

**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 OF A WIND ENERGY
FACILITY IN BON HOMME COUNTY,
CHARLES MIX COUNTY AND
HUTCHINSON COUNTY, SOUTH
DAKOTA, FOR THE PREVAILING
WIND PARK PROJECT**

**INTERVENORS' POST-HEARING
BRIEF**

EL 18-026

Intervenors, Gregg Hubner, Marsha Hubner, Paul Schoenfelder, and Lisa Schoenfelder, through counsel, hereby submit this post-hearing brief requesting the Commission deny Prevailing Wind Park, LLC's ("PWP") Application for a Permit of a Wind Energy Facility in Bon Homme County, Charles Mix County, and Hutchinson County, South Dakota, or alternatively, approve the Application with the below-referenced conditions.

INTRODUCTION

PWP is seeking a permit from the Commission to build a wind farm in Bon Homme County, Charles Mix County, and Hutchinson County. As the applicant, PWP shoulders the burden of proof to establish its proposed project satisfies the provisions of SDCL 49-41B-22. Intervenors shoulder no burden. Therefore, if there remains a question as to whether the proposed project complies with SDCL 49-41B-22, the permit application must be denied. As shown below, PWP has not satisfied its burden. Therefore, Intervenors respectfully request the Commission deny PWP's permit application.

Alternatively, Intervenors encourage the Commission to impose the following conditions in the event the permit application is approved:

- 35 dBA nighttime noise limit when averaged over a ten minute period for non-participating residences;
- 2 mile setback from non-participating residences;
- 1,500 foot setback from property lines and rights-of-way;
- No shadow flicker be permitted on non-participating residences; and
- These conditions/restrictions may be waived by any non-participating landowner.

ARGUMENT

PWP had the burden of proof to establish that the proposed project (1) will comply with all applicable laws and rules; (2) 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 area; (3) will not substantially impair the health, safety or welfare of the inhabitants; and (4) will not unduly interfere with the orderly development of the region with due consideration having been given to the views of governing bodies of affected local units of government. SDCL 49-41B-22. PWP failed to satisfy its burden that the proposed project will not substantially impair the health, safety or welfare of the inhabitants.

I. PWP Failed to Prove that the Sound Generated by the Proposed Project Will Not Substantially Impair the Health and Welfare of the Inhabitants

PWP shouldered the burden of proving the sound (or more aptly put, noise) generated by the proposed project will not substantially impair the health and welfare of the inhabitants. PWP fell short in meeting its burden.

Wind turbines create different types of sound. The most obvious and readily perceivable type of sound is audible sound. Audible sound generated from turbines—like any audible sound—has the ability to both annoy inhabitants as well as disrupt their sleep if not adequately regulated. (Ex. I-32 p. xii (“Measureable effects of noise on sleep begin at LAeq levels of about

30 dB. However, the more intense the background noise, the more disturbing is its effect on sleep.”); Transcript 739: 3-6; Ex. I-1 at Lines 58-85; Ex. I-2 at Lines 398-399.) In addition to audible sound, wind turbines produce infrasound and low-frequency noise (“ILFN”). ILFN has the ability to affect people as well. (Ex. I-32 p. xii (“It should be noted that low-frequency noise . . . can disturb rest and sleep even at low sound pressure levels.”); Transcript 715:22 – 716:8.) Because both audible sound and ILFN generated from wind turbines can negatively affect people,¹ it is necessary to ensure such sound does not substantially impair the health and welfare of the inhabitants. SDCL 49-41B-22.

Audible Sound – dBA Metric

Audible sound generated from wind turbines can both annoy and disrupt the sleep of inhabitants if allowed to reach certain levels. (Transcript 739: 3-6; Ex. I-1 at Lines 58-85; Ex. I-2 at Lines 398-399; Transcript 1048: 7-12; 1076:24 – 1077:15 .) The question, then, is at what level does the audible sound generated by wind turbines become so problematic that it impairs the health or welfare of inhabitants. SDCL 49-41B-22. Because audible sound is most often measured using the A-weighted scale expressed as dBA, limits placed on audible sound are normally expressed using the dBA metric. (Ex. A10-2 p. 10.)

