

BEFORE
THE OHIO POWER SITING BOARD

In the Matter of the Application of)
Firelands Wind, LLC for a Certificate)
of Environmental Compatibility and)
Public Need to Construct a Wind-Powered)
Electric Generation Facility in Huron and)
Erie Counties, Ohio)

Case No. 18-1607-EL-BGN

**POST-HEARING REPLY BRIEF OF THE LOCAL RESIDENTS
AND THE BLACK SWAMP BIRD OBSERVATORY**

This Post-Hearing Reply Brief is filed on behalf of the Black Swamp Bird Observatory (“BSBO”) and Local Residents Patricia Didion, Jane Fox, Marvin Hay, Theresa Hay, Patricia Olsen, Sheila Poffenbaugh, Walt Poffenbaugh, Christina Popa, John Popa, Lori Riedy, Charles Rogers, Kenn Rospert, Dennis Schreiner, Sharon Schreiner, Donna Seaman, William Seaman, Deborah Weisenauer, Kenneth Weisenauer, and Gerard Wensink (collectively, “Residents”). The entire brief is filed on behalf of the Residents, and the brief’s arguments on birds and bats are also filed on behalf of BSBO.

I. The Turbines In Their Proposed Locations Are Too Close To Neighboring Homes And Inflict Loud, Obnoxious Noise On Them.

A. Firelands’ Poor Site Selection Has Incentivized Firelands To Follow Deceptive Practices To Disguise The Harmful Noise Impacts Of Its Turbines.

There is nothing pleasant or soothing about the clanging or whooshing sound of a loud wind turbine. Firelands cites (at 37) Kenneth Mundt’s testimony for the proposition that turbine sounds are similar to those generated, inter alia, by lawn equipment, video games, and radio/TV forecasts. But few people would be able to tolerate an onslaught of lawnmower or video game noise while trying to relax or sleep in their homes.

B. The Proposed 49.1 dBA Operational Noise Limit Exceeds Firelands’ Measured Project Area Ambient Nighttime Average Sound Level By Five A-Weighted Decibels, Which Violates The Operational Noise Standard In OAC 4906-4-09(F)(2).

Firelands repeats the mistake made in proposed Condition 33 by stating (at 37) that OAC 4906-4-09(F)(2) allows turbine noise to be as high as five dBA above the background sound level, when the rule actually prohibits noise increases of five dBA or more. The Board must apply the standard as written in the rule, not as Firelands would like to apply it.

C. Sound Measurements Outside Of The Project Area Must Not Be Used To Calculate The Ambient Nighttime Average Sound Level Of The Project Area.

The other parties’ initial briefs did not address this issue.

D. OPSB Should Exclude Ambient Sound Measurements Collected In Noisy Areas That Skew The Project-Wide Average Sound Level And That Would Allow Firelands’ Turbines To Create Harmful Noise Increases In The Community.

Firelands states (at 36-37) that its background sound study measured ambient sound to find out what environmental sound levels are “consistently present and available to mask or obscure” turbine noise, “such as sound from insects, trees, leaves, and the wind itself.” Indeed, those are the ambient sounds that Firelands was supposed to measure for that purpose. But what Firelands did was very different. Instead of measuring background sounds “consistently present and available to mask or obscure” turbine noise, Firelands’ consultant exploited his knowledge from 17 years of acoustics experience to identify the noisiest monitoring locations he could find rather than selecting stations with sound levels characteristic of most of the Project Area. Rather than primarily measuring sounds from “insects, trees, leaves, and the wind,” he was primarily interested in finding noisy highways, trains, and heavy farming equipment operating at night. He even sited two monitoring stations outside of the Project Area to maximize the noise levels. For

the reasons explained in the Residents' initial brief, Firelands' strategy complies with neither the letter nor the spirit of the Board's rules.

E. The World Health Organization Has Determined That Long-Time Exposure To Turbine Noise At Levels Of 40 dBA Or Higher Causes Harmful Health Effects.

Firelands argues (at 37) that its sound study was "very conservative," because its projections of turbine noise levels are based on 87 turbines when 52 to 71 will be built. This hypothesis does not withstand any amount of scrutiny. First of all, even if some turbines are eliminated, they might be removed from relatively few locations while keeping the original clusters of turbines intact for most of the Project Area. This would mean that the full blast of modeled noise would still affect most of the Project Area. Second, Firelands' trick to measure high background levels guarantees that the turbine noise from the remaining turbines will be too loud for the neighbors' comfort. There is nothing conservatively protective about that reality.

Firelands also contends (at 37-38) that the 49 dBA limit proposed for the Project "conform[s] to the guidelines of the World Health Organization ("WHO") and the national Association of Regulatory Utility Commissioners ("NARUC"), both of which are conservative and, therefore, protective." This is a quote from Dr. Mundt's direct testimony, which states that he is just restating what RSG concluded in its "noise reports." Applic. Exh. 42, p. 9, lines 20-24. Dr. Mundt does not identify the noise reports from which this statement was supposedly taken, but Firelands' brief cites (at 38) Application Exhibit G for this statement without providing a page citation. But Application Exhibit G, which is RSG's noise report, makes no such statement. It does not even mention the WHO or NARUC. Nor is any such statement contained in the RSG updates provided to the Board. Nothing in the record explains who NURUC is, or why it would be expected to have any expertise on noise guidelines.

The direct testimony of Eddie Duncan, the RSG project manager for this Project, does mention the 2018 WHO Europe Environmental Noise Guidelines for the European Region. LR Exh. 9; Applic. Exh. 41, p. 11, line 21 – p. 12, line 21. Therein, Mr. Duncan went to great lengths to argue, unpersuasively, that the Board should not heed the WHO's recommendation that turbine noise should not exceed 45 dB L_{den} . *Id.* More importantly, neither Mr. Duncan nor Dr. Mundt addressed WHO's findings in its 2009 Night Noise Guidelines for Europe, in which WHO recommends a limit of 40 decibels of $L_{nightoutside}$. LR Exh. 8, p. XVI. The Residents' initial brief describes this recommendation and the bodily harm to humans exposed to noise over 35 decibels and over 40 decibels at night.

Firelands cites (at 38-39) Dr. Mundt's testimony for the proposition that turbine noise at 49.1 dBA does not damage human health. Dr. Mundt is an epidemiologist, *i.e.*, a professional who studies diseases. Applic. Exh. 41, p. 4, lines 5-7. He admitted that, with one or two exceptions out of about 100 cases, he has always testified on behalf of parties who claim they have not caused diseases. Mundt, Tr. V 683:16 – 684:11. In almost every case, an opposing epidemiologist has expressed an opinion contrary to his. Mundt, Tr. V 684:12 – 685:3. In every one of those 100 cases, one of the epidemiologists was testifying inaccurately about health effects. That is, epidemiologists such as Dr. Mundt are prone to rendering whatever expert opinions they know their clients want.

Dr. Mundt has never conducted his own epidemiological study of wind turbine noise. Mundt, Tr. V 685:14-17. All he did was read other scientists' reports on the health impacts and annoyance from turbines. Then he just agreed with the reports that supported his opinion in this case, and criticized the many reports that are contrary to his opinion. His secondhand opinion adds nothing to the understanding of the health impacts from wind turbines in this case.

Importantly, Dr. Mundt does not categorize annoyance as a disease or indicator of harm to health, but he acknowledged that turbine noise can cause annoyance. Applic. Exh. 41, p. 12, line 8 & p. 29, 9-11. In fact, he admitted that this Project's noise "at or below the [49.1 dBA] limit proposed for this facility" will be "potentially distracting or annoying to some." *Id.*, p. 29, lines 9-11. As explained in the Residents' initial brief, this annoyance can lead to sleep disturbances and other harmful impacts on a person's body and mind. The Staff agrees, noting in its Staff Report that "[a]nnoyance can lead to stress and stress can lead to adverse health effects." Staff Exh. 1, p. 51.

