

November 16, 2018

Grant County Planning Commission  
Grant County Courthouse  
210 E 5<sup>th</sup> Ave  
Milbank, SD 57252

**RE: Update of Grant County Compiled Zoning Ordinances Section 1211. Energy System (WES) Requirements**

Planning Commissioners:

In June 2018, Ollson Environmental Health Management (OEHM) was retained by NextEra Energy Resources (NEER) to review the *Grant County Zoning Ordinance Section 1211. Energy System (WES) Requirements*, with respect to protection of public health and safety. It was understood by OEHM that the Grant County Planning Commission would be undertaking a review and updating the *WES Requirements*. At that time I provided the Board with a letter report dated June 8, 2018 that outlined the science behind the proper siting of wind turbines to ensure the protection of public health and safety. The original letter is attached as Appendix A to this updated letter.

A draft proposed change to the WES Requirements ordinance was published on October 16, 2018, which is being considered by the Planning and Zoning Board on November 19, 2018. OEHM supports all of the setback requirements in Table 1211-1.

**Table 1211-1  
WES Setbacks**

	<b>Setback Distance*</b>
<b>Participating Residence, business, church, school, building owned and/or operated by a governmental entity</b>	<b>1,500 Feet**</b>
<b>Non-Participating Residence, business, church, school, building owned and/or operated by a governmental entity</b>	<b>1,500 Feet</b>
<b>Municipal Boundaries existing at the time of Conditional Use Permit Application</b>	<b>5,280 Feet</b>
<b>Distance from Public Right-of-Way</b>	<b>500 Feet or 110% of the vertical height of the wind turbine, whichever is greater***</b>
<b>Distance from Property Line</b>	<b>500 Feet or 110% of the vertical height of the wind turbine, whichever is greater ****</b>

\* Setback distance to be measured from the wall line of the neighboring principal building to the base of the WES tower. The vertical height of the wind turbine is measured from the ground surface to the tip of the blade when in a fully vertical position.

\*\* No less than 110% of the vertical height of the wind turbine if agreed upon by participating entity.

\*\*\* The horizontal setback shall be measured from the base of the tower to the public right-of-way.

\*\*\*\* The horizontal setback shall be measured from the base of the tower to the adjoining property line unless wind easement has been obtained from adjoining property owner.

In addition, OEHM supports the new requirements for sound and shadow flicker:

9. Flicker Analysis. A Flicker Analysis shall include the duration and location of flicker potential for all schools, churches, businesses and occupied dwellings within a one (1) mile radius of each turbine within a project. The applicant shall provide a site map identifying the locations of shadow flicker that may be caused by the project and the expected durations of the flicker at these locations from sun-rise to sun-set over the course of a year. The analysis shall account for topography but not for obstacles such as accessory structures and trees. Flicker at any receptor shall not exceed thirty (30) hours per year within the analysis area.

a. Exception: The Board of Adjustment may allow for a greater amount of flicker than identified above if the participating or non-participating landowners agree to said amount of flicker. If approved, such agreement is to be recorded and filed with the Grant County Register of Deeds. Said agreement shall be binding upon the heirs, successors, and assigns of the title holder and shall pass with the land.

and

13.14 Noise. Noise level shall not exceed 50 45 dBA, average A-weighted Sound pressure including constructive interference effects measured twenty-five (25) feet from at the perimeter of the principal and accessory structures of existing off-site non-participating residences, businesses, and buildings owned and/or maintained by a governmental entity.

Noise level shall not exceed 50 dBA, average A-weighted Sound pressure including constructive interference effects measured twenty-five (25) feet from the perimeter of participating residences, businesses, and buildings owned and/or maintained by a governmental entity.

Noise level measurements shall be made with a sound level meter using the A-weighting scale, in accordance with standards promulgated by the American National Standards Institute. A L90 measurement shall be used and have a measurement period no less than ten (10) minutes unless otherwise specified by the Board of Adjustment.

These new setback distances, sound level at non-participating homes, and shadow flicker requirements are consistent with other South Dakota counties that have recently updated their ordinances. For example, Deuel County and Codington County recently passed very similar requirements for wind energy systems. The proposed changes to the Grant County WES Requirements are supported by the published scientific research in the field (Appendix A).

It is important to recognize that sound and distance setbacks should go hand in hand. For example, to achieve the 45 dBA one would have to be approximately 1,500 – 1,600 feet from wind turbines. This is demonstrated in the recently submitted EPAC Sound and Shadow Flicker report for the Crowned Ridge I/II project CUP application before Grant County. At the recent CUP hearing on November 13, 2018 a proposed condition of setting turbines no closer than three quarters of a mile (3,960 ft) was made. This setback distance is excessive, provides no greater protection for public health, and would result in a sound level of likely <40 dBA.

### **South Dakota Public Utilities Commission**

There is no South Dakota state regulated sound or setback distance to non-participating homes. Rather the Public Utilities Commission (PUC) has traditionally adopted county ordinance requirements in issuing project approval. However, in the latest two permits granted Crocker Wind Farm, LLC (EL17-055, June 12, 2018, attached Appendix B) and Dakota Range I/II Wind, LLC (PUC EL18-003, July 7, 2018, attached Appendix C) they set Permit Conditions as follows:

29. The Project, exclusive of all unrelated background noise, shall not generate a long-term average sound pressure level (equivalent continuous sound level, Leq), as measured over a period of at least two weeks, defined by Staff, that includes all integer wind speeds from cut in to full power, of more than 45 dBA at any non-participating residence or more than 50 dBA at any participating residence. Applicant shall, upon Commission formal request, conduct field surveys or provide post-construction monitoring data verifying compliance with specified noise level limits. If the long-term average level exceeds 45 dBA at any non-participating residence or 50 dBA at any participating residence, then the Project Owner shall take whatever steps are necessary to rectify the situation. Sound monitoring will not be repeated in a representative area during any five-year period unless operational or maintenance changes result in a reasonable assumption of higher turbine sound levels.
- c) a shadow flicker analysis showing the anticipated shadow flicker levels will not exceed Applicant's voluntary commitment of 30 hours per year at any residence; and

Importantly under the Findings of Fact for both permits the PUC found **"The facility will not substantially impair the health, safety or welfare of the inhabitants."** These Finding of Facts are related to the 45 dBA sound limit for non-participating residents and no more than 30 hours of shadow flicker a year.

It is clear that the PUC has not standardized a required setback distance to non-participating homes, rather it has focused on the protective sound level of 45 dBA. Both decisions make reference that the projects will comply with county ordinance setbacks. The Clark County setback requirement is 3,960 ft to non-participating landowners residents, while the Grant County setback requirement (current) to non-participating homes is 1,000 ft. Both setback distances were recognized by the PUC as being protective of health, but again OEHM believes that their primary focus was on the audible sound standard of 45 dBA.

In OEHM's opinion the Clark County setback of 3,960 ft is excessive and not consistent with the PUC Staff's retained acoustics expert, Mr. David Hessler, who proposed that 45 dBA at non-participating homes would be sufficient for protection of the community. At the same time OEHM also believes that the Grant County existing setback of 1,000 is not far enough and should be extended. As detailed above, in order to achieve a 45 dBA sound level at the exterior of a home one would need to be approximately 1,500 ft from a residence. Therefore, the distance set in the proposed Grant County WES Requirements ordinance change is consistent with recent PUC findings of protection of health and should be adopted.

Most, if not all, of the proposed changes to the Grant County ordinance changes are consistent with these recent PUC decisions. It is important to note that the PUC Commission received written and oral testimony by their staff's third-party acoustics expert (Mr. David Hessler) and experts in acoustics (Mr. Robert O'Neal) and public health (Dr. Mark Roberts) brought by the proponents. They were also provided with material from interveners. Therefore, the findings of the PUC Commission were based on sound scientific principles and research.

#### **Additional Health Concerns Raised Grant County**

Throughout the Grant County WES Requirement review there have been numerous unsupported claims made by some members of the public that living in proximity to wind turbines results in sleeplessness and other potential health impacts. These were raised again at the Crowned Ridge

I/II CUP hearing on November 13, 2018. I have also reviewed the material posted to the Grant County Wind Energy System Ordinance Review website (<http://association.1stdistrict.org/grant-county-wind-energy-system-ordinance-review/>). None of the material provided on the website or at the public meetings has involved peer-reviewed scientific literature to support their assertions. Again I note that Appendix A provides detailed scientific literature review on the sufficiency of the proposed Grant County WES Requirements ordinance changes. Similar material was provided to the PUC in their deliberations and findings that 45 dBA and 30 hours of shadow flicker are protective of public health. Respectfully, anecdotal or unsubstantiated Internet information raised by some members of the public should not be the basis upon which to set county ordinance requirements.

### **Conclusions**

OEHM respectfully submits that the proposed WES Requirements ordinance amendment that is before the Grant County Planning Commission for consideration is protective of the health, safety and welfare of county residents. It is consistent with recently updated neighboring county ordinance changes that have occurred in the past year, recent PUC decisions and would be amongst the most stringent of any county ordinances in the Midwest.

Its adoption will allow for the protection of residents health, while still allowing adequate setback distances to ensure that a project can be built in the county. I believe that a 3,960 ft setback to non-participating homes is excessive and that the setback should be based on the corresponding sound level of 45 dBA at non-participating homes or 1,500 ft.

Dr. Christopher Ollson, Ph.D. will be in attendance at the November 20, 2018 Planning Commission hearing and would be happy to address any questions the Commission may have.

Sincerely,

**OLLSON ENVIRONMENTAL HEALTH MANAGEMENT**



Christopher Ollson, PhD  
Senior Environmental Health Scientist

**Appendix A**  
**OEHM Letter to Planning Commission**  
**June 8, 2018**

June 8, 2018

Grant County Planning and Zoning Board  
Grant County Courthouse  
210 E 5<sup>th</sup> Ave  
Milbank, SD 57252

**RE: Consideration of Update of Grant County Compiled Zoning Ordinances Section 1211. Energy System (WES) Requirements**

Planning and Zoning Board Members:

Ollson Environmental Health Management (OEHM) was retained by NextEra Energy Resources (NEER) to review the *Grant County Zoning Ordinance Section 1211. Energy System (WES) Requirements*, with respect to protection of public health and safety. OEHM understands that the Grant County Planning and Zoning Board is undertaking a review of the *WES Requirements* and is considering updating and making changes.

NEER has been pursuing a wind turbine project in Grant County for several years under the existing ordinance. This report provides the Board an overview of the science supporting proper siting of wind turbines for the protection of public health. It provides a review of the existing Grant County WES Requirements and proposes changes or updates, where applicable. Dr. Christopher Ollson of OEHM will be available to answer any questions the board may have.

In summary, over the past decade there has been considerable research conducted around the world evaluating health concerns of those living in proximity to wind turbines. This independent research by university professors, consultants and government medical agencies has taken place in many different countries on a variety of models of turbines that have been in communities for numerous years. Based on scientific principles, and the collective findings of over 80 scientific articles, OEHM believes that some minor changes to the Grant County WES requirements could be considered; however, excessive setback distances are not required, not supported by the scientific evidence in this field, and would not afford any greater protection of health of Grant County residents.

**1 Qualifications of Dr. Christopher Ollson of OEHM**

Dr. Ollson is owner and a senior environmental health scientist with OEHM. His expertise is in the field of environmental health science. Dr. Ollson is trained, schooled and practiced in the evaluation of potential risks and health effects to people and ecosystems associated with environmental issues.

Dr. Ollson's formal education includes:

- Doctorate of Philosophy, Environmental Science, Royal Military College of Canada, Kingston, Ontario, Canada, 2003.
- Master of Science, Environmental Science, Royal Military College of Canada, Kingston, Ontario, Canada, 2000.
- Bachelor of Science (Honours), Biology, Queen's University, Kingston, Ontario, Canada, 1995.

In addition to his consulting practice he holds an appointment of Adjunct Professor in the School of the Environment at the University of Toronto. In 2013, he was appointed to the Governing Council, and was Vice-Chair of the Academic Affairs Committee, of the University of Toronto Scarborough until 2016. Dr. Ollson teaches a graduate course at the University of Toronto in Environmental Risk Analysis and co-supervises doctoral students.

Approximately one third to half of Dr. Ollson's practice on an annual basis has been devoted to better understanding the relationship between people, animals and wind energy. For almost a decade, he has been engaged by a number of private companies to review the potential health effects that may be associated with living in proximity to wind turbines as part of their preparation of planning and permitting documentation. Since 2014, he has provided expert advice on wind turbines, health and proper siting requirements for the Vermont Public Services Department. This led to the development of a research team at his former employer (Intrinsic), which included three Doctoral level staff, one Environmental Physician, and one Doctoral Candidate. These research efforts were first published in a peer-reviewed scientific article entitled:

*Knopper, L.D. and Ollson, C.A. 2011. Health Effects and Wind Turbines: A Review of the Literature. Environmental Health. 10:78. Open Access. Highly Accessed.*

Environmental Health is an open access journal (meaning anyone can obtain a copy for free) and has an impact factor of 3.37, meaning that articles published in this journal are often cited in other peer reviewed scientific papers. After its publication in September 2011 the journal quickly identified the article as "highly accessed", it has been viewed over 49,000 times and cited in more than 30 other scientific articles.

Subsequently, the research team published the following five articles in peer-reviewed scientific journals:

*Berger R.G., Ashtiani P., Ollson C.A., Whitfield Aslund M., McCallum L.C., Leventhall G., Knopper L.D. 2015. Health-based audible noise guidelines account for infrasound and low frequency noise produced by Wind Turbines. Front Public Health. Vol 3, Art. 31*

*Knopper, L.D., Ollson, C.A., McCallum, L.C., Aslund, M.L., Berger, R.G, Souweine, K., and McDaniel, M. 2014. Wind turbines and Human Health. Front. Public Health, Vol. 2, Art. 63*

*McCallum, L.C., Whitfield Aslund, M.L., Knopper, L.D., Ferguson, G.L., Ollson, C.A. (2014). Measuring electromagnetic fields (EMF) around wind turbines in Canada: is there a human health concern? Environmental Health 13(9), doi:10.1186/1476-069X-13-9.*

*Ollson, C.A., Knopper L.D. McCallum, L.C., Aslund-Whitfield, M.L. 2013. Are the findings of 'Effects of industrial wind turbine noise on sleep and health' supported? Noise & Health 15:63, 148-150*

*Whitfield Aslund, M.L., Ollson, C.A., Knopper, L.D. 2013. Projected contributions of future wind farm development to community noise and annoyance levels in Ontario, Canada. Energy Policy. 62, 44-50*

Dr. Ollson's research has been presented at numerous international scientific conferences. He has been formally qualified to provide expert opinion evidence on wind turbines and potential health effects at a number of North American hearings, tribunals and legal cases.

Dr. Ollson has appeared before numerous County Planning & Zoning and County Commissions, including in South Dakota, to provide an overview of potential health concerns during their deliberations on review of WES ordinances and granting Conditional/Special Use Permits for wind generating facilities.

## 2 Grant County WES Requirements

OEHM is familiar with *Grant County Zoning Ordinance Section 1211. Energy System (WES) Requirements*.

As with any energy facility it is important that proper setbacks and guidelines are in place for wind turbines to ensure public health and safety. Table 1 is provides the list of set back requirements listed in the *WES Requirements* and recommendations for the Board to consider by OEHM. The suitability of these setbacks will be discussed in each of the following sections.

**Table 1. List of Setback Requirements and Disturbances**

Distance from a...	Current Grant County WES Requirements	OEHM Recommendations
Existing off-site residences, businesses, churches, and buildings owned and/or maintained by a governmental entity	1000 ft	Recommend changing to 1500 ft from non-participating existing off-site residences, business, churches, and buildings owned and/or maintained by a governmental entity and public buildings.
On-site or lessor's residence	500 ft	Recommend consider changing to a minimum of 1000 ft.
Centerline of public right-of-way	Distance from centerline of public roads shall be at least five hundred (500) feet or one hundred ten percent (110%) the height of the wind turbines, whichever distance is greater, measured from the ground surface to the tip of the blade when in a fully vertical position.	Recommend changing "from centerline..." to "from the edge..."
Property Line	Distance from any property line shall be at least five hundred (500) feet or one hundred ten percent (110%) the height of the wind turbine, whichever distance is greater, measured from the ground surface to the tip of the blade when in a fully vertical position unless wind easement has been obtained from adjoining property owner.	Recommend no change to distance of current ordinance requirement.  Would recommend clarifying the language to relate only to non-participating property lines.
Noise	Noise level shall not exceed 50 dBA, average A-weighted Sound pressure including constructive interference effects at the perimeter of the principal and accessory structures of existing off-site residences, businesses, and buildings owned and/or maintained by a governmental entity.	Recommend no change to current ordinance requirement of 50 dBA to residence. Would recommend removing language on "including constructive interference".
Shadow Flicker	There are no standards for shadow flicker in the current WES Regulation.	Recommend limiting modeled shadow flicker to no more than 30 hours per year at residential dwellings of non-participating landowners.

### **3 Health Research on Living in Proximity to Wind Turbines**

Wind-based energy production has been identified as a clean and renewable resource that does not produce any known emissions or harmful wastes. As a result, wind power has become the fastest growing source of new electric power generation, with several countries achieving high levels of wind power capacity.

Over 80 studies have been published worldwide to examine the relationship between wind turbines and possible human health effects. Based on the findings and scientific merit of these studies they have lead health and medical authorities to state that when sited properly (i.e., based on distance and/or noise guidelines and setbacks), wind turbines are not causally related to adverse effects.

This letter serves to provide background on issues that may arise in the discussion on possible changes to the *Grant County WES Requirements* to protect public health and safety, including:

- Audible noise
- Low frequency noise and infrasound
- Shadow Flicker
- Setback Distances – sound and public safety

#### **3.1 Peer-Reviewed Health Literature for Consideration by Grant County Audible Noise**

##### ***The Health Canada Wind Turbine Noise and Health Study – The Most Comprehensive Study 2012-2014***

This study is the most comprehensive study of its kind to date and its results will be referenced a number of times in this report. The following provides a high-level overview of the study design. This study was initiated in 2012 and was a partnership between Health Canada and Statistics Canada to understand the potential impacts of wind turbine noise on health and wellbeing of communities in Southern Ontario and Prince Edward Island (PEI). A total of 1238 households participated in the study, with an almost 80% response rate of all households within 10 km (6 mi) of projects investigated, making it the largest and most comprehensive study ever undertaken around the world. Households were located as close as 250 m (820 ft) and out to 10 km (6 mi) from operational wind turbines. Their reported high response rate included 1238 randomly selected participants (606 males, 632 females) between the ages of 18-79 years old. In addition, the study included both self-reported and physical/objective measures of health in participants. The sound modeling conducted in relation to this study indicated wind turbine noise (WTN) as high as 46 dBA outside of people's homes. This does not mean that issues arise at levels of greater than 46 dBA, rather it is just the high end of sound that was predicted in this study.

In 2014, Health Canada released a Summary of their findings on their website (Health Canada, 2014).

<http://www.hc-sc.gc.ca/ewh-semt/noise-bruit/turbine-eoliennes/summary-resume-eng.php>

It is OEHM's understanding that Health Canada chose to release the summary of their findings to make the information available to the scientific community and the public in a timely manner. Subsequently, they have released eight (8) peer-reviewed scientific publications with their results.

Health Canada's public brochure contains the following statement:

*The Wind Turbine Noise and Health Study is a landmark study and the most comprehensive of its kind. Both the methodology used and the results are significant contributions to the global knowledge base and examples of innovative, leading edge research.*

This research will be discussed as appropriate throughout this report.

### **3.2 Audible Sound (Noise)**

The audible sound (noise) from the wind turbines is limited no greater than 50 dBA at the property line of existing non-participating residences, businesses, and buildings owned and/or maintained by a governmental entity. With any sound source sleep is the critical health endpoint that needs to be protected at residences. By setting the acceptable sound level at the home of non-participating homes, Grant County is consistent with most jurisdictions and the science that has been conducted. Therefore, there is no need to set sound levels at property lines.

However, there are a number of other concerns that have been raised with living in proximity to wind turbines. The past decade of rapid increase in wind power development in North America has been coupled with some who believe that wind turbines should be set miles back from residences or else it will result in public health impacts. However, the weight of scientific evidence does not hold this to be true. The following section provides an overview of the most up to date peer-reviewed published evidence to understand if the changes to the WES Ordinance are required for the protection of health.

#### **3.2.1 Sleep**

The critical effect from a health perspective in setting any sound source standard is to ensure that it is protective of sleep. Quality of sleep and sleep perception can be challenging to establish causation through self-reported surveys alone.

In 2006, the Institute of Medicine of the National Academies released the book “*Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem*” (IOM, 2006). At that time they reported that: “*It is estimated that 50 to 70 million Americans suffer from a chronic disorder of sleep and wakefulness, hindering daily functioning and adversely affecting health.*” In 2006 the population of the United States was 298 million, resulting in an approximately 23% of Americans with sleep disorders. This needs to be considered within any review of the sleep literature with respect to wind turbines.

*Michaud et al., 2016. Effects of Wind Turbine Noise on Self-Reported and Objective Measures of Sleep. Sleep, Vol. 39, No. 1 (Health Canada)*

The journal Sleep is a highly respected scientific publication in this area of research. This is reflected in its five-year Impact Factor score of 5.8. The paper presents the peer-reviewed published findings of the Health Canada study (2014) of wind turbine noise on sleep. The sample size was the entire 1,238 participants from the overall study for self-reported sleep quality over the past 30 days using the Pittsburgh Sleep Quality Index (PSQI) and additional questions assessing the prevalence of diagnosed sleep disorders and the magnitude of sleep disturbance over the previous year. For the first time for wind turbine sound and objective measures for sleep latency, sleep efficiency, total sleep time, rate of awakening bouts, and wake duration after sleep were recorded using the wrist worn Actiwatch2® for 654 participants, over a total of 3,772 sleep nights.

It is the largest and most comprehensive of its kind ever undertaken for wind turbine noise.

The following excerpt from the paper discusses the study objective:

*The current study was designed to objectively measure sleep in relation to WTN exposure using actigraphy, which has emerged as a widely accepted tool for tracking sleep and wake behavior. The objective measures of sleep, when considered together with self-report, provide a more comprehensive evaluation of the potential effect that WTN may have on sleep.*

Table 1 in Michaud et al. (2016), provides an overview of the self-reported sleep magnitude and contribution of disturbance. They reported, “*The prevalence of reported sleep disturbance was unrelated to wind turbine noise levels.*”

From the conclusions of the paper:

*The potential association between WTN levels and sleep quality was assessed over the previous 30 days using the PSQI, the previous year using percentage highly sleep disturbed, together with an assessment of diagnosed sleep disorders. These self-reported measures were considered in addition to several objective measures including total sleep time, sleep onset latency, awakenings, and sleep efficiency. In all cases, in the final analysis there was no consistent pattern observed between any of the self-reported or actigraphy-measured endpoints and WTN levels up to 46 dB(A) [at homes as close as 820 ft]. Given the lack of an association between WTN levels and sleep, it should be considered that the study design may not have been sensitive enough to reveal effects on sleep. However, in the current study it was demonstrated that the factors that influence sleep quality (e.g. age, body mass index, caffeine, health conditions) were related to one or more self-reported and objective measures of sleep. This demonstrated sensitivity, together with the observation that there was consistency between multiple measures of self-reported sleep disturbance and among some of the self reported and actigraphy measures, lends strength to the robustness of the conclusion that WTN levels up to 46 dB(A) [at homes as close as 820 ft] had no statistically significant effect on any measure of sleep quality.*

Given the breadth of the study, the number of participants and consistency with past credible, peer-reviewed studies on whether living in proximity to wind turbines impacts sleep OEHM believes that this is a critical study.

The Health Canada findings are consistent with credible previously published peer-reviewed literature in the field.

*Bakker et al. 2012. Impact of wind turbine sound on annoyance, self-reported sleep disturbance and psychological distress. Science of The Total Environment, Volume 425, 15 May 2012. Pages 42-51*

Prior to the Health Canada Study (2014), perhaps the most compelling research into wind sound awakenings was conducted by Bakker et al. (2012). This research reported the number or percentage of awakenings with those living in proximity to wind turbines in a rural setting. As can be seen from Table 7 from the Bakker paper, more people in rural environments are awakened by people/animal sound and traffic/mechanical sounds, than by the proximate wind turbines. In this study, people living in close proximity to wind turbines reported being awoken more by

people/animal noise (11.7%) and rural traffic/mechanical noise (12.5%), than by turbine noise (6.0%). Sound levels in this study were as high as 54 dBA.

**Table 7**  
Sound sources of sleep disturbance in rural and urban area types, only respondents who did not benefit economically from wind turbines.

Sound source of sleep disturbance	Rural		Urban		Total	
	n	%	n	%	n	%
Not disturbed	196	69.8	288	64.9	484	66.8
Disturbed by people/ animals	33	11.7	64	14.4	97	13.4
Disturbed by traffic/ mechanical sounds	35	12.5	75	16.9	110	15.2
Disturbed by wind turbines	17	6.0	17	3.8	34	4.7
Total	281	100	444	100	725	100

From Michaud et al., 2016:

*“Study results concur with those of Bakker et al. (2012), with outdoor WTN levels up to 54 dB(A), wherein it was concluded that there was no association between the levels of WTN and sleep disturbance when noise annoyance was taken into account”.*

Jalali et al. 2016. Before–after field study of effects of wind turbine noise on polysomnographic sleep parameters. Noise Health: 18:194-205.