Acousticians like George and David Hessler and Richard James who have been studying wind turbine noise for years recognize that “[a]dverse impact in the form of annoyance and complaints can occur if facility noise emissions significantly exceed the prevailing environmental background sound level[.]” (Ex. I-37 p. 95.) When a wind farm is introduced to

¹ “[D]isturbed sleep (either from internal factors or from external factors) leads to or is at least associated with fatigue, lower cognitive performance, depression, viral illness, accidents, diabetes, obesity and cardiovascular diseases.” (Ex. I-31 p. 42.)

a relatively quiet rural area, higher community annoyance is expected.² This concept is reflected in industry standards, namely ANSI-ASA S12.9 Part 4 “Noise Assessment and Prediction of Long-term Community Response” Appendix F, which cautions:

F.3.4.1 In newly created situations, especially when the community is not familiar with the sound source in question, higher community annoyance can be expected. This difference may be equivalent to up to 5 dB.

F.3.4.2 Research has shown that there is a greater expectation for and value placed on “peace and quiet” in quiet rural settings. In quiet rural areas, this greater expectation for “peace and quiet” may be equivalent to up to 10 dB.

F.3.4.3 The above two factors are additive. A new, unfamiliar sound source sited in a quiet rural area can engender much greater annoyance levels than are normally estimated by relations like equation F.1. This increase in annoyance may be equivalent to adding up to 15 dB to the measured or predicted levels.

(Ex. I-1 Lines 69-82.)

Applying this industry-standard concept to the project here raises serious red flags about the project’s effect on the community. The project area is certainly a quiet rural setting. Indeed, the sound study performed by PWP noted that the average background noise (or “ambient sound level” measured as L90) for the project area is 28.8979 dBA. (Ex. A10-2 p.15.) Examining only the nighttime measurements taken at midnight, the average ambient sound level is 27.2875 dBA. (*Id.*) PWP’s predicted³ noise levels of the turbines anticipates 52 residences will experience

² This is especially true given the characteristics of wind turbine noise—e.g., fluctuating, pulsating, tonal infra and low frequency sound—which make wind turbines more likely to cause “adverse effects than other common rural noise sources.” (Ex. I-1 lines 63-65.)

³ Of course, these predicted levels “represent only the noise emitted by the wind turbines and do not include any extraneous noises” that already exist in the project area. PWP recognizes that when the extraneous sounds are added to the wind-turbine noise, the “overall sound level” may be higher than 45 dBA. (Ex. A10-2 p. 19.)

noise levels of 35 dBA or more.⁴ (Ex. A42.) Applying ANSI's guidance reveals that those 52 residences may have the same annoyance level as though the sound levels were 50 dBA or more. High levels of annoyance can be expected at these levels, especially when the inhabitants are used to nighttime sound levels of 27 dBA. (Ex. I-1 Lines 126-136.) This is one of the reasons Richard James proposes a maximum sound level of 35 dBA (Leq) for nighttime wind turbine noise for new projects in addition to a 1.25 mile setback from property lines. (Ex. I-1 Lines 101-105, 158-168.)

A study conducted by Health Canada supports James's proposal. Health Canada looked at a sample of just under 2,000 people living within 3-5 km of six wind projects in Ontario. (Ex. I-1 Lines 126-136.) Less than 2 percent of individuals reported high annoyance at levels at 35 dBA Leq or less. That percentage jumps to over 10 percent for levels between 35 and 40 dBA Leq. Imagine the percentage of complaints that would exist if participating landowners were allowed to lodge complaints instead of being subject to strict confidentiality provisions. (Ex. I-17.) Interestingly, the limits for new wind projects in Canada are set at 40 dBA Leq, which is also a limit used in the United Kingdom, Australia, and New Zealand. (*Id.* at Lines 137-142.) Other countries, like Germany for example, have limits of 35 dBA Leq for quiet rural communities. (*Id.*; *see also* Ex. I-37 p.97.) Given wind development is newer to the United States than other countries like Canada, Germany, the UK, and New Zealand, (Ex. I-37 pp. 96-67), it makes sense to compare the noise standards those countries impose on new wind projects, as they have a longer history evaluating complaints of those persons living close to wind projects. And those countries have implemented noise limits between 35 and 40 dBA to help