F. Conclusions

As explained in the Residents' initial brief, Firelands is asking OPSB to approve noise limits that (1) would exceed the background level by as much as 15.5 dBA in the quieter parts of the Project Area, even though WHO has found that an increase of five dBA causes annoyance, (2) exceed 35 dBA, which according to WHO is the threshold for annoyance, and (3) would exceed WHO's recommendation of 40 dBA, at which sleep disturbance, insomnia, and other bodily harm occur. The Board should not approve a Project with a noise limit of 49.1 dBA.

II. Firelands' Plans To Install Turbines On Karst Could Pollute Or Cut Off The Community's Water Supplies.

Although Firelands has attempted to portray its geological field study as an investigation of both geotechnical and hydrogeological condition, in reality it fails on both counts. At this point, Firelands has conducted only limited geotechnical desktop review and field work designed to prevent its turbines from collapsing and has done just a desktop hydrogeological survey that completely fails to determine whether turbine foundations will destroy or damage the community's water supply wells.

A. **Because Firelands' Limited Geotechnical Investigation Did Not Rule Out The Existence Of Karst At Any Of The Turbine Sites, Firelands Must Conduct Additional Geotechnical Work At All Sites.**

Firelands' Application and the proposed Stipulation are silent about the number of borings or the identity of other geotechnical tools that will be used to search for karst features at the turbine sites. The Application states that Firelands' geotechnical investigation will be guided by a "Generalized Geotechnical Exploration Work Plan" attached as Appendix E to Exhibit E. Application Narrative, p. 84. That appendix only provides that the geotechnical engineer "will determine the number of borings to be drilled at turbine locations." Application Exh. E, Appx. E, p.1 (pdf p. 250). After filing its Application, Firelands' consultant RRC conducted limited geotechnical field work consisting of one boring at some of the proposed turbine sites. Williams Testimony, Attachment AW-2. One of Firelands' own exhibits advises that "multiple borings per turbine" are appropriate in karst areas. Applic. Exh. 87, "Evaluating Karst Risk at Proposed Wind Projects," p. 31 (pdf p. 5).¹

Notwithstanding the inadequacy of RRC's investigation, RRC's report recommends (*id.*, p. 14) and Firelands' brief promises (at 48) to conduct additional geotechnical investigation only at the seven proposed turbines sites at which RRC's borings detected a "moderate to high probability" of karst presence. However, neither this promise, nor RRC's report, are contained in the Application or its supplements, so even those promises are unenforceable if the Application is approved. The proposed Stipulation does not fix this deficiency, but only vaguely

¹ During Dr. Sasowsky's cross-examination, Dr. Sasowsky stated he had not evaluated the effects of karst features on existing wind projects. Tr. VIII 1064, line 10 – 1065:5. However, this does not indicate that karst has not caused problems at other wind projects. Conversely, Firelands' witnesses did not testify that karst had no negative impacts at existing wind projects. In fact, one of Firelands' own exhibits proclaims that "[k]arst can cause a litany of problems for a windpower project." Applic. Exh. 87, "Evaluating Karst Risk at Proposed Wind Projects," p. 27 (pdf p. 1). "Karst can lead to dramatic tilting and even toppling of a wind turbine." *Id.*, p. 36 (pdf p. 10). This paper did not comment on the risk to groundwater from turbines on karst, it was intended only to address geotechnical issues. Sasowsky, Tr. VIII 1085:6-13.

requires Firelands' engineering drawings to "account for karst topography." Jt. Exh. 1, p. 3, Condition 7. In short, the Board's approval of the Stipulation as proposed would not require any additional geotechnical field work.

The lack of thought, or the premeditated strategy, that resulted in proposed Condition 7 of the Stipulation is alarming in light of the shortcomings of RRC's investigation to adequately characterize the karst at the turbine sites. These shortcomings are exemplified by Firelands' statement (at 28) that RRC found karst voids at "only a couple" borings. Firelands is urging OPSB to draw conclusions about the prevalence of karst at the turbine sites based on a limited geotechnical investigation that drilled only one boring on some proposed turbine sites and drilled no borings at seven of them. Williams Testimony, p. 4, lines 25-26; Williams Testimony, Attachment AW-2, Table A2, pdf p. 55-56; Williams, Tr. VI 750:3-20. As explained in the Residents' initial brief (at 28-29), one boring per turbine site does not sufficiently search for karst openings in the area of the entire foundation. This reality is demonstrated by the fact that Firelands' borings found karst openings at a "couple" of sites, even though the features noted in the borings revealed a "moderate to high probability" of karst at the seven sites for Turbines 24, 25, 26, 43, 73, 74, and 75. Williams Testimony, p. 7, lines 26-28. Thus, the lone boring at each site likely missed karst voids present at five of these seven sites.

For the same reason, Firelands' limited geotechnical investigation likely missed karst features at some or all of the other 80 turbine sites. Twenty turbine sites are located in the known karst area depicted by Figure 9 in Appendix A of the RRC report.² Williams Testimony, Attachment AW-2, pdf p. 69; Williams, Tr. VI 758:16-21. It is especially suspicious that the

² While the RRC report shows 20 turbine sites in the karst area, Figure 4 of Application Exhibit E shows only six. Applic. Exh. E, p. 3; Williams, Tr. VI 768:15 – 769:4. Firelands' experts could not identify a reason for the discrepancy. Williams, Tr. VI 769:5-12; Corzatt, Tr. VI 779:7-18. This is further evidence of the superficial nature of Firelands' geotechnical investigation.

borings found a moderate to high probability of karst at only six of these sites in the known karst area (the seventh such site was outside of the known karst area, see Williams, Tr. VI 759:12-22). This indicates that the single boring at each such site probably missed the karst features at as many as 14 sites in the known karst area. As Mr. Williams admitted, finding no karst in one boring does not mean that no karst is located a short distance away. Williams, Tr. VI 747:6-21, 752:16-23. RRC's report warns that "[i]t is likely soil conditions will vary between or beyond the points explored." Williams Testimony, Attachment AW-2, p. 34. This is such a commonly known fact that this warning is "standard language that is included" in geotechnical reports. Williams, Tr. VI 770:13-22. The diameters of RRC's borings were only six inches or less. Williams, Tr. VI 762:24 -763:4. A single boring of that width cannot come even close to characterizing the geology for a turbine foundation as wide as 60 to 70 feet.

B. Since A Geotechnical Field Investigation, Even If Competently Conducted, Will Not Prevent The Pollution Or Dewatering Of Neighboring Wells, The Board Should Deny The Application For Failing To Include Information Necessary To Determine Whether The Project Will Damage Neighboring Water Supply Wells. If A Certificate Is Issued, It Should Direct Firelands To Perform A Bona Fide Hydrogeological Field Investigation Under The Supervision Of An Experienced Hydrogeologist.

Firelands keeps stating (at 48-49) that it has performed and will perform geotechnical studies of the geology for its turbine sites, and it keeps pretending that the geotechnical studies are hydrogeological studies. There is a big difference. They answer different questions. Geotechnical surveys determine whether the land will support a heavy wind turbine. Hydrogeological studies determine whether the intrusion of a turbine foundation or grout on karst openings will pollute or dewater someone else's water supply well. But Firelands has not conducted any field work to identify the Project Area's hydrogeology. Sasowsky, Tr. VIII 1088:4-14. Firelands has not even figured out "where people's water is coming from."

