BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY CROCKER WIND FARM, LLC FOR A PERMIT OF A WIND ENERGY FACILITY AND A 345 KV TRANSMISSION LINE IN CLARK COUNTY, SOUTH DAKOTA, FOR CROCKER WIND FARM	))))))	EL 17-028

DIRECT TESTIMONY OF

JOYCE PICKLE

ON BEHALF OF

CROCKER WIND FARM, LLC

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Q. Please state your name and business address for the record.

A. My name is Joyce Pickle. My business address is 7575 Golden Valley Rd., Suite 350, Golden Valley, Minnesota 55427

Q. Can you briefly describe your education and experience?

A. I have been employed at Western EcoSystems Technology, Inc. (WEST), an environmental and statistical consulting company, for over three years. Prior to WEST, I worked at two other environmental consulting firms for a total of 14 years. My primary experience has been in preparing permit applications, developing NEPA documents, and managing field work for pre- and post-construction studies primarily for energy projects. I have worked on feasibility studies, biological field surveys, constraints analyses and regulatory compliance issues for transmission line and wind projects in over 20 states. My technical background is in the area of biology and I received my Masters of Science from Iowa State University.

Q. Have you attached a resume or CV.

A. Yes, my resume is attached as Exhibit A of my testimony.

Q. Have you previously submitted or prepared testimony in this proceeding in South Dakota?

A. No.

Q. What is the purpose of your direct testimony?

A. To summarize the information in the sections of the application I contributed to, and to provide additional information and clarification.

Q. Which sections of the application are you responsible for?

A. I managed the terrestrial wildlife surveys, along with the development of a draft Bird and Bat Conservation Strategy, information from which are summarized in the following sections:

- 13.1.10 (Existing Terrestrial Ecosystem - Wildlife),
- 13.1.11 (Existing Terrestrial Ecosystem – Sensitive Terrestrial Species),
- 13.2.5 (Impacts to Terrestrial Systems – Wildlife – Wind Farm),
- 13.2.6 (Impacts to Terrestrial Systems – Wildlife – Transmission Line),
- 13.2.7 (Impacts to Terrestrial Systems – Sensitive Species – Wind Farm and Transmission Line)

Q. Describe the information contained in Section 13.1.10 - Existing Terrestrial Ecosystem - Wildlife

A. The section describes the regulatory environment related to potential wildlife impacts associated with a wind project, including the Migratory Bird Treaty Act and the USFWS Wind Energy Guidelines, which is a tiered approach to assessing wildlife conservation concerns at all stages of wind energy development. The data gathered in the initial site assessment (Tiers I and II) is summarized, including the presence of tracts of grassland (native and non-native, some on previously undisturbed lands) and prairie potholes which could provide habitat for multiple terrestrial species. This section also summarizes the results of several Tier III field surveys that have been conducted to date, including: grouse lek surveys (no leks have been documented), eagle nest and use surveys (no eagle nests documented in the Project, and low numbers of bald eagles have been observed within the Project), and potential wildlife congregation areas in the form of the prairie pothole lakes. Avian use surveys are currently ongoing, but the section documents a list of species that have been observed at the Project in the first year of surveys (Appendix B of the application).

Q. Are there any updates or clarifications you want to make on the information contained in Section 13.1.10?

A. Yes. On page 13-9 of the application there is a reference to lek surveys being conducted in 2016 and 2017. I would like to clarify that lek surveys were conducted in 2016, and based on the results (no leks were documented) and the fact that no historical leks were documented in the area, no lek surveys were conducted in 2017.

Regarding the reference to distance to eagle nests (also on page 13-9) I would like to clarify that there are no eagle nests located within 3 miles of the current Project boundary (as described further on page 13-12). The reference to no eagle nests being located within 5 miles is referring to the "original" project boundary that was surveyed for eagle nests in 2016; when the Project boundary expanded to the north, the nearest distance became 3.2 miles.