The first study to be published on before–after operation effect of wind turbine noise on objectively measured sleep was conducted in 16 participants living within 2 km to a five-wind turbine project in Ontario, Canada. It should be noted that outdoor sound measurements ranged between 40 – 45 dBA before operation and 38-42 dBA after the turbines became operational. The average indoor sound level in the bedrooms was reported as 31 dBA. For the first time authors used portable polysomnography (PSG), which is a comprehensive system that objectively monitors people’s sleep in their homes.

Although there are concerns about the small sample size and that exterior sound levels were higher pre-operation of wind turbines, the authors concluded:

*The result of this study based on advanced sleep recording methodology together with extensive noise measurements in an ecologically valid setting cautiously suggests that there are no major changes in the sleep of participants who host new industrial WTs in their community. Further studies with a larger sample size and including comprehensive single-event analyses are warranted.*

These findings are consistent with the previous reported studies.

**Conclusion on Wind Turbine Noise and Sleep**

The recent published findings reveal that there is no association between exterior wind turbine sound levels and impact on sleep for residences as close as 820 ft to turbines. Therefore, OEHM believes that the existing Grant County WES Ordinance of 50 dBA at the residence should not affect the sleep of those living in proximity wind projects.

### 3.2.2 Other Potential Health Concerns Living in Proximity to Wind Turbines

Much of the peer-reviewed literature on living in proximity to wind turbines has been focused on sleep and annoyance. This section is focused on the literature investigating both self-reported and physical measures of health for those living around wind turbines. Given that the extensive nature of the literature it is not possible to summarize it all in this document. Rather, preference has been given to key references and those most recent or extensive.

There are numerous peer-reviewed studies that have explicitly examined the relationship between levels of wind turbine noise and various self-reported indicators of human health and well-being (e.g., Health Canada 2014 and associated publications; Bakker et al. 2012; Janssen et al. 2011; Pedersen 2011; Pedersen and Persson Waye 2004; 2007). These studies have researched a wide range of wind turbine models, manufacturers, heights and noise levels. They were conducted over several years, in some cases over 10 years, after wind turbines became operational. The study of wind turbine health concerns began in Europe in the early 2000s and most recently examined in Canada.

It is important to understand that from a health perspective it is not the height of the turbines, or the noise output at their hub, that is the important. Rather, it is the resulting sound level at people's homes that is critical to ensure the protection of public health. Simply put, whether a developer selects a >500-foot wind turbine, or smaller model, the requirement to meet the 50 dB sound level at nonparticipating residences remains the same.

In general, peer reviewed studies do not support a correlation between wind turbine noise exposure and any other response other than some annoyance (McCunney et al., 2014). For example, various studies based on the results of two surveys performed in Sweden and one in the Netherlands (1755 respondents overall), found that no measured variable (e.g., self-reported evaluations of high blood pressure, cardiovascular disease, tinnitus, headache, sleep interruption, diabetes, tiredness, and reports of feeling tense, stressed, or irritable) other than annoyance was directly related to wind turbine noise for all three datasets (Pedersen, 2011) at noise levels below 45 dBA.

#### *Michaud et al. 2016a. Exposure to wind turbine noise: Perceptual responses and reported health effects. (Health Canada)*

This paper provides the results of Health Canada's investigation into perceptual responses (annoyance and quality of life) and those of self-reported health effects by participants. Only the self-reported health effects results are discussed here. Health Canada developed a final questionnaire (Michaud, 2013) that consistent of socio-demographics, modules on community noise and annoyance, self-reported health effects, lifestyle behaviors, and prevalent chronic illness.

Health Canada reported that:

*"The results from the current study did not show any statistically significant increase in the self-reported prevalence of chronic pain, asthma, arthritis, high blood pressure, bronchitis, emphysema, chronic obstructive pulmonary disease (COPD), diabetes, heart disease, migraines/headaches, dizziness, or tinnitus in relation to WTN exposure up to 46 dBA [at homes as close as 820 ft]. In other words, individuals with these conditions were equally distributed among WTN exposure categories."*

This resulted in the overall conclusion of the paper that:

*“Beyond annoyance, results do not support an association between exposure to WTN up to 46 dBA [at homes as close as 820 ft] and the evaluated health-related endpoints.”*

*Michaud et al. 2016b. Personal and situational variables associated with wind turbine noise annoyance. (Health Canada)*

This paper is a continuance of the work reported in Michaud et al. (2016a). In the first paper (2016a) they provide Figure 2 that illustrates the overall level of annoyance associated with wind turbine noise across varying sound levels. In Michaud et al. 2016b, they provide Table I. that provides numerous variables that at least provide some contribution to the overall annoyance levels. As reported by others, this is a clear illustration that wind turbine annoyance is not based solely on sound levels but that there are numerous factors that contribute to reported annoyance levels in relation to living in proximity to wind turbines.

The authors state (Michaud et al., 2016b):

*The complex relationship that exists between community annoyance and noise is a well-established phenomenon that has been further illustrated in the current study. This study found that the R2 for the model with only WTN levels was merely 9% and that any efforts aimed at mitigating the community response to WTN will profit from considering other factors associated with annoyance. Although the final models had R2 's of up to 58%, their predictive strength for WTN annoyance was still rather limited.*

They concluded (Michaud et al., 2016b):

*“Variables associated with WTN annoyance included, but were not limited to, other wind turbine-related annoyances, personal benefit, noise sensitivity, physical safety concerns, property ownership, and province.”*

Overall, annoyance levels associated with wind turbine sound are low and consistent with other levels of noise related annoyance. Most notable was that only 9% of the annoyance from wind turbines could be correlated to the sound. Regardless of the presence of some annoyance, the previous Health Canada research (Michaud et al. 2016a), demonstrated there was no association between self-reported health conditions and sound levels.

*Michaud et al. 2016c. Self-reported and measured stress related responses associated with exposure to wind turbine noise (Health Canada)*

This is the only study reported in the literature that in addition to collecting self-reported measures of stress, includes biophysical and chemical objective measurements of health associated with living in proximity to wind turbines. Of the 1238 study participants 1077 (87%) agreed to have blood pressure measurements, 917 of 1043 (87.9%) participants with hair consented to sampling for cortisol analysis and all completed questionnaires.

In the Concluding Remarks the authors report:

*The results provide no evidence that self-reported or objectively measured stress reactions are significantly influenced by exposure to increasing levels of WTN up to 46 dB [at homes as close as 820 ft]. There is an added level of confidence in the findings as this is the first study to date to investigate the potential stress impacts associated with WTN exposure using a combination of self-reported and objectively measured endpoints.*

Therefore, wind turbine noise annoyance should not be considered a health impact and the level of annoyance falls within levels that we accept in our daily lives.

### 3.2.3 Summary

What can be seen from these peer-reviewed articles (and many others) is that the relationship between wind turbines and human responses to them is extremely complex and influenced by numerous variables. Key points that have come out of these studies are:

- Adverse health effects have not been attributed to properly sited wind turbine projects;
- People tend to notice sound from wind turbines almost linearly with increasing sound pressure level (in other words, the louder the wind turbine at ground level the more people notice them);
- A proportion (typically less than 10%) of people that notice sound from wind turbines find it annoying (annoyance is not a medical condition);
- Noise-related annoyance can be within the range of existing levels of community noise related annoyance (e.g., rail, road and air traffic; animal noise);
- Annoyance is not only related to wind turbine noise but more strongly to subjective factors like attitude, visual cue, stress and expectations; and
- People who economically benefit from wind turbines often experience higher sound levels outside their homes than non-participants and have significantly decreased levels of annoyance compared to individuals that received no economic benefit.

The reported correlation between wind turbine noise and annoyance is not unexpected as noise-related annoyance (described by Berglund and Lindvall (1995) as a “*feeling of displeasure evoked by a noise*”) has been extensively linked to a variety of common noise sources such as rail, road, and air traffic (Berglund and Lindvall 1995; Laszlo et al. 2012; WHO Europe 2011).

Noise-related annoyance from these more common sources is prevalent in many communities. For instance, results of national surveys in Canada and the U.K. by Michaud et al. (2005) and Grimwood et al. (2002), respectively, suggested that annoyance from noise (predominantly traffic noise) may impact approximately 8% of the general population. Even in small communities in Canada (i.e., <5000 residents) where traffic is relatively light compared to urban centers, Michaud et al. (2005) reported that 11% of respondents were moderately to extremely annoyed by traffic noise. This same trend was noted in the Bakker *et al.*, 2012 study in the Netherlands where people living in close proximity to wind turbines reported being awoken more by people/animal noise (11.7%), rural traffic/mechanical noise (12.5%) than turbine noise (6.0%).

McCunney et al. (2014) published a comprehensive review of the issue “*Wind Turbines and Health A Critical Review of the Scientific Literature*”. This work involved review of the publications on wind turbines and health that were available. The authors provide the following summary:

1. *Measurements of low-frequency sound, infrasound, tonal sound emission, and amplitude-modulated sound show that infrasound is emitted by wind turbines. The levels of infrasound at customary distances to homes are typically well below audibility thresholds.*

2. *No cohort or case–control studies were located in this updated review of the peer-reviewed literature. Nevertheless, among the cross-sectional studies of better quality, no clear or consistent association is seen between wind turbine noise and any reported disease or other indicator of harm to human health.*

3. *Components of wind turbine sound, including infrasound and low frequency sound, have not been shown to present unique health risks to people living near wind turbines.*

4. *Annoyance associated with living near wind turbines is a complex phenomenon related to personal factors. Noise from turbines plays a minor role in comparison with other factors in leading people to report annoyance in the context of wind turbines.*

Therefore, the existing Grant County WES Ordinance, perhaps with some minor modification, will ensure the protection of public health.

### **3.3 Low Frequency Noise (LFN) and Infrasound**

Infrasound is a term used to describe sounds that are produced at frequencies too low to be heard by the human ear at frequencies of 0 to 20 Hz, at common everyday levels. It is typically measured and reported on the G-weighted scale (dBG). Low frequency noise (LFN), at frequencies between 20 to 200 Hz, can be audible. It is typically measured and reported on the C-weighted scale (dBC) to account for higher-level measurements and peak sound pressure levels. The Applicant has proposed a design goal that will be predicated on the A-weighted scale, which covers the audible range 20 Hz to 20 kHz and is similar to the response of the human ear at lower levels.

Wind turbine sound standards are set using audible dBA levels and approved based on modeling. This is also true of most post construction sound monitoring requirements. Over the past couple of years there have been a limited number of researchers that have speculated that wind turbine infrasound and LFN could potentially cause health impacts or sleep disturbance. The mere presence of measured LFN and infrasound does not indicate a potential threat to health or an inability for people to sleep. The fact that one can measure infrasound and LFN from wind turbines at either the exterior or interior of a home does mean that it is at a level that poses a potential health threat. In addition, just because there may be a distinct acoustical signature that allows sound engineers to distinguish between low levels of infrasound or LFN from turbines does not mean that it results in health impacts.

Although wind turbines are a source of LFN and infrasound during operation, these sound pressure levels are not unique to wind turbines. Common natural sources of LFN and infrasound include ocean waves, thunder, and even the wind itself. Other sources include road traffic, refrigerators, air conditioners, machinery, and airplanes.

Given the growing attention being paid to this issue, an international team of acousticians and health scientists published a peer-reviewed article entitled “*Health-based Audible Noise Guidelines Account for Infrasound and Low Frequency Noise Produced by Wind Turbines*” in the journal *Frontiers in Public Health* (Berger et al., 2014).

The purpose of this paper was to investigate whether typical audible noise-based guidelines for wind turbines account for the protection of human health given the levels of infrasound and LFN typically produced by wind turbines. New field measurements of indoor infrasound and outdoor LFN at locations between 400 m (1300 feet) and 900 m (2950 feet) from the nearest turbine, which were previously underrepresented in the scientific literature, were reported and put into context with existing published works. The analysis showed that indoor infrasound levels were below auditory threshold levels while LFN levels at generally accepted setback distances were similar to background LFN levels.

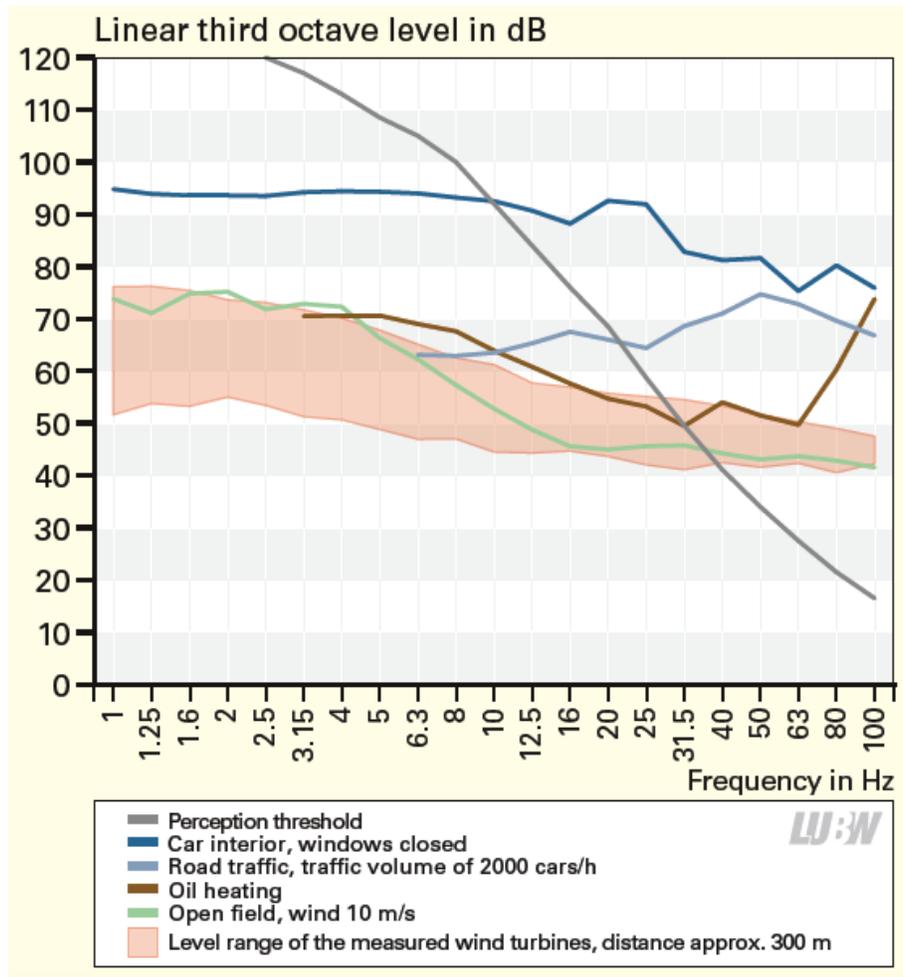
From the abstract of Berger et al., 2015:

*Over-all, the available data from this and other studies suggest that health-based audible noise wind turbine siting guidelines provide an effective means to evaluate, monitor, and protect potential receptors from audible noise as well as Infrasound and Low Frequency Noise.*

Simply put, the 50 dBA design goal sound level for wind turbines on the A-weighted scale to the residences, and the proposed 1,500 foot setback to homes, will ensure that levels of LFN and infrasound will not impact health.

In 2016 the Ministry for the Environment, Climate and Energy of the Federal State of Baden-Wuerttemberg in Germany reported on their study “*Low-frequency noise including infrasound from wind turbines and other sources*” (MECE, 2016). The objective of the research was to collect field measurement of infrasound and low-frequency noise around six different turbines by different manufacturers from 1.8 to 3.2 MW. Measurements were taken at 150 m (492 feet), 300 m (984 feet) and 700 m (2296 feet) from wind turbines. Measurements of other common sources of infrasound and low frequency noise were also collected for comparative purposes.

Figure 1 (from MECE, 2016) provides detail on the range of infrasound and low frequency noise measured at 300 m (984 feet). It can be seen that the levels of infrasound from wind turbines were similar to that of just the wind in an open field, while there was an increase in low frequency sound. The levels were considerably lower than either being in the interior of a car, near road side traffic or in a home with oil heating. All infrasound levels (< 20 Hz) were below the perception threshold and international standards.



**Figure 1. Measurements of infrasound and low frequency noise 300 m from wind turbines compared to other sources. [from MECE, 2016].**

Overall, they concluded:

*“Infrasound and low-frequency noise are an everyday part of our technical and natural environment. Compared with other technical and natural sources, the level of infrasound caused by wind turbines is low. Already at a distance of 150 m, it is well below the human limits of perception. Accordingly, it is even lower at the usual distances from residential areas. Effects on health caused by infrasound below the perception thresholds have not been scientifically proven. Together with the health authorities, we in Baden-Württemberg have come to the conclusion that adverse effects relating to infrasound from wind turbines cannot be expected on the basis of the evidence at hand.*

*The measurement results of wind turbines also show no acoustic abnormalities for the frequency range of audible sound. Wind turbines can thus be assessed like other installations according to the specifications of the TA Lärm (noise prevention regulations).*

*It can be concluded that, given the respective compliance with legal and professional technical requirements for planning and approval, harmful effects of noise from wind turbines cannot be deduced.”*

## Conclusion on Low Frequency Noise and Infrasound

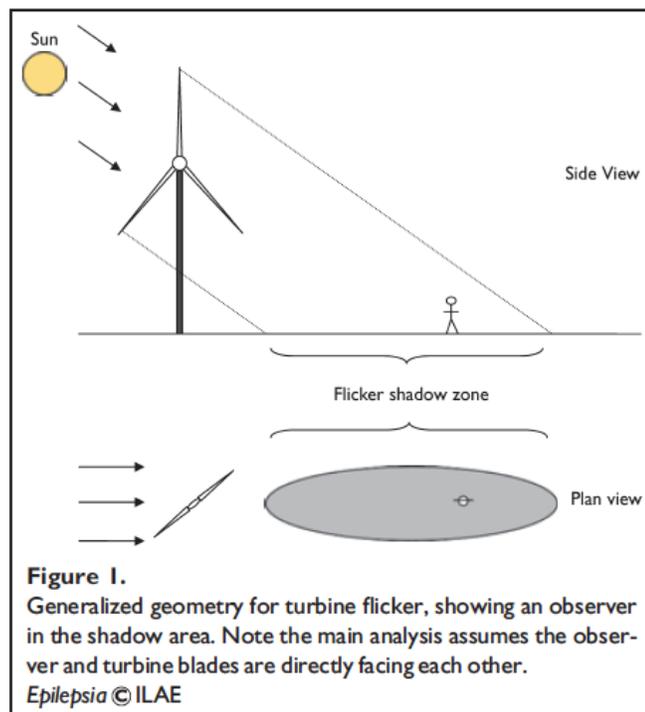
The hypothesis that low frequency noise or infrasound from wind turbines is a causative agent in health effects is not supported by the scientific and medical literature. Although infrasound and low frequency noise are emitted from wind turbines and their contribution above background sources can be measured close to wind turbines, the levels are typically within background levels at homes and are well below levels that could induce health impacts. Measurements at other wind farms are similar, if not lower, than natural and anthropogenic sources of infrasound that we are exposed to, and are below international guidelines on infrasound.

Therefore, the weight of scientific evidence supports setting the compliance standard as an audible sound level at 50 dBA at the non-participating homes with a minimum setback distance of 1,500 feet from homes, as being a suitable surrogate to ensure that infrasound and low frequency noise do not pose a health threat to people living near wind turbines in Grant County.

### 3.4 Shadow Flicker

Shadow flicker occurs when interruption of sunlight by the wind turbine blades. Figure 1 was taken from Smedley et al. (2010) and demonstrates the shadow flicker phenomenon from wind turbines. Shadow flicker is unavoidable for wind turbines, however, it typically only occurs for a limited number of hours a year at a home. This is due to the fact that certain factors must be present:

- a. the sun must be in a precise location in the sky such that sunlight will cast a shadow from the wind turbine;
- b. the wind turbine must be in operation during this period (i.e., the wind must be of sufficient speed for the wind turbine to be operational);
- c. shadow will not be cast on overcast of cloud cover days; and,
- d. the shadow will typically not be cast any further than 10x the total height of the turbine to any appreciable extent. For most modern turbines this would mean shadow flicker would not extend past 5,000 feet.



Conducting shadow flicker modeling has become common practice for proposed wind farm projects across the United States. It is often completed using commercially available software; such as WindPro.

A search of both the primary scientific literature and the Internet was conducted for wind turbine shadow potential health concerns, and report of annoyance or nuisance. Of this body of literature three of the published papers address shadow flicker.

The main health concern that has been raised with shadow flicker is the potential risk of seizures in those people with photosensitive epilepsy. Photosensitive epilepsy affects approximately 5% of people with epilepsy where their seizures can be triggered by flashing light. The Epilepsy Society first investigated this issue in the United Kingdom in the late 2000s. They polled their members and determined that no one had experienced an epileptic seizure living or being in proximity to a wind farm from shadow flicker (Epilepsy Society, 2012).

Following on this informal polling two of the United Kingdom's academic experts in epilepsy published scientific research articles in the area. Harding et al. (2008) and Smedley et al. (2010) have published the seminal studies dealing with this concern. Both authors investigated the relationship between photo-induced seizures (i.e., photosensitive epilepsy) and wind turbine shadow flicker. Both studies suggested that flicker from turbines that interrupt or reflect sunlight at frequencies greater than 3 Hz pose a potential risk of inducing photosensitive seizures in 1.7 people per 100,000 of the photosensitive population. For turbines with three blades, this translates to a maximum speed of rotation of 60 revolutions per minute (rpm).

Modern turbines commonly spin at rates well below this threshold and are typically below 20 rpm. For example, the General Electric (GE) turbines has a maximum rotational speed of 18.5 rpm. Therefore, shadow flicker from these wind turbines is not at a flash frequency that could trigger seizures and not a concern.

In 2011, the Department of Energy and Climate Change (United Kingdom) released a consultant's report entitled "Update of UK Shadow Flicker Evidence Base". The report concluded that

*"On health effects and nuisance of the shadow flicker effect, it is considered that the frequency of the flickering caused by the wind turbine rotation is such that it should not cause a significant risk to health."*

Therefore, there are no requirements to limit shadow flicker for health concerns.

Two of the most comprehensive and widely cited published scientific review articles on this topic are Knopper & Ollson (2011) and McCunney et al. (2014). Both papers review the potential health impacts of shadow flicker and concluded that there are no health effects associated with this issue living in proximity to wind turbines. Knopper & Ollson (2011) concluded:

*"Although shadow flicker from wind turbines is unlikely lead to a risk of photo-induced epilepsy there has been little if any study conducted on how it could heighten the annoyance factor of those living in proximity to turbines. It may however be included in the notion of visual cues. In Ontario it has been common practice to attempt to ensure no more than 30 hours of shadow flicker per annum at any one residence."*

Since 2011, there has only been one study conducted that examined the potential for shadow flicker to lead to increased annoyance for those living near wind turbines. Health Canada recently completed the most comprehensive study of wind turbine health and annoyance issues of its kind in the world (Health Canada, 2014). In 2016, Health Canada published a paper "Estimating

*annoyance to calculated wind turbine shadow flicker is improved when variables associated with wind turbine noise exposure are considered” (Voicescu et al., 2016). By using the questionnaires of over 1200 people living as close as 800 feet from a turbine they attempted to determine if they could predict the percentage of people that were highly annoyed by varying levels of hours of shadow flicker (SF) a year or number of minutes on a given day. However, although annoyance did tend to increase with increasing minutes a day they could not find a statistical relationship:*

*“For reasons mentioned above, when used alone, modeled  $SF_m$  results represent an inadequate model for estimating the prevalence of  $HA_{WTSF}$  as its predictive strength is only about 10%. This research domain is still in its infancy and there are enough sources of uncertainty in the model and the current annoyance question to expect that refinements in future research would yield improved estimates of SF annoyance.”*

Therefore, there is nothing in the scientific literature that suggests that shadow flicker should be limited to protect health.

That said OEHM does believe that limits on shadow flicker are prudent to keep nuisance levels to a minimum at non-participating residences. A number of Counties and States have adopted various ordinances and rules limiting shadow flicker on non-participating land. A no more than 30 hours of shadow flicker modeled on a residence has almost become the universally adopted standard.

The origins of this industry standard are traced to Germany in 2002. The German Territorial Committee for Emissions control released the document “Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen, Länderausschuss für Immissionsschutz [Notes on the identification and evaluation of optical emissions from wind turbines], (in German).” The standard was based on limiting the nuisance of local residents. This level is often cited as being below one that would result in nuisance of local residents. They subsequently codified this formal shadow flicker guideline as part of the *Federal Emission Control Act* (Haugen, 2011). Similar standards to this have been adopted internationally with modifications for shadow flicker.

Eliminating shadow flicker at non-participating homes does not afford any additional protection for health. Therefore, OEHM suggests adopting a no more than 30 hours of shadow flicker a year at non-participating residences. To put this in perspective it represents less than 0.5% of the daylight hours a year. OEHM believes the Board should consider limiting this restriction to on nonparticipants.

### **3.5 Physical Health and Safety**

Public health and safety with respect to wind projects are also governed by setback and safety distances. The *Grant County WES Requirements* are consistent with other jurisdictions and with for example a major manufacture of wind turbines - GE Power & Water setback considerations (GE Power & Water, 2013) (Table 2).

All of these setbacks were developed to ensure protection of public health and safety.

The following describes the suitability of the *Grant County WES Ordinance* for projection from ice throw and blade failure. Overall, these setback distances are not meant to be protective of the fact that these issues can occur, rather the infrequent events under which they happen and the odds that an individual would be harmed.