Sasowsky, Tr. VIII 1088:11-14. Firelands has persistently resisted any requirement for conducting a hydrogeological study to protect neighboring wells.

Consistent with its subterfuge, Firelands argues (at 28) that its detections of karst openings at only a “couple” of turbine sites mean that turbine construction should have a minimal impact on the quality, availability, and/or movement of groundwater. This argument is wrong for two reasons. First, as explained in Section II. A above, Firelands’ geotechnical field work was so limited that it was not adequate even to evaluate geotechnical issues. Second, Firelands’ geotechnical field work is not a hydrogeological field investigation, and thus it is inadequate to find out what pathways of groundwater movement are traveling through the turbine sites.

Proposed Condition 7 of the Stipulation would require Firelands to identify the “professional engineer(s), structural engineers(s), or engineering firm(s)” who review and approve the project designs on the engineering drawings that “account for karst topography.” Jt. Exh. 1, p. 3, Condition 7. Notably, no review or signoff by a hydrogeologist is required. In fact, the proposed Stipulation requires no hydrogeological field investigation at all. Nor does the Application provide for any hydrogeological field work, since it limits its commitment for field work to just the geotechnical investigation designed to make sure the turbine foundations are steady. Application Narrative, pp. 84-85 & Exh. E, p. 9.

Firelands has purposely attempted to conflate hydrogeological field investigation with geotechnical field investigation in order to avoid a hydrogeological field investigation. Displaying this strategy, Firelands states (at 18) that “[i]nstallation of turbine foundations has the greatest potential to result in localized impacts to groundwater; however, based on the preliminary turbine design, shallow foundations are anticipated to be able to support the

turbines.” To the contrary, ensuring the foundations are stable, which is the goal of the geotechnical field work, does not prevent damage to groundwater. Moreover, these two objectives can be at odds, if the foundations or grout fills karst openings.

As Dr. Sasowsky explained, a hydrogeological field investigation is essential to prevent the loss of groundwater through contamination or the obstruction of groundwater pathways through the bedrock. See Sections II. F, H, and I of the Residents’ initial brief. Given the importance of the wells as the only source of water for many of the area’s residents, a hydrogeological field investigation is a logical and indispensable step towards making sure these water sources are not lost.

Firelands also repeats (at 18 & 26) the fiction in its Application that keeping a distance of 1,371 feet between turbines and neighboring wells will protect the wells. Firelands has no basis for this conclusion, since Firelands performed no time-of-travel calculations to figure out how fast the groundwater travels in the bedrock. Corzatt, Tr. VI 784:5-8. However, Firelands’ Application recounts that Ohio EPA has calculated the time-of-travel for groundwater through the bedrock with karst in the area. The Application acknowledges that “Ohio EPA delineated the entire region contributing water via the karst system as a SWPA” for the Capital Aluminum and Glass water supply, because the groundwater flows at a rapid rate of 3,500 to 8,600 feet per day, the bedrock is at a shallow depth, and sinkholes are present. Application Narrative, p. 77; Application Exh. E, p. 4. This time-of-travel exposes the fallacy of Firelands’ argument that a mere 1,371-foot setback would protect the neighborhood wells. Even at the low end of the 3,500 to 8,600-foot per day groundwater flow rate, a 1,371-foot setback would allow contaminants to reach a neighboring well, or to cut off its flow of groundwater, in less than a half day. While such a setback might prevent turbine foundation excavation from digging out or crushing a

neighbor's wellhead, it does not prevent contaminants from rushing through karst openings from the foundation excavation or stop the foundation or grouting from plugging the karst openings that carry groundwater to the neighbor's well. A competent groundwater field investigation is essential to make sure this does not happen.

Firelands was required to submit this hydrogeological information in its Application pursuant to OAC 4906-4-08(A)(4)(a), so that the Board could determine whether the turbine foundations will damage neighboring water supply wells. See Section II. I of the Residents' initial brief. Because Firelands has not complied with OAC 4906-4-08(A)(4)(a), its Application should be denied. If the certificate is issued, then a comprehensive groundwater field investigation should be required.

C. **The Certificate, If Issued, Should Prohibit Turbine Construction In The Known Karst Area And At Any Other Site In Which Karst Features Are Detected Following A Competent Geotechnical Field Investigation.**

A driller could put 100 borings in a one-acre site and still miss karst. Sasowsky, Tr. VIII 1087:18 – 1088:3. Sinkholes can be located hundreds of feet below, and not visible at, the surface and then later propagate up to the surface. *Id.*, Tr. 1097:2-7. In the karst area in the Project Area, the continued dissolution of bedrock deep underground can cause upwards collapses of the land surface. Sasowsky Testimony, p. 11, line 23 – p. 12, line 2 & p. 12, lines 2-3. The karst is “generally characterized by sinkholes, springs, in some areas depressions, and the cause of it is linked to the underlying carbonate bedrock.” Williams, Tr. VI 748:5-12. Many of the sinkholes, including some large ones, in the Bellevue area “are forming at depth of hundreds of feet and then propagating up to the surface. Sasowsky, Tr. VIII 109:2-8. Although karst openings can take thousands of years to form (Williams, Tr. VI 771:10-23), the earth is more than thousands of years old. As a result, the ages-long erosion process can manifest itself at the

surface at any moment, as displayed by the sinkhole that suddenly appeared in Florida and swallowed a man and his house. Sasowsky Testimony, p. 10, lines 12-15. The continuing erosion of bedrock far below the surface means that even a competent geotechnical search for karst features can miss them. Therefore, turbines should not be sited in the area known to harbor karst.

Thus, the certificate, if issued, should prohibit turbines in the known karst area depicted by the light green color on Figure 9 (pdf p. 69) in Appendix A of Attachment AW-2 of Alfred Williams' direct testimony. At any other turbine site, Firelands should be required to conduct a competent geotechnical field investigation to look for karst features and a competent hydrogeological field investigation under the supervision of an experienced hydrogeologist to evaluate groundwater presence and movement. The certificate should prohibit turbine construction at any site at which karst features are detected. The certificate also should prohibit the construction of any turbine whose foundation could interfere with the movement of groundwater to any neighbor's well.

D. The Application And Stipulation Do Nothing To Protect Groundwater From Contamination.

When changes are made to the land surface from activities like constructing turbines, contaminated water from fields, ditches, and constructed areas may be directed into sinkholes or other openings that provide a direct connection to the aquifer. Sasowsky Testimony, p. 15, lines 9-12. This water is generally of lesser quality than existing groundwater, and can be unhealthy for human consumption. *Id.*, lines 12-13. This problem is well-understood in karst areas, ever since the rapid movement of contaminants in the Bellevue Castalia Karst Plain area wiped out underground drinking water supplies just north of the Project Area. *Id.*, lines 1-4.

Firelands states (at 29 & 48) that, “[i]mportantly,” it commits to use best management practices (“BMPs”) during turbine construction and operation to protect source water protection areas (“SWPAs”), citing the Application and Mr. Corzatt’s testimony. Both the Application and Mr. Corzatt’s testimony identified Application Exhibit E as the source of the promise to follow BMPs. Application Narrative, p. 78; Applic. Exh. 39, Corzatt Testimony, p. 6, lines 6-7. But, while Application Exhibit E states that BMPs can be employed to protect the SWPAs, it does not identify or describe the BMPs. Applic. Exh. E, p. 5. Certainly, if BMPs were so “important” to protect SWPAs as stated in Firelands’ brief, the Application would have described or identified them in some way. Firelands’ and the Staff’s failure to provide any information about the BMPs in the Application or the Stipulation makes the promise of BMPs unenforceable and meaningless.

E. The Board Should Prohibit The Filling Of Karst Openings With Grout And Other Substances, Because The Karst Openings Are Essential For Maintaining Groundwater Recharge And Movement.