I would also like to provide an update to information provided on page 13-12, based on the eagle nest survey conducted in 2017. WEST conducted an aerial survey within 10 miles of the Project on April 13, 14 and 18, 2017. A total of five bald eagle nests were detected during the aerial survey, all outside of the Project: four occupied and active bald eagle nests and one unoccupied and inactive nest. The mean inter-nest distance for active bald eagle nests observed during the 2017 aerial survey was approximately 12.0 mi (19.4 km), with a half-mean inter-nest distance of 6.0 mi (9.7 km). The closest bald eagle nest was 3.2 miles from the Project, with the remaining nests ranging from 4.1 to 9.2 miles from the Project.

Q. Describe the information contained in Section 13.1.11 - Existing Terrestrial Ecosystem – Sensitive Terrestrial Species

A. Clark County is in the range of six federally listed species: one bat (northern-longed bat), two birds (rufa red knot and whooping crane), two butterflies (Dakota skipper and Poweshiek skipperling), and one fish (Topeka shiner). There are no records of any of these federally-listed species in the Project. There is limited habitat for the northern long-eared bat in the Project, and acoustic surveys conducted in summer 2016 confirmed likely absence of these species during the breeding season. There is potential migration stopover habitat for the rufa red knot and whooping crane, although neither of these would be anticipated to be frequent migrants at the Project, and no observations of either species have been made during the Tier III studies to date. There are several stream segments, particularly in the western portion of the Project, that may provide habitat for the shiner. The grassland in the Project, particularly areas that are not degraded by grazing and retain a community of forbs and grasses, provide suitable habitat for the skipper. However, suitable habitat within potential impact corridors were surveyed in the butterflies' flight season in 2017 and no observations of either species was made.

There is one state-listed species, the northern river otter, that may occur in Clark County, but there are no records of this species or any other state sensitive species within the Project area. Several records of state sensitive bird species (species tracked but not afforded protections under the state endangered species law statute) in the Wildlife Diversity Program database were observed within two miles of the Project, including the snowy egret, great egret, great blue heron and black-crowned night heron.

Q. Are there any updates or clarifications you want to make on the information contained in Section 13.1.11?

A. Yes. I would like to clarify the last sentence of the section on Northern long-eared bats, which ends on page 13-15. The conclusion that this species is likely absent from the Project is applicable to the summer season; it is possible that the species would pass through the Project during migration, as described further on page 13-26 in Section 13.2.7.

Q. Describe the information contained in Section 13.2.5 – Impacts to Terrestrial Systems – Wildlife – Wind Farm

A. The Project is proposed in an area of primarily grassland (native and non-native), with cultivated fields and pothole lakes. Avian fatalities are anticipated to occur at the Project, but it is unlikely to affect populations of most species, especially at a regional scale. Pre-construction avian use surveys are still ongoing, but the information gathered to date indicate that passerine species (particularly those associated with grassland habitats) and waterfowl/waterbird groups make up the majority of the bird use in the Project area and therefore this section provides information from other projects in the Midwest to give context for potential fatality rates.

Overall, fatality rates between 0.3 to 12 birds/MW have been documented at other wind farms in the U.S. For wind farms located in areas of potholes or waterfowl management areas with relatively high use by waterbirds and waterfowl, fatality rates of this bird group have been documented at low rates between 0.38 to 0.79 birds/MW.

This section also discussed the potential direct impacts to bats. Given the relatively low bat activity levels documented in the pre-construction acoustic surveys and general lack of wooded habitat, it is anticipated that bat fatalities at the Project will be on the lower end of rates documented at other wind farms in the Midwest, with risk relatively higher in the fall migration peak period. However, there has not been enough research to determine if there is a straight-line relationship between pre-construction bat activity and post-construction fatality rates, and this section provides a range of bat fatality rates that have been documented at other wind projects in the Midwest for context (0.41 to 2.81 bats/MW/study period).

Finally, this section lists the avoidance, minimization and mitigation measures that are being proposed to further reduce impacts to wildlife from the wind project.

