BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY PREVAILING WIND PARK, LLC FOR A PERMIT FOR A WIND ENERGY FACILITY IN BON HOMME, CHARLES MIX, AND HUTCHINSON COUNTIES, SOUTH DAKOTA, FOR PREVAILING WIND PARK ENERGY FACILITY	* * * * * * * *	**PREVAILING WIND PARK, LLC'S POST-HEARING BRIEF** **EL18-026**

INTRODUCTION

Prevailing Wind Park, LLC ("Prevailing Wind Park" or "Applicant") submits this post-hearing brief to the South Dakota Public Utilities Commission ("Commission") in support of its Application for Energy Facility Permit for the proposed Prevailing Wind Park Project ("Project"). As discussed in more detail below, the primary material issue in dispute after the evidentiary hearing is what sound limit the Commission should apply to the Project. The record supports applying the same sound limit of 45 A-weighted decibels ("dBA") on non-participating residences in Bon Homme County and Hutchinson County that the Commission has uniformly applied in the Dakota Range (EL18-046) and Crocker (EL17-055) dockets. Based solely on Prevailing Wind Park's commitment, a 43 dBA limit at non-participating residences is appropriate in Charles Mix County.[1] The record lacks any reasonable justification under the siting criteria for varying from these levels.

Taken as a whole, the record evidence demonstrates that the Commission should grant the requested permit for the Project, subject to the attached Attachment A, Applicant's and

[1] Prevailing Wind Park committed to a 45 dBA limit at participating residences in Charles Mix County unless there is a signed waiver is obtained from the owner of the residence. Ex. I-22 (Letter from Charles Mix County with Affidavit of Peter Pawlowski).

Staff's Revised Joint Recommended Conditions, and Attachment B, Applicant's Proposed Sound and Charles Mix Conditions.[2]

BACKGROUND

I. THE PROJECT.

The Project is an up to 219.6 megawatt ("MW") wind energy conversion facility located in Hutchinson, Bon Homme, and Charles Mix counties, which is proposed to include up to 61 wind turbines. The Project would interconnect at Western Area Power Administration's ("WAPA") existing Utica Junction Substation; WAPA is preparing an Environmental Assessment ("EA") in connection with its review of the Project's proposed interconnection.[3] The EA will tier off of the Upper Great Plains Wind Energy Programmatic Environmental Impact Statement ("PEIS") and will analyze the potential environmental effects of the Project and the proposed transmission line that is being permitted locally (rather than solely the proposed interconnection).[4] The Project area ("Project Area") is comprised of 50,364 acres of land between the towns of Avon, Tripp, and Wagner.[5]

Prevailing Wind Park proposes to use the GE 3.8-137 turbine model for the Project, which is a 3.8 MW turbine with a 111.5 meter/366-foot hub height and 137-meter/450-foot rotor diameter.[6] The total turbine height is 586 feet.[7] In addition, Prevailing Wind Park seeks the flexibility to use the GE 2.3 MW turbine model at up to nine locations in the event that the use of

[2] The Revised Project Layout admitted as Attachment 4-2 to Exhibit I-29 is attached to Applicant's brief as Attachment C.

[3] Ex. A1 at 1-1, 3-1 (Application).

[4] Evid. Hrg. Tr. at 455-56 (Canty).

[5] Ex. A1 at 1-1 (Application).

[6] Ex. A7 at 2 (Pawlowski Rebuttal).

[7] Ex. A7 at 2 (Pawlowski Rebuttal).

the GE 2.3 MW turbine model is required to qualify for the production tax credit ("PTC").[8] The GE 2.3 MW turbine has an 80-meter/260-foot hub height and 116-meter/380-foot rotor diameter with a total tip height of 453 feet.[9]

The evidence demonstrates that Prevailing Wind Park has worked cooperatively with local governments, even where no local land use controls exist. Specifically: Bon Homme County granted a Large Wind Energy System approval for the Project on August 21, 2018; Hutchinson County granted conditional use approvals for the Project on September 4, 2018; and, the Project received building permits from Charles Mix County in July 2018 and worked with Charles Mix County, which does not have a zoning ordinance, to address concerns regarding the Project.[10]

II. PROJECT DEVELOPMENT & OWNERSHIP.

Prevailing Wind Park will own, manage, and operate the Project. Prevailing Wind Park is a wholly-owned subsidiary of sPower Development Company, LLC ("sPower"), which is an independent renewable energy company with extensive experience developing and operating renewable energy assets across the United States.[11]

Prevailing Wind Park acquired the Project in 2017 from Prevailing Winds, LLC, which was formed by a group of local investors who sought to create additional sources of income for area landowners and economic growth for the local communities through wind energy.[12] Since its October 2017 acquisition of the assets and development rights to the Project, Prevailing Wind Park has undertaken extensive development activities, consisting of landowner outreach and

[8] Evid. Hrg. Tr. at 209 (Pawlowski).

[9] Evid. Hrg. Tr. at 209 (Pawlowski).

[10] Ex. A7 at 1 (Pawlowski Rebuttal).

[11] Ex. A1 at 1-1 (Application).

[12] Ex. A1 at 2-1 (Application); *see also* Ex. A1 at § 9.1 (Application).

easement acquisition, detailed studies of resources in the Project Area, coordination with resource agencies, and design and refinement of the Project configuration.[13] For example, since acquiring the Project, Prevailing Wind Park negotiated additional lease agreements for approximately 40 percent of the total Project acreage.[14] Prevailing Wind Park has obtained all of the private land rights necessary to construct the Project.[15]

LEGAL STANDARD

Pursuant to South Dakota Codified Law ("SDCL") 49-41B-22, Prevailing Wind Park has the burden of proof to establish:

> (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.

The Commission must make complete findings regarding an energy facility permit application and must grant, deny, or grant with conditions or modifications an energy facility permit.[16] The Commission must find that the Project meets the requirements of SDCL Ch. 49-41B.[17]

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[13] Ex. A1 at 2-1 (Application).

[14] Evid. Hrg. Tr. at 215, 226 (Pawlowski).

[15] Ex. A1 at 2-1 (Application).

[16] SDCL § 49-41B-25.

[17] *Id.*

DISCUSSION

I. THE PROJECT WILL COMPLY WITH ALL APPLICABLE LAWS AND RULES.

The evidence submitted by Prevailing Wind Park demonstrates that the Project will comply with all applicable laws and rules.[18] No other party submitted evidence to the contrary. Thus, Prevailing Wind Park has met its burden of proof with respect to this factor.

II. THE PROJECT DOES NOT POSE A THREAT OF SERIOUS INJURY TO THE ENVIRONMENT OR SOCIAL AND ECONOMIC CONDITION IN THE PROJECT AREA.

The evidence demonstrates that the Project does not pose a threat of serious injury to the environment or social and economic condition in the site proposed for the Project ("Project Area"), and that Prevailing Wind Park has adopted numerous avoidance and minimization measures, as well as commitments, to further limit potential environmental impacts. More specifically, Prevailing Wind Park has demonstrated that it will avoid and/or minimize impacts to:

- Geological resources;[19]
- Soil resources;[20]
- Hydrology;[21]
- Vegetation;[22]
- Wildlife;[23]
- Federally- and state-listed species;[24]

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[18] *See* Ex. A6 at 3 (Pawlowski Supplemental Direct); Ex. A7 at 2-3 (Pawlowski Rebuttal); Ex. A1 at §§ 27.1, 27.4 (Application); *see also, e.g.,* Ex. A1 at 9-3, 9-4, 12-6, 15-7 (Application).

[19] *See* Ex. A1 at § 11.1.2 (Application).

[20] *See* Ex. A1 at § 11.2.2 (Application).

[21] *See* Ex. A1 at §§ 12.1.2, 12.2.2, 12.2.3.2 (Application).

[22] *See* Ex. A1 at § 13.1.2 (Application).

[23] *See* Ex. A1 at § 13.4.2 (Application).

[24] *See* Ex. A1 at §§ 13.4.2.4, 14.3 (Application).