⁴ According to Richard James, PWP's predicted levels underestimate what the actual levels will be by at least 5 dBA. (Ex. I-1 Lines 343-377.)

protect the health and welfare of its citizenry. Even with those stricter noise regulations, wind development continues.⁵ (I-1 Lines 139-140.)

Infrasound and Low Frequency Noise

Not only does the audible sound produced by wind turbines have the ability to disturb inhabitants, ILFN produced by wind turbines has the ability to do so also. (Ex. I-1 Lines 208-219 (noting ILFN from wind turbines is problematic because it “results in people hearing a rumble (very low frequency noise) or roar (low frequency sound above 100Hz) that penetrates their homes, especially at night when the house is quiet” and that some people can also “feel” the ILFN even if they cannot hear it); Ex. I-32 p. xii (“It should be noted that low-frequency noise . . . can disturb rest and sleep even at low sound pressure levels.”); Transcript 715:22 – 716:8 (noting “people with certain sensitivities are affected by extremely low frequency pulsations from wind turbines”); *id.* at 730:1 – 732:5 (relying on the Cooper study where people who complained of ILFN were able to identify when they were being exposed to ILFN with 100 percent accuracy as “convincing” that certain people experience dizziness, vertigo, and nausea from the ILFN produced by wind turbines).) ILFN pulses in the 40 dB range generate complaints and when ILFN pulses get to the 60 dB range, people begin considering moving from

⁵ Witnesses suggested that anything less than a 45 dBA noise limit would prevent wind development. This is a commonly-used tactic. Regardless of the specific regulation, developers claim that any stricter regulation will prevent development. The Commission saw it first hand in the Crocker proceedings. There, the developer represented to Clark County that any setbacks greater than 2,000 feet would prevent the project from being built. Clark County nevertheless required $\frac{3}{4}$ mile setbacks. Low and behold, the developer found a way to develop the project with the $\frac{3}{4}$ mile setbacks. Here, PWP made no efforts to develop this project with stricter noise limitations, because it was focused solely on compliance with Bon Homme County’s 45 dBA regulation. (Transcript 486:3-24, 509:10-19.) So any claim that this project cannot be built with a 35 or 40 dBA limitation has no basis in the evidence.

their homes. (Transcript 855: 2-25.) In other words, ILFN works alongside audible sound to add to the annoyance factor created by wind turbines.

ILFN, however, is typically unregulated when it comes to wind farms. That is because noise regulations use the dBA scale, and the “A-weighting scale . . . de-emphasizes sounds in the low and high frequencies.” (Ex. A10-2 at p.10.) Thus, regulating for ILFN is most easily accomplished using a distance setback, which is discussed further below.

Annoyance from Noise—Whether Audible or ILFN—Is a Serious Issue

During the hearing, PWP’s witnesses downplayed the seriousness of those studies showing wind turbine noise causes high levels of “annoyance,” seemingly equating annoyance and NIMBYism. Annoyance generated by a consistent noise, however, is a very real and serious issue. That is because “it may be assumed that much of the annoyance associated with noise from neighbors relates to the influence of such noise on sleep.” (Ex. I-31 at 60.) Everyone knows sleep is critical to a person’s health and welfare. Further, studies have recognized that reports of annoyance from turbine sound are associated with sleep disturbance, negative emotions, or other health-related effects. (A4-5 p. 17.) Because complaints of noise annoyance are so closely associated with sleep disruption and other health-related effects, Health Canada defines high annoyance to noise as an adverse health effect in accordance with the World Health Organization (“WHO”).⁶ (Ex. I-1 Lines 131-133.)