Q. Is there additional information you would like to convey about potential impacts to terrestrial game animals?

A. Yes. The Project is not anticipated to significantly affect the presence or distribution of game mammals in the area. During construction, some animals may temporarily move away from the Project due to construction noise and activity. Once the Project is operational, limited effects are anticipated. No new fences will be built as part of the Project (besides small fences around the substation), so the movement of game mammals will not be affected. Project-related traffic on local and Project roads has the potential to result in collisions with game mammals, but Project staff will travel at low levels of speed on Project roads and will follow the posted speed limit on township and county roads, and therefore this risk will be minimized.

Q. Is there additional information you would like to convey about potential impacts (direct or indirect) to non-migratory game birds?

A. Yes. Pre-construction surveys at the Project have documented the presence of wild turkey (*Meleagris gallopavo*), ring-necked pheasants (*Phasianus colchicus*) and sharp-tailed grouse (*Tympanuchus phasianellus*), with pheasants making up the majority of game bird sightings (69 documented over the first year of avian use surveys and two additional documented during a month of breeding bird surveys). Four sharp-tailed grouse were documented at the Project (two during the first year of general avian use surveys and two during the breeding bird surveys); aerial lek surveys showed no grouse leks within a mile of the Project area. Wild turkey (24 individuals) were documented in the fall and winter during the first year of avian use surveys. Project construction could affect game birds through disturbance of habitat, potential fatalities from construction equipment (hitting adults or running over nests), and disturbance or displacement effects from construction activities. However, potential mortality from construction equipment is expected to be very low. Equipment used in wind energy facility construction generally moves at slow rates or is stationary for long periods (e.g., cranes).

Upland game birds account for approximately 7.5% of the fatalities documented at North American wind energy facilities, according to publicly available data (609 out of 8,069 fatalities). About 29% of the upland game bird fatalities were of ring-necked pheasant (179 fatalities) and approximately 5.4% and 1.6% were of turkey (33 fatalities) and sharp-tailed grouse (10 fatalities), respectively. Additionally, some evidence suggests that some of the upland game bird fatalities may be attributed to other sources of mortality, such as predation and vehicle collisions. For instance, at Buffalo Ridge, 2,482 fatality searches were conducted over four years on study plots without turbines to estimate reference mortality in the study area, and 31 avian fatalities were found, eight of which were upland game birds (Johnson et al. 2000). While the cause of death of many birds found in reference plots could not be determined, most appeared to have been caused by predators or vehicles. Reference mortality was estimated to average 1.1 fatalities per plot per year, compared to 0.98, 2.27, and 4.45 fatalities per turbine search plot per year in the Phase 1, 2 and 3 wind projects, respectively (Johnson et al. 2000). During eight pre-construction searches of five transects at a study area in Montana, three upland game bird fatalities were found, two of which were presumed raptor kills and another from an unknown cause (Harmata et al. 1998). These studies suggest that not all upland game bird carcasses found are attributable to wind turbine collisions.

Turkeys do not appear to be particularly susceptible to collisions with wind turbines and the Project would not be expected to affect their population or movement within the Project area or in adjacent hunting areas. Pheasants have been documented more frequently as fatalities at wind projects in the U.S. and they were the most commonly documented game bird species at the Project so this species may be at relatively higher risk than the other gamebird species. However, although it is possible that individual pheasants and turkeys may collide with wind turbines and/or be hit by project-related vehicles, overall these anticipated levels of mortality would not be expected to affect local populations.

There have been some studies that indicate that indirect displacement/avoidance effects can occur, particularly by grouse species at leks, to anthropogenic infrastructure (Robel et al. 2004; Pruett et al 2009, LeBeau et al. 2014). Studies focusing on the effects of wind projects on grouse reproductive success have shown mixed results, with some studies indicating that wind turbines may affect habitat and/or stress levels to the point of a negative effects (Robel et al. 2004, Pitman et al. 2005, Hagen et al. 2011, Sheriff et al. 2011, Willis 2013) while other studies have indicated that the presence of wind projects may change the predation habits of raptors, with resulting beneficial effect to grouse species (Pearce-Higgens et al. 2009, Garvin et al. 2011, Smith and Dwyer 2016). Recent work in Nebraska suggests grouse species avoid roads more than turbines and that habitat factors were more of a selection criteria for these species than the presence of turbines (Harrison et al 2017). Given the low numbers of sharp-tailed grouse documented during the surveys, the lack of documented leks in the area, and the fact the sharp-tailed grouse are at relatively low risk of collisions with wind turbines, the Project is anticipated to have a negligible effect on this species.

