Illinois Department of
Natural Resources
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Pat Quinn, Governor
Marc Miller, Director

January 12, 2011

Mr. Denny Lorton
Cass County Planning and Zoning Department
100 East Springfield Street
Virginia, Illinois 62691

RE: Windtron I Wind Farm, Cass County
Endangered Species Consultation Program
EcoCAT Review #1104213

Dear Mr. Lorton:

This proposed action was submitted to the Department by Terracon, Inc., on behalf of Windtron, for consultation in accordance with the *Illinois Endangered Species Protection Act* (IESPA) [520 ILCS 10/11], the *Illinois Natural Areas Preservation Act* (INAPA) [525 ILCS 30/17], and Title 17 *Illinois Administrative Code* Part 1075.

This document is being submitted to you to become a part of any administrative record associated with a decision by the County to authorize the proposed wind farm facility.

This letter states the biological opinions of the Department of Natural Resources pertaining to Natural Areas and those endangered or threatened species protected by the statutes, identified above, which require the County's consultation with the Department. The Attachment to this letter states the Department's opinions and recommendations pertaining to those species covered by the *Fish and Aquatic Life Code* [515 ILCS 5] and the *Illinois Wildlife Code* [520 ILCS 5].

Indiana Bat, *Myotis sodalis*. As demonstrated by fatalities of Indiana Bats at an Indiana wind farm in 2009 and 2010, this species is vulnerable to collision with utility-scale wind turbines. The project footprint contains no known hibernation sites (caves) for the Indiana Bat, a species listed as "endangered" by both the federal government and the State of Illinois, although potential roosting habitat for the Indiana Bat is present throughout the vicinity of the project.

Summer colonies of the Indiana Bat in Cass County have been documented at a number of locations within and adjacent to the **Jim Edgar Panther Creek State Fish & Wildlife Area**, the nearest just five miles away. There is no reason to believe this species is limited to lands owned and managed by the Department of Natural Resources; where similar suitable habitat is present it should be presumed the Indiana Bat is also present.

Many Indiana Bats migrate significant distances, up to 300 miles, to their summer habitats. But many travel lesser distances, and some spend the summers in the vicinity of their winter roosts. It is not known whether individual Indiana Bats consistently use the same summer colony areas and the same winter caves, or if they consistently follow specific migratory routes.

Minor winter hibernaculae, hosting only a few Indiana Bats, exist in Adams County and Pike County, to the west and northwest, while summer colonies also occur there. But Indiana Bats in summer colonies in Cass County may originate as far away as Alexander County in Southern Illinois or deep within Southwestern Missouri, or possibly as far north as the Blackball Mine near LaSalle-Peru. Data from telemetry experiments with this species suggest they do not migrate in a straight line, although the characteristics of weather and terrain which may influence movements are not well-understood. No assumptions should be made regarding the direction(s) of migratory movements of Indiana Bats to, from, or through Cass County.

Indiana Bat surveys in nearby Adams and Pike counties during 2010 found numerous summer colony locations, and associated telemetry work with captured bats showed that at least one post-lactating female bat was foraging as far as five kilometers (three miles) from her primary roost tree. Because the terrain in Cass County is very similar, it is reasonable to infer that wind turbines sited within five kilometers of suitable Indiana Bat summer habitat are at risk of interactions with this species. This would include all turbines proposed for this facility.

The Department is aware Windtron has commissioned acoustic bat monitoring centered on its meteorological towers. This is both useful and appropriate. However, the failure to identify the calls of the Indiana Bat through this method cannot establish their absence from the vicinity. The Department is aware of at least one case where numerous Indiana Bats were captured at a site where multiple detectors failed to indicate their presence.

Based on existing information, it is the biological opinion of the Department the proposed action is likely to result in the taking of one or more Indiana Bats in the course of its service life. Please see the Attachment for additional important information about non-listed bats.

Recommendation #1. The Department recommends Windtron seek an Incidental Take Authorization from the Department of Natural Resources for the Indiana Bat, pursuant to 520 ILCS 10/5.5.

Recommendation #2. Windtron should conduct at least one fall season of post-construction bat mortality monitoring to quantify the numbers of each species of bat taken during turbine operations, and to determine whether they include Indiana Bats.

Illinois Chorus Frog, *Pseudacris* [*streckeri*] *illinoensis*. Over the last twenty years, this species has been documented at a number of locations in Sections 33, 34, and 35, along the ridge line between Lost Creek and Clear Creek, only 2.5 miles west-southwest of the project area, as well as at numerous other locations in Cass County.

Dispersed in sandy or friable soils, the Illinois Chorus Frog is usually found above the 100-year floodplain, but may occur in higher upland areas where there is both favorable geology and

hydrology. This small amphibian (adults rarely exceed about 1.5 inches in length) has a fossorial habit, spending nearly all of its life underground. This is one of the few frogs which can burrow forward.

The Illinois Chorus Frog is most easily identified in late winter and early spring after dark, when it emerges from burrows and travels to nearby ephemeral vernal pools soon after ice-out, in late February or early March. Males then sing to attract mates, thus comprising the "chorus" from which the species derives its name. Typically, the species is identified by its characteristic vocalizations, since they are wary and hard to observe directly.

After only a few weeks, adults return to their dispersed burrowing areas. If the vernal pools last long enough (in even the best habitats, recruitment may be successful only half the time), tadpoles metamorphose and disperse, leaving no trace of the species until the following breeding season. Such pools frequently are farmed wetlands and may be difficult to identify outside the breeding season or in drier years. Breeding ponds must usually be free of fish, although Chorus Frogs may attempt reproduction in well-vegetated waters containing these predators. In many areas, pools in roadside ditches may be an important component for successful breeding and recruitment. Generally, a pond with more vegetative detritus provides better habitat. (For example, corn stubble would provide better breeding habitat than soybean stubble.) Breeding ponds may be located outside sandy or friable soils, but nearby.

Dispersal distances of around one kilometer have been reported from Arkansas, but few attempts to measure this activity have been made in Illinois. The relative density of populations is also unknown. Adults are believed to spend the winter deep in the soil below the frost-line; how deep is unknown, as is how extensive an area one individual's burrow may be during a year. Their diet is believed to consist mainly of earthworms and soil insects.