Firelands, in an important admission, acknowledges (at 49) that its “bedrock grouting will reduce the movement of water in soluble bedrock....” This admitted reduction of groundwater movement is exactly the harm about which the Residents are warning the Board. The Residents’ water supply wells are dependent on the recharge groundwater that Firelands plans to block with grouting. The aquifers are replenished by precipitation percolating into a recharge zone and making its way to the aquifers. Sasowsky, Tr. VIII 1098:4-10. The water in the bedrock flows laterally into residents’ wells. “[I]f pathways are closed off, then it could have the potential to affect groundwater.” Sasowsky, Tr. VIII 1097:11-16.

Firelands’ admission is well-founded, for three reasons. First, the turbine foundations range between 8 ½ to 12 feet deep. Williams, Tr. VI 747:10-12. Second, the bedrock in the

Project Area is as shallow as two inches below surface. Williams Testimony, Attachment AW-2, p. 6, § 4.2; Williams Tr. VI 767:19-24. And third, the groundwater levels as shown in the Project Area wells are as shallow as three feet deep, as discussed in more detail below. The combination of these three facts means that the turbine foundations, and the grout poured into karst openings underneath the turbine foundations, will be plugging the karst openings through which groundwater moves laterally into water supply wells whose water levels are at the same elevation as the foundations or the grout plugs.

Firelands' admission that its grouting will reduce groundwater movement repudiates Robin Corzatt's opinion that turbine foundations would not impair the community's wells, because groundwater tables in the "majority" of the landowners' wells are at depths "quite below" the foundations. Corzatt, Tr. VI 787:17 - 788:12. Mr. Corzatt based this opinion on Hull & Associates' well survey questionnaires described on Page 27 of Firelands' initial brief, but a review of those questionnaires reveals that Mr. Corzatt's opinion is very wrong. Firelands notes (at 27) that it sent a survey to 140 landowners in the Project Area to obtain information about their water supply wells. Firelands further recounts (at 27) that, out of the 94 responding landowners, 43 had wells and some of the wells were less than 20 feet deep. Actually, while turbine foundations typically are 8 ½ to 12 feet deep (Williams, Tr. VI 747:10-12), the landowners' questionnaire responses indicate that 12 of them have wells with water levels ranging from three to 12 feet deep (with 10 of them below 8 ½ feet deep). Applic. Exh. E, Appx. B, Well Survey Questionnaires, pdf pp. 160 (Laws), 161 (Martin), 168 (Martin), 169 (Koch), 179 (BRB Farms), 185 (Orwig), 200 (Locust Knoll), 210 (Deering), 212 (Erf), 214 (Francis), 217 (Herner), 223 (Yingling), and 235 (Wilson). Twenty respondents did not know the water level in their wells. *Id.*, pdf pp. 146-238. Only five of the 43 respondents with wells indicated that their

water levels were deeper than 12 feet. *Id.*, pp. 149, 171, 188, 213, and 238. This hardly supports Mr. Corzatt's statement that the water table in the "majority" of landowners' wells are below the turbine foundations or the grout poured into cavities below the foundations.

As demonstrated by these facts, the installation of turbine foundations and the grouting of karst openings below the foundations would prevent groundwater movement to the neighborhood's wells. While Mr. Corzatt stated that he was not aware of any wind projects that have damaged groundwater supplies (Corzatt, Tr. VI 22-25), that may simply mean that wind projects in other states have not been allowed to pour grout into shallow aquifers as Firelands intends to do here. The Board should not allow Firelands to dry up any neighbor's water supply by constructing its foundations in karst openings or by filling them with grout or other substances.

F. Conclusion

Groundwater supplies are a critical resource for the community in and around the Project Area. Sasowsky, Tr. VIII 1097:17-23. Many of the Project's neighbors depend on this water for their basic needs, such as drinking, cooking, and showering. *Id.* To protect this essential resource, the Residents request that the Board do the following with respect to the geotechnical and hydrogeological problems posed by Firelands' Application:

1. Deny the Application for failure to include evidence sufficient to determine whether turbine foundations will cause the pollution or dewatering of neighboring water supply wells;
2. Deny the Application for failure to identify the BMPs that will be used to protect SWPAs;
3. Deny the Application for failing to include the evidence necessary to prove that turbine foundations will not increase flooding;

4. If a certificate is issued, prohibit the construction of turbines in the known karst area depicted in Figure 9 (pdf p. 69) in Appendix A of the RRC report attached as Attachment AW-2 to Alfred Williams' direct testimony;

5. If a certificate is issued, require a comprehensive geotechnical field investigation to search for karst features at every site at which a turbine might be constructed;

6. If a certificate is issued, prohibit the construction of turbines at any site at which the geotechnical field investigation finds any karst features;

7. If a certificate is issued, require a competent hydrogeological investigation under the supervision of an experienced hydrogeologist to be conducted at every site at which a turbine might be constructed;

8. If a certificate is issued, prohibit the construction of turbines at any site at which the hydrogeological field investigation finds that the construction or the presence of a turbine foundation may pollute or reduce the groundwater flow to any water supply well; and

9. If a certificate is issued, prohibit the use of grout or other substances for the purpose of filling karst voids.

III. The Setback Between Turbines And Neighboring Properties And Roads Should Be At Least 1640 Feet To Prevent Injuries And Property Damage From Flying Blade Pieces.

The Staff states (at 11) that the turbines will be fitted with safety features and that Firelands will be required to report blade shear to the Staff in 30 minutes of occurrence. However, reporting that a flying blade has smashed a nearby residence or killed someone is hardly a good substitute for preventing such a disaster in the first place by providing for an adequate setback.

Firelands touts (at 52) its setbacks of 1,355 and 1,384 feet, depending on the size of the chosen turbine model, as an important reason why blades will not harm the public. But as explained in the Residents' initial post-hearing brief, the emergency response procedures for fires in the Nordex safety manual exposes any setback of less than 1640 feet as inadequate to contain flying debris from a damaged turbine blade.

Firelands also promises (at 53) to train firefighters and other emergency responders in procedures specific to turbines. However, there is no way to put out a turbine fire, because ladders cannot get high enough to reach the turbine hub. Applic. Narrative, p. 61. If a fire, lightning, or wind severs all or part of a blade before the wind company can clear an excavation zone of 1640 feet, a shorter setback to nonparticipating properties will expose the public to danger.

IV. The Project As Currently Designed Does Not Comply With The Board's Shadow Flicker Standard.

Neither Firelands nor the Staff deny that the Project as currently designed fails to comply with the 30-hour per year standard in OAC 4906-4-09(H)(1). Firelands admits (at 39) that, as now designed, the Project will expose more than 55 nonparticipating households to more than 30 hours of annoying shadow flicker per year in their homes and yards. The company tries (at 39) to disguise the seriousness of this problem by stating that only 7% of the households within 4,921 feet of a turbine will receive more than 30 hours of flicker per year. Making just one family miserable in their own home or yard is unacceptable, not to mention more than 50 households. Firelands has an obligation to avoid harm to all of its nonparticipating neighbors, and it has done nothing so far to fulfill that responsibility.

Firelands uses (at 39-40) one of its favorite ploys in this case in an attempt to undercut its own shadow flicker model, arguing that its analysis used worst-case assumptions so that the

actual harm might be less than forecasted. For example, the company argues (at 39) that the impacted buildings were assumed to have only windows. However, worst-case scenarios are employed for good reason, because the worst case very well may occur, and it is necessary to protect the public against that potential harm. And, because Firelands has not performed a flicker model on the final wind project's design, the model required in the future by Condition 34 could produce worse results, not better results. In fact, as noted in the Residents' opening brief (at 33), the flicker model actually underestimated flicker minutes by assuming that the receiving building or yard is only one square meter in size.