**Table 2. GE Setback Considerations**

Setback Distance from center of turbine tower	Objects of concern within the setback distance
All turbine sites (blade failure/ice throw): 1.5 x (hub height + rotor diameter)	- Public use areas - Residences - Office buildings - Public buildings - Parking lots - Public roads - Moderately or heavily traveled roads if icing is likely - Heavily traveled roads if icing is not likely - Passenger railroads
All turbine sites (tower collapse): 1.1 x tip height <sup>1</sup>	- Public use areas - Residences - Office buildings - Public buildings - Parking lots - Public roads - Private roads - Railroads - Sensitive above ground services <sup>2</sup>
All turbine sites (rotor sweep/falling objects): 1.1 x blade length <sup>3</sup>	- Property not owned by wind farm participants <sup>4</sup> - Buildings - Non-building structures - Public and private roads - Railroads - Sensitive above ground services <sup>5</sup>

**3.5.1 Ice Throw**

In 2007, Garrad Hassan Canada Inc. was commissioned by the Canadian Wind Energy Association (CanWEA) to undertake a probabilistic risk evaluation of the likelihood of ice fragment throw from wind turbines would strike a member of the public. They used a hypothetical 2.0 MW turbine with the same hub height (80 m) as common modern wind turbines. They examined meteorological conditions in Ontario, Canada, which are similar to winter environment in South Dakota. Three scenarios were examined – Scenario A House, Scenario B Road and Scenario C Individual. The setback distances they used were consistent or less than those found in the Grant County WES Requirements or those proposed for consideration by OEHM. Their findings are provided in Table 3.

**Table 3. Ice Throw Strike Probabilities (Garrad Hassan, 2007)**

Scenario A House	Scenario B Road	Scenario C Individual
<ul style="list-style-type: none"> <li>• 1000 ft<sup>2</sup> house</li> <li>• 1000 ft from turbine</li> <li>• 1 ice strike per 62,500 years</li> </ul>	<ul style="list-style-type: none"> <li>• north-south road is situated directly west of a turbine at 650 ft</li> <li>• 100 vehicles at 40 mph</li> <li>• 1 vehicle strike per 100,000 years</li> </ul>	<ul style="list-style-type: none"> <li>• ever-present individual between 65 ft to 1000 ft from turbine</li> <li>• 1 strike in 500 years</li> </ul>

The results indicate an extremely low probability that an individual or vehicle would ever be struck. Therefore, setback distances in the Grant County WES Requirements and those minor changes recommended by OEHM are more than sufficient to protect public health and safety from risk of ice throw.

**3.5.2 Blade Failure**

With respect to turbine failure, the Garrad Hassan report (2007) determined that the risk of a failure of a piece of a blade is 1 in 4,000 turbines per year and that the risk of a full blade failure is 1 in 2,400 turbines a year. They also reported that maximum distance for an entire blade to travel was 150 m (500 feet) and for a blade fragment 500 m (1640 feet).

In 2013, MMI Engineering Ltd undertook a study titled “Study and development of a methodology for the estimation of the risk and harm to persons from wind turbines” for the United Kingdom

government. They studied a 2.3 MW wind turbine with a hub height of 80 m, similar to that of modern wind turbines. Through their probabilistic assessment they determined that risk of fatality from wind turbine blade fragment throw is low in comparison to other societal risks. It was roughly equivalent to the risk of fatality from taking two aircraft flights a year or being struck by lightning.

Given the very low probability of risk of fatality or injury from blade failure the existing or proposed changes to the *Grant County WES Requirements*.

### **3.5.3 Tower Collapse**

Tower collapse is a very rare event, although it is acknowledged that it can occur. When wind turbine tower fail, they tend to collapse within a distance equal or less to their total height. The proposed changes require wind turbines be placed 1.1 times Turbine Height from edge of the Right-of-Way from roads and property lines. This safety distance ensures that in the unlikely event of a tower collapse that the wind turbine will impact only the participating parcel of land and not interfere, or affect, roads or neighboring properties.

### **3.5.3 Safety Setback for Emergency Actions**

Several wind turbine manufacturers have “safety” zone setback distances that they recommend be adhered to during abnormal operating conditions. Such conditions could include “runaway” turbine (blades spinning out of control), blade failure, tower collapse or fires. In general the recommended safety setback is 500 m (1640 ft). For example, if a fire were to break out in the nacel of the wind turbine, then it would be recommended that the fire department not allow people within this 500 m zone. It is recognized that at a minimum 1500 foot setback to non-participating homes that it is possible that a handful could be within this zone. However, these events are extremely rare and would be similar to a barn fire, where closest homes would be evacuated and extra protection ensured by the fire department. In no way are these set back distances meant to be for siting purposes of wind turbines.

### **3.5.4 Conclusions on Setback Distances**

The existing Grant County WES Requirements and those minor changes recommended by OEHM are sufficient to protect public health and safety.

#### **4 Conclusions**

Over the past decade there has been considerable research conducted around the world on the potential for wind turbines to adversely impact health. This independent research by university professors, consultants and government medical agencies has taken place in many different countries on a variety of models of turbines that have been in the community for a number of years. Based on scientific principles, and the collective findings of over 80 scientific articles, OEHM believes that the Grant County WES Requirements, and potential minor changes recommended by OEHM, are reasonable balance between satisfying participating and non-participating landowners, while ensuring the protection of public, health and safety.

Sincerely,

**OLLSON ENVIRONMENTAL HEALTH MANAGEMENT**



Christopher Ollson, PhD  
Senior Environmental Health Scientist

## **References**

Australian Government NHMRC (National Health and Medical Research Council). *Wind turbines and health: a rapid review of the evidence*. Canberra, ACT: Commonwealth of Australia (2010) p. 1-11.

Bakker RH, Pedersen E, van den Berg GP, Stewart RE, Lok W, Bouma J. Impact of wind turbine sound on annoyance, self-reported sleep disturbance and psychological distress. *Sci Total Environ* (2012) **425**:42–51.

Berger R.G., Ashtiani P., **Olsson C.A.**, Whitfield Aslund M., McCallum L.C., Leventhall G., Knopper L.D. 2015. *Health-based audible noise guidelines account for infrasound and low frequency noise produced by Wind Turbines*. Front Public Health. Vol 3, Art. 31

Berglund B, Lindvall T. (Eds.) *Community Noise*. Center for Sensory Research, Stockholm University and Karolinska Institute (1995).

Chief Medical Officer of Health, Ontario. The potential health impact of wind turbines. Chief Medical Officer of Health (CMOH) report. Toronto, ON: Queen's Printer for Ontario (2010).

Epilepsy Society of United Kingdom. 2012. <https://www.epilepsysociety.org.uk/wind-turbines-and-photosensitive-epilepsy#.WCCsnBSSom4>

Garrad Hassan Canada. 2007. Recommendations for Risk Assessment of Ice Throw and Blade Failure in Ontario. Prepared for Candian Wind Energy Association.

Grimwood CJ, Skinner GJ, Raw GJ, BRE, Watford, WD25 9XX. *The UK national noise attitude survey 1999/2000*. Noise Forum Conference, London, England (2002).

Harding G, Harding P, Wilkins A. Wind turbines, flicker, and photosensitive epilepsy: Characterizing the flashing that may precipitate seizures and optimizing guidelines to prevent them. *Epilepsia* (2008) **49**:1095-8.

Health Canada. Wind Turbine Noise and Health. The Government of Canada. 2014. Available online: <http://www.hc-sc.gc.ca/ewh-semt/noise-bruit/turbine-eoliennes/summary-resume-eng.php>

Institute of Medicine (IOM). 2006. *Sleep Disorders and Sleep Deprivation: An Unmet Public Health Problem*

Jalali et al. 2016. Before–after field study of effects of wind turbine noise on polysomnographic sleep parameters. *Noise Health*; 18:194-205.

Janssen SA, Vos H, Pedersen E. A comparison between exposure-response relationships for wind turbine annoyance and annoyance due to other noise sources. *J Acoust Soc Am* (2011) **130**:3746-53.

*Kaperman and James. 2008. The “How To” Guide to Siting Wind Turbines to Prevent Health Risks from Sound*

Keith SE, Feder K, Voicescu SA, Soukhovtsev V, Denning A, Tsang J, Broner N, Richarz W, van den Berg F. 2016. Wind turbine sound power measurements. *J. Acoust. Soc. Am.* 139 (3), 1431-1435

Knopper, L.D., **Olsson, C.A.**, McCallum, L.C., Aslund, M.L., Berger, R.G, Souweine, K., and McDaniel, M. 2014. *Wind turbines and Human Health*. Front. Public Health, Vol. 2, Art. 63

Knopper, L.D. and **Ollson, C.A.** 2011. *Health Effects and Wind Turbines: A Review of the Literature*. Environmental Health. 10:78. Open Access. Highly Accessed.

Laszlo HE, McRobie ES, Stansfeld SA, Hansell AL. Annoyance and other reaction measures to changes in noise exposure - A review. *Sci Total Environ* (2012) **435**:551-562.

McCallum, L.C., Whitfield Aslund, M.L., Knopper, L.D., Ferguson, G.L., **Ollson, C.A.** 2014. *Measuring electromagnetic fields (EMF) around wind turbines in Canada: is there a human health concern?* Environmental Health 13(9), doi:10.1186/1476-069X-13-9.

McCunney, R.J., Mundt, K.A., Colby, D., Dobie, R., Kaliski, K., Blais, M. 2014. Wind Turbines and Health A Critical Review of the Scientific Literature. JOEM Volume 56, Number 11

MassDEP and MDPH. *Wind Turbine Health Impact Study: Report on Independent Expert Panel*. Massachusetts Department of Environmental Protection and Department of Public Health (2012). Available online at: [http://www.mass.gov/dep/energy/wind/turbine\\_impact\\_study.pdf](http://www.mass.gov/dep/energy/wind/turbine_impact_study.pdf).

Merlin T, Newton S, Ellery B, Milverton J, Farah C. 2014. *Systematic review of the human health effects of wind farms*. National Health and Medical Research Council, Canberra, Australia.

Michaud DS, Feder K, Keith SE, Voicescu SA, Marro L, Than J, Guay M, Denning A, Murray BJ, Weiss SK, Villeneuve PJ, van den Berg F, Bower T. 2016. Effects of Wind Turbine Noise on Self-Reported and Objective Measures of Sleep. *Sleep*. 2016 Jan 1;39(1):97-109. doi: 10.5665/sleep.5326.

Michaud DS, Feder K, Keith SE, Voicescu SA, Marro L, Than J, Guay M, Denning A, McGuire D, Bower T, Lavigne E, Murray BJ, Weiss SK, van den Berg F. 2016a. Exposure to wind turbine noise: Perceptual responses and reported health effects. *J Acoust Soc Am*. 2016 Mar;139(3):1443-54.

Michaud DS, Keith SE, Feder K, Voicescu SA, Marro L, Than J, Guay M, Bower T, Denning A, Lavigne E, Whelan C, Janssen SA, Leroux T, van den Berg F. 2016b. Personal and situational variables associated with wind turbine noise annoyance. *J Acoust Soc Am*. 2016 Mar;139(3):1455-66.

Michaud DS, Feder K, Keith SE, Voicescu SA, Marro L, Than J, Guay M, Denning A, Bower T, Villeneuve PJ, Russell E, Koren G, van den Berg F. 2016c. Self-reported and measured stress related responses associated with exposure to wind turbine noise. *J Acoust Soc Am*. 2016 Mar;139(3):1467-79.

Michaud DS, Keith SE, McMurchy D. Noise annoyance in Canada. *Noise Health* (2005) **7**:39-47.

MMI Engineering Ltd, 2013. Study and development of a methodology for the estimation of the risk and harm to persons from wind turbines. Prepared by for the Health and Safety Executive of the Government of the United Kingdom

*National Research Council. 2007. Environmental Impacts of Wind Energy Projects*

**Ollson, C.A.**, Knopper L.D. McCallum, L.C., Aslund-Whitfield, M.L. 2013. *Are the findings of 'Effects of industrial wind turbine noise on sleep and health' supported?* *Noise & Health* 15:63, 148-150.

Pedersen E. Health aspects associated with wind turbine noise-Results from three field studies. *Noise Control Eng J* (2011) **59**:47-53.

Pedersen E, Persson Waye K. Perception and annoyance due to wind turbine noise – a dose–response relationship. *J Acoust Soc Am* (2004) **116**:3460-70.

Pedersen E, Persson Waye K. Wind turbine noise, annoyance and self-reported health and well-being in different living environments. *Occup Environ Med* (2007) **64**:480-6.

*Pierpont. 2009. Wind Turbine Syndrome: A Report on a Natural Experiment*

Smedley ARD, Webb AR, Wilkins AJ. Potential of wind turbines to elicit seizures under various meteorological conditions. *Epilepsia* (2010) **51**:1146-51.

UK DECC (Department of Energy and Climate Change). *Update of UK shadow flicker evidence base: final report*. Department of Energy and Climate Change, London, United Kingdom: (2011).

Voicescu SA, Michaud DS, Feder K, Marro L, Than J, Guay M, Denning A, Bower T, van den Berg F, Broner N, Lavigne E.n 2016. Estimating annoyance to calculated wind turbine shadow flicker is improved when variables associated with wind turbine noise exposure are considered. *J Acoust Soc Am*. 2016 Mar;139(3):1480. doi: 10.1121/1.4942403.

Whitfield Aslund, M.L., **Ollson, C.A.**, Knopper, L.D. 2013. *Projected contributions of future wind farm development to community noise and annoyance levels in Ontario, Canada*. *Energy Policy*. 62, 44-50

WHO (World Health Organization), Regional Office for Europe. *Burden of disease from environmental noise: Quantification of healthy life years lost in Europe*. WHO Regional Office for Europe, Copenhagen, Denmark (2011).

**Appendix B**  
**PUC Decision Crocker Wind Farm, LLC**  
**EL17-055**  
**June 12, 2018**

**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 )**

**FINAL DECISION AND ORDER  
GRANTING PERMIT TO  
CONSTRUCT FACILITIES AND  
NOTICE OF ENTRY**

**EL17-055**

**APPEARANCES**

Commissioners Kristie Fiegen, Gary Hanson, and Chris Nelson.

Mollie Smith and Lisa Agrimonti, Fredrikson & Byron, P.A., 200 South Sixth Street, Minneapolis, Minnesota 55402, and Brett Koenecke, May, Adam, Gerdes & Thompson LLP, 503 South Pierre Street, P.O. Box 160, Pierre, South Dakota 57501, appeared on behalf of the Applicant, Crocker Wind Farm, LLC.

Kristen Edwards and Amanda Reiss, 500 E. Capitol Ave., Pierre, South Dakota 57501, appeared on behalf of the South Dakota Public Utilities Commission Staff.

Reece Almond, Davenport, Evans, Hurwitz & Smith, LLP, 206 West 14th Street, Sioux Falls, South Dakota, 57101, appeared on behalf of Intervenors Shad Stevens and Gale Paulson.

**PROCEDURAL HISTORY**

On December 15, 2017, Crocker Wind Farm, LLC (Applicant or Crocker) filed with the South Dakota Public Utilities Commission (Commission) an Application for Energy Facility Permits (Application) for the Crocker Wind Farm and a 345 kilovolt (kV) transmission line (collectively, the "Project"). The Project includes a wind energy facility located on approximately 29,331 acres of privately owned land in Clark County, South Dakota, approximately 8 miles north of Clark, South Dakota. The proposed Project includes up to 120 wind turbines, associated access roads, a new collector substation, an operations and maintenance facility, permanent meteorological towers, and an associated approximately 5.2-mile 345-kV transmission line in Clark County, South Dakota. The transmission line will extend from the Project substation in Section 30 of Township 119N, Range 58W to the point-of-interconnect, which is located approximately 2 miles north of the town of Crocker in Section 9 of Township 119N, Range 58W.

On December 15, 2017, Crocker filed the pre-filed direct testimony of Brie Anderson, Barry Fladeboe, Rob Copouls, Eddie Duncan, Elizabeth Engelking, Michael Morris, and Mark Thayer.

On December 20, 2017, the Commission issued a Notice of Application, Order For and Notice of Public Input Hearing, and Notice of Opportunity to Apply For Party Status ("Order"). The Order scheduled a public input hearing for February 5, 2018, at 5:00 p.m., at Clark American Legion Hall, 103 North Commercial Street, Clark, South Dakota. The Order also set an intervention deadline of February 13, 2018. On December 21, 2017, the Commission served the Order on the governing bodies of all counties and municipalities in the Project Area, and notices of the public hearing were published in Project area newspapers as provided in SDCL 49-41B-5.2. On December 27, 2017, Applicants mailed a copy of the public hearing notice via certified mail to all landowners within a half mile of the Project. Applicant also published notice of the public hearing in the *Clark County Courier* and the *Watertown Public Opinion* on January 10, 2018, and January 31, 2018. On January 4, 2018, the Commission issued an Order Assessing Filing Fee assessing a filing fee not to exceed \$500,000 with a minimum filing fee of \$8,000.

On February 5, 2018, the public input hearing was held as scheduled.

On February 9, 2018, Crocker filed additional information requested by Commissioner Nelson regarding the height and marking of the Project's permanent meteorological towers.

On February 9, 2018, an Application for Party Status was submitted by a law firm representing 64 individuals, each seeking party status. On February 21, 2018, Crocker filed a Response to Application for Party Status and Motion for Procedural and Scheduling Orders. On February 26, 2018, the Commission issued a procedural schedule and granted party status to the 64 individuals. On March 21, 2018, 62 individuals moved to withdraw their party status. On April 9, 2018, the Commission issued an Order Granting Withdrawal of Party Status for the 62 persons requesting withdrawal, leaving only Shad Stevens and Gale Paulson as remaining intervenors (Intervenors).

On March 21, 2018, Crocker filed updated pre-filed testimony of Elizabeth Engelking. On March 23, 2018, Crocker filed the stipulation and order for dismissal of Crocker's action against the Clark County Commission and Clark County Board of Adjustment.

On March 28, 2018, Intervenors Gale Paulson and Shad Stevens filed pre-filed testimony. Also on March 28, 2018, South Dakota Public Utilities Commission Staff (Staff) filed the pre-filed rebuttal testimony of Darren Kearney, Paige Olson, Tom Kirschenmann, David Hessler, and David Lawrence.

On April 11, 2018, the Commission issued an Order For and Notice of Evidentiary Hearing, scheduling an evidentiary hearing for May 9-11, 2018, in the Matthew Training Center, Foss Building, 523 East Capitol Avenue, Pierre, South Dakota.

On April 13, 2018, Crocker filed the pre-filed rebuttal testimony of Melissa Schmit, Eddie Duncan, Michael Morris, Brie Anderson, Joyce Pickle, Adam Holven, Mike MaRous, Jody Obermeier, and Wendy Christman. On April 17, 2018, Crocker filed a corrected exhibit to the pre-filed rebuttal testimony of Joyce Pickle.

On May 2, 2018, Staff filed the pre-filed surrebuttal testimony of David Lawrence. On May 10, 2018, Crocker filed the pre-filed sur-surrebuttal testimony of Mike MaRous.

On May 2, 2018, Staff filed its witness and exhibit lists and exhibits for hearing. Intervenors also filed their witness and exhibit lists and exhibits for hearing. Crocker also filed its witness and exhibit lists and exhibits for hearing on May 2, 2018, and filed an updated witness list and exhibit list on May 7, 2018.

On May 4, 2018, Crocker filed a Motion to Exclude certain proposed hearing exhibits of Intervenors. On May 7, 2018, Staff filed a response to Crocker's Motion to Exclude. On May 9, 2018, Crocker withdrew its Motion to Exclude.

The evidentiary hearing was held as scheduled before the Commission on May 9, 10, and 11, 2018, in Pierre, South Dakota.

Having considered the evidence of record, applicable law, and the briefs and arguments of the parties, the Commission makes the following Findings of Fact, Conclusions of Law, and Order:

## **FINDINGS OF FACT**

### **I. PROCEDURAL FINDINGS.**

1. The Procedural History set forth above is hereby incorporated by reference in its entirety in these Procedural Findings. The procedural findings set forth in the Procedural History are a substantially complete and accurate description of the material documents filed in this docket and the proceedings conducted and decisions rendered by the Commission in this matter.

### **II. PARTIES.**

2. Crocker Wind Farm, LLC, is a wholly owned subsidiary of Geronimo Energy, LLC ("Geronimo").<sup>1</sup> Crocker will be the sole owner.<sup>2</sup>

3. Geronimo is a North American utility-scale renewable energy development company headquartered in Edina, Minnesota, and is a privately held Delaware limited liability company. At the time of the Application, approximately 1,400 megawatts ("MW") of wind projects and 200 MW of solar projects developed by Geronimo were either currently under construction or operational. Geronimo has a multi-gigawatt development pipeline of wind and solar projects in various stages of development throughout the United States.<sup>3</sup>

4. Gale Paulson is a landowner near the Project.<sup>4</sup>

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<sup>1</sup> Ex. A1 at 1.

<sup>2</sup> Ex. A1 at 2.

<sup>3</sup> Ex. A1 at 1.

<sup>4</sup> Evid. Hrg. Tr. (May 10, 2018) at 483 (Paulson).

5. Shad Stevens is a landowner near the Project.<sup>5</sup>

6. Staff fully participated as a party in this matter, in accordance with SDCL 49-41B-17(1).

### III. PROJECT DESCRIPTION.

7. The proposed Project is an up to 400 MW wind energy conversation facility (Wind Farm Facility) and an associated 345 kV transmission facility (Transmission Facility) located in Clark County, South Dakota (collectively, the "Project"). The Wind Farm Facility includes up to 120 wind turbines,<sup>6</sup> up to 4 meteorological towers, associated access roads, improvements to existing public and private roads, temporary crane paths, temporary laydown/staging area, an operations and maintenance (O&M) facility, collector and communication systems, and a new Project electrical substation. The Transmission Facility includes a 345-kV transmission line, temporary staging area, temporary access roads, and a switchyard with permanent access road.<sup>7</sup> The Project would generate up to 400 MW.<sup>8</sup>

8. The turbines Crocker is considering for the Project span the energy production range of 2.0 MW to 4.0 MW. Crocker will identify a specific turbine model prior to construction. Any turbine model selected will utilize the turbine locations specified in the Application, and will meet all applicable local, state, and federal requirements and commitments.<sup>9</sup>

9. The 5.2 miles of overhead transmission line will extend from the Project substation in Section 30 of Township 119N, Range 58W to the switchyard, which is located approximately 2 miles north of the town of Crocker in Section 9 of Township 119N, Range 58W, in Clark County, South Dakota. At the switchyard, the power will transfer to the Basin Electric Groton-to-Watertown 345 kV transmission line, part of the Southwest Power Pool, Inc. (SPP)/Western Area Power Administration (Western) transmission line portfolio.<sup>10</sup>

10. The Project is located on approximately 29,331 acres of privately owned land in Clark County, South Dakota (Project Area), approximately 8 miles north of Clark, South Dakota.<sup>11</sup>

11. The total installed capital costs for the Wind Farm Facility are estimated to be approximately \$1.5 million per MW with project cost depending on project size and other variables, including wind turbine selection, associated electrical and communication systems, and access roads. Ongoing operations and maintenance costs and administrative costs are estimated to be approximately \$13 to \$14 million per year when

<sup>5</sup> Evid. Hrg. Tr. (May 10, 2018) at 498 (Stevens).

<sup>6</sup> Ex. A1 at 20.

<sup>7</sup> Ex. A1 at 1; Ex. A5 at 3-4.

<sup>8</sup> Ex. A1 at 13.

<sup>9</sup> Ex. A1 at 20.

<sup>10</sup> Ex. A1 at 1.

<sup>11</sup> Ex. A1 at 1.

including direct landowner agreement payments and annual capacity and production taxes due for the wind farm.<sup>12</sup>

12. The total installed capital costs for the Transmission Facility are estimated to be approximately \$5 million. Ongoing operations and maintenance costs and administrative costs are estimated to be approximately \$100,000 per year, including payments to landowners for easement rights.<sup>13</sup>

13. Crocker presented evidence of consumer demand and need for the Project.<sup>14</sup> The Project would install up to 400 MW of wind generating capacity in South Dakota that would contribute to satisfying utilities', commercial and industrial customers', and consumers' demands for renewable energy, and meet utility renewable requirements or individual sustainability goals.<sup>15</sup>

14. Crocker recently executed a Power Purchase Agreement (PPA) for 150 MW of the Project's output.<sup>16</sup> In addition, at the time of hearing, Crocker was in the final stages of active discussions for an additional 50 MW with another large commercial entity, but had not yet executed an offtake agreement. This agreement is anticipated to be finalized by the end of the Second Quarter or beginning of the Third Quarter of 2018, which would bring the total output under contract to 200 MW.<sup>17</sup> Crocker continues to market the second up to 200 MW.<sup>18</sup>

15. Because 200 MW of the Project currently has or is expected to shortly have offtake agreements with large commercial entities, Crocker plans to construct 200 MW of the up to 400 MW Project as soon as all requisite permits and approvals have been secured.<sup>19</sup> Construction of the remaining up to 200 MW of the Project will be dependent on the final turbine model selected for the initial 200 MW constructed, and securing additional offtake agreements.

16. Regardless of the timing of construction, all turbines will be constructed within the Project Area consistent with the configuration presented in the Application, and subject to all commitments, conditions, and requirements of this Order.<sup>20</sup>

17. Crocker provided evidence to support the need for turbine and associated facility flexibility.<sup>21</sup> With respect to turbine flexibility, Crocker and Staff agreed to the turbine flexibility and "material change" provisions set forth in Condition 23, attached hereto. With respect to the access roads, collector system, and temporary facilities, Crocker requested the ability to shift those facilities, as needed, so long as they are

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<sup>12</sup> Ex. A1 at 18.