Population estimates are usually based on the number of males in the chorus. Population levels are cyclic and tied closely to precipitation patterns. Several dry years result in a significant contraction of population numbers, but the size of the population (and the occupied area) can expand rapidly under favorable conditions in successive years.

The construction and operation of wind turbines may adversely modify Chorus Frog habitat in a number of ways. The excavation of turbine foundations and the trenches for collection power lines can directly kill or injure Frogs whose burrows are located within the excavation. The construction of turbine access roads may fragment habitat or increase exposure to predators and "road-kill" when they must be crossed. Grading and spoil disposal may inadvertently fill or destroy breeding ponds, or alter their volume and longevity by changing localized drainage patterns.

Chorus Frogs may prove sensitive to the underground transmission of noise and vibrations emanating from operating turbines or, almost as seriously, their primary prey species may be sensitive, resulting in alterations of the size and locations of suitable habitat actually occupied. (Multiple sound sources will produce zones of interference and amplification where their vibrations intersect, so that the intensity of subterranean noise will not be uniform throughout the vicinity.)

Collection power lines from turbines to interconnection substations are typically buried to reduce interference with farming operations. Such lines produce an Electro-Magnetic Field (EMF). Burial trenches, being disturbed, may be easier to burrow than in-place soils, which could result in concentrating the Chorus Frog population along the path of burial trenches, and this would maximize exposure to EMF. It is not known that Chorus Frogs are directly sensitive to EMF, but it is documented that long-term exposure of biological organisms to EMF can produce issues with DNA replication, leading to mutations which can produce cancers and other adverse outcomes. Because the EMF strength is directly inversely proportional to the distance from the power line, EMF near underground lines will be much stronger than that experienced from overhead lines. Amphibians are notoriously sensitive to chemical mutagens, and may be equally sensitive to the mutagenic effects of EMF.

Power lines have been known to produce ground currents, sometimes called stray voltage, which can convey an electrical current directly to animals in or on the affected soils. Low intensity electrical currents have no beneficial effects, and are known to interfere with many "normal" activities and responses. Ground currents are not intended, but sometimes occur. Ground currents in areas containing the Illinois Chorus Frog would obviously result in harassment and injury of individual animals, constituting a prohibited taking.

A turbine array may have some potential to alter the frequency and location of lightning strikes. Turbines, themselves, are well-protected by lightning grounding systems but Chorus Frogs, presuming they remain near turbines, could be adversely affected by changes in the location and frequency of strikes. Strikes may be fatal or injurious to Chorus Frogs in the immediate vicinity of turbines which convey charges into the ground.

Chorus Frogs are nocturnal during above-ground forays, and thus may be adversely affected by aircraft warning lights on turbines. Usually such warning lights are synchronized and, with a low cloud ceiling, can produce significant ground illumination. Such lights have no natural analog, so their effect on Chorus Frogs is unknown. There may be some potential to interfere with movement or other activities, and the lights may aid or interfere with the Frog's predators.

It is even plausible that "flicker" shadows caused by moonlight through rotating turbine blades could hamper their surface movements or suppress chorusing because such shadows may mimic the movement of airborne and terrestrial predators.

Turbines at a distance of 2.5 miles are unlikely to affect a Chorus Frog population, save through vibration or illumination. However, the project area is essentially at the same elevation of the known habitats and is directly connected to them without intervening ravines or forests. The project area may contain similar friable soils suitable for burrowing. From aerial photographs, fields within and directly adjacent to the project area contain farmed wetlands large enough to provide vernal pools of sufficient size and volume to serve as breeding ponds for Chorus Frogs. Given dispersal distances of up to one kilometer (~0.6 miles), it is possible that a population of the Illinois Chorus Frog exists, has existed, or may exist within the footprint during the extended life of the project.

Recommendation #3. The Department recommends Windtron perform at least one late-winter survey of potential breeding ponds within, and within one kilometer (0.6 miles) of, the project perimeter to determine whether the Illinois Chorus Frog is present. An assessment of the proximity of potential breeding ponds to sandy or friable soils may aid in defining the scope of such a survey.

Recommendation #4. If a population of the Illinois Chorus Frog is confirmed within or near the project, Windtron should consider whether obtaining an Incidental Take Authorization from the Department of Natural Resources, pursuant to 520 ILCS 10/5.5, may be appropriate. Such a permit from IDNR may not be needed if Chorus Frog habitat will not be adversely affected or modified by the project.

Regal Fritillary, *Speyeria idalia*. This threatened butterfly has been documented at three locations in Cass County: **Bluff Springs Sand Pond INAI Site**, about 3.5 miles to the west of the project; the **Charles "Chinee" Colvin Sand Prairie INAI Site** (aka "Lewis Landfill"), about 8 miles west-southwest; and from a former sand quarry and adjacent sand prairie about one mile north of Arenzville, about eight miles southwest of the project. More than one hundred Fritillaries occurred at the latter site in 1999.

In order for successful reproduction to occur, the eggs of this species must be laid in a tallgrass prairie natural community containing one or more species of violet. (For many years, Birdsfoot Violet was thought to be the exclusive food host for the caterpillars of this species, but now more than eight violet species have been documented as supporting larval feeding, while Birdsfoot Violet is completely absent from some of these sites.)

The species has an unusual life history. The sexes are dimorphic, males having a discernibly different wing pattern than females. Adult males emerge in early to mid-June, several weeks before the females, with the flights of the two genders overlapping only for about two weeks in June and early July, when mating occurs. However, females do not lay their eggs immediately after fertilization, instead entering an extended period of arrested egg development known as "diapause" until September, when egg-laying begins. During this period, the female faces the challenge of surviving for weeks on the nectar of flowering plants, something once easy to do in extensive prairies, but much more difficult when such systems are small, widely scattered, and often lacking a diversity of flowering plants.

This species is classed as a strong flyer, with flights claimed in excess of 20 miles. Unfortunately, the females are indiscriminate egg-layers, depositing a few eggs on any plant which offers a perch, unlike most species which lay eggs directly on the larval food host. After a few days, the eggs hatch, and the first-instar larvae drop to the ground and seek shelter for the winter, but eat nothing. Not until spring do larvae seek the nearest violet and begin to feed, but only if any violets can be found and if the larva survives so long. There are many predators and diseases which can attack dormant larvae, to say nothing of fire and bad weather. Overenthusiastic or uninformed stewardship practices on remaining prairies using prescribed fire have undoubtedly reduced or eliminated some populations.