- Aquatic ecosystems;[25]
- Land use;[26]
- Recreation;[27]
- Conservation easements;[28]
- Noise;[29]
- Visual resources;[30]
- Telecommunications;[31]
- Air quality;[32]
- Socioeconomic and community resources;[33]
- Commercial, industrial, and agricultural sectors;[34]
- Transportation;[35] and,
- Cultural resources.[36]

The Project will also implement applicable avoidance and mitigation measures from the PEIS.[37] Staff also consulted with South Dakota Game, Fish and Parks ("GFP"), and that agency did not identify any concerns unique to the Project.[38]

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[25] *See* Ex. A1 at § 14.3 (Application).

[26] *See* Ex. A1 at § 15.1.2 (Application).

[27] *See* Ex. A1 at §§ 15.2.2, 15.4.2 (Application).

[28] *See* Ex. A1 at § 15.2.2 (Application).

[29] *See* Ex. A1 at § 15.3.4 (Application).

[30] *See* Ex. A1 at § 15.4.2 (Application).

[31] *See* Ex. A1 at § 15.6 (Application); Ex. A14 at 5 (Canty Rebuttal).

[32] *See* Ex. A1 at § 18.2 (Application).

[33] *See* Ex. A1 at §§ 20.1.2, 20.3.2 (Application).

[34] *See* Ex. A1 at §§ 20.1.2, 20.2.2 (Application).

[35] *See* Ex. A1 at § 20.4.2 (Application).

[36] *See* Ex. A1 at § 20.5.2 (Application).

[37] Evid. Hrg. Tr. at 441 (Canty). The PEIS is available online at: https://www.wapa.gov/regions/UGP/Environment/Pages/ProgrammaticWindEIS.aspx.

[38] Ex. S1 at 8 (Kearney Direct); Evid. Hrg. Tr. at 1119 (Kearney).

This evidence is set forth in the Application and applicable testimony and will not be restated here; rather, Prevailing Wind Park will address those specific and discrete issues which were the focus of the evidentiary hearing.

A. Environment.

1. Whooping Cranes.

The Project is located within an area where ten percent or less of whooping crane migration occurs.[39] To date, no whooping crane has died as the result of a wind turbine.[40] In response to questions from Commissioner Hanson at the evidentiary hearing, Prevailing Wind Park witnesses further described how the Project has been designed and will be operated to avoid impacts on the whooping crane. Specifically, the Project has committed to a curtailment program whereby, if a whooping crane is sighted within two miles of the Project, turbines will be shut down until the cranes leave the area.[41] There will be two ways to stop operation of the turbines. First, monitors may call the operations center and ask them to shut the turbines down.[42] Second, each monitor will have a laptop or tablet equipped with software that will allow him or her to shut down the turbines remotely if a whooping crane is sighted.[43] This software has been successfully implemented by sPower on another wind project.[44]

[39] Evid. Hrg. Tr. at 467 (Canty).

[40] Evid. Hrg. Tr. at 468 (Canty).

[41] Evid. Hrg. Tr. at 432 (Canty).

[42] Evid. Hrg. Tr. at 1142 (Pawlowski).

[43] Evid. Hrg. Tr. at 1142 (Pawlowski).

[44] Evid. Hrg. Tr. at 1142 (Pawlowski); *see also* Evid. Hrg. Tr. at 1165-67 (Pawlowski).

The Project has also committed to monitoring during the spring and fall migration periods.[45] The Project is coordinating with U.S. Fish and Wildlife Service regarding the specific timing of that monitoring and has also engaged a consultant to assist in that process.[46]

2. Aviation Detection Lighting System.

At the public input hearing, Prevailing Wind Park proposed to use an Aviation Detection Lighting System ("ADLS") for the Project, provided that the Federal Aviation Administration ("FAA") approves it.[47] The use of ADLS addresses the concerns raised at the evidentiary hearing and in public comments regarding the potential for "red flashing lights" on the Project, as are seen on existing wind projects.[48] ADLS involves the installation of radar units around the perimeter of a wind project. As long as the radar does not detect an aircraft, it keeps the wind turbine lighting turned off. When the radar detects aircraft, the wind turbine lighting activates.[49] The use of ADLS means that the Project will not introduce constant, flashing red lights into the area. Rather, the vast majority of the time, the lights will remain off.[50]

B. Social and Economic Condition.

The record also demonstrates that the Project will not pose a threat of serious injury to social and economic condition of inhabitants or expected inhabitants in the siting area. When considering this criterion in prior contested siting dockets, the Commission has considered the following socioeconomic issues: temporary and permanent jobs; tax revenue; and impacts on

[45] Evid. Hrg. Tr. at 432 (Canty).

[46] Evid. Hrg. Tr. at 468 (Canty).

[47] Pub. Hrg. Tr. at 14 (Pawlowski).

[48] *See, e.g.*, Evid. Hrg. Tr. at 1019 (Powers), 1036 (Andersh); Pub. Hrg. Tr. at 79 (Holborn); Comment by Gregg Hubner (July 9, 2018) (https://puc.sd.gov/commission/dockets/electric/2018/EL18-026/comments/Hubnerattachment.pdf).

[49] Ex. A6 at 5 (Pawlowski Supplemental Direct); *see also* Evid. Hrg. Tr. at 245 (Pawlowski).

[50] *See* Evid. Hrg. Tr. at 245 (Pawlowski).

commercial, agricultural, and industrial sectors, housing, land values, labor market, health facilities, energy, sewage and water, solid waste management facilities, fire protection, law enforcement, recreational facilities, schools, transportation facilities, and other community and government facilities.[51] The record demonstrates that the Project will provide positive socioeconomic impacts when considering these factors.

For example, with respect to property values, Mr. Mike MaRous, a Member Appraisal Institute appraiser, testified that "there would be no negative impact on property values" as a result of the Project.[52] He further noted that the additional income from participating in the Project may actually increase the value and marketability of participating agricultural land.[53] This conclusion is also consistent with the Commission's recent findings regarding property values in the Crocker and Dakota Range wind farm proceedings.[54]

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[51] *See, e.g.*, *In the Matter of the Application of Dakota Access, LLC for an Energy Facility Permit to Construct the Dakota Access Pipeline*, Docket HP14-002, Final Decision and Order; Notice of Entry (Dec. 14, 2015) at ¶¶ 100-101; *see also In the Matter of the Application by TransCanada Keystone Pipeline, LP for a Permit Under the South Dakota Energy Conversion and Transmission Facilities Act to Construct the Keystone XL Project*, Docket HP09-001, Amended Final Decision and Order; Notice of Entry (June 29, 2010) at ¶¶ 107-110 (discussing socioeconomic effects, including tax revenue, jobs, and impacts on agricultural, commercial, and industrial sectors and public facilities); *In the Matter of the Application of Dakota Range I, LLC and Dakota Range II, LLC for a Permit of a Wind Energy Facility in Grant County and Codington County, South Dakota, for the Dakota Range Wind Project*, Final Decision and Order Granting Permit to Construct Wind Energy Facility; Notice of Entry (July 23, 2018) at ¶¶ 50-57; *In the Matter of the Application of Montana-Dakota Utilities Co. and Otter Tail Power Company for a Permit to Construct the Big Stone South to Ellendale 345 kV Transmission Line*, Docket EL13-028, Final Decision and Order; Notice of Entry (Aug. 22, 2014) ¶¶ 29-31 (discussing impacts to agriculture, property values, and local roads under this criterion).

[52] Evid. Hrg. Tr. at 292 (MaRous).

[53] Ex. A15 at 12 (MaRous Supplemental Direct).

[54] *See In the Matter of the Application by Dakota Range I, LLC and Dakota Range II, LLC for a Permit of a Wind Energy Facility in Grant County and Codington County, South Dakota, for the Dakota Range Wind Project*, Docket EL18-003, Final Decision and Order Granting Permit to Construct Wind Energy Facility; Notice of Entry (July 23, 2018) at ¶¶ 53-55; *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*, Docket EL17-055, Final Decision and Order Granting Permit to Construct Facilities and Notice of Entry (June 12, 2018) at ¶¶ 58-61.