<sup>13</sup> Ex. A1 at 18.

<sup>14</sup> See Ex. A1 at Ch. 2.0; see also Ex. A4B.

<sup>15</sup> Ex. A1 at 1, 13; see also Ex. A4B at 4-5.

<sup>16</sup> Ex. A4B at 5; Evid. Hrg. Tr. (May 9, 2018) at 17 (Engelking).

<sup>17</sup> Ex. A4B at 5; Evid. Hrg. Tr. (May 9, 2018) at 17-19 (Engelking).

<sup>18</sup> Evid. Hrg. Tr. (May 9, 2018) at 19 (Engelking).

<sup>19</sup> Ex. A4B at 5; see also Ex. A1 at Ch. 6.0.

<sup>20</sup> Ex. A1 at 19, 46.

<sup>21</sup> See Ex. A15 at 7-9; see also Ex. A15-7; Ex. A1 at 19-20.

located on leased land, cultural resources are avoided, sensitive species habitat is avoided, wetland impacts are avoided, and all other applicable regulations and requirements are met.<sup>22</sup> Crocker and Staff agreed to Condition 24, attached hereto.

18. With respect to the Transmission Facility, Crocker requested the ability to shift structures so long as they remain within the easement acquired, impacts to cultural resources and sensitive habitat are avoided, and wetland impacts are avoided. For "material changes," the review process outlined for "material changes" to turbine locations would apply.<sup>23</sup> With respect to the Transmission Facility, Crocker and Staff agreed to Condition 25, attached hereto.

19. The record demonstrates that Crocker has made appropriate and reasonable plans for decommissioning.<sup>24</sup> With respect to financial security for decommissioning, an escrow account is an appropriate financial assurance to cover decommissioning costs.<sup>25</sup>

20. The record demonstrates that Crocker has provided adequate information on potential cumulative impacts and that the Project will not have a significant impact.<sup>26</sup>

#### **IV. FACTORS FOR AN ENERGY FACILITY PERMIT.**

21. Under the SDCL 49-41B-22, the Commission must find:

- (1) The proposed facility will comply with all applicable laws and rules;
- (2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area;
- (3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and
- (4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

22. In addition, SDCL 49-41B-25 provides that the Commission must make a finding that the construction of the facility meets all of the requirements of Chapter 49-41B.

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<sup>22</sup> Ex. A1 at 20; see also Crocker's Recommended Permit Condition 24.

<sup>23</sup> Ex. A1 at 26; see also Crocker's Recommended Permit Condition 25.

<sup>24</sup> Ex. A1 at Ch. 5.0.

<sup>25</sup> Evid. Hrg. Tr. (May 9, 2018) at 107-108 (Fladeboe).

<sup>26</sup> See Ex. A1 at Ch. 9.0; see also Evid. Hrg. Tr. (May 11, 2018) at 660 (Kearney).

23. There is sufficient evidence on the record for the Commission to assess the proposed Project using the criteria set forth above.

**V. SATISFACTION OF REQUIREMENTS FOR ISSUANCE OF AN ENERGY FACILITY PERMIT.**

**A. The proposed facility will comply with all applicable laws and rules.**

24. The evidence submitted by Crocker demonstrates that the Project will comply with applicable laws and rules.<sup>27</sup> Neither Staff nor Intervenors have asserted otherwise or submitted evidence to the contrary.

25. Construction of the Project meets all of the requirements of Chapter 49-41B.

**B. The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area.**

**1. Environment.**

26. The evidence demonstrates that the Project does not pose a threat of serious injury to the environment in the Project Area, and that Crocker has adopted reasonable avoidance and minimization measures, as well as commitments, to further limit potential environmental impacts.

27. Construction of the Project would result in negligible impacts on geological resources.<sup>28</sup> The risk of seismic activity in the vicinity of the Project Area is extremely low to negligible, according to data from the U.S. Geological Survey (USGS).<sup>29</sup>

28. Crocker has demonstrated that it will minimize and/or avoid impacts to soil resources.<sup>30</sup> The majority of impacts will be temporary and related to construction activities. Permanent impacts associated with aboveground facilities will be up to 157 acres, which is less than one percent of the Project Area. Crocker will implement various best management practices (BMPs) during construction and restoration to minimize impacts to the physical environment, including separating topsoil and subsoil, installing temporary erosion control devices, and decompacting soil after construction is complete.<sup>31</sup>

29. The Project is not anticipated to have material impacts on existing air and water quality.<sup>32</sup>

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<sup>27</sup> See, e.g., Ex. A1 at 46-47 and Ch. 8.0 and 9.0.

<sup>28</sup> See Ex. A1 at 51 and § 9.1.1.

<sup>29</sup> Ex. A11 at 5.

<sup>30</sup> See Ex. A1 at § 9.1.2.

<sup>31</sup> Ex. A11 at 6.

<sup>32</sup> See Ex. A1 at §§ 9.2 and 9.6.

30. Crocker has demonstrated that it will minimize and/or avoid impacts to hydrology.<sup>33</sup> The record demonstrates that Crocker has minimized impacts to wetlands and wetland basins.<sup>34</sup> The Project is not anticipated to have long-term impacts on groundwater resources.<sup>35</sup> Any potential impacts to floodplains would be temporary in nature, and existing contours and elevations would be restored upon Project completion.<sup>36</sup> Project impacts on hydrologic resources are anticipated to be temporary and/or minor. The Project is anticipated to permanently impact only approximately 0.2 acres of wetlands and will avoid permanent impacts to U.S. Fish and Wildlife Service (USFWS) wetland basins.<sup>37</sup>

31. Crocker has demonstrated that it will minimize and/or avoid impacts to vegetation.<sup>38</sup> Permanent impacts associated with aboveground facilities would be up to 157 acres, which is less than one percent of the Project Area.<sup>39</sup> Overall, 80 percent of the Project's construction and operations-related impacts would occur in vegetation types that have experienced prior disturbance or alteration.<sup>40</sup>

32. Crocker has worked with the USFWS and the South Dakota Game Fish and Parks Department (GFP) to redesign the site layout to avoid impacts to high quality prairie communities, and to realign linear corridors, such as the access roads, collector system, crane pathways, and transmission line, to follow existing disturbed corridors (e.g., roads, transmission lines, fence rows) in an effort to reduce fragmentation. In response to input from USFWS and GFP, Crocker shifted turbines closer to the edges of potentially undisturbed grassland (PUDL) to minimize the associated access road lengths, and sited access roads to avoid and minimize fragmentation.<sup>41</sup> The Project will not permanently impact high quality PUDL and will temporarily impact only 0.1 acres of high quality PUDL.<sup>42</sup> The record demonstrates that the Project will not have a significant or negative impact on habitat, and will not substantially increase habitat fragmentation in the area.<sup>43</sup>

33. Crocker will restore areas of disturbed soil using weed-free native grasses, forbs, and shrubs, in consultation with landowners, land managers, and appropriate agencies.<sup>44</sup>

34. Crocker has demonstrated that it will minimize and/or avoid impacts to wildlife.<sup>45</sup> Crocker consulted with the USFWS and GFP to identify which species and/or habitat surveys were needed and to design the survey protocols, in accordance with the

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<sup>33</sup> See Ex. A1 at § 9.2.

<sup>34</sup> See Ex. A1 at 67 and § 9.2.

<sup>35</sup> See Ex. A1 at 62-63 and § 9.2.2.

<sup>36</sup> See Ex. A1 at 66.

<sup>37</sup> Ex. A11 at 7; see also Evid. Hrg. Tr. (May 9, 2018) at 182-83 (Anderson).

<sup>38</sup> See Ex. A1 at § 9.3.1.

<sup>39</sup> Ex. A1 at 27.

<sup>40</sup> Ex. A1 at 70.

<sup>41</sup> See Ex. A12 at 3, 6; Ex. A11 at 4; Ex. A1 at 72.

<sup>42</sup> Ex. A12 at 3; see also Ex. A12-1 and Ex. A12-2; Ex. A1 at Table 9-11.

<sup>43</sup> Ex. A12 at 4.

<sup>44</sup> Ex. A1 at 73.

<sup>45</sup> See Ex. A1 at §§ 9.3.2, 9.3.3, 9.3.4.

USFWS Land-Based Wind Energy Guidelines (WEG) (USFWS, 2012).<sup>46</sup> Crocker conducted habitat assessments that informed the turbine siting process to minimize impacts to quality habitats. Turbines will not be sited in the Game Production Areas (GPAs) or Waterfowl Productions Areas (WPAs). In addition, Crocker has implemented or will implement appropriate measures to avoid or minimize potential impacts to wildlife in the Project Area during Project construction, operation, and decommissioning.<sup>47</sup>

35. Crocker has conducted numerous wildlife studies and surveys for the Project to assess existing use, identify potential impacts, and incorporate appropriate avoidance and minimization measures.<sup>48</sup> In addition, Crocker has prepared a Bird and Bat Conservation Strategy (BBCS), which includes strategies for mitigating risks to birds and bats during construction and operation of the Project.<sup>49</sup>

36. Construction of the Project may have impacts on wildlife species primarily as a result of habitat disturbance. However, following construction, all temporary construction workspaces will be reseeded, except for actively cultivated croplands, unless approved in writing by the landowner. Wildlife may avoid areas during Project construction, but it is anticipated that displaced wildlife would return to these areas following restoration.<sup>50</sup> Some grassland bird species may avoid habitat around wind turbines; however, these species would be expected to move to adjacent grassland areas (which exist both within and adjacent to the Project Area) during the breeding season.<sup>51</sup>

37. The record demonstrates that, while the Project may directly impact birds and bats, avian fatalities due to the Project are anticipated to be localized and to not have population level impacts.<sup>52</sup> Bat activity at Crocker was lower than the average rate of bat activity at most Midwest projects, and bat impacts are expected to be low.<sup>53</sup>

38. Crocker conducted three years of pre-construction avian surveys.<sup>54</sup> Those surveys indicate that avian impacts from the Project will be similar to other wind projects in Minnesota and South Dakota.<sup>55</sup> Applicable studies have shown little impact on waterfowl behavior as a result of wind projects.<sup>56</sup> Further, the record demonstrates that just because an area may have high avian use, it does not necessarily follow that a wind project would result in high avian mortality.<sup>57</sup> Further, Crocker has committed to two years

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<sup>46</sup> Ex. A1 at 74.

<sup>47</sup> See Ex. A1 at 83-85.

<sup>48</sup> See Ex. A1 at § 9.3.2 and Ex. A13, Ex. A13-2, Ex. A13-3, Ex. A13-4, Ex. A13-5, Ex. A13-6, Ex. A13-7, Ex. A13-8, Ex. A13-9, Ex. A13-10, Ex. A13-11.

<sup>49</sup> Ex. A13 at 2-3 and Ex. A13-2, Ex. A13-3, Ex. A13-4, Ex. A13-5, Ex. A13-6, Ex. A13-7, Ex. A13-8, Ex. A13-9, Ex. A13-10, Ex. A13-11.

<sup>50</sup> Ex. A11 at 9.

<sup>51</sup> Ex. A13 at 7.

<sup>52</sup> Ex. A11 at 9-10.

<sup>53</sup> Ex. A11 at 9-10.

<sup>54</sup> See Ex. A13 at 3-4.

<sup>55</sup> Ex. A13-11 at 31.

<sup>56</sup> See Ex. A13 at 7-8; Evid. Hrg. Tr. (May 10, 2018) at 300-303 (Pickle).

<sup>57</sup> See Ex. A13 at 7-8.

of post-construction avian mortality monitoring and has developed a BBCS.<sup>58</sup> The BBCS was developed consistent with the USFWS Land-Based WEG and contains detailed discussions of minimization measures that will be used to limit impacts to avian and bat species during construction and operation of the Project. If the results of the post-construction mortality monitoring show unexpectedly high avian impacts, Crocker has committed to coordinating with applicable agencies to determine what additional mitigation or operational changes are appropriate.<sup>59</sup>

39. Crocker has demonstrated that it will minimize and/or avoid impacts to federally and state-listed species.<sup>60</sup> No designated critical habitat for federally-listed species is present within the Project Area.<sup>61</sup> Impacts on federally threatened and endangered species due to Project construction and operations are anticipated to be minimal due to the low likelihood or frequency of species presence in the Project Area and implementation of appropriate species-specific conservation measures.<sup>62</sup> No state-listed species have been documented in the Project Area.<sup>63</sup>

40. Overall, there is a low level of risk for potential bald eagle impacts at the site. Crocker conducted eagle nest surveys within and within ten miles of the Project Area during multiple years.<sup>64</sup> No eagle nests were identified within the Project Area, and the closest eagle nest is approximately 2.2 miles from the Project Area.<sup>65</sup> In addition, Crocker has committed to implementing a number of avian-related monitoring and mitigation measures, including: conducting post-construction avian mortality monitoring for at least two years; utilizing an Aircraft Detection Lighting System (ADLS) in which unnecessary lighting will be turned off at night; and following applicable USFWS Land-Based WEG lighting guidelines.<sup>66</sup>

41. Crocker has demonstrated that it will minimize and/or avoid impacts to aquatic ecosystems.<sup>67</sup> No federally-listed aquatic species are present in the Project Area, and the Project is not anticipated to have long-term impacts to aquatic ecosystems.<sup>68</sup>

42. Crocker has demonstrated that it will minimize and/or avoid impacts to land use.<sup>69</sup> All Project impacts are on private land; the Project will not impact any publicly owned land.<sup>70</sup> The Project will not displace existing residences or businesses. With the exception of permanent above-ground facilities, the land impacted during construction will

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<sup>58</sup> See Evid. Hrg. Tr. (May 10, 2018) at 294 and 328-333 (Pickle); Ex. A13-11 at 39; and Crocker's Recommended Permit Condition 37.

<sup>59</sup> See Ex. A13-11 at 39-40.

<sup>60</sup> See Ex. A1 at § 9.3.3.

<sup>61</sup> Ex. A11 at 8.

<sup>62</sup> See Ex. A1 at § 9.3.3.2.

<sup>63</sup> See Ex. A1 at § 9.3.4.3.

<sup>64</sup> See Ex. A13 at 3-4, 7; Ex. A1 at 77; *see also* Evid. Hrg. Tr. (May 10, 2018) at 326-327 (Pickle).

<sup>65</sup> See Evid. Hrg. Tr. (May 10, 2018) at 274 (Pickle); Ex. A1 at 77.

<sup>66</sup> Ex. A11 at 9; Ex. A1 at §§ 9.3.2.2 and 9.3.2.3.

<sup>67</sup> See Ex. A1 at § 9.4.

<sup>68</sup> Ex. A11 at 8.

<sup>69</sup> See Ex. A1 at § 9.5.1.

<sup>70</sup> Ex. A1 at 94.

be restored and could return to its prior agricultural use. Crocker will work with landowners and employ various BMPs to avoid and/or minimize disruption to agricultural operations.<sup>71</sup>

43. Crocker has demonstrated that it will minimize and/or avoid impacts to recreation.<sup>72</sup> The Project will avoid direct impacts to all GPAs, WPAs, Reid Lake State Waterfowl Refuge, and School and Public Lands. There is one turbine and associated access road and collector line proposed on the Walk-In Area (WIA) parcel located in the northern portion of the Project Area. Access on this parcel would be temporarily restricted during construction; however no long-term impacts to use are expected.<sup>73</sup>

44. Intervenor Gale Paulson proposed a three-mile setback from Reid Lake.<sup>74</sup> Neither GFP nor USFWS have supported such a setback. Further, Mr. Paulson did not present any evidence in support of the three-mile setback,<sup>75</sup> and did not request a three-mile setback from Clark County during the conditional use permit process for the Project.<sup>76</sup> Nothing in the record supports Mr. Paulson's proposed three-mile setback from Reid Lake.

45. Crocker has demonstrated that it will minimize and/or avoid impacts to conservation easements.<sup>77</sup> Crocker proposes to construct and operate some of the facilities on USFWS easement land. Therefore, the USFWS prepared a Draft Environmental Assessment (EA) for the Project in accordance with the applicable requirements and standards of the National Environmental Policy Act (NEPA).<sup>78</sup> The Project avoids permanent impacts to USFWS wetland basins.<sup>79</sup> There are 14 turbines and associated access roads sited on USFWS grassland easements.<sup>80</sup> The Project will permanently impact 15.1 acres, which is less than one percent of the grassland easements in the Project Area.<sup>81</sup> USFWS must approve use of USFWS grassland easement areas for wind farm facilities and has a policy requiring 1:1 mitigation for acres permanently impacted. Crocker has voluntarily agreed to 2:1 mitigation for federal easement grasslands.<sup>82</sup>

46. The record does not support a permit condition requiring Crocker to make compensatory mitigation for potential impacts to undisturbed grasslands. No evidence was introduced to support such a permit condition. As Staff witness Mr. Kirschenmann testified, South Dakota does not have such a policy and GFP has not endorsed any particular method for calculating such impacts. The land at issue is private property where

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<sup>71</sup> Ex. A11 at 5 and Ex. A1 at §§ 9.5.1.2 and 9.5.1.3; Ex. A1 at 141.

<sup>72</sup> See Ex. A1 at § 9.5.2.

<sup>73</sup> See Ex. A1 at § 9.5.2.2.

<sup>74</sup> Ex. I-53 at line 134.

<sup>75</sup> See Evid. Hrg. Tr. (May 10, 2018) at 496 (Paulson).

<sup>76</sup> Evid. Hrg. Tr. (May 10, 2018) at 492 (Paulson).

<sup>77</sup> See Ex. A1 at § 9.5.3.

<sup>78</sup> See Ex. A1 at 99.

<sup>79</sup> See Ex. A1 at 99.

<sup>80</sup> See Ex. A1 at 99.

<sup>81</sup> See Ex. A1 at 99-100.

<sup>82</sup> See Ex. A11 at 13 and Ex. A15 at 7 and Ex. A12 at 4.

GFP does not have a property interest.<sup>83</sup> Participating landowners voiced their support for the Project and asserted their right to use their private property as they see fit. For example, Ms. Obermeier testified that the turbine on her property will be sited on grasslands.<sup>84</sup>

47. Crocker has made a voluntary commitment to donate \$25,000 to a third-party for conservation efforts in the Project Area.<sup>85</sup>

48. Crocker has demonstrated that it will minimize and/or avoid impacts to visual resources.<sup>86</sup> For example, consistent with the South Dakota Bat Working Group's and GFP's Siting Guidelines for Wind Power Projects in South Dakota for reducing impacts to visual resources, Crocker has collocated linear Project features such as access roads, crane paths, and collector and communication systems with existing disturbances to the extent practicable.<sup>87</sup> Due to the presence of existing wind farms in the vicinity of the Project Area, significant adverse impacts to visual resources are not anticipated.<sup>88</sup> Additionally, Crocker will install and use ADLS, thereby reducing visual impacts.<sup>89</sup>

49. With respect to cultural and historical architectural resources, Ms. Olson made three recommendations. First, she recommended that an official record search be conducted for the Project. Crocker satisfied this recommendation when it conducted the Level I cultural resource file search in October 2016 and updated in April 2018.<sup>90</sup> Second, the State Historic Preservation Office (SHPO) recommended that a Level III Intensive Survey be completed for the Project Area. As of the evidentiary hearing, Crocker had completed a Level III Intensive Survey of nearly all areas to be impacted by construction of the Project, including both areas of temporary and permanent impacts.<sup>91</sup> As of the evidentiary hearing, only a small portion remained to be surveyed, as Crocker was asked to delay survey until spring calving was complete.<sup>92</sup> That survey will be completed once landowner clearance is given.<sup>93</sup> Third, SHPO recommended that Crocker analyze the visual effects to architectural resources located within one mile of the Project, which Crocker completed. Crocker used a recent Clark County survey to identify structures and assess potential impacts. SHPO recommended that a one-mile buffer from proposed turbines be used to assess impacts; Crocker also included a one-mile buffer around the proposed permanent meteorological towers.<sup>94</sup>

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<sup>83</sup> Evid. Hrg. Tr. (May 10, 2018) at 533-534 (Kirschenmann).

<sup>84</sup> Evid. Hrg. Tr. (May 10, 2018) at 461-462 (Obermeier).

<sup>85</sup> Evid. Hrg. Tr. (May 10, 2018) at 394 (Schmit).

<sup>86</sup> See Ex. A1 at § 9.5.5.

<sup>87</sup> See Ex. A1 at 105.

<sup>88</sup> See Ex. A1 at 105.

<sup>89</sup> Evid. Hrg. Tr. (May 9, 2018) at 27 (Engelking), 98-99 (Fladeboe).

<sup>90</sup> Ex. A14 at 5.

<sup>91</sup> Evid. Hrg. Tr. (May 10, 2018) at 352 (Holven).

<sup>92</sup> Evid. Hrg. Tr. (May 10, 2018) at 352 (Holven).

<sup>93</sup> Evid. Hrg. Tr. (May 10, 2018) at 352 (Holven); see also Ex. A14 at 2.

<sup>94</sup> Ex. A14 at 6.

50. Where Crocker determined that additional investigation (beyond pedestrian surveys) should be conducted to assess the presence or absence of archaeological materials, Crocker has conducted or will conduct shovel testing. Crocker is conducting shovel tests throughout the Project Area, as appropriate, to identify and avoid cultural resources. Crocker anticipates that shovel testing will be completed in early summer 2018.<sup>95</sup>

51. Crocker has demonstrated that it will minimize and/or avoid impacts to cultural resources.<sup>96</sup> Crocker conducted multiple cultural resource surveys to identified cultural resources within the Project Area.<sup>97</sup> Crocker has committed to avoiding cultural resources with Project infrastructure.<sup>98</sup> Further, consistent with best practices, Crocker is developing an Unanticipated Discoveries Plan that will govern the process for addressing any additional resources encountered during construction.<sup>99</sup>

52. Ms. Olson also recommended that Tribal Historic Preservation Officers (THPOs) in South Dakota be contacted. Tribal consultation is being conducted by USFWS as part of its obligation under Section 106 of the National Historic Preservation Act (NHPA) in connection with the USFWS easement exchange process. Section 106 includes a specified process for consultation, identification of resources, and treatment of those resources, and a mechanism for resolving any disputes concerning identification and treatment.<sup>100</sup> Neither the SHPO nor Crocker can consult directly with the tribes in the Section 106 process unless there is an agreement between the USFWS and the tribe delegating USFWS's consultation authority to another party.<sup>101</sup> Unlike the federal Section 106 process, there is no state-level requirement for tribal consultation, and no state-level process for tribal consultation.<sup>102</sup>

53. Staff and Crocker have agreed upon Conditions 12 through 14 regarding cultural resources, which are attached.<sup>103</sup>

## 2. Social and Economic.

54. Crocker initially identified a site in Clark County for development of the Project because a group of local landowners contacted Geronimo regarding potentially developing a wind energy facility on their land. The identification of the Project Area was primarily driven by: (1) the robustness of the available wind energy resource; (2) ready access to transmission interconnection; (3) land use and environmental compatibility with wind development; and (4) landowner support for wind energy development.<sup>104</sup>

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<sup>95</sup> Ex. A14 at 3.

<sup>96</sup> See Ex. A1 at § 9.7.4.

<sup>97</sup> See Ex. A1 at § 9.7.4; Ex. A11 at 11-12; Ex. A14 at 2-3.

<sup>98</sup> Ex. A14 at 5; Ex. A1 at 128.

<sup>99</sup> Ex. A14 at 5.

<sup>100</sup> Ex. A14 at 7.

<sup>101</sup> Evid. Hrg. Tr. (May 10, 2018) at 514-515 (Olson).

<sup>102</sup> Evid. Hrg. Tr. (May 10, 2018) at 516 (Olson).

<sup>103</sup> Crocker's Recommended Permit Conditions 12 through 14.

<sup>104</sup> Ex. A5 at 5; see also Ex. A1 at Ch. 7.0.

55. Participating landowners, Ms. Obermeier and Ms. Christman, testified regarding their support for the Project.<sup>105</sup> The Project will provide an additional stable source of income and a way for landowners to maximize the use of their land.<sup>106</sup> Ms. Obermeier and Ms. Christman also testified to their good working relationships with Crocker and their belief that Crocker has shown “a commitment not only to the landowners, but to the community as well.”<sup>107</sup>

56. The Project will also benefit local organizations in the community through the Project’s community fund.<sup>108</sup> Crocker will create an independently directed community fund and provide that fund with \$200 per MW installed capacity per year for 20 years.<sup>109</sup>

57. Crocker has demonstrated that construction and operation of the Project will result in substantial benefits to South Dakota and local economies.<sup>110</sup> The Project will create temporary job opportunities during construction, and permanent operations and maintenance job opportunities.<sup>111</sup> Additionally, local expenditures are anticipated to be made for equipment, fuel, operating supplies, and other products and services, which will benefit area businesses.<sup>112</sup> The Project will provide participating landowners with lease payments, and will provide long-term benefits to the state and local tax base.<sup>113</sup>

58. Mr. MaRous, a South Dakota State Certified General Appraiser and a certified Member Appraisal Institute appraiser with extensive experience evaluating the impact of wind turbines on property values, conducted a Market Analysis to analyze the potential impact of the Project on the value of the surrounding properties and found no credible data indicating property values will be adversely impacted due to proximity to the Project.<sup>114</sup>

59. Staff’s witness, Mr. Lawrence, acknowledged that he had not conducted a study for the Project and could not offer an opinion regarding the potential impact of the Project on property values.<sup>115</sup>

60. There was no credible showing that there will be quantifiable or qualitative effect on property value.<sup>116</sup>

61. There is no basis in the record to require a property value guarantee. First, there is no record evidence that property values will be adversely affected. Further, Mr.