Fortunately, the Regal Fritillary is a prolific egg-producer, with each female laying ten thousand eggs or more, so that at least a few offspring are likely to reach maturity. But "few" is the key word; even a "stronghold" of this species, such as the Nachusa Grassland in Lee County, may produce only about 50 pairs annually. Many documented breeding locations produce less than a dozen.

The Regal Fritillary is vulnerable to the destruction of larvae through the use of off-road vehicles and encroachment on, or the destruction of, tallgrass plant communities, through excavation or wildfire. Adults are susceptible to collisions with vehicles and, possibly, turbine blades. Whether larvae or adults (or their predators) may have a negative response to flicker is unknown.

The project footprint is eight miles from the larger documented populations in Cass County (only a single Regal Fritillary has been documented at the **Bluff Springs Sand Pond INAI Site**), but these by no means may be the only population centers in the vicinity. Timing is critical to the observation of butterfly flights, but weather in any given year may cause earlier or later emergence. Because this species may wander far in search of nectaring plants, there is a chance that females may lay eggs in small hill prairies along the northern edge of the project. If these areas contain violets, successful reproduction may occur.

It is the biological opinion of the Department the proposed action is unlikely to adversely modify the essential habitat of the Regal Fritillary Butterfly. Nevertheless, the following precautions are offered.

Recommendation #5. Windtron should identify and map potential breeding and nectaring habitat within the project footprint and in the vicinity. The essential elements for breeding habitat are tallgrass prairie communities containing violet species, and grasslands containing prairie forbs which flower from July through September for nectaring habitat.

Recommendation #6. Potential breeding habitats should be surveyed for the presence of Regal Fritillary larvae or adults. Any site where adults are observed should be more closely examined the following year for caterpillars, especially if the observed adults include males.

Recommendation #7. Construction workers should be trained to recognize male and female Regal Fritillaries, and be instructed to report sightings and to discontinue any activities which may be harmful to the butterflies or to their habitat.

Recommendation #8. Sites where adult Regal Fritillaries are observed should be evaluated for the risks turbine construction or operations may pose to butterflies using such habitat.

Ottoe Skipper, *Hesperia ottoe*. The Ottoe Skipper is a small orange butterfly (wingspan about 1.25 inches) associated with sand prairies and hill prairies. It is known form the **Chandlerville-Snyder Hill Prairie INAI Site** and the **Cox Creek Hill Prairie Land & Water Reserve**, six and seven miles, respectively, northeast of the project area, and from several sites in Mason County. Sightings of this species are rare, with none being reported to IDNR since 1999. However, a number of low-quality hill prairies remain in the vicinity of the project which could host this species.

The Ottoe Skipper produces only one flight per year, with adults appearing from June through August, with a peak in late June and early July. Adults nectar on a variety of flowering native plants associated with tallgrass prairies. Little Bluestem is believed to be the specific larval host plant for this species. Males loiter near the base of a host plant, awaiting a female. Eggs are laid on or near the host plants. Newly-hatched larvae drop to the ground and construct a cocoon from debris, then overwinter to the following spring. Larvae are thus vulnerable to predation, disease, and fire. In the spring, larvae feed on a host plant until metamorphosis and emergence. Although classed as strong fliers, they are seldom found outside native prairie contexts.

Any patch of native grasses within or adjacent to the project area should remain undisturbed to avoid potential destruction of larvae. Any sighting of an Ottoe Skipper will be a significant event.

Due to its rarity and possible extirpation, it is the biological opinion of the Department the proposed action is unlikely to adversely modify the essential habitat of the Ottoe Skipper.

Loggerhead Shrike, *Lanius ludovicianus*. The State-listed threatened Loggerhead Shrike is adapted to the savanna conditions of interspersed grasslands, shrubs, and trees. This species has been adversely affected by the decline in animal husbandry and the abandonment of the "shelter-belt" fence-row conservation practice, which has severely reduced both breeding and foraging habitat. The Shrike, also known as the "butcher bird," needs thorny trees and shrubs, even barbed wire, on which to impale its prey, which may be left for several days before being eaten. Areas which support large insects and small rodents, major food items, are also necessary. Due to losses of suitable habitat, Loggerhead Shrikes may attempt reproduction in trees near homesteads, in cemeteries, and in other areas where they would normally not be expected.

The Shrike has been documented from three locations within Cass County (at **Jim Edgar Panther Creek SFWA** and near Ashland) in the last 20 years. They may make use of forest margins if an adequate hunting territory is associated with them. The species also has a statewide distribution so that migrants, as well as resident birds, may occur in the area.

Apart from migratory collisions, the main risk for wind energy facilities is thought to be the potential for further loss of remaining habitat, if trees are cleared to avoid wind turbulence or to improve turbine exposure, or if road-side trees are cleared to create turning radii for turbine carriers, or to establish power lines. Should such activities occur during the breeding season, the potential may exist for prohibited “taking” of nesting Shrikes. This species’ sensitivity to tall structures, visible motion, noise, shadow-flicker, and other turbine effects has not been studied, but these effects may have the potential to displace this species from otherwise suitable habitat.

Based on existing information, the biological opinion of the Department is that it is unlikely, but not impossible, for the proposed action to adversely modify the essential habitat of the Loggerhead Shrike. The results of pre-construction avian surveys may alter this opinion.

Northern Harrier, *Circus cyaneus*. The State-listed endangered Northern Harrier is a ground-nesting grassland hawk. The species has a statewide range. While many sources indicate the

species needs large open areas of habitat, Illinois studies have demonstrated this hawk can use relatively small patches of habitat for successful breeding, especially in the vicinity of larger habitats. Breeding is often associated with wetlands such as marshes, sedge meadows, and wet prairies.

While most hunting activities occur at fairly low altitudes, below typical rotor-swept elevations, hunting can expose this bird to collision risk. This species engages in an aerial courtship display which places it at risk of collision with wind turbines. Wind farm construction and operation may alter concentrations of prey species. This hawk relies heavily on its acute hearing to locate prey; if the noise generated by wind turbines interferes with this function, turbines might adversely affect their ability to hunt near the turbines, reducing available food resources.