The Commission heard testimony as to what happens when inhabitants experience “annoyance” from wind turbine noise. They cannot sleep. They experience headaches and

⁶ Recognizing noise annoyance relates to sleep disruption, the WHO publishes noise recommendations to protect sleep. The WHO Guidelines for Community Noise “recommend that, for continuous noise, an indoor sound level of 30 dBA should not be exceeded during the sleep period time to avoid sleep disturbance.” (Ex. A39 p. 97.) As for outdoor sound levels, the WHO’s Night Noise Guidelines for Europe suggest an annual average of 40 dBA “to reduce negative health outcomes from sleep disturbance.” (*Id.*)

fatigue. Loss of concentration. Their quality of life substantially decreases. They no longer enjoy being at home. And in some cases, they abandon their homes. Put simply, their lives are turned upside down.

Vicki May is a prime example. (Transcript 1070: 25 – 1084:10.) Initially, her and her husband were not opposed to the wind project that was built one and three-eighths miles from their home. In fact, her husband was on the planning commission and voted in favor of the project. That project predicted the sound levels at their home would be between 33 and 35 dBA on average, which was a significant increase above the ambient levels of 20 to 25 dBA they were used to. (*Id.* at 1081:17, 1084: 3.) Once the project became operational, she experienced substantial impairments to her welfare, namely her ability to sleep. She testified as follows:

Q: And has the noise from the wind turbines affected your ability to sleep in your home?

A: Yes.

Q: Tell us about that.

A: If you can get to sleep, it's very limited sleep. Our bedroom is on the south end of our house, along with our great room so those are the rooms we spend our most time.

It's not uncommon in the summer especially when we have the most south and southeast wind that I will go eight, nine nights in a row without sleep.

I've had to find different places in my house now that I can sleep. But, there again, it's not a full night's sleep. It's not a restful sleep.

(*Id.* at 1076:24 – 1077:12.) As a result of her sleep disruption, she has fallen asleep twice while driving and been forced to reduce her in-home quilting business. She no longer enjoys her property like she once could due to the noise from the turbines and now looks forward to the day she can move away from her home of twenty years.

Scott Rueter is another example. (Transcript 1045:5 – 1053: 18.) Just like Vicki May, Scott was not opposed to the project that was built close to his home. In fact, he was a participating landowner in the project. After the project became operational, however, he was forced to abandon his family farmhouse where he had lived for approximately 45 years due to sleep disruption and annoyance from the noise. He explained his problems with sleep disruption as follows: “Well, after they put the turbine up I couldn’t sleep anymore, and I didn’t have any choice. I slept for probably an hour and half a night for almost a year, and my body was shutting down. I could feel it. I lost 35 pounds.” (*Id.* at 1048: 7-11.) Once he moved away from the turbines, he began sleeping better and his health returned. However, when he returns to his property to farm, he gets headaches when the turbines are operating. He actually has to plan his farming process around whether the turbines are operating.

Jerome Powers, Kevin Andersh, and Sherman Fuerness are three South Dakota residents who live in or around the proposed project area and who already experience noise-related annoyance, including sleep disruption, from the Beethoven Wind Farm. Jerome Powers testified:

Q: Since [the Beethoven] project became operational have you noticed any symptoms or experienced any symptoms that you weren’t experiencing before the project?

A: Yes.

Q: And what are those?

A: The main problem was disrupted sleep. The next problem I noticed was an increase in migraine headaches, a more sense of an agitated mood, infinite mood swings.

...

A: I feel my quality of life in the last two years has decreased immensely. Obviously, if you have disrupted sleep, you do not sleep well. Your cognitive

thinking just isn't the name (sic). You're mentally fatigued. And to concentrate on things that you really need to concentrate on becomes really difficult at times.

(Transcript 1010: 6-13, 1011: 17-22.) Kevin Andersh also has difficulties sleeping at night and describes his home as an echo chamber where he constantly hears noise from the wind turbines.

(Transcript 1034: 9 – 1035:7.) He no longer sleeps with his windows open. (*Id.* at 1041: 18-19.)