In addition, the record demonstrates that the Project will, on the whole, have positive economic impacts on the community. For example, the Project is anticipated to result in up to 245 jobs during construction,[55] up to ten full-time permanent jobs,[56] and additional annual tax revenue for the state and local governments.[57]

The one alleged potential negative impact on social and economic conditions in the record was by Mr. Jerome Powers, relating to his guided hunting business. However, his testimony did not support his claims. During his testimony, Mr. Powers acknowledged that he owns less than 13 acres of land.[58] In the past, he has relied upon year-to-year leases for hunting rights on various properties.[59] He testified that some of those landowners have decided not to renew his leases for the coming year.[60] One of those landowners – Clearfield Colony – is a participating landowner in the Project. Mr. Powers attributes that landowner's decision not to renew his hunting lease to the Project.[61] However, each landowner has the right to decide whether to enter into a hunting lease for his/her property. Further, as acknowledged by Mr.

[55] Ex. A1 at 20-4 (Application).

[56] Evid. Hrg. Tr. at 277 (Pawlowski); *see also* Ex. A1 at 6-1 (Application).

[57] Ex. A1 at 20-3 – 20-4 (Application). At the evidentiary hearing, Commissioner Hanson questioned a portion of Mr. Damon's testimony (Ex. A6-3 (Damon Direct)) that included a calculation regarding the anticipated benefits of the Project. *See* Evid. Hrg. Tr. at 270-71. To clarify, the excerpt in question (on pages 15-16 of Ex. A6-3 (Damon Direct)) corresponds to page 20-4 of the Application, which states: "construction of the Project would create a $14.9 million boost to the local economy. Prevailing Wind Park estimates that $220,000 of food, supplies, and fuel would be purchased locally by the Project and Project staff annually (or $20.4 million over the life of the Project)." The $20.4 million total cited in Mr. Damon's testimony and the Application includes the $14.9 million *plus* the $220,000 in annual purchasing over the life of the Project. Thus, there was no calculation error in Mr. Damon's direct testimony; however, it could have been more clearly stated.

[58] Evid. Hrg. Tr. at 1017 (Powers).

[59] Evid. Hrg. Tr. at 1017, 1023-24 (Powers).

[60] Evid. Hrg. Tr. at 1024, 1028 (Powers).

[61] Evid. Hrg. Tr. at 1029-30 (Powers).

Powers, the Project does not prohibit or otherwise restrict hunting.[62] Thus, it is Mr. Powers' ownership of limited acreage and his need to hunt on others' land that affects his hunting business, and not the Project.

Although there was discussion at the evidentiary hearing regarding disagreements concerning the Project within the community, these differences of opinion should not impact the Commission's analysis of whether the Project poses a "threat of serious injury to . . . social and economic condition." While Prevailing Wind Park acknowledges that the Project has both supporters and detractors, this is not unique to this Project. As the Commission has seen in the past, with almost any energy infrastructure project, there is not unanimous support for the Project. This was true for the Crocker and the Dakota Range projects, as it has been for other infrastructure projects approved by the Commission.[63] There are residents in the Project Area who do not support the Project, some of whom participated in these proceedings to advocate for

[62] Evid. Hrg. Tr. at 1018 (Powers).

[63] *See, e.g., In the Matter of the Application by Dakota Range I, LLC and Dakota Range II, LLC for a Permit of a Wind Energy Facility in Grant County and Codington County, South Dakota, for the Dakota Range Wind Project*, Docket EL18-003, Final Decision and Order Granting Permit to Construct Wind Energy Facility; Notice of Entry (July 23, 2018) (two intervenors participated in the evidentiary hearing); *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*, Docket EL17-055, Final Decision and Order Granting Permit to Construct Facilities and Notice of Entry (June 12, 2018) (two intervenors participated in the evidentiary hearing); *In the Matter of the Application of Dakota Access, LLC for an Energy Facility Permit to Construct the Dakota Access Pipeline*, Docket HP14-002, Final Decision and Order; Notice of Entry (Dec. 14, 2015) (50 intervenors participated in the evidentiary hearing); *In the Matter of the Application by TransCanada Keystone Pipeline, LP for a Permit Under the South Dakota Energy Conversion and Transmission Facilities Act to Construct the Keystone XL Project*, Docket HP09-001, Amended Final Decision and Order; Notice of Entry (June 29, 2010) (15 intervenors participated in the evidentiary hearing); *In the Matter of the Application by Buffalo Ridge II LLC, a Subsidiary of Iberdola Renewables, Inc. for an Energy Conversion Facility Permit for the Construction of the Buffalo Ridge II Wind Farm and Associated Collection Substation and Electric Interconnection System*, Docket EL08-031, Final Decision and Order; Notice of Entry (April 23, 2009) (six Intervenors participated in the evidentiary hearing); *In the Matter of the Application of Montana-Dakota Utilities Co. and Otter Tail Power Company for a Permit to Construct the Big Stone South to Ellendale 345 kV Transmission Line*, Docket EL13-028, Final Decision and Order; Notice of Entry (Aug. 22, 2014) (three intervenors participated in the evidentiary hearing).

their views. However, the fact that people intervened and participated in the proceeding is not indicative of negative impacts to the social and economic condition of inhabitants or expected inhabitants in the siting area. Such a conclusion would ignore the merits of the concerns raised, and would look solely to the number of opponents, which is inconsistent with the purpose of the Commission's evidentiary process.

Moreover, while the intervenors voiced their concerns, the Commission also heard the testimony of landowners who do support the Project, and they explained their reasons for participating in the Project. These reasons included: positive experiences with the existing Beethoven Wind Project; tax revenue for local governments; support for renewable energy;[64] expanded opportunities for local residents; and, community investment.[65] Ms. Peters and Mr. Brandt also testified that, although there is disagreement among some area residents regarding the Project, the discourse has been civil; Mr. Brandt stated: "It's not like there's a huge thing there. I mean, there's people for it. There's people against it. But life goes on. In the end we're all still Avon residents."[66] This is similar to testimony both from Prevailing Wind Park and intervenors – people may have differences of opinion concerning the Project, but it is no more than is to be expected from an energy infrastructure project and is not anticipated to have permanent impacts on the community.[67] In addition, Prevailing Wind Park is committed to

[64] Evid. Hrg. Tr. at 187, 200 (Peters).

[65] *See* Evid. Hrg. Tr. at 394-98 (Brandt).

[66] Evid. Hrg. Tr. at 403-04 (Brandt); *see also id.* at 419-20 (Brandt) ("There is always some controversy with a project, but, as I stated before, I believe when this is all said and done, whether it is built or not, we are all still a community. I mean, these people are my neighbors. They're still going to be my neighbors when this is all said and done. So I do not believe that there's been so much [*word unclear*] that we can't get along and go about life.").

[67] *E.g.*, Evid. Hrg. Tr. at 257 (Pawlowski) ("So what I have observed is that there are people who are unhappy about the project, and they are, you know, of similar numbers that I've seen in other projects and other interventions in projects."); Evid. Hrg. Tr. at 945-46 (Schoenfelder) ("I made a commitment early in this process that I would want to be treated the way other people want to be treated. I hope that

continuing outreach and dialogue in the community regarding the Project, as Mr. Pawlowski testified on the final day of the evidentiary hearing.[68] Thus, taken as a whole, the record supports the conclusion that the Project does not pose a threat to the social and economic condition of the community.

III. THE PROJECT WILL NOT SUBSTANTIALLY IMPAIR HEALTH, SAFETY, OR WELFARE.

The record demonstrates that the Project will not substantially impair health, safety, or welfare. Further, the record demonstrates that the Project has been designed to minimize the potential for health, safety, and welfare impacts. The primary issues at the evidentiary hearing related to shadow flicker, sound, general health effects, and ice throw. Prevailing Wind Park provided testimony from highly qualified and experienced medical doctors: Dr. Jeff Ellenbogen, a Harvard-trained neurologist and former professor at Johns Hopkins University; and Dr. Mark Roberts, a medical doctor and Ph.D. epidemiologist with an extensive public health background.[69] Each doctor independently concluded that the Project will not cause adverse health effects or impact sleep.[70] The testimony of these two doctors was unrefuted in the record—there was no other medical testimony by a qualified expert. In fact, when intervenors, Mr. and Mrs. Hubner and Mr. and Mrs. Schoenfelder ("Intervenors"), attempted to introduce testimony regarding health effects through Dr. Punch and Mr. James, that testimony was

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other people feel the same way. These are my neighbors. A lot of those neighbors are taking the stands for a lot of different reasons. They're not evil people. I just -- I -- I refuse to -- I refuse to hate anyone through this process.").