Firelands notes (at 40) that its epidemiologist Kenneth Mundt testified that neighbors' "high annoyance" with shadow flicker is correlated statistically with "general annoyance with wind turbines (such as visual perception), concern for physical safety, and self-reported noise sensitivity." This can hardly be considered a surprise: any neighbor close enough to experience a turbine's shadow flicker undoubtedly, and justifiably, will be annoyed by the turbine's looming appearance, feel threatened by its potential blade shear, and hear its annoying noises. The fact that a victim of a nearby turbine commonly experiences all four injuries does not make any of the injuries less real.

In defense of the Application's failure to demonstrate compliance with the shadow flicker standard, the Staff states only (at 11) that the Stipulation recommends a condition requiring Firelands to comply with the standard in the future. That condition, Condition 34, would require Firelands to submit a study to the Staff showing how the Project will achieve the standard. Similarly, Firelands promises (at 51-52) to comply with the standard in the future, perhaps by using mitigation measures.

To comply with OAC 4906-4-09(H)(1), the Application must contain a design that complies with the standard so that this design can be tested through the application and hearing process. The scheme set forth by Firelands and the Staff violates the Residents' rights to participate in the review process and it divests the Board of its non-delegable duty under R.C. 4906.10(A) to make the required findings and determinations in R.C. 4906.10(A)(2), (3), and (6) to resolve this issue. The introduction to R.C. 4906.10(A) prohibits the Board from issuing a certificate unless "it finds and determines" compliance with the criteria in that statutory subsection. Emphasis added. Contrary to this mandate, Condition 34 would delegate all shadow flicker compliance to unaccountable staff members without public scrutiny or judicial review. Without a demonstration of compliance in the Application, the record contains no information from which the Board can satisfy its obligation under R.C. 4906.10(A)(2), (3), and (6).

V. The Administrative Law Judges Correctly Denied Firelands' Motion To Strike Portions Of Dennis Schreiner's Direct Testimony About The Project's Lack Of Efficiency And Reliability In Producing Electricity.

Firelands moved prior to hearing to strike Answers 8 through 15 of Dennis Schreiner's testimony on two meritless premises: (1) Mr. Schreiner failed to make legal arguments to explain why his testimony is relevant to the criteria of R.C. 4906.10(A); and (2) Mr. Schreiner's discussion about the intermittent nature of wind energy facilities and other testimony did not expressly state that Firelands Project would be plagued with these issues.

First, Firelands contended that Mr. Schreiner did not explain how his testimony is relevant to any of the eight criteria listed in R.C. 4906.10. But then Firelands admits that Mr. Schreiner's testimony might be relevant to two of these criteria in R.C. 4906.10(A): "(4) In the case of an electric transmission line or generating facility, that the facility is consistent with regional plans for expansion of the electric power grid of the electric systems serving this state

and interconnected utility systems and that the facility will serve the interests of electric system economy and reliability;” and “(6) That the facility will serve the public interest, convenience, and necessity.” Obviously, Mr. Schreiner’s testimony is relevant to these two criteria. For example, if wind power sources such as Emerson Creek wind project impair the availability of electricity as explained in Answer 13, this does not “serve the interests of electric system economy and reliability” or the public interest and convenience as required by R.C. 4906.10(A)(4) and (6) respectively. Notwithstanding the relationship between these statutory criteria and Mr. Schreiner’s testimony, Mr. Schreiner was not obligated to describe the Residents’ legal theories in this regard in his testimony. That is the role of counsel, which Residents’ counsel implemented in his initial brief. Mr. Schreiner’s testimony cannot be struck just because he made no legal arguments.

Second, Firelands argued in its motion to strike that Mr. Schreiner’s testimony about the failures and problems with wind power facilities is not relevant, because Mr. Schreiner does not mention the Emerson Creek wind project by name. However, this testimony explains that these failures and problems pertain to all wind facilities. For example, Answer 10 points out that wind turbines produce electricity intermittently only when the wind blows, and Answers 12 and 13 explain how intermittent energy source such as wind power harm the reliability of the electric grid. In this example, it is hardly necessary to make the obvious point that the Emerson Creek wind project, like every other wind project, relies on the wind to produce electricity and that the wind does not always blow hard enough to produce power. The Application itself confirms these facts. *E.g.*, see Applic. Exh. 1, p. 11 (stating that no electricity is produced at wind speeds below three meters per second). Nate Pedder’s testimony on cross-examination admitted this fact, and also admitted that wind turbines cannot produce electricity at the highest wind speeds. Answer

13 further explains that electricity from wind power cannot be stored by such devices as batteries to be made available in the absence of sufficient of blowing wind, and Mr. Pedder admitted that the Emerson Creek wind project has no plans to store its electricity in batteries or anything else.³

If Firelands actually believed that the Emerson Creek wind project were any different than any other wind project with regard to the principles discussed by Mr. Schreiner, it was free to explore those differences on cross-examination. But it would have been improper to strike Mr. Schreiner's testimony just because he did not expressly mention the obvious – that Firelands' project is no different with respect to these issues than any other wind project – when there is no indication that any difference could possibly exist and when Firelands' own application and project manager (Mr. Pedder) confirmed that no such differences exist.

Based on these arguments, the Administrative Law Judges ("ALJs") recognized the relevance of Mr. Schreiner's testimony in their decision to deny Firelands' motion to strike. Tr. VII 832:23 – 835:14. Now, Firelands raises new arguments in support of its motion to strike, which were not actually included in the motion to strike.

Firelands contends that Mr. Schreiner was unqualified to testify about the PJM grid, since PJM did not exist when he was a control room operator. Firelands' statement is misleading. Mr. Schreiner worked extensively with the regional grid while he was a control room operator. It just was not yet named "PJM" or operated yet by PJM. Schreiner, Tr. VII 848:1-13. And Firelands' assertion that Mr. Schreiner could not identify any PJM manuals applicable to his control room duties is silly, since PJM did not exist at the time. That does not mean, however,

³ Firelands also asserts that Mr. Schreiner was not identified as an expert witness and that he is not qualified to act as one. Actually, Mr. Schreiner is the only witness in this case who is qualified to testify about the subjects of his testimony. Unlike Mr. Pedder, who "sponsored" the portions of the application dealing with the wind project's potential effects on the grid, Mr. Schreiner operated an energy production facility and dealt with the effects of ebbs and flows of power from other energy flows while interacting with the grid's operators. Nor does Mr. Schreiner's absence from Intervenors' early expert witness list serve as a basis for excluding his testimony, as his testimony was timely filed by the deadline in the Board's scheduling order.

that Mr. Schreiner was unfamiliar with the procedures for control room operators provided by PJM's predecessor.

Firelands argues that Mr. Schreiner never worked for PJM. That is true, but irrelevant. If not working for PJM disqualified Mr. Schreiner's testimony, then it also disqualified Deepesh Rana's testimony for Firelands. Firelands also contends that Mr. Schreiner never worked on the "PJM interconnection process for any generation resource." This also true, but also irrelevant. Firelands then goes through a litany of topics related to the procedures for connecting to the grid, none of which are relevant to the points made in Mr. Schreiner's testimony. The Residents are not challenging Firelands' ability to establish a connection to the grid. Nor are the Residents arguing that Firelands is not following cybersecurity protocols. Instead, the Residents are objecting to the problems that Firelands will cause once it has been connected due to the intermittent production of electricity. And on this topic, Mr. Schreiner is eminently qualified to testify, because he had to deal with the problems caused by intermittent energy sources on the grid on a continual basis in his employment. On this topic, Mr. Rana was woefully unprepared to testify due to his lack of experience in operating energy sources.