Lastly, Sherman Fuerniss testified to his difficulties sleeping and feeling fatigued, and that has caused him to be “regretfully” short with his children and crabby. (Transcript 575: 5-10, 587: 7-20.)

Put simply, brushing aside the multiple studies showing wind turbine noise causes high levels of annoyance as well as the complaints of those people like Vicki May, Scott Rueter, Jerome Powers, Kevin Andersh, and Sherman Fuerness ignores a very real and serious issue for inhabitants exposed to wind turbine noise. Yet, that is exactly what PWP wants the Commission to do here. In fact, PWP failed to even consider whether the community would respond to this project with high levels of annoyance. PWP failed to consider how the community would respond to this project whatsoever, because, it claimed, doing so “is not required.” (Ex. A10 Lines 64-81.) That simply is not accurate, as SDCL 49-41B-22 requires PWP to prove the project will not substantially impair the health or welfare of the inhabitants. If the community is expected to respond to the project with high levels of annoyance, the project would substantially impair the health and welfare of the inhabitants of the community. As noted above, Health Canada defines high annoyance to noise as an adverse health effect in accordance with WHO. (Ex. I-1 Lines 131-133.) More obviously, if inhabitants of a community consistently experience high levels of annoyance, their welfare is substantially impaired. PWP's sound study, which focused “entirely on whether the Project complies with the Bon Homme County noise limit of 45 dBA at occupied residences rather than assessing or addressing in any way the potential for an

adverse community reaction to project noise,” is therefore lacking and inadequate. (Ex. S3 Lines 17-22.) Stated differently, PWP failed to meet its burden of proving the noise generated by the project will not substantially impair the health and welfare of the inhabitants. As such, the permit application should be denied.

Adequate Noise Restrictions and Standards

Given the complaints consistently made by people like Vicki May, Scott Rueter, Sherman Fuerniss, Kevin Andersh, and Jerome Powers, the question becomes what limitations or restrictions are needed for this project to ensure the health and welfare of the inhabitants are not substantially impaired.

As a starting point, there is no state law or regulation addressing noise from wind turbines. Further, Hutchinson County and Charles Mix County have not adopted any zoning ordinances addressing noise from wind turbines.

Bon Homme County adopted zoning ordinances that provide: “Noise level produced by the LWES shall not exceed forty five (45) dBA, average A-weighted sound pressure at the perimeter of occupied residences existing at the time the permit application is filed[.]” (Ex. I-14 § 1741.) It is unclear over what period of time the average is taken. For instance, is the average to be taken over one minute? One hour? A 24-hour period? A week? A year? It is not clear. Moreover, no deference should be given to Bon Homme County’s noise restrictions.

Commissioner Soukup, who was serving on both the Bon Homme County Commission and Zoning Board when the wind-specific ordinances were adopted, readily admitted that the noise restrictions contained in the Bon Homme County Ordinances were over his head. (Transcript 686: 5 – 687:4 (“This is over my intelligence.”).) And that is not intended to demean Commissioner Soukup, it is merely a recognition of the complexity of the issue. Some issues,

like noise generated by wind turbines, are so complex local government officials may not fully understand them. When that occurs, like it did here, it makes little sense to totally defer to the local regulation. Moreover, the Commission is charged with ensuring the proposed project will not substantially impair the health and welfare of inhabitants. SDCL 49-41B-22. This means that when local regulations fail to protect the health and welfare of inhabitants, the Commission is not bound by them.

So what noise restriction should the Commission adopt here to ensure the health and welfare of the inhabitants are sufficiently protected? Two acousticians, who are trained in how to measure sound and relate those measurements to human and community responses, (Ex. I-1 Lines 400-401), provided testimony in this matter—David Hessler and Richard James. Hessler recognized that a 40 dBA noise limit “would serve to much better protect the community against complaints and annoyance.” (Transcript 721: 17-18.) He further recognized that a 35 dBA limit would protect everyone. (*Id.* at 722: 8-14.) Separately, James testified that the maximum sound level for audible sounds should be 35 dBA (Leq) and 50 dBC. (Ex. I-1 Lines 101-105.) James specifically noted that a 40 dBA limitation is not adequate protection, as proven in Ontario. “Ontario where there are many projects designed to meet a 40 dBA criteria now have abandoned homes all over the rural communities because people have just left them.” (Transcript 812: 15-17.) Other respected acousticians, including Dr. Paul Schomer, the Emeritus Director of the Acoustical Society of America’s Standards Committee, propose noise standards ranging from 36 to 38 dBA Leq. (*Id.* at Lines 115-125.)