Q. Is there additional information you would like to convey about potential impacts (direct or indirect) to migratory game birds?

A. Yes. The data available from the studies summarized in Section 13.2.5 indicate that while wind projects located in proximity to waterfowl migration stopover and breeding habitat do result in some mortality, the rates do not appear to approach levels that would affect populations (overall 48.4 million breeding ducks, 13.5 million migrating mallards in 2016, as documented in the USFWS' Waterfowl Population Status report) – and some studies have shown no mortality at all even in areas with high waterfowl use during operations.

It should also be noted that in a recent study of wind projects in North and South Dakota, breeding duck pairs were documented to be lower density (reduction in 4 – 56%) in wind project areas compared to reference sites without wind projects (Loesch et al. 2013), indicating a displacement effect during breeding. However, other studies have indicated that the presence of wetlands in close proximity to prairie pothole wetlands in North and South Dakota have not had a significant effect on breeding pair density, and have not impeded waterfowl movement between wetland complexes (Jones et al 2010, USFWS 2009). Waterfowl were observed to fly at lower altitudes, possibly to avoid turbines.

Overall, the Project has the potential to affect the movements and breeding densities of waterfowl in the immediate vicinity of the wind turbines. Waterfowl would still be expected to utilize the prairie potholes in the Project boundaries and adjacent areas during spring and fall migration (including hunting season), and direct collision impacts would not be anticipated to significantly affect their numbers in the area. It is possible that breeding duck densities would be lower in the Project area around turbines compared to adjacent areas, although it is unknown if this breeding displacement would be long term or if the effect would decrease after the first few years of operation as waterfowl acclimate to the presence of the turbines.

Q. Is there additional information you would like to convey about potential impacts (direct or indirect) to non-game migratory grassland birds?

A. Yes. Passerines (small birds) composed about 62.5% of wind turbine fatalities in 116 studies included in a recent analysis (Erickson et al. 2014). A total of 3,110 fatalities represented by 156 species of small passerines were found during the studies. From this it was estimated that about 134,000 to 230,000 fatalities of small passerines occurred each year in the United States and

Canada combined, a rate of 2.10 to 3.35 small birds/MW of installed capacity. Although passerines make up the majority of fatalities at wind projects, the fatalities are spread out among multiple species, with each species experiencing relatively low direct impacts, ranging from 0.008 to 0.043% of respective continental populations suffering mortality each year from collisions with wind turbines. In comparison, researchers estimated that over six million passerines were killed annually from collisions with communication towers (passerines composed 97% of all fatalities), and annual mortality for individual species ranged from 1.2% to 9.0% of their estimated total populations for the twenty species most affected (Longcore et al. 2012, 2013).

Indirect impacts have been documented for some grassland passerine species, which may be due to the birds avoiding turbine noise and maintenance activities (Drewitt and Langston 2006). Construction may also reduce habitat effectiveness due to the presence of access roads and gravel pads surrounding turbines (Leddy 1996, Johnson et al. 2000a). Leddy et al. (1999) surveyed bird densities in Conservation Reserve Program (CRP) grasslands at the Buffalo Ridge wind energy facility in Minnesota and found the mean densities of 10 grassland bird species were four times higher in areas located 180 m from turbines than they were in grasslands nearer turbines. Johnson et al. (2000a) found reduced use of habitat within 100 m of turbines by seven of 22 grassland-breeding birds following construction of the Buffalo Ridge facility in southwest Minnesota. Shaffer and Buhl (2015) reported that seven species of breeding grassland birds were displaced during operation at three facilities in North Dakota and South Dakota for two to five years after construction, based on the average density along transect survey routes. These seven species included bobolink (*Dolichonyx oryzivorus*), chestnut-collared longspur (*Calcarius ornatus*), clay-colored sparrow (*Spizella pallida*), grasshopper sparrow (*Ammodramus *savannarum*), Savannah sparrow (*Passerculus sandwichensis*), upland sandpiper (*Bartramia longicauda*), and western meadowlark (*Sturnella neglecta*), with the strongest displacement results reported for grasshopper sparrow and clay-colored sparrow. All seven of these species were documented at the Project during breeding bird surveys. No displacement effects were detected by Shaffer and Buhl (2015) for other grassland species, such as killdeer (*Charadrius vociferous*) and vesper sparrow (*Pooecetes gramineus*).