[68] Evid. Hrg. Tr. at 1139-40, 1145-46 (Pawlowski).

[69] *See* Ex. A4-1 (Roberts Statement of Qualifications); Evid. Hrg. Tr. at 87 (Roberts); Ex. A18-1 (Ellenbogen Statement of Qualifications); Evid. Hrg. Tr. at 318-19 (Ellenbogen).

[70] *See, e.g.*, Ex. A4 at 15-16 (Roberts Supplemental Direct); Ex. A18 at 4-5, 12 (Ellenbogen Rebuttal); Evid. Hrg. Tr. at 106-07 (Roberts), 328, 360-61 (Ellenbogen).

properly excluded.[71] Prevailing Wind Park also provided unchallenged testimony regarding turbine operations and ice throw coupled with a General Electric publication[72] that showed that the Project has complied with recommended safety setbacks and that the risk of ice throw is low. Each of these issues is discussed in more detail below.

A. Flicker.

Shadow flicker from wind turbines occurs when wind turbine blades rotate and pass in front of the sun. Shadow flicker occurs only under very specific conditions, and shadow flicker intensity and frequency at a given receptor are determined by a number of interacting factors, such as sun position, wind direction, turbine and receptor locations, time of day, and other similar factors. As separation between a turbine and receptor increases, shadow flicker intensity will generally diminish by a corresponding amount as shadows diffuse and become imperceptible.[73]

Flicker is common in the world – it is not only caused by wind turbines.[74] Flicker also does not cause adverse health effects, including seizures. Both Dr. Roberts and Dr. Ellenbogen provided testimony on this issue, explaining that the frequency of shadow flicker from wind turbines is not the frequency that induces epileptic seizures.[75] More specifically, photic-simulated epilepsy (seizures as a result of flashes of light) occurs as a result of frequencies

[71] *See* Order Redacting Exhibits and Testimonies (Nov. 1, 2018).

[72] Ex. A31, "Setback Considerations for Wind Turbine Siting" (Applicant's Updated Responses to Intervenors' Data Requests).

[73] Ex. A2 at 3-4 (Anderson Direct).

[74] Evid. Hrg. Tr. at 94 (Roberts) ("I think that to back up for a minute and talk about it, is flicker, light flicker in general. We are surrounded by light flicker. This monitor in front of me right now is flickering at probably about 75 hertz. The lights above us, if they're fluorescent are probably about 125 hertz."); *id.* at 151 (Roberts) ("We are all exposed to flicker. And I think the one thing I would recommend is carefully consider that shadow flicker is no different than flicker from other devices except for the emotional attachment that it may have to the source.").

[75] *See* Ex. A18 at 5 (Ellenbogen Rebuttal); *see also* Evid. Hrg. Tr. at 94, 154, 159 (Roberts).

greater than 5 hertz ("Hz").[76] In contrast, the frequency of shadow flicker from wind turbines would be about 0.5-1 Hz, which is well below the range that would elicit a seizure even in someone who is vulnerable to photic stimulation seizures.[77]

Shadow flicker modeling for the Project predicted the following results at intervenors' residences:

Name & Address	Receptor ID	Flicker (Hours/Year)	Flicker (Minutes/Day)
Gregg & Marsha Hubner	REC-047	0	0
Paul & Lisa Schoenfelder	REC-139	6.15	26
Sherman & Lori Fuerniss	REC-068	3.13	24
	REC-069	3.20	24
Karen Jenkins	REC-121	0	0
Kelli Pazour	REC-024	6.20	31

Consistent with industry standard, Prevailing Wind Park has committed to limiting shadow flicker at non-participating residences in the Project Area to no more than 30 hours per year.[78] In addition – beyond industry standard – Prevailing Wind Park has also committed to limiting shadow flicker at non-participating residences in the Project Area to no more than 30 minutes per day.[79] Where shadow flicker exceeds the commitments made by Prevailing Wind Park, the Project will use turbine control software to comply with that commitment.[80] Specifically, the software will shut a turbine down before it exceeds the committed shadow flicker limits and will

[76] Ex. A18 at 5 (Ellenbogen Rebuttal).

[77] Ex. A18 at 5 (Ellenbogen Rebuttal); Evid. Hrg. Tr. at 154 (Roberts).

[78] Evid. Hrg. Tr. at 42-43 (Anderson); Ex. A2 at 4 (Anderson Direct); Evid. Hrg. Tr. at 207 (Pawlowski); Applicant's and Staff's Revised Joint Recommended Condition 28.

[79] *See* Evid. Hrg. Tr. at 42-43, 73, 81 (Anderson); Evid. Hrg. Tr. at 207 (Pawlowski); Applicant's and Staff's Revised Joint Recommended Condition 28.

[80] Applicant's and Staff's Revised Joint Recommended Condition 28; Evid. Hrg. Tr. at 207-08 (Pawlowski).

not turn the turbine back on until the shadow flicker at that location has ended.[81] As shown above, the predicted annual hours of shadow flicker at the intervenors' residences are well below the 30-hour-per-year commitment. Further, only one residence would potentially exceed 30 minutes per day, which will be addressed by the turbine control software Prevailing Wind Park has committed to install and use.[82]

At the evidentiary hearing, there were questions why 30 hours per year was the appropriate shadow flicker limit. However, neither the State of South Dakota nor the federal government currently regulates wind turbine shadow flicker.[83] Similarly, none of the counties in which the Project will be located has specific shadow flicker limits. As described above, 30 hours per year is a consistent, accepted standard within the industry.[84] This standard is commonly applied in regulatory proceedings in other jurisdictions.[85]

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[81] Evid. Hrg. Tr. at 207-08 (Pawlowski); *see also* Evid. Hrg. Tr. at 54 (Anderson) ("It's part of the machine itself, and it's simply a modification of the control software for the turbine. And we can modify that so that if the flicker above a certain threshold occurs, whether that's hours per year, minutes per day, et cetera, we can adjust the turbine control settings and, simply put, tell it not to operate or to operate in a different way.").

[82] *See* Ex. A7 at 4 (Pawlowski Rebuttal).

[83] Evid. Hrg. Tr. at 84 (Anderson).

[84] Evid. Hrg. Tr. at 81, 83-84 (Anderson); *see also* Evid. Hrg. Tr. at 1127 (Kearney) ("Ultimately what I looked at was what the county was comfortable with as being a nuisance issue and if they were comfortable with 30 hours without some study saying that's right or wrong, I was comfortable with that.").

[85] *See, e.g., In the Matter of the Application of Freeborn Wind Energy LLC for a Large Wind Energy Conversion System Site Permit for the up to 84 MW Freeborn Wind Farm in Freeborn County*, MPUC Docket WS-17-410, Department of Commerce Energy Environmental Review and Analysis ("EERA") Comments and Recommendations on Draft Site Permit at 18 (December 5, 2017) (eDocket No. 201712-137950-01) ("Some of the comments indicated that non-participants should not experience more than 30 hours of shadow flicker per year. 30 hours of flicker per year was a suggested standard in a couple sources of information reviewed by EERA, but those sources do not provide supporting scientific data that would suggest there is a link between shadow flicker in excess of 30 hours per year of exposure and negative human health impacts."); *In the Matter of the Application of Lindahl Wind Project, LLC's Application for a Certificate of Site Compatibility for the Lindahl Wind Farm Project in Williams County, North Dakota*, Docket PU-15-482, North Dakota Public Service Commission Findings of Fact, Conclusions of Law and Order, (Dec. 2, 2016) at Order ¶ 8.