PWP’s own evidence actually favors a sound restriction less than 45 dBA. PWP’s two medical experts, Drs. Ellenbogen and Roberts, each relied heavily on the Massachusetts Study (Dr. Ellenbogen actually participated in the study). (Ex. A4-7.) The Massachusetts Study was

intended to be a comprehensive study commissioned by the Massachusetts state government to identify concerns (e.g., noise) related to wind development and to identify best practices that could reduce potential human health impacts. (*Id.* at p. 7.) The end goal was to “inform public policy decisions by state, local, or regional governments concerning the siting of turbines.” (*Id.*) Naturally, then, it makes sense to look at what public policy decisions the Massachusetts government made in light of that study to protect the health and welfare of its citizens. David Hessler explained the noise regulations Massachusetts adopted in light of its study:

Q: My question to you, because nobody else has been able to answer it, is what is Massachusetts’s regulations as far as noise limits on wind farms?

A: The Massachusetts noise—state noise limit is to measure the background L90 statistical. That’s the near minimum background level. And then the project can be 10 above that.

So it starts at a very low level, and then they have a big adder. It’s unusual.

Q: So whatever the L90 level is, the project can go 10 above that?

A: That’s right.

(Transcript 746: 5-20.). Here, PWP’s sound study (ex. A10-2 p.15) shows the average L90 at midnight for the project area is 27.2875 and the average L90 when taking into account the 5pm and 10am measurements is 28.8979. Applying the Massachusetts’s computation would yield noise restrictions of between 37.3 and 38.9 dBA. These noise restrictions fall in line with the restrictions suggested by acousticians who have spent years studying wind noise.

Given the above, and in the event this project is permitted, Intervenors request a condition be placed on the project imposing a nighttime noise limitation of 35 dBA when averaged over a ten minute period for non-participating residences. During compliance testing, turbines must be operating at 90 percent of full power or more as shown by SCADA data showing energy production, hub rpm, hub level wind speed and direction, blade angle and

nacelle yaw. Compliance testing must be conducted via an on/off compliance test in accordance with ANSI S12.9 Part 3 Sections 6 and 7. (Transcript 856:8 – 859:15.) According to David Hessler, this form of compliance testing is the “simpler, more unequivocal way of doing it.” (Transcript 738: 3-4.)

Distance Setbacks to Account for Noise and ILFN

In addition to noise restrictions which are based on the dBA metric, restrictions must be put into place to account for ILFN. Again, the two acousticians who presented testimony in this proceeding recognize ILFN as a serious concern that has the ability to negatively affect inhabitants. (Transcript 715:22 – 716:8 (noting “people with certain sensitivities are affected by extremely low frequency pulsations from wind turbines”); *id.* at 730:1 – 732:5 (relying on the Cooper study where people who complained of ILFN were able to identify when they were being exposed to ILFN with 100 percent accuracy as “convincing” that certain people experience dizziness, vertigo, and nausea from the ILFN produced by wind turbines); *id.* at 855: 2-25 (recognizing some people abandon their homes when being exposed to certain levels of ILFN). The only restriction to account for ILFN addressed at the hearing was in terms of distance setbacks.