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<sup>105</sup> See Ex. A17 and Ex. A18; see also Evid. Hrg. Tr. (May 10, 2018) at 452-460 (Christman); Evid. Hrg. Tr. (May 10, 2018) at 460-465 (Obermeier).

<sup>106</sup> Ex. A17 at 2; Ex. A18 at 3.

<sup>107</sup> Ex. A18 at 2; see also Ex. A17 at 2.

<sup>108</sup> Ex. A17 at 3.

<sup>109</sup> Ex. A1 at 16.

<sup>110</sup> See Ex. A1 at §§ 9.7.1.2.

<sup>111</sup> Ex. A6 at 8.

<sup>112</sup> Ex. A5 at 13.

<sup>113</sup> See Ex. A1 at 114.

<sup>114</sup> See Ex. A16 at 7; see also Ex. A22 at 2.

<sup>115</sup> Evid. Hrg. Tr. (May 11, 2018) at 632 (Lawrence).

<sup>116</sup> See Ex. A1 at 118.

MaRous and Mr. Lawrence both testified that a property value guarantee is unworkable due to difficulties associated with effectively, consistently, and efficiently administering such a requirement.<sup>117</sup>

62. The record demonstrates that Crocker has avoided and/or minimized impacts to telecommunications.<sup>118</sup> Crocker reached an agreement with Interstate Telecommunications Cooperative, Inc., which has telecommunications lines in the areas.<sup>119</sup>

63. The record demonstrates that the Project is not anticipated to adversely impact communications systems.<sup>120</sup> Mr. Stevens alleged potential interference with the Aberdeen weather radar, but the National Oceanic and Atmospheric Administration ("NOAA") stated that it would not request mitigation of impacts for the Project configuration.<sup>121</sup> If television reception interference is reported to Crocker, Crocker has in place reasonable mitigation measures to adequately address the issue.<sup>122</sup>

64. The record demonstrates that Crocker has avoided and/or minimized impacts to transportation.<sup>123</sup> Crocker will coordinate with applicable local road authorities to establish road use agreements, as needed, to minimize and mitigate Project impacts to haul roads.<sup>124</sup> The Project will utilize the One-Call program to locate underground infrastructure prior to construction. In addition, once construction is completed, the Project will register its facilities with the One-Call program.<sup>125</sup>

65. One private airstrip, owned by Intervenor Shad Stevens, is located outside of the Project boundary in Township 118N, Range 58W, Section 18. Mr. Stevens initially expressed concerns regarding the impact of the Project on his private air strip.<sup>126</sup> However, Mr. Stevens testified that his concerns regarding his airstrip had been addressed when Crocker voluntarily removed two turbines.<sup>127</sup>

**C. The facility will not substantially impair the health, safety or welfare of the inhabitants.**

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<sup>117</sup> Evid. Hrg. Tr. (May 11, 2018) at 614-617 (MaRous) and 648-649 (Lawrence).

<sup>118</sup> Ex. A1 at § 9.5.7.

<sup>119</sup> Evid. Hrg. Tr. (May 10, 2018) at 362 (Schmit).

<sup>120</sup> Ex. A15 at 3-4.

<sup>121</sup> Ex. A15 at 5.

<sup>122</sup> Ex. A15 at 4-5.

<sup>123</sup> See Ex. A1 at § 9.7.3.

<sup>124</sup> Ex. A6 at 11.

<sup>125</sup> Ex. A6 at 11.

<sup>126</sup> Ex. I-54 at 3.

<sup>127</sup> Evid. Hrg. Tr. (May 10, 2018) at 506-507 (Stevens); see also Ex. A1 at 124. Crocker voluntarily eliminated a turbine location in the southeast quarter of Township 118N, Range 59W, Section 13 and shifted another turbine in the southwest quarter of the same section (which has subsequently been removed) following discussions with Mr. Stevens. Ex. A1 at 124.

66. The record demonstrates Crocker has minimized impacts from noise.<sup>128</sup> Staff and Crocker agreed to Condition 29, which is attached hereto.<sup>129</sup>

67. Section 4.21.03(13) of the Clark County Zoning Ordinance imposes the following noise limit on wind energy facilities: "Noise shall not exceed 50 dBA, average A-weighted Sound pressure including constructive interference effects at the perimeter of the principal and accessory structures of existing off-site residences, businesses, and buildings owned and/or maintained by a governmental entity." Crocker conducted a Sound Level Assessment to measure the Project's anticipated sound level in order to determine whether the Project will comply with Clark County's noise limit of 50 dBA. The projected sound levels from the Project are 50 dBA or less at all participating residences, and 41 dBA or less at all non-participating residences. Thus, the Project will comply with the Clark County sound level requirement and the agreed-upon noise condition.<sup>130</sup>

68. The record demonstrates that Crocker has minimized and/or avoided impacts from shadow flicker.<sup>131</sup> Crocker has committed to 30 hours of shadow flicker per year or less at existing nonparticipating and participating occupied residences.<sup>132</sup>

69. There is no record evidence that the proposed Project will have any impacts on human health. The construction corridors and placement of facilities meet or exceed industry standards established for protection of the health and welfare of residences and businesses in and around the Project.<sup>133</sup> Further, the South Dakota Department of Health provided Staff with a letter stating that the Department of Health has not taken a formal position on the issue of wind turbines and human health. Further, they referenced the Massachusetts Department of Public Health and Minnesota Department of Health studies and identified those studies generally conclude that there is insufficient evidence to establish significant risk to human health.<sup>134</sup>

70. No impacts due to electromagnetic fields (EMF) are anticipated. Project facilities will be set back from residences in excess of state standards, where EMF will be at background levels. In addition, Crocker conducted an EMF study for the Transmission Facility, and the results of that study show that EMF levels are well within industry standards. As a result, EMF-related issues are not anticipated.<sup>135</sup>

**D. The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.**

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<sup>128</sup> Ex. A1 at § 9.5.4.

<sup>129</sup> Crocker's Recommended Permit Condition 29.

<sup>130</sup> Ex. A7 at 7; *see also* Ex. A1 at Appendix E; Crocker's Recommended Permit Condition 29.

<sup>131</sup> Ex. A1 at § 9.5.6.

<sup>132</sup> Ex. A9 at 4 and Evid. Hrg. Tr. (May 9, 2018) at 172-173 (Morris).

<sup>133</sup> Ex. A1 at 95.

<sup>134</sup> Ex. S1 at 6.

<sup>135</sup> Ex. A6 at 11-12.

71. The record demonstrates that the Project will not unduly interfere with the orderly development of the region, as demonstrated by Clark County's granting of a conditional use permit for the Project.<sup>136</sup>

### **CONCLUSIONS OF LAW**

From the foregoing Findings of Fact and the record in this proceeding, the Commission now makes the following Conclusions of Law:

1. The Commission has jurisdiction to consider the Application under South Dakota Codified Law Chapter 49-41B.

2. The wind energy conversion facility proposed by Crocker is a wind energy facility as defined under South Dakota Codified Law 49-41B-2(13) and an associated transmission facility as defined under South Dakota Codified Law 49-41B-2.1.

3. The Application submitted by Crocker meets the criteria required by South Dakota Codified Law 49-41B-25, and construction of the Project meets the requirements of South Dakota Codified Law 49-41B.

4. The Commission satisfied the hearing and notice requirement in South Dakota Codified Law Chapter 49-41B.

5. Applicant satisfied the applicable notice requirements in South Dakota Codified Law Chapter 49-41B.

6. Applicant has demonstrated that the proposed facility will comply with all applicable laws and rules.

7. Applicant has demonstrated that the facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area.

8. Applicant has demonstrated that the facility will not substantially impair the health, safety or welfare of the inhabitants.

9. Applicant has demonstrated that the facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

10. All other applicable procedural requirements in South Dakota Codified Law Chapter 49-41B have been satisfied.

11. No party has provided evidence sufficient for the Commission to impose a property value guarantee.

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<sup>136</sup> Ex. A1 at 92-93 and 141.

12. No party has provided evidence sufficient for the Commission to impose a three-mile setback from the Reid Lake Complex.

13. No party has provided evidence sufficient for the Commission to require further engagement or consultation with Native American Tribes.

14. No party has provided evidence sufficient for the Commission to impose mitigation for grassland impacts above and beyond the mitigation committed to by Applicant in the record.

15. To the extent that any Finding of Fact set forth above is more appropriately a conclusion of law, that Finding of Fact is incorporated by reference as a Conclusion of Law.

### **ORDER**

From the foregoing Findings of Fact and Conclusions of Law, it is therefore:

ORDERED, that an energy facility permit is issued to Crocker Wind Farm, LLC for the Crocker Wind Farm.

ORDERED, that an energy facility permit is issued to Crocker Wind Farm, LLC for the associated 345 kV transmission line.

ORDERED, that Applicant shall comply with the attached Permit Conditions, ATTACHMENT A, which are hereby incorporated into and made a part of this Order.

### **NOTICE OF ENTRY AND OF RIGHT TO APPEAL**

PLEASE TAKE NOTICE that this Final Decision and Order was duly issued and entered on the 12<sup>th</sup> day of June 2018. Pursuant to SDCL 1-26-32, this Final Decision and Order will take effect 10 days after the date of receipt or failure to accept delivery of the decision by the parties. Pursuant to ARSD 20:10:01:30.01, an application for a rehearing or reconsideration may be made by filing a written petition with the Commission within 30 days from the date of issuance of this Final Decision and Order. Pursuant to SDCL 49-41B-30, the parties have the right to appeal this Final Decision and Order to the appropriate Circuit Court by serving notice of appeal of this decision to the circuit court within thirty (30) days after the date of service of this Notice of Decision.

Dated at Pierre, South Dakota, this 12<sup>th</sup> day of June 2018.

**CERTIFICATE OF SERVICE**

The undersigned hereby certifies that this document has been served today upon all parties of record in this docket, as listed on the docket service list, electronically or by mail.

By:

Adam de Hueck

Date:

6/12/18

(OFFICIAL SEAL)

BY ORDER OF THE COMMISSION:

Kristie Fiegen  
KRISTIE FIEGEN, Chairperson

Gary W. Hanson  
GARY HANSON, Commissioner

Chris Nelson  
CHRIS NELSON, Commissioner

**ATTACHMENT A**

**RECOMMENDED PERMIT CONDITIONS**

1. Applicant will obtain all governmental permits which reasonably may be required by any township, county, state or federal agency, or any other governmental unit for construction and operation activity prior to engaging in the particular activity covered by that permit. Copies of any permits obtained by the Applicant shall be sent to the Commission.
2. The Applicant shall construct, operate, and maintain the Project in a manner consistent with (1) descriptions in the Application, (2) Application supplements, (3) responses to any data requests, (4) the Terms and Conditions of the Permit to Construct Facilities, (5) any applicable industry standards, and (6) any permits issued by a federal, state, or local agency.
3. Applicant agrees that the Commission's complaint process as set forth in ARSD 20:10:01 shall be available to landowners and other persons sustaining or threatened with damage as the result of Applicant's failure to abide by the conditions of the Permit or otherwise having standing to seek enforcement of the conditions of the Permit. Participating landowners are free to use the complaint process free from retribution or consequences regardless of any private easement term to the contrary.
4. Applicant shall provide each landowner on whose property the Project is to be

constructed with the following information:

- a) A copy of the Commission Order Granting Permit to Construct Facilities;
  - b) Detailed safety information describing:
    - 1) Reasonable safety precautions for existing activities on or near the Project,
    - 2) Known activities or uses that are presently prohibited near the Project, and
    - 3) Other known potential dangers or limitations near the Project;
  - c) Construction/maintenance damage compensation plans and procedures;
  - d) The Commission's address, website, and phone number;
  - e) Contact person for Applicant, including name, e-mail address, and phone number.
5. In order to ensure compliance with the terms and conditions of this Permit pursuant to SDCL 49-41B-33, it is necessary for the enforcement of this Order that all employees, contractors, and agents of Applicant involved in this Project be made aware of the terms and conditions of this Permit.
6. Except as otherwise provided in the conditions, Applicant shall comply with all mitigation measures set forth in the Application, Applicant responses to Staff data requests, and the Environmental Assessment. Material modifications to the mitigation measures shall be subject to prior approval of the Commission.
7. Applicant shall comply with and implement any Commitments set forth in the USFWS Final Environmental Assessment.
8. Applicant will negotiate road use agreements with Clark County, and all affected townships, if required. Applicant will follow the terms of all road use agreements.

Applicant shall take appropriate action to mitigate wind-blown particles created throughout the construction process, including but not limited to implementation of dust control measures such as road watering, covering of open haul trucks when transporting material subject to being windblown, and the removal of any soils or mud deposits by construction equipment when necessary.

9. Applicant shall comply with the following conditions regarding road protection:
- a) Applicant shall acquire all necessary permits authorizing the crossing of federal, state, county, and township roads.
  - b) Applicant shall coordinate road closures with federal, state, and local governments and emergency responders.
  - c) Applicant shall implement a regular program of road maintenance and repair through the active construction period to keep paved and gravel roads in an acceptable condition for residents and the public.
  - d) After construction, Applicant shall repair and restore deteriorated roads resulting from construction traffic, or compensate governmental entities for the repair and restoration of deteriorated roads, such that the roads are returned to their preconstruction condition.
  - e) Privately owned areas used as temporary roads during construction will be restored to their preconstruction condition to the extent practicable, except as otherwise requested or agreed to by the landowner.
  - f) Should Applicant need to widen any existing roadways during construction of the Project, the Applicant shall return the roadways back to the original width after completion of the Project, unless agreed upon otherwise with the federal, state, county, or township entities, or the landowner.
  - g) Should the Environmental Assessment identify any mitigation measures to be implemented by Applicant during road construction activities, Applicant shall implement said measures as required.
  - h) Applicant shall use appropriate preventative measures to prevent damage to paved roads and to remove excess soil or mud from such

roadways.

- i) Before commencing construction, Applicant shall furnish an indemnity bond in the amount of \$1,000,000 to comply with the requirements of SDCL 49-41B-38. Such bond shall be issued in favor of, and for the benefit of, all such townships, counties, and other governmental entities whose property is crossed by the transmission facilities. The bond shall remain in effect until released by the Commission, which release shall not be unreasonably denied following completion of the construction and repair period. Applicant shall give notice of the existence and the amount of this bond to all counties, townships, and other governmental entities whose property is crossed by the transmission facilities.
10. Applicant will provide signage that identifies road closures and disturbances resulting from the Project in accordance with the most recent editions of the Manual on Uniform Traffic Control Devices as published by the Federal Highway Administration.
  11. Applicant shall promptly report to the Commission the presence of any critical habitat of threatened or endangered species in the Project area that Applicant becomes aware of and that was not previously reported to the Commission.
  12. Applicant agrees to avoid direct impacts to cultural resources that are unevaluated, eligible for or listed in the National Register of Historic Places (NRHP). When a NRHP unevaluated, eligible or listed site cannot be avoided, Applicant shall notify SHPO and the Commission of the reasons that complete avoidance cannot be achieved in order to coordinate minimization and/or treatment measures.
  13. Applicant agrees to develop an unanticipated discovery plan for cultural resources and follow South Dakota Codified Laws 34-27-25, 34-27-26, and 34-27-28 for the discovery of human remains.
  14. Applicant shall file the final cultural resources report with the Commission prior to construction. If any potential adverse impacts are found in the final cultural resources report, the Applicant shall file with the Commission a report describing the SHPO approved planned measures to ameliorate those impacts.
  15. Applicant shall provide the Stormwater Pollution Prevention Plan (SWPPP) to the Commission when Applicant has a final design for the Project. The SWPPP

will outline the water and soil conservation practices that will be used during construction to prevent or minimize erosion and sedimentation. The SWPPP will be completed before submittal of an application for a National Pollutant Discharge Elimination System (NPDES) general permit for construction activities. All contractors will be given a copy of the SWPPP and requirements will be reviewed with them prior to the start of construction.

16. Applicant will repair and restore areas disturbed by the construction or maintenance of the Project. Except as otherwise agreed to by the landowner, restoration will include replacement of original pre-construction topsoil or equivalent quality topsoil to its original elevation, contour, and compaction and re-establishment of original vegetation as close thereto as reasonably practical. In order to facilitate compliance with this Condition, Applicant shall:
  - a) Strip topsoil to the actual depth of the topsoil, or as otherwise agreed to by the landowner in writing, in all areas disturbed by the Project; however, with respect to access roads, Applicant may remove less than the actual depth of topsoil to ensure the roads remain low-profile and the contours align with the surrounding area;
  - b) Store topsoil separate from subsoil in order to prevent mixing of the soil types;
  - c) Remove all excess soils generated during the excavation of the WTG foundations from the site, unless the landowner requests, and/or agrees, otherwise; and
  - d) When revegetating non-cultivated grasslands, Applicant shall use a seed mix that is recommended by the Natural Resource Conservation Service (NRCS), or other land management agency, and agreed upon by the landowner in writing.
17. Applicant shall work closely with landowners or land management agencies, such as the NRCS, to determine a plan to control noxious weeds.
18. Applicant shall stage construction materials in a manner that minimizes the adverse impact to the landowners and land users as agreed upon between Applicant and the landowner or Applicant and appropriate federal, state, and/or local government agency. All excess construction materials and debris shall be removed upon completion of the Project, unless the landowner agrees otherwise.

19. In order to mitigate interference with agricultural operations during and after construction, Applicant shall locate all structures, to the extent feasible and prudent, to minimize adverse impacts and interferences with agricultural operations, shelterbelts, and other land uses or activities. Applicant shall take appropriate precautions to protect livestock and crops during construction. Applicant shall repair all fences and gates removed or damaged during construction or maintenance unless otherwise agreed upon with the landowner or designee. Applicant shall be responsible for the repair of private roads damaged when moving equipment or when obtaining access to the right-of-way.
20. Applicant shall bury the underground collector system at a minimum depth of four feet, or deeper if necessary, in order to ensure the current land use is not impacted.
21. Applicant shall repair or replace all property removed or damaged during all phases of construction, including but not limited to, all fences, gates, and utility, water supply, irrigation or drainage systems. Applicant shall compensate the owners for damages or losses that cannot be fully remedied by repair or replacement, such as lost productivity and crop and livestock losses. All repair, replacement and/or compensation described above shall be in accordance with the terms and conditions of written agreements between Applicant and affected landowners where such agreements exist.
22. Applicant shall, in the manner described in its written agreement with a landowner, indemnify and hold the landowner harmless for loss, damage, claim, or actions resulting from Applicant's use of the easement, including any damage resulting from any release, except to the extent such loss, damage claim, or action results from the negligence or willful misconduct of the landowner or his employees, agents, contractors, invitees, or other representatives.
23. Applicant may make turbine adjustments of 325 feet or less from the turbine locations identified in the Application without prior Commission approval, so long as the turbine shifts comply with county and state setback requirements, specified noise and shadow flicker requirements, avoid cultural resource and sensitive species habitat, and avoid wetland impacts. Prior to implementing the turbine adjustment, Applicant will file in the docket an affidavit demonstrating compliance with the limitations set forth above. Any turbine adjustment that does not comply with the aforesaid limitations would be considered a "material change," and the Applicant shall file a request for approval of the "material change" prior to making the adjustment pursuant to the following approval process:

- Applicant will file with the Commission and serve on the official Service List a request for approval of the adjustment that includes:
    - An affidavit describing the proposed turbine adjustment, the reason for the adjustment, the reason the adjustment does not comply with one or more turbine flexibility limitations set forth above, and information regarding compliance with all other applicable requirements; and
    - A map showing both the approved location and the proposed adjustment (in different colors);
  - Once received, the information will be reviewed by Staff, and Staff will have 10 calendar days within which to request further Commission review.
  - If no further review is requested, Applicant may proceed with the adjustment.
  - If further review is requested, the Commission will issue a decision regarding Applicant's request at its next available regularly scheduled Commission meeting, subject to notice requirements, after the request for further review is made by Staff.
24. Applicant may adjust access roads, the collector system, and temporary facilities, so long as they are located on leased land, cultural resources are avoided, sensitive species habitat is avoided, wetland impacts are avoided, and all other applicable regulations and requirements are met.
25. With respect to the transmission line, Applicant may adjust structures so long as they remain within the 150-foot-wide right-of-way identified in the Application, impacts to cultural resources and sensitive habitat are avoided, and wetland impacts are avoided. Any adjustments that fall outside of the 150-foot-wide right-of-way identified in the Application, or do not meet the above-stated limitations, are considered a "material change." If a "material change" is proposed, Applicant shall follow the same process for review of the proposed "material change" as is outlined in paragraph 23.
26. The terms and conditions of the Permit shall be made a uniform condition of construction, subject only to an affirmative written request for an exemption addressed to the Commission. A request for an exemption shall clearly state which particular condition should not be applied to the property in question and the reason for the requested exemption. The Commission shall evaluate such requests on a case-by-case basis, which evaluation shall be completed within 60 days unless exigent circumstances require action sooner.

27. If the Project causes interference with radio, television, or any other licensed communication transmitting or receiving equipment, Applicant shall take all appropriate action to minimize any such interference and shall make a good faith effort to restore or provide reception levels equivalent to reception levels in the immediate areas just prior to construction of the Project. This mitigation requirement shall not apply to any dwellings or other structures built after completion of the Project.
28. Applicant will provide Global Positioning System (GPS) coordinates of structure locations to affected landowners at any time during the life of the Project. Coordinates will be provided in writing to landowners within 30 days of a request.
29. The Project, exclusive of all unrelated background noise, shall not generate a long-term average sound pressure level (equivalent continuous sound level, Leq), as measured over a period of at least two weeks, defined by Staff, that includes all integer wind speeds from cut in to full power, of more than 45 dBA at any non-participating residence or more than 50 dBA at any participating residence. Applicant shall, upon Commission formal request, conduct field surveys or provide post-construction monitoring data verifying compliance with specified noise level limits. If the long-term average level exceeds 45 dBA at any non-participating residence or 50 dBA at any participating residence, then the Project Owner shall take whatever steps are necessary to rectify the situation. Sound monitoring will not be repeated in a representative area during any five-year period unless operational or maintenance changes result in a reasonable assumption of higher turbine sound levels.
30. Not less than 30 days prior to commencement of construction work in the field for each phase of the Project, Applicant will provide to Staff the following information:
  - a) the most current preconstruction design, layout, and plans, including the specifications of the turbine model selected;
  - b) a sound level analysis showing compliance with the applicable sound level requirements;
  - c) a shadow flicker analysis showing the anticipated shadow flicker levels will not exceed Applicant's voluntary commitment of 30 hours per year at any residence; and

- d) such additional Project preconstruction information as Staff requests.
31. Within 90 days of the Project's completion of each phase, Applicant shall submit a report to the Commission that provides the following information:
- a) as-built location of structures and facilities, including drawings clearly showing compliance with the setbacks required by state and local governments and the voluntary commitments set forth in Table 8-1 of the Application;
  - b) the status of remedial activities for road damage, landowner property damage, crop damage, environmental damage, or any other damage resulting from Project construction activities; and
  - c) a summary of known landowner complaints and Applicant's plan for resolving those complaints.
32. For purposes of this Project and the commitments herein, "residences," "businesses," and "off-site buildings owned and/or maintained by a government entity" shall include only those that are in existence and in use as of the date of the Commission's order issuing a permit.
33. Applicant shall seek local input to properly and effectively coordinate an emergency response plan consistent with local resources and response abilities. Upon completion of construction, a Project operation emergency response plan shall be provided to Staff to make available on the Commission website.
34. Prior to the construction of each phase of the Project, Applicant will notify public safety agencies by providing a schedule and location of work to be performed within their jurisdiction. The agencies contacted will include the South Dakota Department of Public safety, the Sheriff of Clark County, and the Clark County Office of Emergency Management.
35. Applicant agrees to provide two years of independently conducted post-construction avian mortality monitoring for each phase of the Project, and to provide a copy of the reports to the USFWS, South Dakota Game Fish & Parks, and the Commission.
36. If the Project is decommissioned, Applicant will follow the decommissioning plan

laid out in Section 5 of the Application as supplemented by the answers to Staff's Data Request 2-6. The Commission shall be notified prior to any decommissioning action.