B. Sound.

1. Audible Sound.

In both the Dakota Range and Crocker dockets, the Commission required that the Project sound meet a 45 dBA level at non-participating residences and a 50 dBA level at participating residences.[86] As set forth in Attachment B, Applicant's Proposed Sound Condition, Prevailing Wind Park proposes the same condition in this proceeding for Hutchinson County and Bon Homme County, which has a 45 dBA limit for non-participating residences.[87] For Charles Mix County, Prevailing Wind Park proposes a 43 dBA limit on non-participant residences and 45 dBA limit for participating residences unless a signed waiver is obtained from the owner of the residence consistent with the commitment made to the county.[88] In addition, Dr. Ellenbogen and Dr. Roberts, the only medical doctors to offer testimony, testified that a level of 45 dBA will not cause adverse health impacts or affect sleep.[89] Thus, the 45 dBA limit at non-participants' residences is consistent with prior dockets, consistent with Bon Homme County's requirements, and fully supported on the record.

Mr. Howell, who was retained by Prevailing Wind Park to independently model the predicted sound levels for the Project,[90] testified that this limit is one of the most restrictive

[86] *In the Matter of the Application by Dakota Range I, LLC and Dakota Range II, LLC for a Permit of a Wind Energy Facility in Grant County and Codington County, South Dakota, for the Dakota Range Wind Project*, Docket EL18-003, Final Decision and Order Granting Permit to Construct Wind Energy Facility; Notice of Entry (July 23, 2018) at Attachment A, ¶ 27; *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*, Docket EL17-055, Final Decision and Order Granting Permit to Construct Facilities and Notice of Entry (June 12, 2018) at Attachment A, ¶ 29.

[87] *See* Ex. A1 at 9-4 (Application); Applicant's Proposed Sound and Charles Mix Conditions.

[88] Prevailing Wind Park also proposes a condition in Attachment B that Applicant must comply with other commitments made to Charles Mix County.

[89] For additional discussion of evidence related to health concerns, see Section III(C)(2) below.

[90] Evid. Hrg. Tr. at 509 (Howell).

sound limits he has seen and that, based on his modeling, the Project will meet these limits.[91] By way of comparison, both Mr. Howell and Mr. Hessler testified that the sound level in the hearing room when no one was talking was approximately 40 dBA.[92]

Mr. Howell's modeling was conservative, meaning that the sound levels predicted in his study will not ever happen on a continuous basis.[93] Mr. Howell has also measured sound levels at operating projects; thus, the modeling methodology he used has been tested and confirmed in the field.[94] In addition, the modeled sound from the Project is significantly below 45 dBA at Intervenors' residences. Indeed, Mr. Hessler testified that the levels identified for Intervenors below are "extremely quiet:"[95]

Name & Address	Receptor ID	Modeled Sound (LAeq)
Gregg & Marsha Hubner	REC-047	28.5
Paul & Lisa Schoenfelder	REC-139	35.5
Sherman & Lori Fuerniss	REC-068 REC-069	35.8 36.0
Karen Jenkins	REC-121	28.4
Kelli Pazour	REC-024	34.2

[91] Evid. Hrg. Tr. at 493, 509, 511 (Howell); *see also* Ex. A10 at 2 (Howell Rebuttal).

[92] Evid. Hrg. Tr. at 493 (Howell); Evid. Hrg. Tr. at 716 (Hessler).

[93] Evid. Hrg. Tr. at 520-21 (Howell); Ex. A9 at 7 (Howell Direct) ("Our modeling utilized conservative assumptions and was conducted in accordance with the international standard (ISO 9613-2), which is used for projecting outdoor sound levels from specific sources. . . . This is a conservative method because, in the model, each receiver is downwind of every source, a scenario that cannot physically occur. Additionally, the modeling did not include attenuation for sound propagation through wooded areas, existing barriers, and shielding, and assumed that all turbines were operating at maximum power output . . . at all times to represent worst-case noise impacts from the wind farm as a whole. These assumptions were made to maintain the inherent conservativeness of the model and to estimate the worst-case modeled sound levels.").

[94] Evid. Hrg. Tr. at 489, 511-12 (Howell); *see also* Ex. A9 at 8 (Howell Direct) ("Our own post-construction studies have demonstrated that our pre-construction conservative prediction methods typically exceed actual operational sound levels of proposed projects."); *see also* Ex. A9 at 9 (Howell Direct) ("In-house and third-party monitoring has routinely demonstrated that our prediction methods are conservative, and monitoring results are typically between 1 and 3 dBA lower than our predictions.").

[95] Evid. Hrg. Tr. at 722 (Hessler) ("35's extremely quiet and no one would be bothered.").

In his prefiled testimony, Staff's witness Mr. Hessler agreed that the 45 dBA limit was appropriate, stating, "[i]n my experience 45 dBA is an appropriate and reasonably fair *regulatory* noise limit for wind projects at non-participating residences generally balancing the interests of [] both the community and developers."[96] Mr. Hessler further explained:

> In general, in the course of testing newly operational wind projects for noise compliance and talking with residents at the closest and most impacted houses, I find that noise is not an issue for the vast majority of residents living in or near the turbine array, but also that it is not possible to please everyone. At almost every project that I'm familiar with there is one person or a few people that are extremely upset with project noise, largely irrespective of the specific sound level at their house. Consequently, there really isn't a regulatory sound level that would satisfy everyone.[97]

At the evidentiary hearing, however, Mr. Hessler advocated for another goal, claiming that he would "like to see the project shoot for this 40" dBA.[98] Yet, Mr. Hessler continued to acknowledge that 45 dBA is "a reasonable limit under normal circumstances. When there's not a lot of opposition."[99] When asked about why he had determined there was "a lot of opposition" for this Project, Mr. Hessler referred to the time it took him to read intervenors' submissions.[100] Thus, based on Mr. Hessler's logic, a regulatory body should impose increasingly restrictive sound limits based on the volume of materials submitted by opponents to a project, in the hopes of anticipatorily reducing *potential* complaints. Mr. Hessler's speculation about potential complaints is not workable for the Commission, and it is not supported by this record, for a number of reasons.

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[96] Ex. S3 at 4 (Hessler Direct) (emphasis added).

[97] Ex. S3 at 4 (Hessler Direct).

[98] Evid. Hrg. Tr. at 721-22 (Hessler).

[99] Evid. Hrg. Tr. at 727 (Hessler).

[100] Evid. Hrg. Tr. at 729 (Hessler).

First, no party to the docket is challenging the Project because of anticipated sound levels above 40 dBA. The levels at Intervenors' residences have been modeled generally at or below 35 dBA, a level which Mr. Hessler described as "extremely quiet" at which "no one would be bothered."[101]

Second, Mr. Hessler states that the Project should "shoot for" 40 dBA because it took him a long time to read intervenors' submissions. However, the Commission should consider that substantial portions of Intervenors' experts' testimonies are not actually part of this record; significant portions of the testimonies of Dr. Punch and Mr. James were excluded, and Intervenors withdrew the testimony of Dr. Alves-Pereira. Following Mr. Hessler's logic, parties who "dump" documents and information into the Commission's proceedings, regardless of their relevance and reliability would be rewarded; the Commission should not incentivize this practice, as it is counter to the purpose of an evidentiary proceeding.

Third, Mr. Hessler and Intervenors' witnesses referred to the eight-turbine Shirley Wind Project several times in their testimonies as evidence regarding the potential for complaints from a wind project. However, none of those witnesses acknowledged that, after extensive study and rule-making, the Wisconsin Public Service Commission was unpersuaded to implement the lower sound level for which Mr. Hessler advocated.[102] The Wisconsin Public Service Commission adopted the following requirement: "[A]n owner shall operate the wind energy system so that the noise attributable to the wind energy system does not exceed 50 dBA during daytime hours and 45 dBA during nighttime hours."[103]

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[101] Evid. Hrg. Tr. at 722 (Hessler).

[102] *See* Evid. Hrg. Tr. at 729 (Hessler) and Wisc. Admin. Code § PSC 128.14(3)(a).

[103] Wisc. Admin. Code § PSC 128.14(3)(a).

Finally, adopting Mr. Hessler's recommendation would create substantial uncertainty for the Commission, developers, and residents going forward. In essence, Mr. Hessler recommended that the Commission adopt a regulatory requirement based solely on his perceived risk of future complaints. This is not a reasonable basis for establishing a sound requirement. It is also contradicted by Mr. Hessler's own testimony that there is no limit that could be set to avoid sound complaints.[104]

2. Infrasound.

Apart from audible sound, Intervenors expressed concern about infrasound. The record demonstrates that: (1) infrasound from wind turbines is not perceivable by humans; and (2) there is no scientific evidence that infrasound causes adverse health effects.