Bon Homme County’s zoning ordinance imposes a 1,000 foot setback from non-participating residences.⁷ (Ex. I-14 § 1723.) During the hearing, it was clear Bon Homme County adopted the “state standard” for setbacks from non-participating residences, which was merely the PUC Model Ordinance that was previously on the PUC’s website. (Transcript 672: 14 – 673:13.) This is important because in a prior wind-siting docket that involved 1,000 foot setbacks from non-participating residences, Commissioners represented they believed the

⁷ When Bon Homme County adopted its wind-specific ordinances in 2015, there were no turbines in South Dakota standing 590 feet tall like those being proposed here.

county's setbacks were outdated, but that they would defer to the county regarding appropriate setback distances. (*See* EL 18-003.) Here, Bon Homme County actually deferred to the Commission's "Model Ordinance" in establishing its setbacks. Given that, it makes little sense to defer to the Bon Homme County's setback for non-participating residences. Accordingly, the Commission should be empowered to update these self-described "outdated" setbacks.

So what setbacks reduce adverse exposure to ILFN? When questioned about distance setbacks, David Hessler candidly admitted that he considered advocating for a 2 mile setback in this case. (Transcript 743: 1-16.) Richard James, on the other hand, proposed a 1.25 mile setback from property lines, because people complain about ILFN as far out as 2 miles from a turbine. (Ex. I-1 Lines 101-105, 158-168; Transcript 859: 18 – 860: 8.) Therefore, in the event this project is permitted, Intervenors request a condition be placed on the project imposing a 2 mile setback from non-participating residences.

II. PWP Failed to Prove the Proposed Project Will Not Substantially Impair the Safety of Inhabitants Given the Proposed Setbacks from Property Lines and Rights-of-Way Are Only One Point One (1.1) Times the System Height

Setbacks from property lines and rights-of-way are intended to protect the safety of those persons and property around wind turbines. "From a safety point of view, the most serious failure is associated with splintering of rotor blades and detachment of debris, which could be thrown over long distances and damage people or property." (Ex. A28 p.16 (Analysis of throw distances of detached objects from horizontal-axis wind turbines, p. 151).) "Ice-throw from wind turbines installed in cold climate is also of high concern, especially for wind turbines erected near highways where the ice pieces thrown from a wind turbine may strike a passing car, which in the worst case may cause a fatal accident." (*Id.*) Moreover, the number of *reported* wind-

turbine accidents has steadily grown since 2000. (*Id.* at Figure 1.)⁸ To prevent these accidents from causing personal or property damage, governments typically impose setbacks. (*Id.*) Some countries have imposed a “safety distance” which “is a distance within which it is not allowed to build human structures such as buildings and roads.” (*Id.*) France and Germany, for example, have safety distances of wind turbines from human structures of 5,280 feet. (*Id.* at Table 1.) Manitoba, Canada, on the other hand is 6,500 feet. (*Id.*) Here, setbacks from non-participating residences are only 1,000 feet and setbacks from property lines and rights-of-way are only 1.1 times the system height, or 649.61 feet.

So the question is whether those setback distances risk causing a substantial impairment to the safety of inhabitants. The answer is yes, absolutely. During turbine malfunctions, at normal operating conditions pieces of blade weighing between 7-16 ton can be thrown 700 meters (2,297 feet), and when operating at extreme speeds (as might occur during a malfunction) pieces of blade can be thrown 2 kilometers (6,562 feet).⁹ (*Id.*) Indeed, one witness testified he has found pieces of blade debris approximately a quarter mile from the turbine following a malfunction. (Transcript 1067: 1-13.) For ice throws, pieces of ice weighing between 0.4 to 6.5 kg can be thrown 600 meters (1,969 feet). (Ex. A28 p.16 (Analysis of throw distances of detached objects from horizontal-axis wind turbines, p. 151).)

In light of the above, and given the common use of the land adjoining where turbines are proposed, which includes farmers in fields, hunters walking fields and ditches, cars driving on roads, etc., Intervenors request a 1,500 feet setback from property lines and rights-of-way.

⁸ Presumably, many incidents go unreported for business and political reasons.

⁹ Given a turbine malfunction could cause a 16 ton blade to be thrown 6,562 feet from the turbine, Intervenors believe 6,562 feet should be the absolute minimum setback distance between non-participating residences and turbines. Of course, when taking into account noise concerns, Intervenors continue to request a 2-mile setback from non-participating residences.