37. At least 60 days prior to construction Applicant shall file a plan with the Commission for Commission approval that provides a decommissioning escrow account. The plan shall contain provisions that:
  - a. Is funded by the turbine owner annually at a rate of \$5000 per turbine for a period of 30 years.
  - b. All interest earned by the account remains in the account.
  - c. An account statement is provided annually to the Commission and becomes a public record in this docket.
  - d. The account follows ownership of the wind turbines.
  - e. The account is not subject to foreclosure, lien, judgment, or bankruptcy.
  - f. Beginning in year 10 following the beginning of operation and each fifth year thereafter, the turbine owner shall submit to the Commission an estimated decommissioning date, if established, and estimated decommissioning costs and salvage values. Based on the verification of the information in this filing the Commission may change the annual escrow funding rate to more closely match the estimated amount needed for decommissioning.
  - g. Account funds are to be paid to the turbine owner at the time of decommissioning to be paid out as decommissioning costs are incurred and paid.
  - h. If the turbine owner fails to execute the decommissioning requirement found in Section 36 of the Conditions, the account is payable to the landowner as the landowner incurs and pays decommissioning costs.
38. All conditions apply to each phase of the Project. Phase means the portion of the Project that is constructed under a specific, individual construction schedule. For example, if 200 MWs are constructed under a construction schedule beginning in September of 2018, then that is phase I. If the remaining 200 MWs are constructed under a construction schedule beginning in May of 2019, then that is phase II.
39. Applicant shall utilize an Aircraft Detection Lighting System installed and operated as required by Clark County.
40. Applicant shall provide a public liaison officer, approved by the Commission, to facilitate the exchange of information between Applicant, including its contractors, and landowners, local communities, and residents and to facilitate prompt resolution of complaints and problems that may develop for landowners, local communities, and residents as a result of the Project. Applicant shall file with the Commission its proposed public liaison officer's credentials for approval by the Commission prior to the commencement of construction. After the public liaison

officer has been approved by the Commission, the public liaison officer may not be removed by Applicant without the approval of the Commission. The public liaison officer shall be afforded immediate access to Applicant's on-site project manager, its executive project manager, and to contractors' on-site managers and shall be available at all times to the Staff via mobile phone to respond to complaints and concerns communicated to the Staff by concerned landowners and others. As soon as the Applicant's public liaison officer has been appointed and approved, Applicant shall provide contact information for him/her to all landowners in the Project area and to law enforcement agencies and local governments in the vicinity of the Project. The public liaison officer's contact information shall be provided to landowners in each subsequent written communication with them. If the Commission determines that the public liaison officer has not been adequately performing the duties set forth for the position in this Order, the Commission may, upon notice to Applicant and the public liaison officer, take action to remove the public liaison officer.

**Appendix C**  
**PUC Decision Dakota Range I/II, LLC**  
**EL18-003**  
**July 7, 2018**

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF SOUTH DAKOTA**

<b>IN THE MATTER OF THE APPLICATION OF )</b>	<b>FINAL DECISION AND ORDER</b>
<b>DAKOTA RANGE I, LLC AND DAKOTA )</b>	<b>GRANTING PERMIT TO</b>
<b>RANGE II, LLC FOR A PERMIT OF A WIND )</b>	<b>CONSTRUCT WIND ENERGY</b>
<b>ENERGY FACILITY IN GRANT COUNTY AND )</b>	<b>FACILITY; NOTICE OF ENTRY</b>
<b>CODINGTON COUNTY, SOUTH DAKOTA, )</b>	
<b>FOR THE DAKOTA RANGE WIND PROJECT )</b>	<b>EL18-003</b>

**APPEARANCES**

Commissioners Kristie Fiegen, Gary Hanson, and Chris Nelson.

Mollie Smith and Lisa Agrimonti, Fredrikson & Byron, P.A., 200 South Sixth Street, Minneapolis, Minnesota 55402, appeared on behalf of the Applicant, Dakota Range I, LLC and Dakota Range II, LLC.

Kristen Edwards and Amanda Reiss, 500 E. Capitol Ave., Pierre, South Dakota 57501, appeared on behalf of the South Dakota Public Utilities Commission staff.

Teresa D. Kaaz, South Shore, South Dakota 57263, appeared pro se.

Kristi Mogen, Twin Brooks, South Dakota 57269, appeared pro se.

**PROCEDURAL HISTORY**

On January 24, 2018, the South Dakota Public Utilities Commission (Commission) received an Application for a Facility Permit for a wind energy facility (Application) from Dakota Range I, LLC, and Dakota Range II, LLC (together Dakota Range or Applicant).<sup>1</sup> Applicant proposes to construct a wind energy facility to be located in Grant County and Codington County, South Dakota, known as the Dakota Range Wind Project (Project). According to the Application, the Project would be situated within an approximately 44,500-acre project area, ten miles northeast of Watertown, South Dakota (Project Area). The total installed capacity of the Project would not exceed 302.4-mega-watt (MW) nameplate capacity. The proposed Project includes up to 72 wind turbine generators, access roads to turbines and associated facilities, underground 34.5-kilovolt (kV) electrical collector lines connecting the turbines to the collection substation, underground fiber-optic cable for turbine communications co-located with the collector lines, a 34.5 to 345-kV collection substation, up to five permanent meteorological towers, and an operations and maintenance facility. The Project would interconnect to the high-voltage transmission grid via the Big Stone South to Ellendale 345-kV transmission line which crosses the Project Area. The Project is expected to be completed in 2021. Applicant estimates the total construction cost to be \$380 million.

The Application included the prefiled direct testimony and exhibits of Mark Mauersberger/Brenna Gunderson, Robert O'Neal, and David Phillips/Ryan Henning.

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<sup>1</sup> See Ex. A1 (Application).

On January 25, 2018, the Commission electronically transmitted notice of the filing and the intervention deadline of March 26, 2018, to interested persons and entities on the Commission's PUC Weekly Filings electronic listserv. On January 30, 2018, Applicant sent a copy of the Application and the prefiled testimony to the auditor of Codington County and Grant County. On January 31, 2018, the Commission issued a Notice of Application; Order for and Notice of Public Input Hearing; Notice of Opportunity to Apply for Party Status (Order). The Order scheduled a public input hearing for March 21, 2018, at 5:30 p.m., at the Waverly-South Shore School Gymnasium, 319 Mary Place, Waverly, South Dakota. The Order also set an intervention deadline of March 26, 2018.

On February 9, 2018, Applicant mailed a copy of the public hearing notice via certified mail to all landowners within a half mile of the Project in accordance with SDCL 49-41B-5.2. On February 15, 2018, the Commission issued an Order Assessing Filing Fee assessing a filing fee not to exceed \$390,000 with a minimum filing fee of \$8,000.

The Commission published Notice of Public Hearing in the *Watertown Public Opinion* and the *Grant County Review* on February 21, 2018, and March 14, 2018, and in the *South Shore Gazette* on March 1 and March 15, 2018, as provided in SDCL 49-41B-15. Applicant published Notice of Public Hearing in the *Watertown Public Opinion* on February 13 and February 20, 2018, and in the *Grant County Review* on February 14 and February 21, 2018, and in the *South Shore Gazette* on February 15 and February 22, 2018, as provided in SDCL 49-41B-15.

On March 21, 2018, pursuant to SDCL 49-41B-15, 49-41B-16, and its Order, the Commission held a public input hearing as scheduled. The purpose of the public input hearing was to hear public comment regarding the Application and Project. At the public input hearing, Dakota Range presented a brief description of the project, following which interested persons appeared and presented their views, comments, and questions regarding the Application and Project. See Public Hearing Transcript.

On March 21, 2018, the Commission received Applications for Party Status from Teresa Kaaz, Daniel D. Seurer, Vincent Meyer, Diane Redlin, Jared Krakow, Kevin Krakow, Matt Whitney, Timothy J. Lindgren, Linda M. Lindgren, Christian Reimche, Derek Nelson, Paul Nelson, Kelly Owen, Kristi Mogen, Wade Bauer, Patricia Meyer, and Mark Kriesel. On March 26, 2018, the Commission received an email withdrawing the application for party status for Mark Kriesel. On March 28, 2018, Commission staff submitted a Motion for Adoption of Procedural Schedule. On March 30, 2018, Dakota Range filed a Response to Applications for Party Status and Staff's Motion for Adoption of Procedural Schedule.

On April 3, 2018, Teresa Kaaz filed a response to her Party Status Application. On April 6, 2018, the Commission issued an Order Granting Party Status and Establishing Procedural Schedule. On April 6, 2018, Dakota Range filed the prefiled direct testimony and exhibits of Mark Roberts and Michael MaRous.

On May 2, May 4, May 7, and May 10, 2018, respectively, Dan Seurer, Christian Reimche, Paul Nelson, and Derek Nelson requested withdrawal of party status. On May 4, 2018, Commission staff filed the prefiled direct testimony and exhibits of Paige Olson, Tom Kirschenmann, David Hessler, David Lawrence, and Jon Thurber. On May 4, 2018, Teresa Kaaz filed prefiled direct testimony and exhibits; and, Kristi Mogen filed prefiled direct testimony and exhibits.

On May 15, 2018, Dakota Range filed a Motion to Exclude Portions of Testimony and/or Exhibits of Intervenors Teresa Kaaz and Kristi Mogen and Request Regarding Hearing Participation. On May 15, 2018, the Commission issued an Order for and Notice of Evidentiary Hearing. On May 16, 2018, the Commission issued an Order Granting Withdrawal of Party Status. On May 16, 2018, Commission staff filed its Response to Dakota Range's Motion and Motion for Judicial Notice. On May 16, 2018, the Commission issued an Order for and Notice of Motion Hearing on Less Than 10 Days' Notice. On May 21 and May 22, 2018, Dakota Range filed the prefiled rebuttal testimony and exhibits of Mark Mauersberger, Robert O'Neal, David Phillips, Brenna Gunderson, Daniel Pardo, Dr. Mark Roberts, Michael MaRous, Alice Moyer, and Wade Falk. On May 24, 2018, the Commission issued an Order Granting Motion to Exclude Portions of Exhibits.

On June 7, 2018, Dakota Range filed its exhibits for hearing. On June 8, 2018, Kristi Mogen, Teresa Kaaz, and Commission staff each filed their Witness and Exhibit List. On June 8, 2018, Commission staff filed the prefiled surrebuttal testimony and exhibits of David Lawrence. On June 11, 2018, Commission staff filed a Motion to Compel Discovery, which was granted on June 12, 2018, and Dakota Range filed a confidential copy of the Wind Energy Lease and Wind Easement Agreement on the same date (Exhibit A19). On June 12, 13, and 14, 2018, Dakota Range filed exhibits A18 – A27. On June 14, 2018, Commission staff filed Exhibit S7.

The evidentiary hearing was held as scheduled, beginning on June 12, 2018, and ending on June 14, 2018. At the conclusion of the evidentiary hearing, in consultation with the parties, a briefing schedule and decision date was set by the Commission and on June 18, 2018, an Order Setting Post-Hearing Briefing Schedule and Decision Date was issued.

On July 10, 2018, at its ad hoc meeting, the parties made oral arguments. After questions of the parties by the Commissioners and discussion among the Commissioners, the Commission voted unanimously to grant a permit to Dakota Range to construct the Project, subject to the approved Permit Conditions.

Having considered the evidence of record, applicable law, and the briefs and arguments of the parties, the Commission makes the following Findings of Fact, Conclusions of Law, and Final Decision and Order Granting Permit to Construct Wind Energy Facility:

## FINDINGS OF FACT

### **I. PROCEDURAL FINDINGS.**

1. The Procedural History set forth above is hereby incorporated by reference in its entirety in these Procedural Findings. The procedural findings set forth in the Procedural History are a substantially complete and accurate description of the material documents filed in this docket and the proceedings conducted and decisions rendered by the Commission in this matter.

### **II. PARTIES.**

2. Dakota Range I, LLC and Dakota Range II, LLC are wholly owned indirect subsidiaries of Apex Clean Energy Holdings, LLC (Apex).<sup>2</sup> Dakota Range I, LLC and Dakota Range II, LLC will jointly own, manage, and operate the Project.<sup>3</sup>

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<sup>2</sup> Ex. A1 at 6-1 (Application).

<sup>3</sup> Ex. A1 at 6-1 (Application).

3. Apex is an independent renewable energy company based in Charlottesville, Virginia. Apex has a large and diversified portfolio of renewable energy resources, capable of producing more than 14,000 MW of clean electricity. Apex has brought 2,200 MW online since 2012, and operating assets under management are nearly 1 gigawatts (GW) as of the first quarter of 2018.<sup>4</sup>

4. Kristi Mogen owns property approximately 9 miles from the Project area.<sup>5</sup>

5. Teresa Kaaz is a landowner within the Project area.<sup>6</sup>

6. Commission staff fully participated as a party in this matter, in accordance with SDCL 49-41B-17(1).

### **III. APPLICABLE STATUTES AND REGULATIONS FOR AN ENERGY FACILITY PERMIT.**

7. The following South Dakota statutes are applicable: SDCL 49-41B-1 through 49-41B-2.1, 49-41B-4, 49-41B-5.2, 49-41B-11 through 49-41B-19, 49-41B-22, 49-41B-25, 49-41B-26 through 49-41B-37 and applicable provisions of SDCL Chapters 1-26 and 15-6.

8. The following South Dakota administrative rules are applicable: ARSD Chapters 20:10:01 and 20:10:22.

9. Pursuant to SDCL 49-41B-22, Applicant for a facility construction permit has the burden of proof to establish that:

- (1) The proposed facility will comply with all applicable laws and rules;
- (2) The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area;
- (3) The facility will not substantially impair the health, safety or welfare of the inhabitants; and
- (4) The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

10. SDCL 49-41B-25 provides that the Commission must make a finding that the construction of the facility meets all the requirements of Chapter 49-41B.

11. There is sufficient evidence on the record for the Commission to assess the proposed Project using the criteria set forth above.

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<sup>4</sup> Ex. A1 at 1-1 – 1-2 (Application).

<sup>5</sup> Ex. A10 at 7 (Mauersberger).

<sup>6</sup> Ex. TK-1a (Kaaz).

#### IV. PROJECT DESCRIPTION.

12. The proposed Project is an up to 302.4 MW wind energy conversion facility located in Grant and Codington counties, South Dakota. The proposed Project includes up to 72 wind turbine generators, access roads to turbines and associated facilities, underground 34.5-kilovolt (kV) electrical collector lines connecting the turbines to the collection substation, underground fiber-optic cable for turbine communications co-located with the collector lines, a 34.5-kV to 345-kV collection substation, up to five permanent meteorological (MET) towers, and an operations and maintenance (O&M) facility. The Project would interconnect to the high-voltage transmission grid via the Big Stone South to Ellendale 345-kV transmission line, which crosses the Project site.<sup>7</sup>

13. A new 345-kV interconnection switching station connecting to the Big Stone South to Ellendale line will be constructed, owned, and operated by Otter Tail Power Company and Montana Dakota Utilities. Applicant would construct and own a 345-kV interconnection facility connecting the Project collection substation to the interconnection switching station. Because the interconnection facility is less than 2,640-feet long, does not cross any public highways, and does not require the use of eminent domain, it falls outside the Commission's jurisdiction and has been permitted locally.<sup>8</sup>

14. The Project is located on approximately 44,500 acres of privately owned land in Grant County and Codington County, South Dakota (Project Area). Applicant expects construction to be completed in 2021.<sup>9</sup>

15. The current estimated capital cost of the Project is approximately \$380 million based on indicative construction and wind turbine pricing cost estimates for the proposed Vestas V136-4.2 MW turbine layout. This estimate includes lease acquisition, permitting, engineering, procurement, and construction of turbines, access roads, underground electrical collector system, Project collection substation, interconnection facilities, O&M facility, supervisory control and data acquisition (SCADA) system, and MET towers; and project financing.<sup>10</sup>

16. The proposed turbine that would be utilized for the Project is the Vestas V136-4.2 MW turbine at an 82-meter hub height and 136-meter rotor diameter (RD).<sup>11</sup>

17. All turbines will be constructed within the Project Area consistent with the configuration presented in the Updated Layout Map (Exhibit A25), and subject to all commitments, conditions, and requirements of this Order.<sup>12</sup>

18. Apex currently owns Dakota Range and is overseeing the development of the Project. Northern States Power Company, d/b/a/ Xcel Energy (Xcel Energy) has entered into a Purchase and Sale Agreement (PSA) with Apex to acquire Dakota Range, which owns the Project. The PSA will be finalized after the completion of certain development milestones, including acquisition of an Energy Facility Permit from the Commission for the Project. Xcel

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<sup>7</sup> Ex. A1 at 1-1, 9-1 – 9-2 (Application).

<sup>8</sup> Ex. A1 at 1-1 (Application); SDCL 49-41B-2.1(1).

<sup>9</sup> Ex. A1 at 1-1 (Application); Ex. A1 at 20-1 (Application).

<sup>10</sup> Ex. A1 at 8-1 (Application).

<sup>11</sup> Ex. A1 at 9-3 (Application).

<sup>12</sup> See Ex. A25 (Updated Wind Turbine Map).

Energy is a utility company operating in South Dakota, Minnesota, North Dakota, Colorado, Michigan, New Mexico, Texas, and Wisconsin.<sup>13</sup>

19. Applicant presented evidence of consumer demand and need for the Project.<sup>14</sup> The Project would install up to 302.4 MW of wind generating capacity in South Dakota that would contribute to satisfying utilities', commercial and industrial customers', and consumers' demands for renewable energy, and meet utility renewable requirements or individual sustainability goals.<sup>15</sup> Though Xcel Energy will own Dakota Range (the Project entities), and therefore the electricity produced, the specific electrons generated by the Project would be utilized as needed on the Midcontinent Independent System Operator, Inc. (MISO) regional grid and cannot be tracked to their exact delivery location or final use. The electricity generated by the Project would help MISO operators meet electricity demand in both the immediate and surrounding MISO control area. This Project would also provide zero-emission cost electricity to the grid, as well as firm price stability due to the availability of a renewable resource that would replace the need for ongoing fuel costs.<sup>16</sup>

20. Applicant provided evidence to support the need for turbine and associated facility flexibility.<sup>17</sup> With respect to turbine flexibility, Applicant and Commission staff testified to the need for turbine flexibility and material change provisions.<sup>18</sup> With respect to the access roads, the collector system, the O&M facility, the Project substation, and temporary facilities, Applicant and Commission staff agreed to Permit Condition 23, attached hereto.<sup>19</sup>

21. At the evidentiary hearing, Applicant requested that three proposed turbine shifts be approved as part of the Project configuration, with the proposed new locations identified as Turbines 34a, 60a, and A12a in Exhibit A15-3.<sup>20</sup> Applicant provided evidence to demonstrate that the proposed turbine shifts comply with all applicable siting requirements.<sup>21</sup> With respect to the three proposed turbine shifts, Applicant and Commission staff agreed to Permit Condition 39, attached hereto.

22. The record demonstrates that Applicant has made appropriate and reasonable plans for decommissioning.<sup>22</sup>

23. With respect to financial security for decommissioning, if a sale to Xcel Energy does occur, Xcel Energy is a regulated public utility that recovers decommissioning costs from its customers through retail rates. The Commission has the authority to review the decommissioning costs recovered through rates to ensure funds are available for decommissioning.<sup>23</sup>

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<sup>13</sup> Ex. A1 at 7-1 (Application).

<sup>14</sup> See Ex. A1 at § 7.2 (Application).

<sup>15</sup> Ex. A1 at 7-3 (Application).

<sup>16</sup> Ex. A1 at 7-1 (Application).

<sup>17</sup> See Ex. A1 at 9-2 (Application); Ex. A15 at 3-4 (Gunderson).

<sup>18</sup> Ex. A18; Evid. Hrg. Tr. at 299-300 (Thurber).

<sup>19</sup> Ex. A18; Recommended Permit Condition 23; Evid. Hrg. Tr. at 299 (Thurber).

<sup>20</sup> Evid. Hrg. Tr. at 214, 216-218 (Gunderson).

<sup>21</sup> See Evid. Hrg. Tr. at 399-402 (O'Neal); Ex. A15-3 (Constraints Map); Ex. A24; Ex. A25 (Updated Wind Turbine Map - Public) and Ex. A25-C (Updated Wind Turbine Map (CONFIDENTIAL)).

<sup>22</sup> See Ex. A1 at Ch. 24.0 (Application); Ex. A4-2 (Decommissioning Cost Estimate Technical Memorandum).

<sup>23</sup> Evid. Hrg. Tr. at 301-302 (Thurber); SDCL 49-34A-6.

24. If a sale to Xcel Energy does not occur, an escrow account is an appropriate financial assurance to cover decommissioning costs.<sup>24</sup>

## V. SATISFACTION OF REQUIREMENTS FOR ISSUANCE OF AN ENERGY FACILITY PERMIT.

### A. The proposed facility will comply with all applicable laws and rules.

25. The evidence submitted by Applicant demonstrates that the Project will comply with applicable laws and rules.<sup>25</sup> Neither Commission staff nor Intervenors have asserted otherwise or submitted evidence to the contrary.

26. Construction of the Project meets all the requirements of Chapter 49-41B.

### B. The facility will not pose a threat of serious injury to the environment nor to the social and economic condition of inhabitants or expected inhabitants in the siting area.

#### 1. Environment.

27. The evidence demonstrates that the Project does not pose a threat of serious injury to the environment in the Project Area and that Applicant has adopted reasonable avoidance and minimization measures, as well as commitments, to further limit potential environmental impacts.<sup>26</sup>

28. Construction of the Project will not result in significant impacts on geological resources.<sup>27</sup> The risk of seismic activity in the vicinity of the Project Area is low according to data from the U.S. Geological Survey.<sup>28</sup>

29. Applicant has demonstrated that it will minimize and/or avoid impacts to soil resources.<sup>29</sup> The majority of impacts will be temporary and related to construction activities.<sup>30</sup> Permanent impacts associated with operation of the Project will be up to 65 acres, which is less than 0.2 percent of the Project Area.<sup>31</sup> Applicant will implement various measures during construction and restoration to minimize impacts to the physical environment, including separating topsoil and subsoil, installing temporary erosion control devices, and decompacting soil after construction is complete.<sup>32</sup>

30. The Project is not anticipated to have material impacts on existing water and air quality.<sup>33</sup>

31. Applicant has demonstrated that it will minimize and/or avoid impacts to hydrology.<sup>34</sup> The record demonstrates that Applicant has minimized impacts to wetlands and

<sup>24</sup> Permit Conditions 37 and 38; Evid. Hrg. Tr. at 318-319 (Thurber).

<sup>25</sup> See, e.g., Ex. A1 at 9-2, 10-2, 13-6, Ch. 17.0 (Application).

<sup>26</sup> See, e.g., Ex. A1 at Ch. 11.0, 12.0, 13.0, 14.0, 15.0, 16.0, 17.0, 18.0, 19.0 (Application).

<sup>27</sup> See Ex. A1 at § 12.1.2 (Application).

<sup>28</sup> Ex. A1 at 12-3 (Application).

<sup>29</sup> See Ex. A1 at § 12.2.2 (Application).

<sup>30</sup> See Ex. A1 at 12-10 (Application).

<sup>31</sup> Ex. A1 at 3-1, 12-10; Table 11 -1 (Application).

<sup>32</sup> Ex. A1 at 9-7 – 9-8, 12-10 – 12-11, 14-3 (Application).

<sup>33</sup> Ex. A1 at 18-1, 19-1 (Application).

<sup>34</sup> See Ex. A1 at Ch. 13.0 (Application).

water bodies.<sup>35</sup> The Project is not anticipated to have long-term impacts on groundwater resources.<sup>36</sup> Any potential impacts to floodplains would be temporary in nature, and existing contours and elevations would be restored upon completion of construction.<sup>37</sup> Project impacts on hydrologic resources are anticipated to be temporary and/or minor.<sup>38</sup> No turbines are located within wetlands, and the Project is anticipated to permanently impact only approximately 0.08 acres of wetlands.<sup>39</sup>

32. Applicant has demonstrated that it will minimize and/or avoid impacts to vegetation.<sup>40</sup> Permanent direct impacts associated with operation of the Project would be up to 65 acres, which is less than 0.2 percent of the Project Area.<sup>41</sup>

33. The Project facilities have been sited to avoid native grasslands, to the extent practicable.<sup>42</sup> In areas where impacts cannot be avoided, temporary impacts would be minimized through construction Best Management Practices (BMPs), such as re-vegetation and erosion control devices.<sup>43</sup>

34. Applicant coordinated with the South Dakota Game, Fish and Parks Department (GFP) to avoid and minimize impacts to grasslands. The Project will directly impact approximately 9.8 acres of potentially untilled grasslands, which is less than 0.13 percent of the total grasslands in the Project Area.<sup>44</sup> Applicant will reseed potentially untilled grasslands temporarily impacted by the Project with native seed mixes following construction.<sup>45</sup> The Project is not likely to result in significant adverse effects to the species that rely on these grasslands or to the functionality of the grassland ecosystem in and near the Project.<sup>46</sup> The record also demonstrates that the Project will not have a significant adverse impact on habitat, and will not substantially increase habitat fragmentation in the area.<sup>47</sup>

35. Applicant will reseed temporarily disturbed uncultivated areas with certified weed-free seed mixes to blend in with existing vegetation.<sup>48</sup>

36. Applicant has conducted numerous wildlife studies and surveys for the Project to assess existing use, identify potential impacts, and incorporate appropriate avoidance and minimization measures.<sup>49</sup> Applicant consulted with the U.S. Fish and Wildlife Service (USFWS) and GFP to seek input on wildlife resources potentially occurring within the Project Area and to seek guidance on the appropriate studies to evaluate risk and inform development of impact avoidance and minimization measures for the Project.<sup>50</sup> Applicant followed the processes outlined in the USFWS Land-Based Wind Energy Guidelines (WEG), Eagle Conservation Plan Guidance (ECPG), and the SD Siting Guidelines for developing, construction, and operation

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<sup>35</sup> Ex. A1 at §14.2.2 (Application).

<sup>36</sup> Ex. A1 at §13 (Application).

<sup>37</sup> Ex. A1 at 13-5 (Application).

<sup>38</sup> See, e.g., Ex. A1 at 13-4, 14-5, 14-6 (Application).

<sup>39</sup> Ex. A8 at 5 (Phillips).

<sup>40</sup> See Ex. A1 at § 14.1.2 (Application).

<sup>41</sup> Ex. A1 at 3-1, § 14.1.2 (Application).

<sup>42</sup> Ex. A1 at 14-3 (Application).

<sup>43</sup> Ex. A1 at 14-3 (Application).

<sup>44</sup> Ex. A8 at 7 (Phillips).

<sup>45</sup> Ex. A8 at 8 (Phillips).

<sup>46</sup> Ex. A8 at 7 (Phillips).