Infrasound, which is also referred to as low frequency sound, is sound between 0 Hz and 20 Hz.[105] A level of 20 Hz is commonly considered the low end of the range of human hearing.[106] Infrasound is generated by both natural and man-made sources, including HVAC systems and the human heart and lungs.[107] At *very high* levels, the levels created by jet engines and bomb blasts, infrasound can cause adverse health effects.[108] By contrast, however, wind turbines result in very low levels of infrasound, more akin to infrasound levels produced by human organs. More specifically, for example, heart sounds are in the range of 27 to 35 dBA at

[104] Evid. Hrg. Tr. at 726-27, 780 (Hessler); *see also* Ex. S3 at 4 (Hessler Direct).

[105] Ex. A4 at 17 (Roberts Supplemental Direct).

[106] Ex. A4 at 17 (Roberts Supplemental Direct). In addition, Exhibit A40 is a graphic showing the relationship between sound pressure levels (dB) and frequency (Hz) as it relates to human hearing. As indicated on the graphic, sound pressure levels must be above 100 dB for humans to hear at very low frequencies.

[107] Ex. A4 at 17 (Roberts Supplemental Direct).

[108] Evid. Hrg. Tr. at 150 (Roberts) (describing effects of sound levels of 110-120 dB from jet engines); Evid. Hrg. Tr. at 375-76 (Ellenbogen) (describing blast injuries experienced by veterans from sound pressure levels exceeding 110 dB).

20-40 Hz, which is in the range of sound produced by wind turbines.[109] Infrasound is not unique to wind turbines, nor is the infrasound from wind turbines unique or distinct from infrasound produced by other sources at similar levels.[110] More simply, infrasound from the human heart is no different than infrasound from wind turbines from a human health perspective.[111] Overall, as Dr. Roberts testified, "infrasound – both man-made and naturally-occurring – [is] all around us."[112]

The evidence in this record demonstrates that there is no scientific evidence that infrasound at the levels produced by wind turbines causes adverse health effects.[113] There have been numerous studies analyzing wind turbine effects; none of these studies have found a causal relationship between wind turbine infrasound and human health effects.[114] Dr. Roberts explained

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[109] Ex. A4 at 17 (Roberts Supplemental Direct).

[110] *See* Evid. Hrg. Tr. at 177 (Roberts); Ex. A4 at 17 (Roberts Supplemental Direct); Ex. A5 at 6-7 (Roberts Rebuttal).

[111] Evid. Hrg. Tr. at 177 (Roberts).

[112] Ex. A4 at 17 (Roberts Supplemental Direct); *see also* Evid. Hrg. Tr. at 169 (Roberts) ("If we begin to have regulations about infrasound, we're going to have to consider the other sources. Our lungs, our heart, our diaphragm, my GI tract all make low frequency sounds. My joints make low frequency sounds as well."); Evid. Hrg. Tr. at 171 (Roberts) ("Infrasound is caused by a large number of different natural and technical sources. It is every day part of our environment that can be found everywhere. Wind turbines make no considerable contribution to it. The infrasound levels generated by them lie clearly below the limits of human perception. There is no scientifically proven evidence of adverse effects in this level range.").

[113] *See* Ex. A18 at 4-5 (Ellenbogen Rebuttal) ("None of the limited epidemiological evidence reviewed suggested an association between noise from wind turbines and a wide range of topics we considered: pain, stiffness, diabetes, high blood pressure, tinnitus, hearing impairment, cardiovascular disease, and/or headache/migraine. In addition, claims that infrasound from wind turbines directly impacts the vestibular system have not been demonstrated scientifically. . . . We did not find evidence in the human or animal literature to support that vibrations of the kind produced by a wind turbine could influence the vestibular system."); Ex. A4 at 16 (Roberts Supplemental Direct) ("the levels of sound and infrasound from wind turbines are significantly lower than those that have been shown to cause harm."); *see also* Evid. Hrg. Tr. at 118, 171-72 (Roberts); Evid. Hrg. Tr. at 327, 375-76 (Ellenbogen).

[114] *See* Evid. Hrg. Tr. at 118, 135, 139-40, 143, 160-62, 171-74 (Roberts); *see also* Ex. A5 at 7 (Roberts Rebuttal); Ex. A18 at 5 (Ellenbogen Rebuttal); Evid. Hrg. Tr. at 516-17 (Howell) ("In general the absolute values that we're talking about for this wind farm don't require any further analysis of low frequency noise, in my opinion. . . . In this scenario we looked at dBA and I did an off the cuff look at the

why there are not potential adverse health effects from the sound, including infrasound, of wind turbines:

> [T]he levels of sound and infrasound from wind turbines are significantly lower than those that have been shown to cause harm. Substantial research has been done on sound level exposure to humans. . . . [T]his same science has not identified a causal link between any specific health condition and exposure to the sound patterns generated by contemporary wind turbine models. In addition to my own conclusions, several other respected organizations and agencies have reached similar conclusions.[115]

Mr. Hessler also noted that there are more than 90,000 MW of installed wind power in the United States involving more than 50,000 wind turbines, with *self-reported* adverse health effect complaints at only a very small number of those turbines.[116]

Overall, Intervenors presented no evidence to rebut the testimony provided by Mr. Hessler, Mr. Howell, Dr. Roberts, and Dr. Ellenbogen (as well as the numerous reliable studies relied upon by those witnesses) that demonstrated that: (1) infrasound from wind turbines is below the level generally perceivable by humans;[117] and (2) there is no scientific evidence that

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dB(C) values as well and none of the values exceeded that recommended differential to determine if there's a low frequency component. So I would not expect a significant low frequency component here.").

[115] Ex. A4 at 16 (Roberts Supplemental Direct); *see also* Ex. A5 at 8 (Roberts Rebuttal) ("[W]ind turbines are sources of infrasound and low sound frequencies, but no exceedance of the audibility thresholds in the areas of infrasound and low frequencies up to 50 Hz has been found.").

[116] Ex. S3 at 7 (Hessler) ("According to the latest quarterly report of the American Wind Energy Association there are now over 90,000 MW of installed wind power in this country involving more than 50,000 wind turbines. To my knowledge, instances of apparent adverse health effects from wind turbines have occurred at only a small handful of sites with only a few turbines each, such as Falmouth in Massachusetts (three 1.5 MW GE units) and Shirley Wind in Wisconsin (eight 2.5 MW Nordex units).").

[117] Intervenors repeatedly referenced a study conducted on guinea pigs to argue that wind turbine infrasound could be detected and/or somehow impact the inner ear. This study is neither relevant nor helpful, as Dr. Ellenbogen explained. First, it has nothing to do with adverse health effects. Evid. Hrg. Tr. at 386 (Ellenbogen) ("I actually don't have confidence that the study is relevant for this panel for two reasons. One, because of the animal comparison and also because it was not about health effects. It was about perception."). Second, there are significant differences between the inner ears of guinea pigs and humans. Evid. Hrg. Tr. at 386, 389-90 (Ellenbogen).

infrasound at the levels produced by wind turbines causes adverse health effects. Notably, although Dr. Punch asserted to the contrary in his prefiled testimony, he was unable to provide any support for those statements at the evidentiary hearing, even when directly asked by Commissioner Nelson.[118]

C. Other Health Concerns.

1. The Commission Appropriately Excluded the Testimony of Mr. James and Dr. Punch Regarding Health Effects.

Intervenors submitted pre-filed testimony from three individuals – Mr. James, Dr. Punch, and Dr. Alves-Pereira. Each of these individuals, in one form or another, attempted to opine on the health effects of wind turbines. At the hearing, however, it became clear that neither Mr. James nor Dr. Punch was qualified to opine on health effects, and the hearing examiner appropriately so limited their testimony. With respect to Mr. James:

- He is not a medical doctor.[119]
- He is not a licensed physician.[120]
- He is not a licensed psychologist.[121]
- He has not conducted a medical evaluation on any of the people that have provided complaints to him. [122]
- He did not provide credible literature supporting his assertions regarding alleged health effects.[123]

With respect to Dr. Punch:

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[118] Evid. Hrg. Tr. at 918 (Punch) ("I cannot cite at this point – I was basing that on information I had then, but I don't recall what I was basing it on at this point.").

