a mitigation plan that would promote the continued meaningfulness of the survey area's rural history, as outlined in the Recommended Conditions of Certificate.

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<sup>14</sup> Application, Volume 1, p. 151.

<sup>15</sup> Application, Volume 1, pp. 142-144.

<sup>16</sup> Area of Potential Effect refers to the geographic area or areas within which an undertaking may directly, or indirectly, cause changes in the character or use of historic properties, if any are present.

Of the 260 archaeological sites recorded in the Ohio Archaeological Inventory within the five-mile study area, five are within or adjacent to the lands leased for the project. There are 55 cemeteries in the Ohio Genealogical Society database within five miles of the project area, none of which are located on the lands leased by the Applicant for the project. No known archaeological sites or cemeteries would be disturbed as a result of the project.

In addition to the literature and database review, and the Phase I review conducted for the Buckeye I facility, the Applicant would conduct a targeted Phase I archaeological reconnaissance survey to analyze potential impacts to previously-undocumented archaeological resources within five miles of the project area. The targeted review would cover the area in the proposed project that was not covered in the Phase I review for the Buckeye I facility. Staff recommends a requirement for the Applicant to develop a cultural resources avoidance plan, as outlined in the Recommended Conditions of Certificate.

### *Aesthetics*

The Applicant conducted a visual impact assessment of the area within five miles of the project. The assessment included cumulative impacts if both Buckeye I and Buckeye II are constructed. Turbines would be visible throughout most of the study area. In some areas, turbines would be at least partially screened by buildings and vegetation.

The visual impact varies depending on the distance between the viewer and the turbines, the number of turbines visible, the amount of screening, atmospheric conditions, and the presence of other vertical elements such as utility poles and communication towers. Visual impact also varies greatly for each viewer and depends on the value of the existing landscape to the viewer and personal attitudes toward wind power.<sup>17</sup>

### *Economics*

The proposed facility would have an overall positive impact on the local economy because of the increase in construction spending, wages, purchasing of goods and services, annual lease payments to the local landowners, and local tax revenues.

During construction, approximately 598 full-time jobs would be created in the local economy, generating \$25.3 million in wages and salaries. The construction work force would employ 86 workers of the 598 total jobs over a 12-month period with a payroll of \$4.9 million. Another 391 jobs of the 598 total would be generated by indirect impacts from inter-industry activity, and the remaining 121 jobs would fall into induced impacts, which result from changes in local household spending in the community.

The operations and maintenance of the facility would generate a total work force of 38 new full-time jobs in the local economy, totaling \$1.8 million in wages and salaries. Once operational, seven full-time positions consisting of an operations manager, operations and maintenance technicians, parts/logistics personnel, and customer service representatives would be required. Another 15 jobs would be generated by indirect impacts and the remaining 16 positions of the total 38 would be created by induced impacts resulting from changes in household spending.

The proposed facility would have a significant impact on the local tax base, including local school districts and other taxing districts that service the area. The increase in local tax revenues would be between \$840,000 and \$1,260,000 annually.

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<sup>17</sup> edr Companies. March 2012. *Visual Impact Assessment, Buckeye II Wind Project*. Application, Volume 3, Exhibit Q, p. 27.

Any delays associated with the permitting stage, construction phase, or failing to meet federal deadlines for incentives could incur additional costs to the project. The Applicant submitted estimated capital and intangible costs, operational costs, and maintenance costs of the facility under seal.

All OPSB Staff recommendations for the requirements discussed in this section can be found under the **Socioeconomic Conditions** heading of the Recommended Conditions of Certificate.

## Ecological Impacts

### *Surface Waters*

The Applicant indicated that 38 streams are within 100 feet of buried collection lines, access roads, and/or crane paths. Of the 38 streams, the Ohio EPA has designated three as Warmwater Habitat, five as Exceptional Warmwater Habitat (EWH), and six as Coldwater Habitat (CWH). The remaining 27 streams were surveyed by the Applicant's consultant and were provisionally scored as lower-quality ephemeral and intermittent streams. Three of the provisionally scored streams were reported as having a perennial flow regime.