Firelands cannot argue that the ALJs improperly denied Firelands' motion to strike based on the foregoing arguments that were not even included in the motion to strike. Moreover, Firelands' new arguments are irrelevant to the points of Mr. Schreiner's testimony and the legal application of that testimony by Residents' counsel. The Board should affirm the ALJs' denial of this motion.

VI. The Project Is Likely To Impair The Television Reception For Hundreds Of Neighbors.

The Staff admits (at 12) that the Project will impact communications, but states that the impacts will be mitigated. Firelands also admits (at 34) that the turbines will interfere with television reception.

Firelands represents (at 34) that it will pay the monthly subscription fees for cable television where cable is necessary to overcome the turbines' impacts on reception. That commitment should be expressly added to Condition 38, so that there is no question later about whether the certificate requires the subscription fees to be paid.

VII. The Project May Impair The Operation Of Real-Time Kinematic GPS Locator Systems.

Firelands acknowledges (at 35) that its turbines might interfere with the signals from base stations for the Real-Time Kinematic ("RTK") Global Positioning System locator systems used for farming. Firelands represents (at 35) that it will fund the purchase and installation of a new system if that happens. That commitment should be expressly added to Condition 38, so that there is no question later about whether the certificate requires this mitigation measure.

VIII. The Wind Turbines Will Be A Visual Blight On The Community.

Three pages (31-33) of Firelands' initial brief are devoted to describing the wind turbines' disfigurement of the visual landscape for 10 miles around the Project Area. These impacts include (1) seeing turbines during daylight from 57.5% of a 10-mile radius of the Project in about 544 square miles of land; (2) seeing turbines from most of the transportation corridors in the area; (3) viewing turbines from an undisclosed number of the 377 visually sensitive receptors in the area; and (4) seeing red blinking lights at night from the rural areas. Firelands makes attempts to slap happy faces on some of the worst aesthetic assaults from the Project, but

they are unconvincing. For example, Firelands proclaims (at 31) that more than 34 of the 87 proposed turbines will be visible from “only” 17.2% of the study area. Firelands does not explain how seeing more than 34 turbines from almost a fifth of a 544-square mile area is a good thing. In the same vein, Firelands praises (at 31) the fact that in other areas where turbines are visible, fewer than 34 of them will be seen. But Firelands cannot disguise the awful visual impact these turbines will impose throughout the countryside. To place the visibility of these machines into perspective, a turbine is as tall as a 60-story building with three blades each the length of 5 ½ school buses and, at a setback of 1320 feet, is only the equivalent of four city blocks away from a neighboring property. Transcript of public hearing, Aug. 20, 2020, pp. 151, 153-154 (testimony of Tamra Andrews). Consequently, this Project does not represent the minimum adverse environmental impact under R.C. 4906.10(A)(3) or serve the public interest, convenience, and necessity under R.C. § 4906.10(A)(6).

IX. The Board Should Disapprove The Project Due To Its Destruction Of Bat Populations.

Firelands argues (at 21) that there are no indicators of an elevated risk of collision between bats and turbines. But in the same sentence, Firelands then concedes (at 21) that the Project may kill as many as 1,459 to 3,275 bats per year based on published wind industry estimates of 4.9 to 11 bat fatalities per megawatt of wind generation capacity.

To make things worse, the evidentiary record in this case shows that these estimates likely underestimate the actual harm to bats from the Project. The wind industry’s 2014 estimates on which Firelands bases its estimated mortalities from the Project are unsubstantiated, as revealed by a hearing exhibit that Firelands introduced into evidence and which was authored by a group of pro-wind advocates in 2019. Applic. Exh. 85, Taber Allison, *et al.*, “Impacts to Wildlife of Wind Energy Siting and Operation in the United States,” pp. 2, 4-5, 17 (expressing

their avid support for wind power). The Allison paper notes that the accuracy of wind industry estimates of bird and bat fatalities “is uncertain for several reasons.” *Id.*, p. 7. One reason for this uncertainty is that “results from fatality-monitoring studies are only available for a subset of all wind energy facilities in the U.S.” *Id.* Some regions of the country with high installed wind energy capacity have “relatively few available studies. *Id.* Another reason for this uncertainty is that, “although survey methods are becoming more standardized, older studies included in cumulative estimates varied more widely in methods and may have had insufficient sampling intensity, leading to questions about the validity of aggregating estimates from different studies.” *Id.* “[T]he uncertainty around existing fatality estimates leads to uncertainties around the potential for population-level effects” *Id.*, p. 9.

The use of fatality counts at other wind projects is fraught with uncertainty due to the errors and bias employed by the wind companies to count the bodies. Smallwood Testimony, p. 18, line 16 – p. 19, line 10. Dr. K. Shawn Smallwood has identified 94 causes of bias and error that have plagued the mortality counts at existing wind projects that are used to provide pre-construction mortality estimates for proposed wind projects such as Emerson Creek. *Id.*, pp. 19-24, Table 1. The most common error is that humans miss many of the dead bats (and birds) in their searches at wind projects, which the scientists’ estimator models then attempt to quantify to make up the shortfall. Smallwood Testimony, p. 27, lines 8-13. These estimators historically have been full of error and bias. *Id.* Consequently, the bat mortality estimate in Firelands’ brief is infected by these bias and errors.

Firelands’ witness Paul Rabie provided his own estimate of bat fatalities for Emerson Creek based on a fatality estimator model that he promotes, known as GenEst. Using this estimator, he estimated that the Project will kill between 6.5 and 12.9 bats per megawatt. Rabie

Testimony, p. 9, Table 3. Based on these figures, the 297.66 megawatt Project will kill up to 3,840 bats per year, totaling up to 96,000 bats over 25 years.⁴ This mortality estimate is substantially higher than the one provided in Firelands' brief.

While Dr. Rabie's estimate reveals that the Project will cause substantial damage to the community's bat populations, it too has every indication of being biased and low. Dr. Rabie is not a wildlife biologist, or a biologist of any kind. Instead he is a biometrician, someone who applies statistics to wildlife. Rabie, Tr. IX 1215:19-25. He has only 15 years of experience in this field, including his time as a college research associate. Rabie, Tr. IX 1216:1-17. Only seven years of this experience involved statistical work on bats, and he has never searched for dead bats at a wind project or anywhere else. Rabie, Tr. IX 1218:17-24, 1232:3. He has spent more than 85% of this time working on projects for wind companies. Rabie, Tr. IX 1219:13-18. As a paid witness whose livelihood depends on pleasing the wind industry, Dr. Rabie has every incentive to make bat mortalities appear to be lower than they actually are.

Dr. Smallwood has designed the "overall detection model" for estimating bat fatalities, based on his extensive experience with and field studies of bat mortalities, that eliminates the bias so prevalent in wind company mortality counts. BSBO Exh. 7, p. 1182, col. 2. Unlike GenEst and other estimators, the overall detection model quantifies the number of carcasses missed through searcher inefficiency and carcass persistency as a group, instead of separately quantifying searcher inefficiency and carcass persistency, thus eliminating biased low estimates. Smallwood, Tr. VIII 1124:22 – 1126:1, 1136:5 – 1137:16. Dr. Smallwood's estimator model was contained in a peer-reviewed paper in 2018 after being made public in 2012. Rabie, Tr. IX 1238:16 – 1240:6; Smallwood, Tr. VIII 1124:3-8; BSBO Exh. 7. Due to the recency of its 2018

⁴ Wind turbines typically have a life expectancy of 20 to 25 years. Staff Exh. 1, Staff Report, p. 55.

publication, this estimator has not had much time to catch on with other scientists, but it has passed peer review for publication three times. Smallwood, Tr. VIII 1119:14-20, 1124:3-8.