Post-construction avian surveys of other wind farms have noted the absence of Northern Harriers which were previously present, suggesting that migrant Harriers may avoid operating wind turbines. The major effect on this species may be displacement or exclusion from previously-available hunting habitat. The Northern Harrier has been documented as breeding in Cass County only at **Jim Edgar Panther Creek SFWA**.

It is the biological opinion of the Department the project is unlikely to adversely affect the essential habitat of the Northern Harrier.

Plains (Western) Hognose Snake, *Heterodon nasicus nasicus*. This species has been documented from Cass County at the **Shick Shack Sand Pond Nature Preserve and INAI Site**, about five miles southwest of the project area, and from the **Charles "Chinee" Colvin Land & Water Reserve**, about eight miles west-southwest, as recently as 2010.

This subspecies of the Western Hognose is a thick-bodied snake typically found in sand prairies, savannas, and nearby woodlands. An ambush predator, this snake sometimes buries itself in the soil with only its eyes exposed and waits for prey, primarily toads and rodents, to move within striking distance, or moves about slowly while searching for prey which has burrowed just beneath the surface.

It is not a constrictor, as are most other snakes in the area. Although not usually classified as a venomous reptile dangerous to humans, it is sometimes described as rear-fanged, having enlarged rear teeth which serve to deflate toads and frogs (which swell themselves as a defense against being swallowed). Its saliva (venom) is toxic, but it cannot deliver large amounts. Even so, bites from this animal, though rare, may require medical attention.

With its close cousin, the Eastern Hognose Snake (*Heterodon platirhinos*), whose range overlaps that of the Plains Hognose and which also occurs in Cass County, it shares two characteristics. First is an upturned snout, which produces the vaguely pig-like appearance from which the common name is derived, and which enables this snake to actually burrow through loose soils, an ability most snakes lack. The second is the habit of rolling over and playing dead when harassed; if righted, the snake will roll over again. However, this behavior occurs only after puffing up the body, loud hissing, and mock strikes have failed to discourage an attacker.

The two species may be distinguished by the colors of the undersides of their tails—that of the Plains Hognose is black, while that of the Eastern Hognose is always a lighter color than the belly.

It may use an abandoned rodent burrow for thermo-regulation or during its hibernation period (September through March). It is most active in early morning or late evening (crepuscular activity), spending much of the rest of the time seeking shade or warmth to regulate its temperature. In Illinois, mating begins soon after spring emergence, with females depositing eggs in the soil beginning in June; eggs usually require six to eight weeks to hatch, and neonates are fully-capable of independent existence. Adults neither guard the nest nor provide any care. Its primary predators include raptors, other snakes, and medium-sized mammals.

Few wind energy projects have been constructed in regions of the country where this snake is rare or endangered, so little if any attention has been paid to the potentially adverse effects wind turbines may exert on this species. Construction activities pose the obvious threats of road-kill and the excavation of hibernating or thermo-regulating snakes, soil compaction, habitat fragmentation, and altering the distribution of prey species through changes in hydrology and vegetation. Operational impacts may include flicker during crepuscular activity periods, which may mimic aerial predators and suppress the activity of both the snakes and their prey; noise and vibration, which may limit the ability to detect prey or may stimulate defensive responses; and stray voltage (ground current), which may stress adults or affect the successful development of eggs.

Appropriate habitat for this species exists as near to the project as the **Bluff Springs Sand Pond INAI Site**, 2.5 miles west of the project. However, appropriately vegetated habitat for this species is rare within or adjacent to the proposed project area and where it exists is very limited. However, if the Illinois Chorus Frog is found to be present within the project, the probability rises that the Plains Hognose Snake may also be present.

On the basis of existing information about the project area and this species, it is the biological opinion of the Department the project is unlikely to adversely modify the essential habitat of the Plains Hognose Snake. Nonetheless, educating site workers to recognize this animal may be advisable.

Bluff Springs Sand Pond INAI Site and Fiedler Family Farm Natural Heritage Landmark.

This approximately sixty-acre INAI Site occupies the ridge between Clear Creek and Lost Creek, north of Six-Mile Road, about 2.5 miles west of the project area. Privately-owned, a portion of the INAI Site has been accorded Natural Heritage Landmark status by the Illinois Nature Preserves Commission.

Bluff Springs Sand Pond provides essential habitat for four State-listed endangered or threatened species: the **Illinois Chorus Frog**; the **Regal Fritillary Butterfly; Vahl's Fimbristylis,** *Fimbristylis vahlii*; and the **Small Burhead,** *Echinodorus tenellus*. The Frog and Butterfly have been described above. Both Fimbristylis and Small Burhead are obligate wetland plants near the northern limits of their range which are most often found around the margins of sand ponds. The

Sand Ponds here may provide foraging locations for Indiana Bats, but no effort has been made to identify bat fauna at this location.

All turbines in the project will be easily visible to humans from all portions of the INAI Site with a direct line-of sight. Flicker will not extend to this Site, but intermittent night illumination is likely and there may be some possibility animals on this Site may experience extra-low frequency (ELF) ground vibrations produced by wind turbines.

The effects of such vibrations are uncertain, but would be most likely to affect animals in aquatic and fossorial habitats, such as the Illinois Chorus Frogs. Such vibrations may elevate chronic stress levels in animals which depend on the detection of vibrations to avoid predators or to identify prey. Tiger Salamanders, an important predator of Chorus Frog tadpoles, provide an example of such an animal. Should such vibrations stimulate resonance in animal tissues or in their environment, which could occur at harmonic frequencies to the primary vibration, animals might actually be displaced or excluded from essential habitat. The level of vibration experienced across the Site will not be uniform due to a number of factors, including the fact that multiple unsynchronized sources will produce waves whose frequencies and intersections may amplify or cancel their intensity. On the other hand, intervening variations in geology could prevent the reception of any vibrations at all.

Research on the noise and vibrations produced by wind turbines has been almost exclusively limited to the sounds audible to humans transmitted through the air. Limited research on ground vibrations emitted by turbines has studied the potential for interference with military intelligence applications, which in the United Kingdom has resulted in restricting turbine construction and operation near sensitive defense installations to a distance of 10 kilometers (six miles). Apart from confirming that technological effects of such vibrations exist and are measurable, the researchers had no interest in potential biological effects, and made no effort to identify or measure them.