Project facilities would cross 31 streams. Based on responses to interrogatories dated September 26, 2012, the Applicant has committed to avoiding in-water work in any EWH or CWH streams. To avoid in-water work at these streams, the Applicant would install buried collection lines by horizontal directional drilling (HDD). The Application states that any buried collection lines crossing perennial streams would also be installed by HDD.

Access roads and crane paths would cross CWH and EWH streams by way of arched bridge structures or other methods that avoid work below the ordinary high water mark. There would be potential for in-water work for crossings of lower-quality ephemeral or intermittent streams, including open trenching for installation of buried collection lines. However, to minimize impacts, this work would be done when these streams segments are dry. Additional measures to reduce water quality impacts would be taken through the development of a Stormwater Pollution and Prevention Plan (SWPPP) to help control potential sedimentation, siltation, and run-off.

No wetlands, ponds, or lakes would be impacted by this project during construction or operation. Through information obtained from the ODNR and the Federal Emergency Management Authority, the Applicant has determined that flooding would be unlikely to impact the proposed turbine locations. Other than turbine 93, which is approximately 145 feet from the 100-year floodplain of Treacle Creek, no other turbines come within 1,000 feet of any 100-year floodplains.

### *Threatened and Endangered Species*

The Applicant requested information from the ODNR and the USFWS regarding state- and federally-listed threatened and endangered plant and animal species. Additional information was provided through field assessments and review of published ecological information. The following table reflects the results of the information requests, field assessments, and document review.

BIRDS				
Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
upland sandpiper	<i>Bartramia longicauga</i>	N/A	Threatened	Suitable habitat, not found during survey

peregrine falcon	<i>Falco peregrinus</i>	N/A	Threatened	Suitable habitat, found during survey
loggerhead shrike	<i>Lanius ludovicianus</i>	N/A	Endangered	Suitable habitat, not found during survey
bald eagle	<i>Haliaeetus leucocephalus</i>	BGEPA & MBTA <sup>18</sup>	N/A	Migrating eagles seen, no established nests
golden eagle	<i>Aquila chrysaetos</i>	BGEPA & MBTA	N/A	Migrating eagles seen, no established nests
sandhill crane	<i>Grus canadensis</i>	N/A	Endangered	Observed during 2008 breeding bird surveys
Northern harrier	<i>Circus cyaneus</i>	N/A	Endangered	Observed during 2008 breeding bird surveys and 2007/ 2008 raptor surveys
boblink	<i>Dolichonyx oryzivorus</i>	N/A	Species of Concern	Observed during 2007/ 2008 raptor surveys
sharp-shinned hawk	<i>Accipiter striatus</i>	N/A	Species of Concern	Observed during 2007/ 2008 raptor surveys

#### REPTILES & AMPHIBIANS

Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
Eastern massasauga rattlesnake	<i>Sistrurus catenatus</i>	Candidate	Endangered	Suitable habitat, survey needs to be completed

#### MAMMALS

Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
Indiana bat	<i>Myotis sodalis</i>	Endangered	Endangered	Suitable habitat, found during survey
big brown bat	<i>Eptesicus fuscus</i>	N/A	Species of Concern	Suitable habitat, found during survey
tri-colored bat	<i>Pipistrellus subflavus</i>	N/A	Species of Concern	Suitable habitat, found during survey
Northern long-eared bat	<i>Myotis septentrionalis</i>	N/A	Species of Concern	Suitable habitat, found during survey
little brown bat	<i>Myotis lucifugus</i>	N/A	Species of Concern	Suitable habitat, found during survey
red bat	<i>Lasiurus borealis</i>	N/A	Species of Concern	Suitable habitat, found during survey
hoary bat	<i>Lasiurus cinereus</i>	N/A	Species of Concern	Suitable habitat, found during survey
big-eared bat	<i>Corynorhinus rafinesquii</i>	N/A	Species of Concern	Suitable habitat, not found during survey
silver-haired bat	<i>Lasionycteris noctivagans</i>	N/A	Species of Concern	Suitable habitat, not found during survey
Eastern small-footed bat	<i>Myotis leibii</i>	N/A	Species of Concern	Suitable habitat, not found during survey
evening bat	<i>Nycticeius humeralis</i>	N/A	Species of Concern	Suitable habitat, not found during survey