In contrast to Dr. Rabie, Dr. Smallwood has more than 40 years of experience with wildlife field work. Smallwood Testimony, p. 62, Resume. He has performed research and monitoring on the wildlife impacts of renewable energy projects for 21 years, and has authored numerous peer-reviewed reports, papers, and book chapters on fatality monitoring, fatality rate estimation, mitigation, micro-siting, and other issues related to biological impacts of wind energy generation. Smallwood Testimony, p. 1, lines 25-28. He served for five years on the Alameda County Scientific Review Committee that was charged with overseeing the fatality monitoring and mitigation measures at wind projects in the Altamont Pass Wind Resource Area (APWRA). *Id.*, lines 28-30. He has also collected and analyzed data from bat studies performed by others at many wind projects. *Id.*, p. 2, lines 16-17. He has been involved with renewable energy impacts on all fronts – study design, fieldwork on fatalities and use and behavior and ecological relationships, study administration, hypothesis-testing, report-writing, presentations at meetings, formulation of mitigation, micro-siting, study review, policy review and decision-making, and public outreach. *Id.*, lines 17-20. He is well-versed with the statistical tools used to estimate bat mortalities. Smallwood, Tr. VIII 1149:20 – 1150:16. He has worked on wind and wildlife issues for county, state and federal government agencies, environmental organizations, consulting firms, individuals, and wind companies. Smallwood Testimony, p. 2, lines 20-22. Thus, unlike Dr. Rabie, Dr. Smallwood's broad client base does not incentivize him to slant the results of mortality studies.

Using his estimator, Dr. Smallwood has used the fatality counts at the Wolfe Island wind project to estimate Firelands' fatalities, since Wolfe Island is located in the same ecoregion as

and on a landscape similar to that of Emerson Creek, including crop fields intersected with streams and forested fragments. Smallwood Testimony, p. 25, line 15 – p. 26, line 1; Smallwood, Tr. VIII 1132:16-22. Dr. Smallwood estimates that Firelands’ Project will kill 49.08 bats per megawatt per year, or 14,620 bats per year. *Id.*, p. 36, lines 15-18 & Table 2. This totals 365,500 dead bats over 25 years. This is a conservative estimate, because the Wolfe Island turbines were feathered for some of the fatality count period. *Id.*, p. 36, line 20 – p. 37, line 1.⁵

Firelands witness Rhett Good testified that bat mortality rates at Midwest wind projects have been documented at up to 61.8 bats per megawatt per year. Applic. Exh. 32, Good Testimony, p. 24, lines 1-3. Bat mortality rates have been the highest in the Midwest. Good, Tr. II 255:4-7. At the Fowler Ridge wind project in Indiana, at which Mr. Good has conducted mortality monitoring, “thousands and thousands of ... bat carcasses ... have been picked up over the years,” including some endangered Indiana bats. Good, Tr. II 189:2-24. At that rate, Firelands’ Project would kill 18,395 bats per year and 459,884 over 25 years.

Dr. Smallwood tested the accuracy of his overall detection model for three years at the Santa Clara and Sand Hill wind farms in the Altamonte Pass in California. Rabie Testimony, p. 5, lines 22-23. Even Dr. Rabie acknowledges that Dr. Smallwood’s model produced accurate results in two of those three years, with the estimates from the model being “very close” to the actual number of carcasses placed in the field. *Id.*, lines 23-25. Dr. Rabie attempted to discredit Dr. Smallwood’s overall detection estimator by pointing out that the estimator was off by 25% in its estimates during one of the three years it was tested. Rabie Testimony, p. 5, lines 25-28; Rabie, Tr. IX 1241:4-17. This variance resulted from an extreme drought that eliminated grass

⁵ For comparison purposes, Dr. Smallwood also estimated mortalities using a different estimator that does not adjust for biases and errors to the same degree as his overall detection model. The other model estimated a mean mortality rate of 9.07 deaths per megawatt per year. Smallwood Testimony, p. 35, lines 23-24.

cover and left the carcasses exposed to a desperate scavenger community that year, resulting in higher than usual carcass theft by carnivores. BSBO Exh. 7, p. 1180, col. 2. Consequently, this 25% variance was an outlier that occurred only during unusual environmental conditions. If Dr. Smallwood's model is applied to mortalities collected under normal conditions, there is no reason to believe that it would be subject to such an error. There is no indication that the Wolfe Island mortality counts occurred during any drought or other abnormal environmental condition, so his use of the Wolfe Island mortality statistics to estimate projected mortalities of 14,620 bats per year (*i.e.*, 365,500 bats over 25 years) at Emerson Creek Wind is appropriate and credible. Moreover, this 25% outlier occurred at only one of the two projects used by Dr. Smallwood to test his estimator. Smallwood, Tr. VIII 1127:10-17. Moreover, even if his estimate is too high by 25%, the estimated bat mortalities for the Project are still 10,965 per year and 274,124 dead bats over 25 years. Even Dr. Rabie cannot quibble with that conclusion.

Dr. Rabie also asserted in his written testimony that searcher efficiency and carcass persistence may not be similar for the hilly grasslands in Altamont Pass and the flatter agricultural fields in Wolfe Island, because of differences in wind regimes, victim flight heights, and topography might make carcasses harder to find at Altamont Pass. Rabie Testimony, p. 8, lines 8-13. Searcher efficiency is the rate at which searchers find carcasses rather than miss them. Smallwood, Tr. VIII 1112:19-22. Dr. Rabie rationalized that, with wind regimes, a more powerful wind can carry a bat's body farther after it hits a turbine, but then he admitted this would not make a searcher less likely to find the body. Rabie, Tr. IX 1265:9-25. He also admitted that the victim's flight altitude would not make any difference. Rabie, Tr. IX 1266:9-14. Dr. Rabie admitted that he was speculating that carcasses were hard to find at Altamonte Pass due to topography, that he could not say this was actually the case at the Sand Hill wind

farm, and that he thought the steeper topography at the Santa Clara wind farm would give searchers difficulties in accessing steep terrain when looking for victims falling from the turbine collisions. Rabie, Tr. IX 1266:21 – 1268:15. But none of Dr. Rabie’s points make any sense in light of the fact that the carcasses used to measure search effectiveness in Dr. Smallwood’s study were placed in the fields by the researchers who dropped them from shoulder height. BSBO Exh. 7, p. 1175, col. 1. These carcasses were differentiated from bodies that had collided with the turbines by marking the trial carcasses with feather clipping and wrapping tape or zip-ties around the legs. *Id.* Dr. Rabie’s mistakes are understandable, since he has never performed a mortality search or mortality trial in the field.

With regard to Dr. Rabie’s thought that the grass in Altamonte Pass might hide carcasses more effectively than the crop fields at Wolfe Island, Dr. Smallwood’s report informs that the grass at the Santa Clara and Sand Hill wind farms was “intensively grazed annual grasslands where ground visibility was usually high.” BSBO Exh. 7, p. 1, Abstract. The grass sometimes grew to 75 centimeters (30 inches) in April and fell over by June in some places where grazing was less intense, which may have reduced carcass detections in June. *Id.*, p. 1172, col. 1, p. 1183, col. 2. However, some of the search area at Wolfe Island also posed challenges. For example, an aerial photograph in Dr. Smallwood’s testimony shows a turbine whose search area included trees. Smallwood Testimony, p. 29, Figure 4. In addition, the fields searched around the turbines at Wolfe Island were raising crops (Smallwood Testimony, p. 25, line 15-17), which also grow in height as the summer progresses. Dr. Rabie stated that about a third of the land within 50 meters around the Wolfe Island turbines was unsearchable. Rabie Testimony, p. 1283:6 – p. 1284:3 & Attachment PR-3, p. 7, Table 4.