[119] Evid. Hrg. Tr. at 823 (James).

[120] Evid. Hrg. Tr. at 821-22 (James).

[121] Evid. Hrg. Tr. at 822 (James).

[122] Evid. Hrg. Tr. at 823 (James).

[123] *See* Evid. Hrg. Tr. at 825-27 (James).

- He is not a medical doctor.[124]
- He does not have any expertise to diagnose non-hearing-related maladies such as heart disease.[125]
- He has not conducted medical evaluations of any of the people that have provided complaints to him.[126]
- He does not have the training or expertise to diagnose individuals.[127]
- He did not provide credible literature supporting his assertions regarding alleged health effects.[128]

Intervenors then chose, without explanation, to withdraw Dr. Alves-Pereira as a witness on the day she was expected to testify. As such, that testimony is not part of this record.

2. The Record Evidence Establishes that the Project Will Not Substantially Impair Health.

In contrast to Mr. James and Dr. Punch, Drs. Roberts and Ellenbogen *are* medical doctors and have substantial training and experience assessing health effects. Specifically, Dr. Roberts has a Ph.D. in Biostatistics and Epidemiology, as well as a medical degree; he has decades of experience in the areas of public health and occupational medicine, including approximately 18 years in the Oklahoma State Department of Health (which included serving as the State Epidemiologist for three years).[129] Similarly, Dr. Ellenbogen has a medical degree from Tufts University and a master's in medical science from Harvard Medical School; he specializes in

[124] Evid. Hrg. Tr. at 897 (Punch).

[125] Evid. Hrg. Tr. at 899 (Punch).

[126] Evid. Hrg. Tr. at 901-02 (Punch).

[127] Evid. Hrg. Tr. at 898-99, 903 (Punch).

[128] Evid. Hrg. Tr. at 901, 904 (Punch). For example, the paper authored by Mr. James and Dr. Punch and which both referred to in their testimony was not peer-reviewed, as that phrase is typically used. *See* Ex. A5 at 17-18 (Roberts Rebuttal).

[129] Ex. A4 at 2-3 (Roberts Supplemental Direct); Ex. A4-1 (Roberts Statement of Qualifications); Evid. Hrg. Tr. at 87-88 (Roberts).

neurology and sleep health.[130] Both Dr. Roberts and Dr. Ellenbogen testified that there is no scientific evidence that wind turbines cause adverse health effects.[131]

More specifically, as Drs. Roberts and Ellenbogen testified, wind turbines do not cause vertigo, induce epileptic seizures, cause or worsen Attention-Deficit/Hyperactivity Disorder, or, at the sound levels anticipated for this Project, cause sleep disturbance.[132] These conclusions are the same ones that have been reached by well-respected, governmental agencies charged with protecting public health that have evaluated the available evidence and concluded that wind turbines are not a cause of adverse health effects.[133] For example, the Australian National Health and Medical Research Council concluded that there is no consistent evidence that wind turbines cause adverse health effects in humans.[134] Similarly, the Wisconsin Siting Council concluded that no association between wind turbines and health effects has been scientifically shown.[135] Researchers at the Lawrence Berkeley National Laboratory also found no link between wind turbines and adverse health effects.[136] In addition, an independent expert panel for Massachusetts (which included Dr. Ellenbogen) found that there was insufficient evidence that

[130] Ex. A18 at 1 (Ellenbogen Rebuttal); Ex. A18-1 (Ellenbogen Statement of Qualification); Evid. Hrg. Tr. at 318-19 (Ellenbogen).

[131] *See, e.g.*, Evid. Hrg. Tr. at 89, 92, 129 (Roberts); Ex. A4 at 4 (Roberts Supplemental Direct); Ex. A5 at 7-8 (Roberts Rebuttal); Evid. Hrg. Tr. at 360-61, 366-67, 382 (Ellenbogen); Ex. A18 at 4-5, 12 (Ellenbogen Rebuttal).

[132] Ex. A4 at 18 (Roberts Supplemental Direct); Evid. Hrg. Tr. at 154, 159-60 (Roberts); Ex. A18 at 5, 12 (Ellenbogen Rebuttal); Evid. Hrg. Tr. at 327, 364-65, 377-78 (Ellenbogen).

[133] *See* Ex. A4 at 4, 12-14 (Roberts Supplemental Direct); Ex. A5 at 7 (Roberts Rebuttal).

[134] Ex. A4 at 12-13 (Roberts Supplemental Direct).

[135] Ex. A4 at 13 (Roberts Supplemental Direct).

[136] Ex. A4 at 13 (Roberts Supplemental Direct).

noise from wind farms directly causes health problems or disease.[137] The South Dakota Department of Health has also relied upon the Massachusetts's study's conclusion.[138]

With respect to sleep disturbance specifically, Dr. Ellenbogen referred to a recent study from Health Canada, which found no evidence of sleep disruption from wind turbines at up to 46 dBA:[139]

> 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 [wind turbine noise] levels ***up to 46 dB(A) had no statistically significant effect on any measure of sleep quality***.[140]

Notably, the modeled sound at all residences within the Project Area is less than 45 dBA – in most cases, far less than 45 dBA – in accordance with the requirements of Bon Homme County and Prevailing Wind Park's commitment to Charles Mix County.

Overall, the record shows that Prevailing Wind Park has met its burden to demonstrate that the Project will not substantially impair human health; indeed, there is no scientific evidence in the record that the Project would impair human health (substantially or insubstantially). Although Intervenors provided some testimony concerning speculative health concerns, the large body of reliable and authoritative and unchallenged medical evidence refutes these claims.[141]

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[137] Ex. A4 at 13-14 (Roberts Supplemental Direct); Ex. A18 at 4-5 (Ellenbogen Rebuttal).

[138] *See 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*, Docket EL17-055, Exhibit S1 at DK-4, Letter, Kim Malsam-Rysdon, Secretary of Health, South Dakota Department of Health (Oct. 13, 2017) ("These studies generally conclude that there is insufficient evidence to establish a significant risk to human health.").

[139] *See* Evid. Hrg. Tr. at 364-65 (Ellenbogen) (emphasis added).

[140] Ex. A39 at 107 (Michaud et al., Effects of Wind Turbine Noise on Self-Reported and Objective Measures of Sleep (2016)) (emphasis added).

[141] For example, Intervenors solicited testimony from individuals regarding other wind projects (Scott Rueter, Vickie May). These witnesses clearly have strong feelings about wind projects; however,

D. Turbine Blade Icing.

Icing on wind turbines blades is sometimes raised as a safety issue with respect to wind projects.[142] Based on the five years of weather data collected for the Project Area, Prevailing Wind Park anticipates that the Project may experience up to 15 icing days per year.[143] Although icing can occur on turbine blades during freezing rain conditions, it is not common and is generally controlled by ice detection systems on the turbines.[144] Project turbines will include the standard turbine control system on each turbine, as well as an additional purchased accessory software package, including Turbine Computer Monitoring ("TCM").[145] The turbine controller senses when the rotor revolutions per minute are not consistent with the measured wind speed (which may occur as the buildup of ice breaks the perfected aerodynamic shape of the blade).[146] The turbine controller then evaluates the temperature and recognizes that icing conditions may exist. The TCM system measures vibration on many components of the turbine and, when it senses vibration above pre-set levels, the turbine automatically shuts down.[147] This shutdown will occur in less than two minutes from the time icing is detected.[148] The turbine will not attempt to restart until conditions (temperature) become favorable or human intervention occurs.[149]

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well-regarded medical research and literature – relied upon by many other regulatory bodies – refutes any claims they may be making regarding health issues and wind turbines.

[142] Ex. A17 at 2 (Creech Rebuttal).

[143] Evid. Hrg. Tr. at 525 (Creech).

[144] Ex. A17 at 2 (Creech Rebuttal).

[145] Ex. A17 at 2 (Creech Rebuttal).