<sup>18</sup> bald and golden eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act

badger	<i>Taxidea taxus</i>	N/A	Species of Concern	Suitable habitat, not found during survey
<b>PLANTS</b>				
<b>Common Name</b>	<b>Scientific Name</b>	<b>Federal Status</b>	<b>State Status</b>	<b>Presence in Project Area</b>
rock serviceberry	<i>Amelanchier sanguinea</i>	N/A	Endangered	Suitable habitat, not found during survey
prairie thimbleweed	<i>Anemone cylindrica</i>	N/A	Threatened	Suitable habitat, not found during survey
southern hairy rock cress	<i>Arabis hirsuta</i> var. <i>adpressipilis</i>	N/A	Potentially Threatened	Suitable habitat, not found during survey
prairie false indigo	<i>Baptisia lactea</i>	N/A	Potentially Threatened	Suitable habitat, not found during survey
sparse-lobed grape fem	<i>Botrychium biternatum</i>	N/A	Threatened	Suitable habitat, not found during survey
limestone savory	<i>Calamintha arkansana</i>	N/A	Threatened	Suitable habitat, not found during survey
Bicknell's sedge	<i>Carex bicknellii</i>	N/A	Threatened	Suitable habitat, not found during survey
reflexed sedge	<i>Carex retroflexa</i>	N/A	Threatened	Suitable habitat, not found during survey
timid sedge	<i>Carex timida</i>	N/A	Endangered	Suitable habitat, not found during survey
tall larkspur	<i>Delphinium exaltatum</i>	N/A	Potentially Threatened	Suitable habitat, not found during survey
hairy tick-trefoil	<i>Desmodium glabellum</i>	N/A	Endangered	Suitable habitat, not found during survey
bearded wheat grass	<i>Elymus trachycaulus</i>	N/A	Threatened	Suitable habitat, not found during survey
yellowish gentian	<i>Gentiana alba</i>	N/A	Threatened	Suitable habitat, not found during survey
ashy sunflower	<i>Helianthus mollis</i>	N/A	Threatened	Suitable habitat, not found during survey
butternut	<i>Juglans cinerea</i>	N/A	Potentially Threatened	Suitable habitat, not found during survey
wild pea	<i>Lathyrus venosus</i>	N/A	Endangered	Suitable habitat, not found during survey
three-flowered melic	<i>Melica nitens</i>	N/A	Threatened	Suitable habitat, not found during survey
false garlic	<i>Nothoscordum bivalve</i>	N/A	Threatened	Suitable habitat, not found during survey
smooth rose	<i>Rosa blanda</i>	N/A	Endangered	Suitable habitat, not found during survey
prairie wedge grass	<i>Sphenopholis obtusata</i> var. <i>obtusata</i>	N/A	Threatened	Suitable habitat, not found during survey
lesser ladies'-tresses	<i>Spiranthes ovalis</i>	N/A	Potentially Threatened	Suitable habitat, not found during survey
arbor vitae	<i>Thuja occidentalis</i>	N/A	Potentially Threatened	Suitable habitat, not found during survey

hairy wingstem	<i>Verbesina helianthoides</i>	N/A	Potentially Threatened	Suitable habitat, not found during survey
pigeon grape	<i>Vitis cinerea</i>	N/A	Potentially Threatened	Suitable habitat, not found during survey

#### FRESH WATER MUSSELS

Common Name	Scientific Name	Federal Status	State Status	Presence in Project Area
rayed bean	<i>Villosa fabalis</i>	Endangered	Endangered	Suitable habitat present
snuffbox	<i>Epioblasma triquetra</i>	Proposed Endangered	Endangered	Unlikely – Lack of suitable habitat, known range
clubshell	<i>Pleurobema clava</i>	Endangered	Endangered	Unlikely – Lack of suitable habitat, known range
rabbitsfoot	<i>Quadrula cylindrica cylindrica</i>	Candidate	Endangered	Unlikely – Lack of suitable habitat, known range

In 2007 to 2008, the Applicant coordinated this proposed project with the ODNR and USFWS prior to the development of ODNR's standardized wildlife monitoring protocols (On-shore Bird and Bat Pre and Post-Construction Monitoring Protocols for Commercial Wind Energy Facilities in Ohio, 2009). The initial survey did not detect the presence of any federally-listed species but did detect the presence of many state-listed species. However, a separate survey at an area in proximity to the project resulted in the capture of an Indiana bat, a state- and federally-endangered species. As a result, the Applicant coordinated an additional survey with the DOW and the USFWS, which also resulted in the capture of the Indiana bat.