Aircraft warning lights impose intermittent low-level red illumination when a low cloud-ceiling is present. Effects on the behavior of nocturnal terrestrial animals subjected to such illumination has not been evaluated, but it could affect the ability of animals to detect prey or to avoid predators, or it may elevate chronic stress levels, affecting hormonal responses to the environment.

The major significance of this Site to the project is as a source for Illinois Chorus Frogs and Regal Fritillary Butterflies which may migrate to the project area, and as a potential foraging destination for Indiana Bats originating in roosts on the far side of the wind project, which would require them to fly through the wind turbine array.

It is the biological opinion of the Department the proposed action is likely to adversely modify environmental conditions within the Bluff Springs Sand Pond INAI Site through intermittent night illumination, and potentially through ground vibration.

Recommendation #9. To minimize the potential adverse effects of intermittent illumination, a wind farm should be equipped with an FAA-approved Audio-Visual Warning System (AVWS) so

that warning lights operate ONLY when approaching aircraft are at risk of collision with a wind turbine, and remain off under other circumstances. (See Attachment for more detailed discussion.)

Recommendation #10. An opportunity exists to conduct research on the potential effects of ground vibrations on animals occupying environments at this site. Windtron may wish to consider commissioning and supporting such scientific work to determine whether adverse effects occur and how they may be minimized or avoided.

Bluff Springs Hill Prairie INAI Site and Natural Heritage Landmark.

This is a loess hill prairie, about two acres in extent, located one mile east of Bluff Springs and not quite a half mile north of Rt. 125, about three miles due west of the project area. This Site provides essential habitat for one of only nine documented occurrences in Illinois of the endangered **Pink Milkwort,** *Polygala incarnata*.

Apart from this endangered plant, the Department lacks detailed floral and faunal inventories for this Site, but typical hill prairies in this vicinity support a sufficient diversity of grasses and forbs to support numbers of rare butterflies, moths, and other insects which thrive in few other environments.

At only three miles, it is likely that multiple wind turbines will be visible from the eastern and southern slopes of this hill prairie, but remain invisible from the western slopes. Other direct effects are unlikely, save for the potential effects of aircraft warning light illumination. The main potential significance of this INAI Site to the project is as another nearby source where rare butterflies, such as the **Regal Fritillary** and **Ottoe Skipper**, may breed and migrate to the project area.

It is the biological opinion of the Department the proposed action is unlikely to adversely modify the Bluff Springs Hill Prairie INAI Site and Natural Heritage Landmark.

Cottonwood Geological Area INAI Site. The Cottonwood Geological Area lies three miles north-northwest of the project area, on the north-facing forested bluffs above the Chandlerville Road. An old road cut at the Site provides an outstanding sectional view of the loess deposits which form much of the local landscape. Due to topography and forestation, the project will remain invisible to observers at the Site, whose attention is likely to remain fixed on the immediate geology, in any case.

It is the opinion of the Department the proposed action is unlikely to adversely modify the Cottonwood Geological Area INAI Site.

Panther Creek Hill Prairie Land and Water Reserve and INAI Site. This 32-acre site within the **Jim Edgar Panther Creek State Fish & Wildlife Area** is located on the north bank of Little Jobs Creek, about 3.5 miles northeast of the project area. It contains a ten-acre loess hill prairie with the remainder in mesic upland forest.

The Site supports a large population of the recently-listed threatened plant, **Bluehearts,** *Buchneria americana,* one of only four documented wild populations in Illinois. It also supports the formerly-listed and still rare Hill's Thistle, *Cirsium hillii,* and strong stands of Little Bluestem and Rattlesnake Master, obligate host plants for the larvae of the endangered **Ottoe Skipper** butterfly and the threatened **Eryngium Stem-Borer Moth**.

The only potential effects of the project on this Site are those of visibility and intermittent night-time illumination. The orientation of the hill prairie, with a maximum elevation of just over 600 feet above mean sea level (msl), is to the southwest. Thus the open slope faces the project area directly, much of which has an elevation of around 630 feet msl. The proposed turbines, located on higher ground, should be clearly visible to observers within the Land & Water Reserve, day or night. Because the only other sign of civilization potentially visible (but largely screened by trees) from the Reserve is State Route 78 one-third of a mile to the west, the existing high value of this Site for the visualization of pre-settlement conditions will be seriously diminished.

The degree of intermittent night illumination received by this Site from the aircraft warning system is unlikely to be significant except under conditions of low cloud ceilings. Though this represents a modification of natural conditions, the direct effects of such illumination on Site fauna have not been quantified. However, the existing high-quality "dark sky" value to humans will be significantly degraded.

It is the biological opinion of the Department the proposed action is likely to adversely modify environmental conditions within the Panther Creek Hill Prairie Land & Water Reserve through intermittent night illumination and intrusive daytime visibility.

Recommendation #11. To minimize the potential adverse effects of intermittent illumination, a wind farm should be equipped with an FAA-approved Audio-Visual Warning System (AVWS) so that warning lights operate ONLY when approaching aircraft are at risk of collision with a wind turbine, and remain off under other circumstances. (See Attachment for more detailed discussion.)

Recommendation #12. In this case, the Department has no recommendation consistent with the project's implementation which would avoid or minimize intrusive visibility.

Shick Shack Sand Pond Nature Preserve and INAI Site. This 57-acre Site, owned by the Illinois Department of Natural Resources, is located on a ridge above the Illinois River plain, just over five miles southwest of the project area. The Preserve supports several State-listed species, including the **Blanding's Turtle**, *Emydoidea blandingii,* the **Plains Hognose Snake**, the **Illinois Chorus Frog**, the **Mudpuppy Salamander**, *Necturus maculosus,* and **Shore St. John's Wort,** *Hypericum adpressum.*

At approximately 625 feet msl, the Shick Shack Nature Preserve is at approximately the same elevation as most of the project area. At a range of five miles, turbines will be visible from the northern perimeter of the Nature Preserve, but the interior will be screened by trees, so that turbines will not be intrusive to Site visitors or Site wildlife.