III. Shadow Flicker Should Not be Permitted on Any Non-Participating Residence

Bon Homme County's zoning ordinances seemingly limit ("when determined appropriate by the County") shadow flicker to no more than 30 minutes per day or 30 hours per year. (Ex. I-14 § 1741.) Intervenors contend no shadow flicker should be permitted on non-participating residences. Certainly non-participants are not permitted to operate a strobe light into the bedrooms of participants at nighttime provided they do so less than 30 minutes per night and 30 hours per year. Shadow flicker is simply the inverse situation. Such conduct should not be authorized by the Commission, as it creates a nuisance.

CONCLUSION

In sum, Intervenor request the Commission deny PWP's siting permit. There simply is too large of a risk that the inhabitants' health, safety, and welfare will be impaired by the proposed project. And for what? So the 29 landowners¹⁰ who are getting turbines can reap the financial benefit? (Ex. I-38.) Denying this project would not be a condemnation of wind development in South Dakota. South Dakota has an abundance of land much more suitable (i.e., less densely populated) for wind development from a health, safety, and welfare perspective. PWP, and other developers, should be encouraged to develop in those locations.

Alternatively, Intervenor request that the following conditions be placed on the proposed project:

- 35 dBA nighttime noise limit when averaged over a ten minute period for non-participating residences;
- 2 mile setback from non-participating residences;
- 1,500 foot setback from property lines and rights-of-way;
- No shadow flicker be permitted on non-participating residences; and
- These conditions/restrictions may be waived by any non-participating landowner.

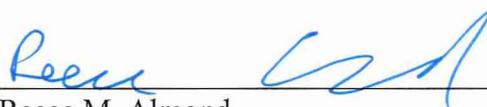
Imposing these conditions on the project will greatly minimize any risk that the project will substantially impair the health, safety, or welfare of inhabitants living in and around the project area. And there is no evidence in the record that shows these conditions would prevent the project from being built.

¹⁰ There are 136 full-rights lease agreements, but only 29 landowners are receiving turbines. (Transcript 236: 10-22; Ex. I-38.) That begs the question of whether those participating landowners who anticipated receiving a turbine but are not receiving one are still supportive of this project. Of course, the lease agreements prevent those persons from raising any such issues to the Commission. (Ex. I-17 at §§ 9.4 and 13.2.)

Other siting dockets suggest Intervenor's proposed conditions are workable. In Crocker, for example, the applicant designed a project of 120 turbines on 29,331 acres *with 3/4 mile setbacks*. PWP's proposed project has 50,364 acres and only needs to site 61 turbines.¹¹ In other words, PWP needs to site half the turbines and has 21,000 more acres to do so. Certainly greater setbacks and stricter noise conditions are workable if PWP were to try. But PWP has not even tried to design this project to provide greater protections for inhabitants, because it was concerned only with meeting Bon Homme County's ordinances. Accordingly, the Commission should force, through conditions, PWP to design the best project that has the smallest chance of impairing the health, safety, and welfare of inhabitants. Intervenor's proposed conditions do just that.

Dated this 13th day of November, 2018.

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¹¹ When Gregg Hubner was asked to sign up for this project, it was represented to him that twelve turbines could be sited on 1,985 acres. (Transcript 954:8 – 955:3.) Using those numbers, PWP needs only 10,090 acres to site 61 turbines; unless the number of turbines Hubner could receive was over-exaggerated to entice him to sign up his land for the project.

CERTIFICATE OF SERVICE

The undersigned, one of the attorneys for Intervenor Gregg C. Hubner, Marsha Hubner, Paul M. Schoenfelder and Lisa A. Schoenfelder, certifies that a true and correct copy of the above was served on November 13, 2018, via email upon the following persons listed on the South Dakota Public Utilities Commission's docket service list:

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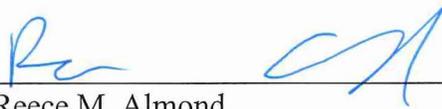
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