<sup>47</sup> Ex. A8 at 9 (Phillips).

<sup>48</sup> Ex. A8 at 8 (Phillips); Ex. A1 at 3-3 (Application).

<sup>49</sup> See, e.g., Ex. A1 at § 14.3.1.4 (Application).

<sup>50</sup> Ex. A1 at 14-6 (Application).

wind energy projects.<sup>51</sup> In addition, Applicant is preparing a Bird and Bat Conservation Strategy (BBCS) in accordance with the WEG, which includes strategies for mitigating risks to avian and bat species during construction and operation of the Project.<sup>52</sup>

37. Construction of the Project may have impacts on wildlife species primarily as a result of habitat disturbance.<sup>53</sup> However, following construction, all areas of temporary disturbance will be reclaimed with vegetation consistent with the surrounding vegetation types.<sup>54</sup> The Project was designed to avoid and minimize displacement of wildlife by minimizing the Project's footprint in undisturbed areas.<sup>55</sup> Permanent wildlife habitat loss and functionality due to construction and operation of the Project would be minimal across the Project Area.<sup>56</sup>

38. The record demonstrates that, while the Project may directly impact birds and bats, avian fatalities due to the Project are anticipated to be low and to not have significant population-level impacts.<sup>57</sup> The Project has been sited in an area and designed in a manner to avoid and minimize impacts to birds and bats.<sup>58</sup>

39. Applicant conducted two years of pre-construction avian surveys.<sup>59</sup> Those surveys indicate that avian impacts from the Project are anticipated to be low.<sup>60</sup>

40. Applicant has demonstrated that it will minimize and/or avoid impacts to federally- and state-listed species.<sup>61</sup> Based on coordination with the USFWS and GFP, the only federally-listed species with the potential to occur in the Project Area are the northern long-eared bat, Dakota skipper, and Poweshiek skipperling.<sup>62</sup> Impacts on federally-listed species due to Project construction and operations are anticipated to be minimal due to the low likelihood or frequency of species' presence in the Project Area and implementation of appropriate species-specific conservation measures.<sup>63</sup> The only state-listed species documented to occur during site-specific studies completed for the Project was the peregrine falcon (state-endangered), and only one individual was observed, suggesting that use of the Project site by this species and associated risk of impact is very low.<sup>64</sup>

41. Overall, there is a low level of risk for potential bald eagle impacts at the site.<sup>65</sup> Applicant conducted eagle nest surveys in April 2016 and April 2017. No eagle nests were identified within the Project Area, and the closest eagle nest is approximately 1.8 miles from the Project Area.<sup>66</sup> In addition, Applicant has agreed to a number of avian-related impact minimization and avoidance measures, including: conducting post-construction avian mortality monitoring and preparing a BBCS in accordance with the USFWS WEG that will be

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<sup>51</sup> Ex. A1 at 14-6 (Application).

<sup>52</sup> Ex. A8 at 11 (Phillips); Ex. A1 at § 14.3.2.5 (Application).

<sup>53</sup> Ex. A1 at 14-12 – 14-13 (Application).

<sup>54</sup> Ex. A1 at 14-13 (Application).

<sup>55</sup> See Evid. Hrg. Tr. at 194 (Phillips).

<sup>56</sup> Ex. A1 at 14-13 (Application).

<sup>57</sup> See Ex. A1 at 14-13 – 14-14 (Application).

<sup>58</sup> Ex. A8 at 10 (Phillips).

<sup>59</sup> See Ex. A1 at 2-1 – 2-2 (Application).

<sup>60</sup> Ex. A1 at 14-14 (Application); Ex. A8 at 10 (Phillips).

<sup>61</sup> See Ex. A1 at § 14.3.2 (Application).

<sup>62</sup> Ex. A1 at 14-7, 14-13 (Application).

<sup>63</sup> See Ex. A1 at 14-7, 14-13 (Application); Ex. A8 at 10-11 (Phillips).

<sup>64</sup> Ex. A1 at 14-13 (Application).

<sup>65</sup> Ex. A7 at 15 (Phillips).

<sup>66</sup> Ex. A1 at 14-10 (Application); Ex. A7 at 15 (Phillips).

implemented to minimize impacts to avian and bat species during construction and operation of the Project.<sup>67</sup>

42. Applicant has demonstrated that it will minimize and/or avoid impacts to aquatic ecosystems.<sup>68</sup> Applicant consulted with USFWS and GFP regarding the federally-and state-listed aquatic species with potential to occur in or near the Project, and both agencies agree that the species are not anticipated to be affected by the Project.<sup>69</sup>

43. Applicant has demonstrated that it will minimize and/or avoid impacts to land use.<sup>70</sup> The Project will not displace existing residences or businesses.<sup>71</sup> In all areas proposed for ground disturbance, Applicant will coordinate with the landowners to minimize impacts to the extent practicable so as to maintain opportunities to continue current land uses.<sup>72</sup> Areas disturbed due to construction that would not host Project facilities would be re-vegetated with vegetation types matching the surrounding agricultural landscape.<sup>73</sup> Agricultural uses may continue within the Project Area during construction and operation.<sup>74</sup>

44. Applicant has demonstrated that it will minimize and/or avoid impacts to recreation.<sup>75</sup> Only five turbines and associated infrastructure will be located on three of the Walk-In Area parcels.<sup>76</sup> To address concerns related to potential viewshed impacts at Punished Woman's Lake, Applicant voluntarily agreed to a turbine setback of two miles from the shoreline of Punished Woman's Lake.<sup>77</sup>

45. Applicant has demonstrated that it will minimize and/or avoid impacts to conservation easements and publicly-managed lands.<sup>78</sup> Applicant coordinated with the USFWS to identify and avoid areas held as conservation easements by the USFWS within the Waubay National Wildlife Refuge Complex (i.e., grassland easements, wetland easements, and waterfowl production area easements).<sup>79</sup> The Project has been designed such that no Project facilities (e.g., turbines, collector lines, access roads) would be placed on these USFWS Wetland, Conservation, or Grassland Easements, and thus, no direct impacts to these easement areas would occur.<sup>80</sup> The Project will also avoid direct impacts to all Game Production Areas and Waterfowl Production Areas.<sup>81</sup>

46. In accordance with Federal Aviation Administration (FAA) regulations, the turbine towers would be painted off-white to reduce potential glare and minimize visual impact.<sup>82</sup> No scenic resources with sensitive viewsheds are located within the Project Area or within viewing

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<sup>67</sup> See Ex. A7 at 16 (Phillips) and Ex. A8 at 10-11 (Phillips); Ex. A1 at § 14.3.2.5 (Application).

<sup>68</sup> See Ex. A1 at § 15.2 (Application); Ex. A7 at 13 (Phillips).

<sup>69</sup> See Ex. A1 at § 15.2 (Application); Ex. A7 at 13 (Phillips).

<sup>70</sup> See Ex. A1 at §§ 16.1.2, 16.2.2 (Application).

<sup>71</sup> Ex. A1 at 16-3 (Application).

<sup>72</sup> Ex. A7 at 7 (Phillips).

<sup>73</sup> Ex. A1 at 16-3 (Application); Ex. A7 at 14 (Phillips).

<sup>74</sup> Ex. A1 at 16-3 (Application).

<sup>75</sup> See, e.g., Ex. A1 at §§ 13.3.2, 16.2.2, 16.6.2 (Application).

<sup>76</sup> Ex. A7 at 7 (Phillips).

<sup>77</sup> Ex. A9 at 6 (Mauersberger); Ex. A1 at 10-3 (Application).

<sup>78</sup> See Ex. A1 at § 16.2.2 (Application).

<sup>79</sup> Ex. A8 at 6 (Phillips).

<sup>80</sup> Ex. A1 at 16-4 (Application).

<sup>81</sup> Ex. A1 at 16-4 (Application); Ex. A8 at 6 (Phillips).

<sup>82</sup> Ex. A1 at 16-13 (Application).

distance of the Project; therefore, no impacts to scenic resources would result from construction or operation of the Project.<sup>83</sup>

47. With respect to cultural and historical architectural resources, the State Historic Preservation Office (SHPO) made four recommendations.<sup>84</sup> First, the SHPO recommended that an official record search be conducted for the Project. Applicant satisfied this recommendation when it conducted the Level I cultural resources records search in June 2017.<sup>85</sup> Second, the SHPO recommended that a Level III Intensive Survey be completed for the Project Area. Applicant completed Level III intensive cultural resource surveys in December 2017 in areas of potential ground disturbance determined to have high probability of sensitive cultural resources.<sup>86</sup> The Level III survey results were provided to the SHPO, and the SHPO issued a letter stating that the Project would not encroach upon, damage or destroy any properties listed in the State or National Register of Historic Places (NRHP) or the environs of such property.<sup>87</sup> Third, the SHPO recommended that Applicant analyze the visual effects to architectural resources located within one mile of the Project, which Applicant completed.<sup>88</sup> No historic architectural resources were identified within the proposed Project footprint or direct area of potential effects.<sup>89</sup> Within the visual area of potential effects, there are three structures recommended eligible for listing on the NRHP; however, the Project will have no adverse effect on the resources.<sup>90</sup> Fourth, the SHPO recommended that Applicant contact the Tribal Historic Preservation Officers (THPO) in South Dakota. Applicant has engaged in ongoing voluntary coordination with the Sisseton-Wahpeton Oyate (SWO) to seek input on cultural resources in the Project Area, the Cultural Resources Monitoring and Management Plan (CRMMP), and the proposed cultural resource surveys for the Project.<sup>91</sup> Applicant completed tribal resource surveys with SWO in May 2018.<sup>92</sup> Commission staff witness Ms. Olson stated that the SHPO's recommendation that Applicant reach out to Native American tribes and consult on tribal resources has been satisfied.<sup>93</sup>

48. Applicant has demonstrated that it will minimize and/or avoid impacts to cultural resources.<sup>94</sup> Applicant conducted multiple cultural resource surveys to identify cultural resources within the Project Area.<sup>95</sup> Applicant would avoid direct impacts to identified cultural resources as defined in the CRMMP and in coordination with the SWO.<sup>96</sup> Both the SHPO and SWO have agreed that the measures outlined in the CRMMP are appropriate to avoid negatively impacting landmarks and cultural resources of historic, religious, archaeological, scenic, natural, or other cultural significance.<sup>97</sup> Further, Applicant's CRMMP provides a plan for unanticipated discovery of sensitive cultural resources, should any be unearthed during construction.<sup>98</sup>

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<sup>83</sup> Ex. A1 at 16-14 (Application); ARSD 20:10:22:23(6).

<sup>84</sup> Ex. S3 at 3-4 (Olson).

<sup>85</sup> See Ex. A7 at 17 (Phillips); Ex. A1 at Appendix M (Application); see also Ex. S3 at 4 (Olson).

<sup>86</sup> See Ex. A7 at 17 (Phillips).

<sup>87</sup> Ex. A8-1 at 2 (SHPO Letter, dated February 14, 2018).

<sup>88</sup> See Ex. A7 at 18 (Phillips); see also Ex. S3 at 4 (Olson).

<sup>89</sup> Ex. A7 at 18 (Phillips).

<sup>90</sup> Ex. A7 at 18 (Phillips).

<sup>91</sup> Ex. A1 at 21-16 (Application); Ex. A7 at 5 (Phillips).

<sup>92</sup> Ex. A15 at 3 (Gunderson).

<sup>93</sup> Evid. Hrg. Tr. at 293 (Olson); Ex. S3 at 4 (Olson).

<sup>94</sup> See Ex. A1 at § 21.5.2 (Application); Ex. A7 at 19 (Phillips); Ex. A8 at 3-4 (Phillips).

<sup>95</sup> See Ex. A1 at § 21.5.1, Appendix M, Appendix N, Appendix O (Application); Ex. A7 at 17-18 (Phillips).

<sup>96</sup> See Ex. A1 at 3-2 (Application).

<sup>97</sup> See Ex. A1 at 21-16 (Application); Ex. A7 at 19 (Phillips).

<sup>98</sup> Ex. A8 at 3 (Phillips).

49. Commission staff and Applicant have agreed upon Permit Conditions 11 through 13 regarding cultural resources, which are attached hereto.

2. Social and Economic.

50. Apex acquired the Dakota Range Project from a small local developer, Wahpeton Wind, in March 2015.<sup>99</sup> The Project was acquired after initial site selection and a specific area was offered for sale; therefore, Apex was not involved in considering broader alternative locations.<sup>100</sup> The identification of the final Project site was primarily driven by: (1) the site's strong wind speeds; (2) direct access to transmission interconnection; (3) land use and environmental compatibility with wind development; (4) landowner support for wind energy development; and (5) the Project's ability to avoid or minimize potential adverse impacts to cultural resources, wetlands, grasslands, and wildlife species of concern.<sup>101</sup>

51. Participating landowners Mr. Falk and Ms. Moyer testified regarding their support for the Project.<sup>102</sup> The Project will provide an additional stable source of income for landowners.<sup>103</sup> Mr. Falk and Ms. Moyer also testified to their good working relationships with Applicant and their belief that Applicant has shown itself to be responsive and thoughtful.<sup>104</sup> Further, the Project uses a community compensation formula that does not limit compensation to only those landowner participants who host Project facilities.<sup>105</sup>

52. Applicant has demonstrated that construction and operation of the Project will result in benefits to South Dakota and local economies.<sup>106</sup> The Project will create temporary job opportunities during construction, and permanent operations and maintenance job opportunities.<sup>107</sup> Additionally, local industrial businesses would also likely benefit from construction-related expenditures for the Project.<sup>108</sup> The Project will make lease payments to participating landowners and will provide long-term benefits to the state and local tax base.<sup>109</sup>

53. Applicant has demonstrated that there was no market data indicating the Project would have a negative impact on either rural residential or agricultural property values in the area surrounding the Project.<sup>110</sup> Mr. MaRous, a South Dakota State Certified General Appraiser and a certified Member Appraisal Institute appraiser, conducted a Market Analysis to analyze the potential impact of the Project on the value of the surrounding properties and found no credible data indicating property values will be adversely impacted due to proximity to the Project.<sup>111</sup>

54. Commission staff's witness, Mr. Lawrence, also a South Dakota State Certified General Appraiser and a certified Member Appraisal Institute appraiser conducted his own analysis of the sales of six Brookings County residential properties in proximity to wind turbines

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<sup>99</sup> Ex. A1 at 2-1 (Application).

<sup>100</sup> Ex. A1 at 10-1 (Application).

<sup>101</sup> Ex. A1 at 10-1 – 10-2 (Application).

<sup>102</sup> See Ex. A11 (Moyer) and Ex. A12 (Falk); Evid. Hrg. Tr. at 138 – 158 (Falk) and 159 – 168 (Moyer).

<sup>103</sup> See Ex. A11 at 2 (Moyer); Ex. A12 at 2 (Falk).

<sup>104</sup> See Ex. A12 at 2 (Falk); Ex. A11 at 2 (Moyer); Evid. Hrg. Tr. at 140-141 (Falk).

<sup>105</sup> Evid. Hrg. Tr. at 92-93, 97 (Mauersberger).

<sup>106</sup> See Ex. A1 at § 21.1.2.1 (Application).

<sup>107</sup> Ex. A1 at 21-3 (Application).

<sup>108</sup> Ex. A1 at 21-3 (Application); Ex. A9 at 18 (Mauersberger).

<sup>109</sup> Ex. A9 at 19 (Mauersberger); Ex. A1 at 21-4 – 21-5 (Application).

<sup>110</sup> See Ex. A1 at § 21.1.2.3 (Application); Ex. A13 at 5, 6 (MaRous); Ex. A13-1 at 3, 35 (Market Impact Analysis); Ex. A14 at 2, 11, 13 (MaRous); Evid. Hrg. Tr. at 171-172 (MaRous).

<sup>111</sup> See Ex. A13 at 2, 6 (MaRous); Ex. A13-1 at 3, 35 (Market Impact Analysis); Evid. Hrg. Tr. at 169 (MaRous).

and testified that based on his research, the evidence supports the presumption there have been no adverse effects on the selling price of rural residential properties in proximity to a wind tower, turbine, or wind project.<sup>112</sup> However, the summary of Mr. Lawrence's research was limited to Brookings County and he analyzed a small population of sales.<sup>113</sup>

55. There is no basis in the record to require a property value guarantee. There is no record evidence that property values will be adversely affected.<sup>114</sup>

56. The record demonstrates that the Project is not anticipated to adversely impact communications systems.<sup>115</sup> If, after construction, Applicant receives information relative to communication systems interference potentially caused by operation of the wind turbines in areas where reception is presently good, Applicant has committed to resolve such problems on a case-by-case basis.<sup>116</sup>

57. The record demonstrates that Applicant has avoided and/or minimized impacts to transportation.<sup>117</sup> Applicant will coordinate with applicable local road authorities to establish road use agreements, as needed, to minimize and mitigate Project impacts to haul roads.<sup>118</sup> For example, Applicant has entered into a road use agreement with Grant County.<sup>119</sup> The Project will utilize the One-Call program to locate underground infrastructure prior to construction.<sup>120</sup> In addition, once construction is completed, the Project will register its facilities with the One-Call program.<sup>121</sup>

**C. The facility will not substantially impair the health, safety or welfare of the inhabitants.**

58. The record demonstrates Applicant has minimized impacts from noise.<sup>122</sup> Commission staff and Applicant agreed to Permit Condition 27, attached hereto.

59. Section 1211.04(13) of the Zoning Ordinance for Grant County imposes the following noise limit on wind energy facilities: Noise level shall not exceed 50 [A-weighted decibel (dBA)], average A-weighted Sound pressure including constructive interference effects at the perimeter of the principal and accessory structures of existing off-site residences, businesses, and buildings owned and/or maintained by a governmental entity.<sup>123</sup>

60. Section 5.22.03(12) of the Comprehensive Zoning Regulations for Codington County requires the following: Noise level shall not exceed 50 dBA, average A-weighted Sound pressure including constructive interference effects at the property line of existing off-site residences, businesses, and buildings owned and/or maintained by a governmental entity.<sup>124</sup>

<sup>112</sup> Ex. S6 at 4 (Lawrence); *see also* Evid. Hrg. Tr. at 289-290 (Lawrence).

<sup>113</sup> Ex. S6 at 5, 6 (Lawrence).

<sup>114</sup> *See* Ex. A1 at § 21.1.2.3 (Application); Ex. A13 at 5, 6 (MaRous); Ex. A13-1 at 3, 35 (Market Impact Analysis); Ex. A14 at 2, 11, 13 (MaRous); Evid. Hrg. Tr. at 171-172 (MaRous) and 289-290 (Lawrence).

<sup>115</sup> *See* Ex. A1 at § 16.5 (Application).

<sup>116</sup> Ex. A1 at 16-11 (Application).

<sup>117</sup> *See* Ex. A1 at § 21.4.2 (Application).

<sup>118</sup> Ex. A9 at 16 (Mauersberger); Ex. A1 at 21-12 (Application).

<sup>119</sup> Evid. Hrg. Tr. at 67-68 (Mauersberger).

<sup>120</sup> Ex. A1 at 25-2 (Application); Ex. A9 at 16 (Mauersberger).

<sup>121</sup> Ex. A1 at 25-2 (Application); Ex. A9 at 16 (Mauersberger).

<sup>122</sup> *See* Ex. A1 at § 16.3.2 (Application).

<sup>123</sup> *See* Ex. A5 at 4 (O'Neal).

<sup>124</sup> *See* Ex. A5 at 5 (O'Neal).

61. Applicant conducted a Sound Level Modeling Report to measure the Project's anticipated sound level in order to determine whether the Project will comply with the noise limits established by Grant and Codington counties.<sup>125</sup> The projected one-hour sound levels from the Project are 45 dBA or less at all participating residences and 44 dBA or less at all non-participating residences.<sup>126</sup>

62. The record demonstrates that Applicant has minimized and/or avoided impacts from shadow flicker.<sup>127</sup> Applicant has committed to limit shadow flicker to 30 hours or less per year at any existing non-participating residence, business, or building owned and/or maintained by a governmental entity, unless otherwise agreed to by the landowner.<sup>128</sup> Applicant will take steps to mitigate shadow flicker concerns at residences that could experience shadow flicker levels above 30 hours per year.<sup>129</sup>

63. There is no record evidence that the proposed Project will substantially impair human health.<sup>130</sup> Construction and placement of facilities meet or exceed industry standards established for protection of the health and welfare of residences and businesses in and around the Project.<sup>131</sup> Further, the South Dakota Department of Health provided Commission staff with a letter stating that the Department of Health has not taken a formal position on the issue of wind turbines and human health.<sup>132</sup> The South Dakota Department of Health referenced the Massachusetts Department of Public Health and Minnesota Department of Health studies and noted that those studies generally conclude that there is insufficient evidence to establish significant risk to human health.<sup>133</sup> Applicant's witness, Dr. Roberts, analyzed and reviewed peer reviewed, published literature and did not identify any scientific works that provide objective support for claims that wind turbines cause adverse health effects.<sup>134</sup> He concluded that there is no peer-reviewed, scientific data to support a claim that wind turbines are causing disease or specific health conditions.<sup>135</sup>

64. The Project will utilize aviation warning lights compliant with the FAA requirements. The FAA determines lighting specifications and determines which turbines must be equipped with lights.<sup>136</sup>

65. Commission staff witness, Mr. Thurber, testified that use of the Aircraft Detection Lighting System (ADLS) by Applicant would be beneficial for the public.<sup>137</sup>

66. Ms. Kaaz testified that she is a landowner within the Project footprint with multiple wind turbines very near her property line.<sup>138</sup> Due to the proximity of the wind turbines,

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<sup>125</sup> See Ex. A5 at 5 (O'Neal); Ex. A1 at Appendix I (Application); see also Ex. A24 (Updated Wind Turbine Coordinates).

<sup>126</sup> Ex. A6 at 7 (O'Neal); Evid. Hrg. Tr. at 400-403.

<sup>127</sup> See Ex. A1 at § 16.4 (Application); Ex. A5 at 11 (O'Neal).

<sup>128</sup> Ex. A1 at 16-11 (Application); Permit Conditions 28 and 29.

<sup>129</sup> Permit Condition 28.

<sup>130</sup> See, e.g., Ex. A2 at 13-14 (Roberts).

<sup>131</sup> See, e.g., Ex. A9 at 14-15 (Mauersberger); Ex. A1 at § 25.2 (Application).

<sup>132</sup> See Ex. S1 at 3 (Thurber).

<sup>133</sup> See Ex. S1 at 3 (Thurber); Ex. A2 at 13-14 (Roberts).

<sup>134</sup> Ex. A2 at 12 (Roberts).

<sup>135</sup> Ex. A2 at 12 (Roberts); see also Ex. A2 at 13 (Roberts) ("Despite the attribution of various health events to wind turbines, there has not been a specific health condition documented in the peer-reviewed published literature to be recognized by the medical community or professional societies as a disease caused by exposure to sound levels and frequencies generated by the operation of wind turbines.").

<sup>136</sup> Ex. A1 at 9-4 (Application).

<sup>137</sup> Evid. Hrg. Tr. at 309 (Thurber).

in particular turbine 67 which is only 1271 feet from her property line, she requested that the Project be required to use the ADLS.<sup>139</sup>

67. ARSD 20:10:22:18(3) requires an analysis of the compatibility of the Project with present land use of the surrounding area, with special attention paid to the effects on rural life and the business of farming. The Commission accordingly finds and concludes that it has the authority to require Applicant to implement the use of the ADLS.

68. The record evidence supports implementing a Permit Condition requiring Applicant to use the ADLS within the Project Area.<sup>140</sup>

69. Applicant provided evidence that the potential for ice to be thrown from turbines is not a common occurrence.<sup>141</sup> The Project meets both the state and county non-participating property line setback requirements.<sup>142</sup> The concern for ice shedding is typically within 300 feet of the turbine. While there is the potential for ice to be thrown further, impacts are not anticipated at 620 feet from a turbine (the closest distance of a turbine to a nonparticipating property line).<sup>143</sup> The record also demonstrates that Applicant has in place appropriate operational mechanisms to minimize and avoid the potential for ice throw. In addition, turbines have ice detection systems that will detect icing conditions from a remote control center, enabling the turbines to be paused remotely in the event that icing is taking place.<sup>144</sup> Further, Applicant has committed to the following condition: Applicant will use two methods to detect icing conditions on turbine blades: (1) sensors that will detect when blades become imbalanced or create vibration due to ice accumulation; and (2) meteorological data from on-site permanent meteorological towers, on-site anemometers, and other relevant meteorological sources that will be used to determine if ice accumulation is occurring. These control systems will either automatically shut down the turbine(s) in icing conditions (per the sensors) or Applicant will manually shut down turbine(s) if icing conditions are identified (using meteorological data). Turbines will not return to normal operation until the control systems no longer detect an imbalance or when weather conditions either remove icing on the blades or indicate icing is no longer a concern.

**D. The facility will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.**

70. The record demonstrates that the Project will not unduly interfere with the orderly development of the region, as demonstrated by Grant County's and Codington County's granting of conditional use permits for the Project.<sup>145</sup>

71. Ms. Mogen and Ms. Kaaz proposed a two-mile setback, with the option of a waiver, from non-participating landowners in order to protect public health and safety, and to protect property rights.<sup>146</sup> Ms. Mogen and Ms. Kaaz did not present any evidence in support of the two-mile setback, and did not request a two-mile setback from the County during the County

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<sup>138</sup> Ex. TK-1a; Evid. Hrg. Tr. at 348, 351-355; Ex. A27.

<sup>139</sup> Ex. S1, JT-1, pg. 88 of 156.