Based on these coordinated efforts, the Applicant concluded that construction, operation, maintenance, and decommissioning of the project may result in incidental take of Indiana bats. As a precaution to avoid violation of the federal Endangered Species Act (ESA), the Applicant has applied for an Incidental Take Permit (ITP) through the USFWS. A prerequisite to the issuance of an ITP is the development of a Habitat Conservation Plan (HCP), which was developed by the Applicant. The HCP is a comprehensive plan for ecological preservation and considers all aspects of the Indiana bat's habitat, including surface water quality, vegetation, and other ecosystem components and also includes measures to minimize impacts and ensure long-term conservation of the endangered species.

Additionally, the USFWS has prepared a draft EIS in response to the Applicant's ITP application in accordance with the requirements of the National Environmental Policy Act (NEPA). In June 2012, the Applicant and the USFWS released a draft of the HCP and EIS, which were open to public review and comment through September 27, 2012. Comments will be addressed or incorporated into the final HCP and EIS, which are expected to be completed after this staff report is published. If approved, the ITP would be for a 30-year period and would authorize incidental take consistent with the Applicant's HCP and the ITP. To issue the ITP, the Service must find that the Buckeye Wind application for an ITP, including its HCP, satisfies the criteria of section 10(a)(1)(B) of the ESA and the USFWS's implementing regulations at 50 CFR parts 13 and 17.22. If the ITP is issued, the Applicant would receive assurances under the USFWS's No Surprise policy, as codified at 50 CFR 17.22(b)(5). OPSB Staff has reviewed the draft HCP and EIS, and finds the conservation measures and conditions within both documents with regards to protection of federally-listed species in the project area to be consistent with Staff's investigation and conclusions.

Bat mortalities have increased at wind facilities across the nation, with the greatest numbers found in the Midwest, Appalachian Mountains, and Northeast. Three species, the eastern red bat, hoary bat, and silver-haired bat, comprise the vast majority of species found at post-construction mortality searches. All three of these species, and others, were detected at the proposed project. Because these species generally fly higher than tree height, mist-netting does not provide a good assessment tool, but rather the acoustic monitoring provides indices of the bat activity levels. Results from these surveys indicate high activity level (23.9 calls per detector night) when compared to other preconstruction surveys within Ohio and across the nation. Swarming surveys and an evaluation of karst areas in proximity to the site also indicate additional bat activity near the project area. Mist-netting surveys were also performed within the project area. Approximately 298 bats were caught, representing seven bat species. These species included the state- and federally-endangered Indiana bat, and six state species of concern, including the little brown, northern myotis, big brown, tri-colored bat, hoary bat, and red bats. Reproductive status was confirmed by the capture of reproductive females for all seven species.

The primary threat to the Indiana bat would be during operation of the facility due to the risk of collision and barotrauma from coming in proximity to an operational wind turbine. As a tree-roosting species during the non-winter months, the Indiana bat could be negatively impacted by tree clearing associated with construction and maintenance of the project. These concerns are addressed through seasonal tree cutting dates (November 1<sup>st</sup> to March 31<sup>st</sup>) that the Applicant has committed to in their HCP.

Additionally, the DOW recommends that the Applicant conduct post-construction avian and bat monitoring in accordance with an ODNR-approved, standardized protocol during the first two years of operation. The DOW specifically requests that the Applicant include a sample of turbines that would be searched daily, following ODNR-approved protocols. Dependent upon the results from the first full year of monitoring, the DOW may revise their second-year monitoring recommendations to focus monitoring on the specific needs at this facility, noting that the state of Ohio does not have a take permit as suggested in the application.