[146] Ex. A17 at 2-3 (Creech Rebuttal); Evid. Hrg. Tr. at 541-42 (Creech).

[147] Ex. A17 at 2-3 (Creech Rebuttal); Evid. Hrg. Tr. at 538-39, 541-42 (Creech).

[148] Evid. Hrg. Tr. at 558 (Creech).

[149] Ex. A17 at 3 (Creech Rebuttal); *see also* Evid. Hrg. Tr. at 556-57, 558 (Creech).

The evidence presented in the record demonstrates that Project setbacks and the proposed permit condition regarding turbine icing will protect human health and safety. Specifically, Mr. Creech testified that the farthest distance he is aware of ice being thrown from a turbine is approximately 250 feet.[150] The Project is set back at least 649.61 feet (1.1 times the tip height of the tower) from non-participating property lines and roads, in conformance with General Electric's Setback Considerations for Wind Turbine Siting.[151] In Hutchinson and Bon Homme Counties, the Project is set back at least 1,000 feet from non-participating residences. Per Prevailing Wind Park's commitments to Charles Mix County, Project turbines are set back at least 3.5 times the system height or 2,000 feet, whichever is greater, from non-participating residences in Charles Mix County.[152] Indeed, even the closest participating residence to a turbine is more than 1,550 feet away.[153] In addition, Prevailing Wind Park has agreed to the same turbine icing condition as the Commission imposed in the Dakota Range proceeding, which requires Prevailing Wind Park to use two methods to detect icing conditions on turbine blades.[154]

Intervenors relied on an outdated article to assert that ice throw may occur as far as 6,500 feet away from a 20 MW wind turbine.[155] Such a machine is not proposed for the Project, nor does it exist. As such, the document is irrelevant. Rather, the real-world data and experience, coupled with the manufacturer recommendations and turbine control software, show that the Project as designed is appropriately sited and will minimize the potential for ice throw.

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[150] Ex. A17 at 3 (Creech Rebuttal).

[151] Ex. A17 at 5 (Creech Rebuttal) and Ex. A31 (Applicant's Updated Responses to Intervenors' Data Requests).

[152] Ex. I-22 (Letter from Charles Mix County with Affidavit of Peter Pawlowski).

[153] Ex. A42 (Distance from Each Residence to the Nearest Wind Turbine, Modeled Shadow Flicker and Sound Pressure Levels).

[154] Ex. A17 at 4 (Creech Rebuttal).

[155] *See* Ex. A28 at 1 and Attachment B (Intervenors' Responses to Staff's Second Set of Data Requests); Evid. Hrg. Tr. at 533-34 (Creech).

IV. THE PROJECT WILL NOT UNDULY INTERFERE WITH ORDERLY DEVELOPMENT IN THE REGION.

The record demonstrates that the Project will not unduly interfere with orderly development in the vicinity of the Project. As an initial matter, as discussed above, the evidence shows that the Project will have substantial positive economic benefits in the area. Further, the Project complies with all applicable local land use requirements, and the evidence demonstrates that Prevailing Wind Park has worked cooperatively with local governments, even where no local land use controls existed. Specifically: Bon Homme County granted a Large Wind Energy System approval for the Project on August 21, 2018; Hutchinson County granted conditional use approvals for the Project on September 4, 2018; and, the Project received building permits from Charles Mix County in July 2018 and has worked with Charles Mix County to address concerns regarding the Project.[156] Prevailing Wind Park executed an affidavit memorializing its commitments to Charles Mix County; this affidavit binds Prevailing Wind Park but imposes no obligations on Charles Mix County.[157]

Intervenors take issue with the development of zoning regulations relevant to the Project and even went so far as to subpoena local officials to testify at the evidentiary hearing. Prevailing Wind Park continues to believe that zoning ordinance development issues are not relevant to this proceeding. That said, the testimony from local officials demonstrated that those local officials listened to all stakeholders and consulted many different resources before thoughtfully making their decisions.[158] Even Mr. Hubner testified that he was dissatisfied with the outcome of such proceedings – not the process itself: "Well, I never contended their

[156] Ex. A7 at 1 (Pawlowski Rebuttal).

[157] Ex. I-22 (Letter from Charles Mix County with Affidavit of Peter Pawlowski); Evid. Hrg. Tr. at 253 (Pawlowski).

[158] Evid. Hrg. Tr. at 685-93 (Soukup); Evid. Hrg. Tr. at 696-703 (Mushitz).

procedure. I mean, I – whether they made a mistake or didn't make a mistake as they were doing this. How they did it was really not an issue for me. It's what they did and who they listened to."[159] Overall, the evidence shows that the local proceedings were robust and that local officials took pains to ensure that everyone had a voice in their processes. There is no reason to second-guess the local officials or their zoning decisions.

V. OTHER ISSUES.

A. Turbine Model.

Prevailing Wind Park provided evidence to support the need for turbine model flexibility. As discussed previously herein, Prevailing Wind Park requests the flexibility to use the GE 2.3 MW turbine model for up to nine turbines instead of the larger GE 3.8 MW model. [160]

Prevailing Wind Park has proposed, and Commission Staff supports,[161] the following permit condition on how it would address the change in turbine model and demonstrate compliance with all of the conditions of the permit for the Project:

> 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, turbine model, and plans;
>
> 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 30 hours per year and/or 30 minutes per day at any non-participating residence and an affidavit from the Applicant identifying the turbine numbers that will be operationally controlled in order to meet the shadow flicker requirements;

[159] Evid. Hrg. Tr. at 979 (Hubner).

[160] Evid. Hrg. Tr. at 209 (Pawlowski).

[161] This condition was separately submitted as Ex. A33 and has been incorporated into Applicant's and Staff's Revised Joint Recommended Conditions as Condition 29.

> d. such additional Project preconstruction information as Commission staff requests; and
>
> e. should Applicant decide at a later point to use a different turbine model, it shall provide the information required in parts a-d above.[162]

B. Micrositing Flexibility.

Prevailing Wind Park provided evidence to support the need for micrositing flexibility for associated facilities.[163] Staff and Prevailing Wind Park have agreed to the following condition:

> Applicant may adjust access roads, the collector system, meteorological towers, the operations and maintenance facility, the Project substation, and temporary facilities, so long as they are located on land leased for the Project, cultural resources and documented habitats for listed species are avoided, and wetland impacts are avoided or are in compliance with applicable USACE regulations.[164]

Prevailing Wind Park notes that met towers were initially inadvertently omitted from this proposed condition. However, met tower flexibility was requested in the Application,[165] and Staff subsequently agreed to include met towers in this proposed condition. The accompanying Staff and Applicant Proposed Conditions (Revised) reflects this change.

CONCLUSION

The record demonstrates that Prevailing Wind Park has met its burden of proof to establish that: (1) the Project will comply with applicable laws and rules; (2) the Project does not pose a threat of serious injury to the environment or social and economic condition; (3) the

[162] Applicant's and Staff's Revised Joint Recommended Condition 29.

[163] *See* Ex. A1 at 8-3 (Application).

[164] Applicant's and Staff's Revised Joint Recommended Condition 24.

[165] Ex. A1 at 8-3 (Application) ("As a result of final micrositing, shifts in the access roads and collector system, as well as changes in the locations of the O&M facility, Project substation, meteorological towers, concrete batch plant, and laydown/staging areas, may be necessary. Therefore, the Applicant requests that the permit allows those facilities to be modified, as needed, as long as the new locations are on land leased for the Project, cultural resources and habitats for listed species are avoided, wetland impacts are avoided to the extent practicable, and other applicable regulations and requirements are met.").

Project will not substantially impair health, safety, or welfare; and (4) the Project will not unduly interfere with orderly development. The record further demonstrates that, in addition to meeting those criteria, the Project will benefit local landowners and the community. Accordingly, Prevailing Wind Park respectfully requests that the Commission grant an Energy Facility Permit for the Project on the terms and conditions set forth in the accompanying Attachment A, Applicant's and Staff's Revised Joint Recommended Conditions, and Attachment B, Applicant's Proposed Sound and Charles Mix County Conditions.

Dated this 13th day of November, 2018.

By /s/ *Lisa M. Agrimonti*

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