Intermittent night-time illumination from aircraft warning lights is likely to be noticeable only on evenings of heavy overcast when flashes may be reflected downward from the cloud deck. There may be no significant effect on Nature Preserve wildlife at this distance.

It is the biological opinion of the Department the proposed action is unlikely to adversely modify the Shick Shack Nature Preserve and INAI Site.

Chandlerville Cemetery Hill Prairie Land & Water Reserve and Chandlerville-Snyder Hill Prairie INAI Site. The Chandlerville-Snyder Hill Prairie INAI Site is located due east of the city limits of Chandlerville, six miles northeast of the project area. The westernmost 2 acres of the INAI Site, within the Cemetery adjacent to the famous Chandler Cenotaph, are registered as the Chandlerville Cemetery Hill Prairie Land & Water Reserve. Elevations within the INAI Site vary between 500 and 650 feet msl; the Cenotaph stands at roughly 580 feet msl. Slopes face the east, south, and west.

The Chandler Cenotaph stands on a promontory, and it is famous for its sweeping views of the Sangamon and Illinois River Valleys. Although it is about 50 feet lower than the project area, at six miles wind turbines will be visible from the Cenotaph under most weather conditions, and certainly at night when lit with aircraft warning lights. Except under heavily-overcast skies, there should be no significant intermittent illumination of the INAI site. At this distance, the visibility of the turbines might not be considered intrusive by many visitors.

The best quality loess hill prairie community is found on the slopes beneath the Cenotaph, which itself lies outside the bounds of the Land & Water Reserve. In the past, the INAI Site has supported the threatened **Ottoe Skipper**, and still supports populations of the formerly-listed Hill's Thistle.

It is the biological opinion of the Department the proposed action is unlikely to adversely modify the Chandlerville-Snyder Hill Prairie INAI Site, including the Chandlerville Cemetery Hill Prairie Land & Water Reserve.

Barkhausen Woods Land & Water Reserve and INAI Site. This 120-acre Reserve, owned by the Department of Natural Resources, is located six miles almost due north of the project area in Mason County. Consisting of dry sand forest and sand prairie, the Site supports populations of the **Bent Milk Vetch**, *Astralagus distortus*, the **Old Plainsman**, *Hymenopappus scabiosaeus*, and **Patterson's Bindweed**, *Stylisma pickeringii*.

The proposed wind farm will be visible from the southern margins of Barkhausen Woods, both at night and during the day. However, due to distance it is unlikely to be regarded as intrusive, and the same factor is likely to reduce the effects of intermittent lighting at night to levels unlikely to stress wildlife within the Reserve.

It is the opinion of the Department the proposed action is unlikely to adversely modify Barkhausen Woods Land & Water Reserve and INAI Site.

Cox Creek Hill Prairies Land and Water Reserve and INAI Site. The Illinois Department of Natural Resources owns this 648-acre Reserve, which lies within the **Jim Edgar Panther Creek SFWA**, about seven miles northeast of the project area. It has supported the **Ottoe Skipper**, and the **Loggerhead Shrike**, and maintains populations of the threatened **Pale False Foxglove**, *Agalinus skinneriana*, and the **White Lady's Slipper**, *Cypripedium candidum*. It may also provide roosting areas for the **Indiana Bat**, which has been captured at five nearby locations associated with Panther Creek, between the Reserve and the project. The slopes of its loess hill prairies face south and west, descending from about 600 feet msl to Cox Creek, one hundred feet below.

No elevations between this Reserve and the proposed project exceed 630 feet msl, so turbines will be visible from the higher elevations of the Reserve, but at seven miles their visibility is unlikely to be deemed intrusive. Aircraft warning lights will be visible from the Reserve, but intermittent illumination is unlikely to have significant effects on Reserve wildlife. The main significance of the Reserve to the project is as essential habitat for endangered or threatened animals which could migrate to the project area.

It is the biological opinion of the Department that the proposed action is unlikely to adversely modify the Cox Creek Hill Prairies Land & Water Reserve and INAI Site.

Charles "Chinee" Colvin Land & Water Reserve and INAI Site. Just southwest of the Beardstown Airport, and about eight miles west of the project area, the Charles "Chinee" Colvin Reserve is a former landfill which now supports populations of **Plains Hognose Snake**, **Regal Fritillary Butterfly**, **Illinois Chorus Frog**, and the **Umbrella Sedge**, *Cyperus grayioides*. As with other Sites situated at this distance, direct effects of the project will be limited to its visibility. Turbines will be visible, but should not be intrusive, and the Reserve does not have a high value for visualizing pre-settlement conditions given its surrounding landscape context. Except under heavy overcast, intermittent illumination at night should be negligible and is unlikely to adversely affect nocturnal species such as the Chorus Frog,, at this location.

It is the biological opinion of the Department the proposed action is unlikely to adversely modify the Charles "Chinee" Colvin Land & Water Reserve and INAI Site.

Meredosia Refuge INAI Site. Fourteen miles west-southwest of the project areas lies the **Meredosia National Wildlife Refuge**, owned and managed by the U. S. Fish & Wildlife Service. It is listed on the Inventory due to the presence of the federally-listed endangered **Decurrent False Aster**, *Boltonia decurrans*, state-listed birds such as the **King Rail**, *Rallus elegans*, and the **Least Bittern**, *Ixobrychus exilis*, and the presence of numerous **Bald Eagles**, *Haliaeetus leucocephalus*.

The Refuge is distant enough the only effect of the project to the Refuge will be its visibility. At this distance, the project will be far more visible at night than in the day. The major significance of the Refuge to the project, however, is its status as an important migratory staging area for thousands of migratory waterfowl each spring and fall. It is not uncommon for 20,000 or more waterfowl to be present for weeks at a time, dispersing into the surrounding countryside daily to feed.

Arriving and departing birds do not necessarily follow the Illinois River. At the Havana Research Station, the Illinois Natural History Survey (INHS) reports that in autumn flocks arrive from the northwest and depart overland to the southeast, toward Springfield. Many birds may require a distance of five miles to reach 500 feet, and the tips of the turbine blades from this project will likely extend more than 600 feet above the elevations of the Refuge.