The DOW requires that any consultant hired to perform any post-construction wildlife monitoring must possess the appropriate federal and state permits prior to conducting any monitoring. Additionally, the ODNR and OPSB Staff recommend that the Applicant enter into a Cooperative Agreement with the ODNR or obtain any suggested permit from ODNR to avoid liability for the impacts that Buckeye II wind turbines may have on wildlife species.

Breeding bird surveys were conducted in 2008 within the project area. Approximately 6,000 individuals of 97 species were observed. The state-endangered Northern harrier (*Circus cyaneus*), and 16 bobolinks (*Dolichonyx oryzivorus*), a state species of concern, were also observed. Raptor surveys were conducted in 2007 and 2008. In the 2007 survey, 421 raptors of eight different species were observed. In the 2008 survey, 1,476 raptors of 12 different species were observed. In 2007, the raptor passage rate was 6.4 birds per hour, and in 2008, it was 6.8 birds per hour. These rates are above the average passage rates found in other preconstruction surveys for wind projects in Ohio.

Raptors observed include the state-endangered Northern harrier, the state-threatened peregrine falcon, and the sharp-shinned hawk, a state species of concern. It was noted that many of the raptors were likely residents of the project area. Additionally, it is concerning to ODNR that many of the observations of these birds were within the rotor-swept areas. In the event that the facility causes a mortality of a state-endangered species, the DOW would recommend that the



company work with the DOW to develop and implement an effective avoidance, minimization, and mitigation strategy.

There are no known occurrences of the Eastern massasauga rattlesnake within the project area. However, a 20-acre wetland in the project area exhibits suitable habitat. The Applicant would avoid this area to eliminate impact to this potential habitat. The USFWS is concerned that there may still be a risk to this species during construction and recommends that a presence/absence survey be conducted at the site. The survey would be conducted by an USFWS- and ODNR-approved herpetologist. If Eastern massasaugas are not detected, then no further avoidance and minimization measures would be required. If the Eastern massasauga is detected, or if a survey is not conducted, then presence of this species would be assumed and the Applicant would need to implement USFWS- and ODNR-approved avoidance and minimization measures.

#### *Vegetation*

The Applicant states approximately 97 percent of the land that would be impacted is agricultural land. The other 3 percent includes 12.7 acres of forested land, with permanent loss of 2.9 acres, and 1.7 acres of scrub shrub habitat, with permanent loss of 0.4 acres. No significant impacts are expected to any specific plant species as a result of this project. The proposed layout shows a collection line running to turbine 84 that would impact more of the adjacent woodlot than necessary. The Applicant has indicated that it is working with the landowner to reroute the line in order to minimize impacts.

All OPSB Staff recommendations for the requirements discussed in this section can be found under the **Ecological Conditions** of the Recommended Conditions of Certificate.

#### **Public Services, Facilities, and Safety**

##### *Setbacks*

ORC Section 4906.20(B)(2) delineates how minimum setbacks for “economically significant wind farms” are to be determined. The Board incorporated these minimum setback requirements in rule (OAC Section 4906-17-08(C)(1)(c)), and indicated that such minimum setbacks would be applied to all wind projects under its jurisdiction.

The minimum distance from a turbine’s base to the property line of the wind farm facility must be at least 1.1 times the total height of the turbine as measured from its base to the tip of the blade at its highest point. Assuming a maximum turbine height of 492 feet as proposed in the application, this minimum property line setback equates to a distance of 541 feet.

The minimum distance from a wind turbine to the exterior of the nearest habitable residential structure located on an adjacent property at the time of the certification application must be no less than 750 feet in horizontal distance from the tip of the turbine’s blade at 90 degrees to the structure. Using maximum blade lengths assumed in the application (169 feet), this minimum setback calculates to 919 feet from the turbine base to the exterior of the nearest habitable residential structure.

Turbine 129 is located 613 feet to the southeast of a residential structure. However, this residence has been abandoned and is no longer habitable. According to the Applicant, it is scheduled to be demolished. Therefore, all turbine locations meet the minimum setback requirements.

### *Roads and Bridges*

During the construction period, local, state, and county roads would experience a temporary increase in truck traffic due to deliveries of equipment and materials. The delivery of components is planned to enter the project area through State Routes 4, 29, and 161. A final routing plan will be developed through discussions with the Champaign County Engineer and performed in conjunction with the special hauling permit process for ODOT. The Applicant does not expect operation of the wind farm to noticeably increase traffic or impact other local services in the project area.