<sup>140</sup> Permit Condition 42.

<sup>141</sup> Evid. Hrg. Tr. at 424 (Gunderson) (CONFIDENTIAL); Evid. Hrg. Tr. at 434-435 (James) (CONFIDENTIAL).

<sup>142</sup> SDCL 43-13-24. Codington County, Ordinance 65 §5.22.03(1)(d)(c) and Grant County Compiled Zoning Ordinances, § 1211.04(2)(c).

<sup>143</sup> Evid. Hrg. Tr. at 435 (James) (CONFIDENTIAL).

<sup>144</sup> Evid. Hrg. Tr. at 432 (James) (CONFIDENTIAL).

<sup>145</sup> See Ex. A1 at 17-1 (Application).

<sup>146</sup> See Evid. Hrg. Tr. at 331 (Mogen) and 356 (Kaaz).

conditional use permitting process for the Project.<sup>147</sup> Nothing in the record supports a proposed two-mile setback from non-participants' land.

72. Ms. Kaaz raised concerns regarding the proximity of the turbines to her land. However, the Project complies with all state and county setback requirements. Additionally, Applicant committed that it will use no more than three of the four turbine locations closest to Ms. Kaaz's property (Turbines 67, 68, 69 and A26).<sup>148</sup>

## VI. GENERAL.

73. An application may be denied, returned, or amended, at the discretion of the Commission, for failure to file an application generally in the form and content required by SDCL Chapter 49-41B and ARSD Chapter 20:10:22. SDCL 49-41B-13(2). The Commission finds that Applicant filed its application generally in the form and content required by SDCL Chapter 49-41B and ARSD Chapter 20:10:22. The Commission notes that the supplementation of an application with additional information is common.<sup>149</sup>

74. An application may be denied, returned, or amended, at the discretion of the Commission, if there are any deliberate misstatements of material facts in the application or in accompanying statements or studies. SDCL 49-41B-13(1). The Commission finds that the application and its accompanying statements and studies did not contain any deliberate misstatements of material facts.

75. The Commission finds that the Permit Conditions attached hereto as Attachment A and incorporated herein by reference are supported by the record, are reasonable and will help ensure that the Project will meet the standards established for approval of a construction permit for the Project set forth in SDCL 49-41B-22 and should be adopted.

76. The Commission finds that the Project, if constructed in accordance with the terms and conditions of this decision, will comply with all applicable laws and rules, including all requirements of SDCL Chapter 49-41B and ARSD Chapter 20:10:22.

77. The Commission finds that the Project, if constructed in accordance with the terms and conditions of this decision, will not pose an unacceptable threat of serious injury to the environment nor to the social and economic conditions of inhabitants or expected inhabitants in the siting area.

78. The Commission finds that the Project, if constructed in accordance with the terms and conditions of this decision, will not substantially impair the health, safety or welfare of the inhabitants in the siting area.

79. The Commission finds that the Project, if constructed in accordance with the terms and conditions of this decision, will not unduly interfere with the orderly development of the region with due consideration having been given the views of governing bodies of affected local units of government.

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<sup>147</sup> See Evid. Hrg. Tr. at 332-333 (Mogen) and 355 (Kaaz); see also Evid. Hrg. Tr. at 72-73 (Mauersberger).

<sup>148</sup> Evid. Hrg. Tr. at 220 (Gunderson).

<sup>149</sup> Ex. S1 at 4 (Thurber).

80. The Commission finds that a permit to construct the Project should be granted subject to the Permit Conditions set forth in Attachment A.

81. To the extent that any Conclusion of Law set forth below is more appropriately a finding of fact, that Conclusion of Law is incorporated herein by reference as a Finding of Fact as if set forth in full herein.

Based on the foregoing Findings of Fact and the record in this proceeding, the Commission hereby makes the following:

### **CONCLUSIONS OF LAW**

1. The Commission has jurisdiction over the subject matter and parties to this proceeding pursuant to SDCL Chapter 49-41B and ARSD Chapter 20:10:22. Subject to the findings made on the four elements of proof under SDCL 49-41B-22, the Commission has authority to grant, deny, or grant upon terms, conditions, or modifications, a permit for the construction, operation, or maintenance of the Project.

2. The Dakota Range Wind Project proposed by Applicant is a wind energy facility as defined in SDCL 49-41B-2(13).

3. Applicant's permit Application, as amended and supplemented through the proceedings in this matter, complies with the applicable requirements of SDCL Chapter 49-41B and ARSD Chapter 20:10:22. The Commission finds that Applicant filed its Application generally in the form and content required by SDCL Chapter 49-41B and ARSD Chapter 20:10:22.

4. The Commission finds there was no showing that there are any deliberate misstatements of material facts in the Application or in accompanying statements or studies.

5. SDCL 49-41B-1 provides in part that "[t]he Legislature also finds that by assuming permit authority, that the state must also ensure that these facilities are constructed in an orderly and timely manner so that the energy requirements of the people of the state are fulfilled." The Commission finds that this language is directed toward ensuring that the permit process is conducted in a timely manner.

6. The Commission satisfied the hearing and notice requirement in SDCL 49-41B.

7. Applicant satisfied the applicable notice requirements in SDCL 49-41B.

8. The Project, if constructed and operated in accordance with the terms and conditions of this decision, will comply with all applicable laws and rules, including all requirements of SDCL Chapter 49-41B and ARSD Chapter 20:10:22.

9. The Project, if constructed and operated in accordance with the terms and conditions of this decision, will not pose a threat of serious injury to the environment nor to the social and economic conditions of inhabitants or expected inhabitants in the siting area.

10. The Project, if constructed and operated in accordance with the terms and conditions of this decision, will not substantially impair the health, safety or welfare of the inhabitants in the siting area.

11. The Project, if constructed and operated in accordance with the terms and conditions of this decision, will not unduly interfere with the orderly development of the region

with due consideration having been given the views of governing bodies of affected local units of government.

12. The standard of proof is by the preponderance of evidence. Applicant has met its burden of proof pursuant to SDCL 49-41B-22 and is entitled to a permit as provided in SDCL 49-41B-25.

13. The Commission has authority to revoke or suspend any permit granted under the South Dakota Energy Facility Permit Act for failure to comply with the terms and conditions of the permit pursuant to SDCL 49-41B-33 and must approve any transfer of the permit granted by this Order pursuant to SDCL 49-41B-29.

14. The Commission concludes that it needs no other information to assess the impact of the proposed facility or to determine if Applicant has met its burden of proof.

15. The Commission concludes that it possesses the authority under SDCL 49-41B-25 to impose conditions on the construction, operation, or maintenance of the Project, that the Permit Conditions set forth in Attachment A are supported by the record, are reasonable and will help ensure that the Project will meet the standards established for approval of a construction permit for the Project set forth in SDCL 49-41B-22 and that the Permit Conditions are hereby adopted.

16. To the extent that any the Findings of Fact in this decision are determined to be Conclusions of Law or mixed findings of fact and conclusions of law, the same are incorporated herein by this reference as a Conclusion of Law as if set forth in full herein.

It is therefore

ORDERED, that a permit to construct the Dakota Range Project is granted to Dakota Range I, LLC and Dakota Range II, LLC, subject to the Permit Conditions set forth in Attachment A.

**NOTICE OF ENTRY**

PLEASE TAKE NOTICE that this Final Decision and Order Granting Permit to Construct Wind Energy Facility was duly issued and entered on the 23<sup>rd</sup> day of July 2018.

<b>CERTIFICATE OF SERVICE</b>
The undersigned hereby certifies that this document has been served today upon all parties of record in this docket, as listed on the docket service list, electronically and mail.
By: <u>Adam de Hueck</u>
Date: <u>7/23/18</u>
(OFFICIAL SEAL)

BY ORDER OF THE COMMISSION:

Kristie Fiegen  
KRISTIE FIEGEN, Chairperson

Gary Hanson  
GARY HANSON, Commissioner

Chris Nelson  
CHRIS NELSON, Commissioner

**ATTACHMENT A**  
**PERMIT CONDITIONS**

1. Applicant will obtain all governmental permits which reasonably may be required by any township, county, state or federal agency, or any other governmental unit for construction and operation activity prior to engaging in the particular activity covered by that permit. Copies of any permits obtained by Applicant shall be sent to the Commission.
2. Applicant shall construct, operate, and maintain the Project in a manner consistent with (1) descriptions in the Application, (2) Application supplements, (3) responses to any data requests, (4) the Final Decision and Order Granting Permit to Construct Wind Energy Facility, Attachment A-Permit Conditions, (5) any applicable industry standards, (6) any permits issued by a federal, state, or local agency, and (7) evidence presented by Applicant at the evidentiary hearing.
3. Applicant agrees that the Commission's complaint process as set forth in ARSD Chapter 20:10:01 shall be available to landowners and other persons sustaining or threatened with damage as the result of Applicant's failure to abide by the conditions of the Permit or otherwise having standing to seek enforcement of the conditions of the Permit. Participating landowners are free to use the complaint process free from retribution or consequence regardless of any private easement term to the contrary.
4. Applicant shall provide each landowner in the Project Area with the following information:
  - a) A copy of the Final Decision and Order Granting Permit to Construct Wind Energy Facility;
  - b) Detailed safety information describing:
    - 1) Reasonable safety precautions for existing activities on or near the Project,
    - 2) Known activities or uses that are presently prohibited near the Project, and
    - 3) Other known potential dangers or limitations near the Project;
  - c) Construction/maintenance damage compensation plans and procedures;
  - d) The Commission's address, website, and phone number;
  - e) Contact person for Applicant, including name, e-mail address, and phone number.
5. In order to ensure compliance with the terms and conditions of this Permit pursuant to SDCL 49-41B-33, it is necessary for the enforcement of this Order that all employees, contractors, and agents of Applicant involved in this Project be made aware of the terms and conditions of this Permit.

6. Except as otherwise provided in the Permit Conditions, Applicant shall comply with all mitigation measures set forth in the Application and Applicant's responses to Commission staff data requests. Material modifications to the mitigation measures shall be subject to prior approval of the Commission.
7. Applicant will negotiate road use agreements with Grant County, Codington County, and all affected townships, if required. Applicant will follow the terms of all road use agreements. Applicant shall take appropriate action to mitigate wind-blown particles created throughout the construction process, including but not limited to implementation of dust control measures such as road watering, covering of open haul trucks when transporting material subject to being windblown, and the removal of any soils or mud deposits by construction equipment when necessary.
8. Applicant shall comply with the following conditions regarding road protection:
  - a) Applicant shall acquire all necessary permits authorizing the crossing of federal, state, county, and township roads.
  - b) Applicant shall coordinate road closures with federal, state, and local governments and emergency responders.
  - c) Applicant shall implement a regular program of road maintenance and repair through the active construction period to keep paved and gravel roads in an acceptable condition for residents and the public.
  - d) After construction, Applicant shall repair and restore deteriorated roads resulting from construction traffic, or compensate governmental entities for their repair and restoration of deteriorated roads, such that the roads are returned to their preconstruction condition.
  - e) Within 180 days of completing construction and reclamation of the Project, Applicant shall submit documentation to the Commission identifying that the roads were repaired in accordance with condition 8 and to the satisfaction of affected townships and counties. If the townships or counties will not provide such documentation, then Applicant shall provide a report to the Commission on the outstanding road repair issues and how those issues will be resolved.
  - f) Privately owned areas used as temporary roads during construction will be restored to their preconstruction condition, except as otherwise requested or agreed to by the landowner.
  - g) Should Applicant need to widen any existing roadways during construction of the Project, Applicant shall return the roadways back to original width after completion of the Project, unless agreed upon otherwise with the federal, state, county, or township entities, or the landowner.
  - h) Applicant shall use appropriate preventative measures to prevent damage to paved roads and to remove excess soil or mud from such roadways.
9. Applicant will provide signage that identifies road closures and disturbances resulting from the Project in accordance with the most recent editions of the Manual on Uniform Traffic Control Devices as published by the Federal Highway Administration.

10. Applicant shall promptly report to the Commission the presence of any critical habitat of threatened or endangered species in the Project area that Applicant becomes aware of and that was not previously reported to the Commission.
11. Sites identified as potentially eligible for National Register of Historic Places (NRHP) listing will be addressed by micrositing facilities to avoid impacts. If complete avoidance cannot be achieved, Applicant shall notify the Commission and work with the South Dakota State Historical Society SHPO program to minimize impacts.
  - a) An example of an avoidance measure that may be implemented is rerouting a collector line road around a resource, or boring under it to avoid ground disturbance.
  - b) If sites must be impacted that are afforded regulatory protection and would require mitigation, the SHPO will be engaged to ensure regulatory compliance is achieved.
12. Applicant agrees to follow the unanticipated discovery plan outlined in the document entitled *Cultural Resources Monitoring and Management Plan for the Dakota Range I Wind Project (CRMMP)*, and follow SDCL 34-27-25, 34-27-26, and 34-27-28.
13. Applicant shall file the final cultural resources report with the Commission prior to construction. If any potential adverse impacts to NRHP unevaluated, listed, or eligible cultural resources are identified in the final cultural resources report, Applicant shall comply with the requirements of the CRMMP.
14. Applicant shall provide the Stormwater Pollution Prevention Plan (SWPPP) to the Commission when Applicant has a final design for the Project. The SWPPP will outline the water and soil conservation practices that will be used during construction to prevent or minimize erosion and sedimentation. The SWPPP will be completed before submittal of an application for a National Pollutant Discharge Elimination System (NPDES) general permit for construction activities. All contractors to be engaged in ground disturbing activities will be given a copy of the SWPPP and requirements will be reviewed with them prior to the start of construction.
15. Applicant will repair and restore areas disturbed by construction or maintenance of the Project. Except as otherwise agreed to by the landowner, restoration will include replacement of original pre-construction topsoil or equivalent quality topsoil to its original elevation, contour, and compaction and re-establishment of original vegetation as close thereto as reasonably practical. In order to facilitate compliance with this Permit Condition, Applicant shall:
  - a) Strip topsoil to the actual depth of the topsoil, or as otherwise agreed to by the landowner in writing (e-mail is sufficient), in all areas disturbed by the Project; however, with respect to access roads, Applicant may remove less than the actual depth of topsoil to ensure roads remain low-profile and the contours align with the surrounding area;
  - b) Store topsoil separate from subsoil in order to prevent mixing of the soil types;
  - c) All excess soils generated during the excavation of the turbine foundations shall remain on the same landowner's land, unless the landowner requests, and/or agrees, otherwise; and

- d) When revegetating non-cultivated grasslands, Applicant shall use a seed mix that is recommended by the Natural Resource Conservation Service (NRCS), or other land management agency, unless otherwise agreed upon with the landowner in writing.
16. Applicant shall work closely with landowners or land management agencies, such as the NRCS, to determine a plan to control noxious weeds.
  17. Applicant shall stage construction materials in a manner that minimizes the adverse impact to landowners and land users as agreed upon between Applicant and landowner or Applicant and the appropriate federal, state, and/or local government agency. All excess construction materials and debris shall be removed upon completion of the Project, unless the landowner agrees otherwise.
  18. In order to mitigate interference with agricultural operations during and after construction, Applicant shall locate all structures, to the extent feasible and prudent, to minimize adverse impacts and interferences with agricultural operations, shelterbelts, and other land uses or activities. Applicant shall take appropriate precautions to protect livestock and crops during construction. Applicant shall repair all fences and gates removed or damaged during construction or maintenance unless otherwise agreed with the landowner or designee. Applicant shall be responsible for the repair of private roads damaged when moving equipment or when obtaining access to the right-of-way.
  19. Applicant shall bury the underground collector system at a minimum depth of three and one-half feet, or deeper if necessary, to ensure the current land use is not impacted.
  20. Applicant shall repair or replace all property removed or damaged during all phases of construction, including but not limited to, all fences, gates, and utility, water supply, irrigation or drainage systems. Applicant shall compensate the owners for damages or losses that cannot be fully remedied by repair or replacement, such as lost productivity and crop and livestock losses. All repair, replacement and/or compensation described above shall be in accordance with the terms and conditions of written agreements between Applicant and affected landowners where such agreements exist.
  21. Applicant shall, in the manner described in its written agreement with a landowner, indemnify and hold the landowner harmless for loss, damage, claim, or actions resulting from Applicant's use of the easement, including any damage resulting from any release, except to the extent such loss, damage claim, or action results from the negligence or willful misconduct of the landowner or his employees, agents, contractors, invitees, or other representatives.
  22. Applicant may make turbine adjustments of 250 feet or less from the turbine locations identified in the Application without prior Commission approval, so long as the turbine shifts comply with county and state setback requirements, comply with specified noise and shadow flicker requirements, cultural resource impacts are avoided or minimized per the CRMMP, environmental setbacks are adhered to as agreed upon with the USFWS and the GFP, and wetland impacts are avoided. Prior to implementing the turbine adjustment, Applicant will file in the docket an affidavit demonstrating compliance with the limitations set forth above. Any turbine adjustment that does not comply with the aforesaid limitations would be considered a "material change," and Applicant shall file a request for approval of the "material change" prior to making the adjustment pursuant to the following approval process:

- Applicant will file with the Commission and serve on the official Service List a request for approval of the adjustment that includes:
    - An affidavit describing the proposed turbine adjustment, the reason for the adjustment, the reason the adjustment does not comply with one or more turbine flexibility limitations set forth above, and information regarding compliance with all other applicable requirements; and
    - A map showing both the approved location and the proposed adjustment (in different colors);
  - Once received, the information would be reviewed by Commission staff, and Commission staff will have 10 calendar days within which to request further Commission review.
  - If no further review is requested, Applicant may proceed with the adjustment.
  - If further review is requested, the Commission will issue a decision regarding Applicant's request at its next available regularly scheduled Commission meeting, subject to notice requirements, after the request for further review is made by Commission staff.
23. Applicant may adjust access roads, the collector system, the operations and maintenance facility, the Project substation, and temporary facilities, so long as they are located on leased land, cultural resource impacts are avoided or minimized per the CRMMP, environmental setbacks are adhered to as agreed upon with the U.S. Fish and Wildlife Service (USFWS) and the South Dakota Game, Fish and Parks Department (GFP), wetland impacts are avoided or are in compliance with applicable regulations and requirements, and all other applicable regulations and requirements are met.
24. The terms and conditions of the Permit shall be made a uniform condition of construction, subject only to an affirmative written request for an exemption addressed to the Commission. A request for an exemption shall clearly state which particular condition should not be applied to the property in question and the reason for the requested exemption. The Commission shall evaluate such requests on a case-by-case basis, which evaluation shall be completed within 60 days unless exigent circumstances require action sooner.
25. If the Project causes interference with radio, television, or any other licensed communication transmitting or receiving equipment, Applicant shall take all appropriate action to minimize any such interference and shall make a good faith effort to restore or provide reception levels equivalent to reception levels in the immediate areas just prior to construction of the Project. This mitigation requirement shall not apply to any dwellings or other structures built after completion of the Project.
26. Applicant will provide Global Positioning System (GPS) coordinates of structure locations to affected landowners at any time during the life of the Project. Coordinates will be provided in writing to landowners within 30 days of a request.
27. The Project, exclusive of all unrelated background noise, shall not generate a long-term average sound pressure level (equivalent continuous sound level, Leq), as measured over a period of at least two weeks, defined by Commission staff, that includes all integer wind speeds from cut in to full power, of more than 45 dBA within 25 feet at any non-participating residence or more than 50 dBA within 25 feet at any participating residence. Applicant shall, upon Commission formal request, conduct field surveys or provide post-construction monitoring data verifying compliance with specified noise level

limits using applicable American National Standards Institute (ANSI) methods. If the long-term average level exceeds 45 dBA at any non-participating residence or 50 dBA at any participating residence, then the Project Owner shall take whatever steps are necessary in accordance with prudent operating standards to rectify the situation. Sound monitoring will not be repeated in a representative area during any five-year period unless operational or maintenance changes result in a reasonable assumption of higher turbine sound levels.

28. Applicant will take steps to mitigate shadow flicker concerns at residences that could experience shadow flicker levels above 30 hours per year.
29. Not less than 30 days prior to commencement of construction work in the field for the Project, Applicant will provide to Commission staff the following information:
  - a) the most current preconstruction design, layout, and plans, including the specifications of the turbine model selected;
  - b) a sound level analysis showing compliance with the applicable sound level requirements;
  - c) a shadow flicker analysis showing the anticipated shadow flicker levels will not exceed Applicant's voluntary commitment of 30 hours per year at any non-participating residence; and
  - d) such additional Project preconstruction information as Commission staff requests.
30. Within 90 days of the Project's commercial operation date, Applicant shall submit a report to the Commission that provides the following information:
  - a) as-built location of structures and facilities, including drawings clearly showing compliance with the setbacks required by state and local governments and the voluntary commitments set forth in Table 10-1 of the Application;
  - b) the status of remedial activities for road damage, landowner property damage, crop damage, environmental damage, or any other damage resulting from Project construction activities; and
  - c) a summary of known landowner complaints and Applicant's plan for resolving those complaints.
31. For purposes of this Project and the commitments herein, "residences," "businesses," and "buildings owned and/or maintained by a governmental entity" shall include only those that are in existence and in use as of the date of the Commission's order issuing a permit.
32. Applicant shall seek input from local emergency response personnel to properly and effectively coordinate an emergency response plan consistent with local resources and response abilities. Upon completion of construction, a Project operation emergency response plan shall be provided to Commission staff to make available to the general public on the Commission's website.

33. Prior to the construction of the Project, Applicant will notify public safety agencies by providing a schedule and the location of work to be performed within their jurisdiction. The agencies contacted will include the South Dakota Department of Public safety, the Sheriff of Codington County, the Sheriff of Grant County, the Codington County Office of Emergency Management, and the Grant County Office of Emergency Management.
34. Applicant agrees to undertake two years of independently-conducted post-construction avian mortality monitoring for the Project, and to provide a copy of the report to the USFWS, GFP, and the Commission. Based on the results of the monitoring, the need for and scope of an additional year of independently-conducted post-construction avian mortality monitoring will be determined in coordination with USFWS and GFP.
35. Applicant shall file the Bird and Bat Conservation Strategy (BBCS) prior to beginning construction of the Project. The BBCS shall be implemented during construction and operation of the Project.
36. Applicant shall provide a public liaison officer, approved by the Commission, to facilitate the exchange of information between Applicant, including its contractors, and landowners, local communities, and residents, and to facilitate prompt resolution of complaints and problems that may develop for landowners, local communities, and residents as a result of the Project. Applicant shall file with the Commission its proposed public liaison officer's credentials for approval by the Commission prior to the commencement of construction. After the public liaison officer has been approved by the Commission, the public liaison officer may not be removed by Applicant without the approval of the Commission. The public liaison officer shall be afforded immediate access to Applicant's on-site project manager, its executive project manager, and to the contractors' on-site managers and shall be available at all times to Commission staff via mobile phone to respond to complaints and concerns communicated to the Commission staff by concerned landowners and others. As soon as Applicant's public liaison officer has been appointed and approved, Applicant shall provide contact information for him/her to all landowners in the Project area and to law enforcement agencies and local governments in the vicinity of the Project. The public liaison officer's contact information shall be provided to landowners in each subsequent written communication with them. If the Commission determines that the public liaison officer has not been adequately performing the duties set forth for the position in this Order, the Commission may, upon notice to Applicant and the public liaison officer, take action to remove the public liaison officer. The public liaison's services shall terminate ninety days after the Project commences commercial operations, unless the appointment is extended by order of the Commission.
37. If the Project is decommissioned, Applicant will follow Section 24 of the Application, the decommissioning plan laid out in Appendix P of the Application, as supplemented by Applicant in Exhibit A4-2, and answers to Commission staff's data requests in Exhibit S1. The Commission shall be notified prior to any decommissioning action.
38. If Applicant is purchased by Xcel Energy, as stated in Section 7.0 of the Application, Xcel Energy will assume financial responsibility for decommissioning and provide funding for the decommissioning and removal of the Project. As a regulated electric utility, the projected financial cost of decommissioning will be reviewed when Xcel Energy requests recovery of the Project investment and associated decommissioning cost from customers in a rate proceeding. The Commission may review and adjust the Project decommissioning cost recovered from customers in subsequent Xcel Energy rate proceedings using the most current information available regarding

decommissioning. In the event Xcel Energy does not purchase Dakota Range, Applicant shall file a decommissioning plan with a proposal for financial assurance consistent with the provisions in Section 37 of the EL17-055 Permit Conditions, at least 60 days prior to construction, for Commission approval. No construction may occur until the Commission approves the decommissioning plan.

39. Applicant's proposed turbine shifts, identified as Turbine 34a, Turbine 60a, and Turbine A12a in Exhibit A15-3, are hereby incorporated into the approved Project configuration.
40. Applicant will use two methods to detect icing conditions on turbine blades: (1) sensors that will detect when blades become imbalanced or create vibration due to ice accumulation; and (2) meteorological data from on-site permanent meteorological towers, on-site anemometers, and other relevant meteorological sources that will be used to determine if ice accumulation is occurring. These control systems will either automatically shut down the turbine(s) in icing conditions (per the sensors) or Applicant will manually shut down turbine(s) if icing conditions are identified (using meteorological data). Turbines will not return to normal operation until the control systems no longer detect an imbalance or when weather conditions either remove icing on the blades or indicate icing is no longer a concern. The Project Owner will pay for any documented damage caused by ice thrown from a turbine.
41. Applicant may construct turbines on only three of the following four turbine locations: Turbines 67, 68, 69 and A26.
42. Applicant shall utilize an Aircraft Detection Lighting System.