However, avian studies at other wind farms in the vicinity of large concentrations of waterfowl in Illinois have shown that, despite a high rate of exposure to operating wind turbines, waterfowl have one of the lowest mortality rates of any group of migratory birds, and this pattern seems to hold true in other States, as well. The Department is not unduly concerned about impacts on the migratory flocks using the Refuge, but pre-construction avian studies should pay particular attention to the use, if any, of the project area by birds based at the Refuge.

It is the biological opinion of the Department the proposed action is unlikely to adversely modify the Meredosia Refuge INAI Site.

Spunky Bottoms INAI Site. Located nearly 16 miles from the project area, in Brown County facing the Meredosia National Wildlife Refuge from the west bank of the Illinois River, Spunky Bottoms is part of the same floodplain wetland complex, and has many of the same ecological attributes as the Meredosia Refuge. The significance of this Site to the project, and that of the project to the Site, are identical to those of the Meredosia Refuge.

It is the biological opinion of the Department the proposed action is unlikely to adversely modify the Spunky Bottoms INAI Site.

Please review the Attachment for additional important information. Consultation on the part of the Department is terminated, unless the County desires additional information or advice related to this proposal. In accordance with 17 Ill. Adm. Code 1075.40(h), Cass County must notify the Department of its decision regarding these recommendations, whether it will:

- Allow the action to proceed as originally proposed;
- Require the action to be modified per Department recommendations (please specify which measures if not all will be required); or
- Forgo the action.

This consultation is valid for two years unless new information becomes available which was not previously considered; the proposed action is modified; or additional species, essential habitat, or Natural Areas are identified in the vicinity. If the project has not been implemented within two years of the date of this letter, or any of the above listed conditions develop, a new consultation is necessary.

The natural resource review reflects the information existing in the Illinois Natural Heritage Database at the time of the project submittal, and should not be regarded as a final statement on the site being considered, nor should it be a substitute for detailed site surveys or field surveys required for environmental assessments. If additional protected resources are encountered during

the project's implementation, the applicant must comply with the applicable statutes and regulations. Also, note that termination does not imply IDNR's authorization or endorsement of the proposed action.

Please contact me if you have questions regarding this review.

Sincerely,

Keith M. Shank
Impact Assessment Section
Division of Ecosystems and Environment
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(217) 785-5500

cc: Jenny Skufca, Illinois Nature Preserves Commission
Jim Valleroy, Terracon, Inc.

Attachment

ATTACHMENT

Windtron Wind Farm
Cass County

Pursuant to the Department's authority to conserve and to protect the fauna and flora of Illinois, the following information is provided about possible impacts to non-listed species and important conservation resources that are or may be found in the area. In certain instances it also provides recommendations for the consideration of the County and the developer.

Avian Wildlife. The construction of large-scale wind farms has implications for a broad range of wildlife; it may result in increased mortality, fragmentation of essential habitats, and displacement of important life-cycle activities, such as feeding and nesting. To assess the effects of such facilities, it is imperative to establish a base-line of wildlife presence and activity within and near the proposed facility to which later conditions may be compared in order to discern how they may have been affected by the wind farm or other human modifications of the area. The nearby presence of a federal wildlife refuge and the Illinois River flyway renders baseline observations even more important than is usual.

Recommendation #A1. The Department recommends pre- and post-construction assessments of avian usage within the project area. Consideration of all seasons should be included, but particularly migratory seasons. Such studies should include mapping of habitats within and adjacent to the project footprint, and consideration should be given to periodic repetition of such studies during the life of the project to detect/monitor significant shifts in wildlife usage. Foraging by waterfowl based at the Meredosia Refuge may be of particular importance.

Bats. Although the Indiana Bat is currently the only federally-listed or state-listed bat believed to occur in or near Cass County, other bat species are abundant in the area. IDNR considers the cumulative risk to species, and the high bat mortality that can be found at some wind farms, coupled with the westward movement of White-Nose Syndrome, suggests increasing threats to bat species in Illinois.

In anticipation of the arrival of White Nose Syndrome (WNS), Wisconsin recently listed four additional species of bats, all of which are present in Cass County. Illinois is awaiting the results of investigations of winter hibernaculae in early 2011 before considering what measures may be appropriate in response to WNS. The four species newly listed by Wisconsin are: **Northern Long-Eared Bat** (*Myotis septentrionalis*), **Little Brown Bat** (*Myotis lucifugus*), **Big Brown Bat** (*Eptesicus fuscus*), and the **Tricolor Bat** (*Perimyotis subflavus*), formerly known as the **Eastern Pipistrelle**.

Recommendation #A2. The Department recommends the applicant perform at least one fall migration season (July-October) of acoustic bat monitoring to assess the level of bat activity within and through the project footprint. The Department recommends consideration of a requirement to periodically repeat, perhaps on a five-year cycle, monitoring activities in order to detect significant shifts in bat species or abundance. The use of full-spectrum acoustic equipment offers an improved opportunity to identify the species of bats present without also

conducting mist-net sampling. If acoustic monitoring indicates a high level of bat activity, further assessment is appropriate, including mist-net studies and telemetry studies to confirm species identification and roosting locations. At a minimum, high levels of pre-construction bat activity should prompt post-construction mortality studies.

Recommendation #A3. Operational curtailment is one method demonstrated to consistently and significantly reduce bat mortality at wind farms with minimal losses in power production. Curtailment consists of adjusting the operational "cut-in" wind speed at which wind turbines initiate rotation. If bat activity in the area is high, Windtron may wish to consider implementing a curtailment policy to minimize bat mortality.

Aviation Warning Lights. Turbines more than 200 feet high are required by the Federal Aviation Administration to have flashing warning lights to warn aviators of potential collision hazards. Usually, flashing red lights are used, which most researchers agree are less likely to attract night-flying migratory birds than are flashing white lights or steady red lights. This does not eliminate collision risk caused by lighting, however.

The light flashes are typically synchronized across a wind energy facility, so that all lit turbines flash together. In overcast conditions, red light is reflected from the cloud deck back to the ground. This may have the effect of altering the behavior of nocturnal terrestrial wildlife, whose visual organs are typically adapted to low light or spectra in the infrared or ultraviolet ranges. Flashing illumination may affect the balance between predators and prey, by either enhancing or interfering with the ability to detect prey or predators.