The Applicant indicates the delivery of wind farm equipment and material would impact local roads. Although the township and county roads appear to be in good condition, local, county, and state thoroughfares along regional delivery routes could be damaged by construction and material delivery equipment.

The Applicant expects some modifications to local roads would be needed, including the expansion of intersection turns to accommodate specialized turbine component delivery vehicles and conventional construction trucks. These modifications would incorporate the previous work for the Buckeye Wind Project as well as subsurface drilling and test borings to determine engineering design and construction methods.

Temporary turn-outs as well as reinforcement to bridges and/or culverts would be completed prior to the movement of heavy equipment. Gravel access roads would be constructed as needed prior to the delivery of heavy equipment. Once deliveries are completed, temporary roads and gravel accesses would be removed and the disturbed areas would be restored to previous condition unless the property owner or County Engineer has requested that certain roads remain in place.

The Applicant notes that, because of the overlap between the Buckeye II Wind Farm and adjacent Buckeye Wind Project, the Applicant will build upon previous work to create an evaluation of the impacts to roads and bridges for the Buckeye II Wind Farm. Additional areas for study and possible improvements include vertical clearance of utility lines and poles, poor pavement conditions, insufficient cover over drainage structures, and inadequate bridge capacity. Staff recommends that the Applicant be required to make all necessary improvements to roads used for the project, to repair all damage to roads, and to enter into a Road Use Agreement with the County Engineer, as detailed in the Recommended Conditions of Certificate.

### *Geology and Seismology*

Karst areas are present in Champaign County. The Applicant has identified at least 25 known karst areas, with the majority of these located west of the project site in Salem Township and north of the project site in northern Wayne Township. In addition, the ODNR documented and visited 10 of the 14 potential karst features in a study area whose footprint stretched beyond the project area. Two of these potential karst features can be found within one mile of proposed wind turbine sites.

The purpose of this survey was to determine if the features had any openings that could be used by hibernating bats. The ODNR identified only one of the 14 features as being a “documented karst.” This particular karst feature is miles outside of the project area for both the Buckeye I & II Wind Farms. No openings were discovered within the project area. None of the known geologic features would prohibit the future development and operation of the project. The

Applicant will perform site-specific subsurface drilling at each wind turbine location to confirm that no karst features exist.

The Applicant has conducted a thorough review of the documented geological structure and seismic information for the project area. To date, no seismic activity has occurred within the project area. The closest recorded seismic activity occurred along the deep structural fault zone known as the “Bellefontaine Outlier Faults.” This fault zone is situated within the granitic basement rock and is located north of the project area. However, part of this fault zone extends south into the general vicinity of the project area. In 1843, in south central Champaign County, a tremor of 3.5 magnitude was recorded. The area of greatest seismic activity is centered in neighboring Auglaize and Shelby counties to the west of the project area.

The Applicant has reviewed the United States Department of Agriculture, Soil Conservation Service, Soil Survey for Champaign County, Ohio. Surface soils in the project area are comprised mostly of Celina, Fox, Miami, and Miamian silt loams and are derived from glacial till. These soils are all well drained and have a moderate to high capacity to transmit water. According to the soil survey, there are no limitations to the use of these soil types for building construction purposes within the project area. The soils within the project area are suitable for grading, backfilling, compaction, and drainage for each wind turbine location. Furthermore, prior to construction of the wind turbines, the Applicant will conduct subsurface drilling to provide site-specific information when the final selection of ground and road boring locations are made.

#### *Public and Private Water Supplies*

The project area lies outside of the water service area of the City of Urbana. Information gathered from the Ohio EPA, ODNR, and the Champaign County Department of Health indicates that there are hundreds of private wells within the project area.

Staff has concluded that private water wells near wind turbine locations have not been fully assessed for potential impacts resulting from construction. The design for the wind turbine foundation will be determined once the Applicant conducts subsurface drilling at wind turbine locations. The final design for the wind turbines will take into account the proximity to private water wells and depth to the water table. Construction and operation of the facility should not disrupt or adversely impact public or private water supplies.