It is therefore anticipated that direct impacts to passerine species will occur at the Project, although not at levels where any individual species' population would be affected. Indirect impacts to grassland-breeding birds also will likely occur, particularly for species with documented displacement behaviors. These species would be expected to move to adjacent grassland areas during the breeding season (the distance varying by species but generally between 100 m to 300 m away from turbines [Shaffer and Buhl 2015]) during at least the first two to five years after construction.

Q. Describe the information contained in Section 13.2.6 - Impacts to Terrestrial Systems – Wildlife – Transmission Line

A. The section describes measures that will be taken to avoid and reduce risk to wildlife (primarily avian) from the transmission line: the transmission facilities will be based on the Avian Power Line Interaction Committee's suggested measures designed to minimize the risk of electrocution of birds, the collection system will be placed underground to the extent practicable, and flight diverters and other devices may be employed along some areas of overhead lines.

Q. Describe the information contained in Section 13.2.7 - Impacts to Terrestrial Systems – Sensitive Species – Wind Farm and Transmission Line

A. Crocker is continuing to coordinate with the USFWS on all federally listed and protected species. In general, the Project is expected to have minimal direct impacts to sensitive species.

There is limited habitat for northern long-eared bats, and surveys have shown they are likely absent from the area in the summer breeding season. They may pass through the area in fall migration, and there is potential for individual bats to collide with the wind turbines, but northern long-eared bats appear to be at less risk of collision than other species of bats. Currently, the 4(d) rule covers incidental take of northern long-eared bats.

Impacts to Topeka shiner will be avoided during construction through proper implementation of erosion and sediment control BMPs, and once the Project is operational no impacts to water quality or to stream beds that may provide habitat would occur.

While the rufa red knot may pass through the Project during migration, it has not been observed during surveys to date, and it would likely be in the form of a few individual migrants, and risk of collision would be low.

There is suitable habitat for Dakota skipper and Powesheik skipperling within the Project, including in corridors that may be disturbed by construction. Species-specific surveys conducted during the flight season by permitted biologists in July 2017 did not document either of these species; therefore these species are likely currently absent from the Project area.

The Project is along the eastern edge of the migration corridor for the whooping crane, and is outside of the 220-mile band where 95% of sightings have occurred. There is potential stopover habitat within the Project, but more preferred stopover habitat is along the James and Missouri River valleys away from the Project, and it is unlikely that whooping cranes will regularly use the Project during migration. Although whooping cranes are not anticipated to migrate through the Project area on a regular basis, because collisions with power lines have been a significant cause of whooping crane mortality (there are no records of collisions with wind turbines), Crocker is proposing to implement measures to minimize potential avian collisions with overhead powerlines, as described above in Section 13.2.6.

Q. Is there additional information you would like to convey about the information contained in Section 13.2.7?

A. Yes. As stated in the application, the Project is located outside of the 95% migration corridor for the whooping crane (the 220-mile corridor from Texas to Canada where 95% of all whooping crane sightings have occurred). It should be noted that a South Dakota state-specific migration corridor indicates that whooping cranes spread out more when they pass through South Dakota than in the "normalized" overall migration corridor. In this state-specific corridor, the Project does fall within the outer (90 – 95%) edge of the corridor. The conclusions in the section generally remain the same: it is possible that whooping cranes may stop in the Project area at some point during the operational life of the Project, but given the location of the Project at the edge of the corridor this would not be expected to be a frequent or likely occurrence. Crocker is continuing to coordinate with the USFWS on this species.

Q. Does this conclude your written pre-filed direct testimony?

A. Yes

Dated this 27 day of September, 2017.

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Joyce Pickle

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