It is the biological opinion of the Department the proposed action is likely to result in nocturnal migrant bird mortality and to adversely affect nocturnal terrestrial wildlife due to intermittent illumination from aircraft warning lights.

Recommendation #A4. To minimize the adverse effects of intermittent illumination, a wind farm should be equipped with an FAA-approved Audio-Visual Warning System (AVWS) so that warning lights operate ONLY when approaching aircraft are at risk of collision with a wind turbine, and remain off under other circumstances.

Bald Eagle, *Haliaeetus leucocephalus*. Although de-listed by both the federal and Illinois governments, this species remains protected by two federal laws, the *Migratory Bird Treaty Act* and the *Bald and Golden Eagle Protection Act*. Illinois has been experiencing a strong population increase, suggesting that Eagles will be occupying much new territory. Large numbers of Bald Eagles are present along the Illinois River and the lower Sangamon River during the winter, and in recent years a number of new nests have been constructed along the middle Sangamon River and its tributaries in Cass, Mason, Menard, and Sangamon Counties.

The Department is aware of a case in Ontario of a juvenile Bald Eagle colliding with a wind turbine. Juvenile birds, which may range as far as ten miles from the aerie, may be more vulnerable to collision, and it is also possible that construction of wind turbines may affect the selection of new nesting sites or the use of existing nests. Bald Eagles typically forage over streams, lakes, and ponds. Eagles are not limited to river corridors during migratory flights.

It is the biological opinion of the Department the project, at present, is not likely to jeopardize the Bald Eagle or to adversely affect its essential habitat. However, if avian studies indicate use of the project's airspace by Bald Eagles, the applicant should consider discussing the matter with the U. S. Fish & Wildlife Service.

Osprey, *Pandion haliaetus*. Several pairs of this endangered migratory raptor have recently established breeding sites along the Illinois River in Fulton County, approximately 40 miles north of the proposed project footprint. However, the routes they follow during migration are unknown.

This species has the distinction of being the only State-listed endangered or threatened bird known to have been "taken" during an interaction with a wind turbine. In late September 2007, a juvenile Osprey migrating south through McLean County was injured by a wind turbine. Persons conducting bat mortality monitoring found the injured bird, which was taken to a veterinarian, who determined that one wing was simply dislocated. The joint was re-set and the bird was successfully released the following day.

Such a mild injury from an encounter with a 1.6 MW wind turbine could only have resulted from a "near-miss" by a turbine blade, or from colliding with the inner limb of a blade near the hub. Anything else would have been fatal. Most likely this bird was roosting or attempting to roost on the nacelle when the injury occurred. Most Ospreys hatched in Illinois are reared in nests built on manmade platforms, a fact which may have induced the bird to attempt to perch on the nacelle.

Another aspect of interest from this incident is the fact it took place in McLean County, many many miles from the nearest documented breeding site for the Osprey. Subsequently, an Osprey was observed during the spring migration at a second McLean County wind farm. McLean County was not anticipated to be on any migratory route for a raptor which feeds primarily on fish. Neither the origin nor the migratory destination of either bird is known.

The knowledge that Ospreys breed on the Illinois River only 40 miles to the north and migrate to locations on the Gulf of Mexico and South Atlantic Coast suggests it is possible Ospreys will pass in close proximity to the proposed wind farm.

It is the biological opinion of the Department the proposed action is unlikely to adversely affect the Osprey, but avian studies should pay particular note to any observations of this species.

Sanganois State Conservation Area. This 10,000-acre IDNR-owned facility is located at the confluence of the Sangamon and Illinois Rivers. All of the Conservation Area lies between five and eleven mile north of the proposed project footprint, but at elevations about 200 feet lower. Consequently, wind turbines will be visible from most points within the Conservation Area except when they are screened by trees. At night, the aircraft warning lights of the project will be clearly visible, and when low cloud ceilings are present, intermittent illumination may have an adverse effect on wildlife present within the boundaries. Whether and to what degree wildlife may become accustomed to such lighting is unknown.

Installation of an FAA-approved Audio-Visual Warning System (AVWS) would significantly reduce the impacts of aviation lighting, thus preserving the natural character of the Conservation Area.

Jim Edgar Panther Creek State Fish & Wildlife Area. All of this 16,000-acre IDNR facility lies between three and ten miles east of the project area, much of it at elevations approximately that of the proposed wind farm. Turbines will be directly visible from many locations throughout the SFWA, although in many places forest vegetation and topography will prevent a direct view. Daytime visibility may not be intrusive for most recreational users.

At night, the entire SFWA may be affected to some degree by intermittent illumination from the turbines' aircraft warning lights, especially when there exists a low cloud ceiling. Night lighting has some potential to alter the behavior of wildlife on the SFWA, as well as to adversely affect the "dark sky" experience of campers.

Installation of an FAA-approved Audio-Visual Warning System (AVWS) would significantly reduce the impacts of aviation lighting, thus preserving the "wildness" of the SFWA.

Weinberg-King State Fish & Wildlife Area. This 2400-acre IDNR property is located on the west bank of the Illinois River directly north of the Spunky Bottoms INAI Site. At a distance of 15 to 17 miles west of the project area, turbines may be visible from Weinberg-King only on the clearest of days, but are likely to be clearly visible at night. However, at this distance intermittent illumination from aircraft warning lights is unlikely to be as important as at nearer locations. Installation of an FAA-approved Audio-Visual Warning System (AVWS) would minimize any effects of aviation lighting.

Chorus Frog Mitigation Area. This 61-acre parcel, immediately south of the **Charles "Chinee" Colvin Land & Water Reserve**, eight miles west of the project area, was acquired by the Illinois Department of Transportation as mitigation for adverse impacts to **Illinois Chorus Frog** habitat associated with highway improvements in and around Beardstown. It was later conveyed to the Department of Natural Resources.

Being adjacent to the Land & Water Reserve, this site provides additional essential habitat for the **Plains Hognose Snake**, **Regal Fritillary Butterfly**, and the **Umbrella Sedge**, as well as for the Illinois Chorus Frog.

The most likely potential impact to this area remains that of the aircraft warning lights, although this close to the Beardstown Airport and the City itself the lights will likely be less intrusive. However, the installation of an FAA-approved Audio-Visual Warning System (AVWS) would minimize any effects of aviation lighting.