The project area also has a number of areas designated as Source Water Protection Areas (SWPAs), as defined and approved by the Ohio EPA for the protection of drinking water sources. The Ohio EPA and the Department of Commerce, Bureau of Underground Storage Regulations have adopted regulations that restrict specific activities within these designated areas. Restricted activities include concentrated animal feeding operations, sanitary, industrial, or residual waste landfills, land application of biosolids, and voluntary brownfield cleanups. The closest SWPA to the project area is the public water supply wells located in Mechanicsburg. The Applicant has concluded that the proposed wind turbine facility will not have any effect on the groundwater or surface water protected by the SWPA.

#### *Pipeline Protection*

At this time, Staff has not found any gas pipelines within the project area. If gas pipelines are found in the project area prior to construction, Staff recommends that any turbines within the setback distance are relocated. Staff recommends a minimum setback distance from gas pipelines of at least 1.1 times the total height of the turbine structure as measured from its tower's base (excluding the subsurface foundation) to the tip of its highest blade.

### *Blade Shear*

Blade shear is the phenomenon where a rotating wind turbine blade, or segment, separates from the nacelle and is thrown a distance from the tower. The Applicant asserts that past incidences of blade shear have generally been the results of human error. Staff has also found that past incidences can be attributed to design defects during manufacturing, poor maintenance, control system malfunction, or lightning strikes. All turbine models under consideration for this project are certified to international engineering standards. The turbines have the following safety features to address blade shear: two independent braking systems, a pitch control system, a lightning protection system, turbine shut down at excessive wind speeds and at excess blade vibration or stress, and the use of setbacks. The Applicant has incorporated a wind turbine layout with a minimum residential setback distance of approximately 1,000 feet, and a property line setback of 541 feet. Installing and utilizing these safety control mechanisms minimizes the potential for blade shear impacts.

### *High Winds*

The turbines are designed to withstand high wind speeds. All turbines under consideration for the facility are designed to meet the standards of the International Electrotechnical Commission-61400 series. Of the proposed turbine models, the GE100, GE103, and Gamesa G97 represent the lowest tolerance for wind extremes. However, these turbines are designed to withstand at least an extreme 10-minute average wind speed of 84 mph, and 50-year return gust of 117 mph. The wind turbines proposed for the facility are rated to withstand wind speeds well in excess of those likely to occur in the project area. The Applicant has incorporated a wind turbine layout with a minimum residential setback of approximately 1,000 feet, and a property setback of 541 feet. Installing and utilizing the safety control mechanisms mentioned in the blade shear section would minimize the potential impacts from high winds.

### *Ice Throw*

Ice throw is the phenomenon where accumulated ice on the wind turbine blades separates from the blade and falls or is thrown from the blade. The Applicant indicates that all turbines would have the following safety features to address ice throw: two independent braking systems, ice detection software, automatic turbine shut down at excessive vibration, and automatic turbine shut down at excessive wind speeds.

GE Energy is the manufacturer of a turbine model under consideration by the Applicant. This manufacturer has developed specific safety standards for ice throw and blade shear for all of their turbine models and has recommended the use of an ice detector and other measures if people or objects (e.g., occupied structures, roads) are within a distance of 150 percent of the sum of the hub height and rotor diameter. This recommendation is derived from an independent study<sup>19</sup> supported by the German Wind Energy Institute (GWEI). GWEI is a UL (Underwriters Laboratory) international consulting company that provides research, wind energy measurements, wind turbine certifications, measuring methods, and testing services. The independent study performed by GWEI, and referenced above, recommended an empirical formula of 150 percent of the sum of the hub height and rotor diameter, in planning the location of wind turbines to address ice throw concerns. Based on this formula, it has been determined that turbines of the similar dimensions as the GE models would need to be located a distance of approximately 302 meters (991 feet) from any occupied structure or heavily travelled road.

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<sup>19</sup> Seifert, Westerhellweg, and Kroning. (2003). *Risk analysis of ice throw from wind turbines*. DEWI.

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Summary: Exhibit Exhibit B Part 2.1 to the Deposition Transcript of Julia Johnson  
electronically filed by Ms. Miranda R Leppla on behalf of Champaign Wind LLC