Dr. Rabie represents that the U.S. Geological Survey (“USGS”) has recommended the

use of GenEst as the most accurate estimator, and that Dr. Smallwood's model does not use statistical methods that have been recommended by USGS. Rabie Testimony, p. 3, lines 27-29 & p. 8, lines 5-6. But he admitted that this has no bearing on whether Dr. Smallwood's estimator is valid. Rabie, Tr. IX 1254:21 – 1255:3. Dr. Rabie did not explain why an opinion of a USGS field office matters, since the USFWS regulates wildlife and not USGS. Dr. Rabie also claimed that another paper stated that GenEst was the best estimator, but it compared the performance of the GenEst estimator only to two other models that did not include Dr. Smallwood's overall detection model. Applic. Exh. 73; Rabie, Tr. IX 1301:24 – 1302:11. That paper was prepared for the American Wind Wildlife Institute, a trade association for wind companies (*id.*, lines 12-14), so it obviously would not have been interested in promoting an estimator that finds bat mortalities to be higher than the estimators favored by the wind industry.

Not able to credibly downplay the Project's damage to bats, Firelands argues (at 45) that the technical assistance letter ("TAL") it procured from the USFWS requires the turbine blades to be feathered at wind speeds below 6.9 meters per second during the Indiana bat's spring and fall migration periods and, during the summer maternity period, within 2.5 miles of an Indiana bat roost. Applic. Exh. 11, TAL, pdf p. 116. The TAL identifies the spring and fall migratory periods as March 15 to May 15 and August 1 to October 31. *Id.* Proposed Condition 21 requires feathering of all turbines below the manufacturer's cut-in speed from May 16 to July 31. The curtailment of blade operation by "feathering" is the process of altering the turbines' blades to either stop or slow their rotors' movement in low wind speeds. Application Narrative, p. 159. The "manufacturer's cut-in speed" is 3.5 meters per second. *Id.* Although turbine blades can rotate below the cut-in speed, that rotation produces no electricity. Applic. Exh. 85, p. 15.

Feathering is known to decrease the number of bat fatalities, but it does not come close to

eliminating fatalities. Curtailment at wind speeds below 5.0 to 6.5 meters per second can reduce bat fatalities by 50% or more. Applic. Exh. 85, p. 15. Most curtailment programs reduce fatalities by 50% to 60% at various cut-in speeds. Smallwood Testimony, p. 48, lines 11-13. That means bat fatalities can still be up to 50% of the number victimized in the absence of feathering below 6.9 meters per second. According to Firelands, curtailment at the manufacturer's cut-in speed of 3.5 meters per second reduces fatalities by only 35%. Application Narrative, pp. 159-160.

The TAL requires feathering below 6.9 meters per second for the stated reason of reducing Indiana bat deaths during migration from March 15-May 15 and August 1-October 31. This leaves a gap in this requirement during summer between May 16 and July 31 (bats hibernate in caves or migrate elsewhere for the winter).

Firelands represents (at 45) that the TAL requires feathering “during the summer maternity period at turbines located within 2.5 miles of an Indiana bat roost.” This statement is inaccurate in two respects. First, since the TAL requires feathering near the roosts of Indiana bat maternity colonies, but not for all Indiana bat roosts. Applic. Exh. 11, pdf p. 116. Second, the TAL requires feathering “within the homerange [sic] of Indiana bat maternity colonies” but it does not define that home range as 2.5 miles or any other distance. *Id.* The Application promises to feather below 6.9 meters per second during summer at locations within 2.5 miles of an Indiana bat roost “[u]nless otherwise authorized by ODNR or USFWS.” Applic. Narrative, p. 161. Firelands undoubtedly would argue that this promise no longer applies, since the TAL is more lenient. At any rate, the TAL's failure to define the Indiana bat's home range, whether or not construed to be 2.5 miles, is concerning. The female Indiana bat captured by Firelands in a mist net traveled to three different roost sites in eight days. Applic. Exh. 34, Leftwich

Testimony, p. 6, lines 14-19. On one night, it flew 14.1 kilometers (8.8 miles) to the south of its core foraging range. Application Exh. Y3, p. 8. Obviously, feathering only within 2.5 miles of an Indiana bat maternity colony is not enough; feathering should occur within nine miles at least. Notably, the TAL does not require Firelands to look for Indiana bat maternity colonies to determine whether feathering will be mandated, so this feathering condition is practically meaningless anyway. Consequently, under Condition 21, feathering only under the manufacturer's cut-in speed of 3.5 meters per second will reduce summertime bat fatalities by only 35%.

Firelands states (at 45) that implementation of the TAL procedures for Indiana bats "will also reduce the potential impacts of the Project to other bat species." This is an overstatement. The TAL actually states that these procedures will help the northern long-eared bat, since that bat species is in the same genus as the Indiana bat and has "similar morphological features, habitat needs, and active periods." Applic. Exh. 11, pdf p. 117. The TAL does not state whether or not these procedures will substantially benefit other bat species.

While the Indiana bat and northern long-eared bats inhabiting the Project Area are threatened and/or endangered, they are not the only bats there that need protection. Bats of all species in the eastern United States are in trouble. The USFWS has found that white-nose syndrome, a white fungal disease attacking hibernating bats, has caused extensive mortality of bats in eastern North America. Applic. Exh. 48, p. 32.

Other bats found by Firelands' surveys include the big brown bat, little brown bat, eastern red bats, hoary bat, tri-colored bat, silver-haired bat, northern bat, and evening bat. Application Exh. Y1 (pdf pp. 28-29); Application Exh. Y2, Appx. C (pdf pp. 41-41); Application Exh. Y3, p. 11, Appx. C (pdf pp. 123-125); Application Exh. Y4, p. 14: and Application Exh. Y5, p. 10.

Firelands admits (at 26) that this little brown bat and the tri-colored bat are listed by ODNR. The Allison paper found that three migratory tree-roosting species of these bats -- hoary bat, eastern red bat, and silver-haired bat --constitute about 72% of the reported bat fatalities at wind projects. Applic. Exh. 85, p. 8. Most bat species have low reproductive potential (*id.*), so their ability to repopulate from population losses is difficult. Modeling results suggest that some of the migratory tree roosting bat species “are at risk of population decline due to collision fatalities.” *Id.* The ecological consequences of turbine-caused mortality of cave-dwelling bats, such as the Indiana bat, northern long-eared bat, and little brown bat, may be significant because of already high mortality and recent population declines caused by white-nosed syndrome. *Id.*, pp 9-10. At some wind projects in the Midwest, little brown bats account for up to 60% of detected fatalities. *Id.*, p. 10. The decline of many cave-dwelling bat species raises concerns about the ecological consequences of any additional mortality. *Id.*

Firelands asserts (at 45) that its feathering will reduce mortalities for these bat species. However, the summer gap in feathering below 6.9 meters per second leaves these species exposed to collisions in great numbers. Firelands’ 2011 acoustic survey of all bat species showed that the periods of peak bat activity were from July 18 to July 24 for the northern met tower and from August 25 to September 2 in all towers. Smallwood Testimony, p. 10, lines 5-6. Firelands’ 2010 acoustic survey of all bat species showed that the periods of peak bat activity were from July 23 to August 12. *Id.*, lines 12-14. Thus, much of the peaks in bat activity occur in July, which is during the summertime (May 16 to July 31) when the TAL and the Stipulation provide for little feathering to protect all of the bat species in the Project Area.

Firelands states (at 45) that it will not site turbines in forests, will minimize forest clearing, and will cut trees at wintertime instead of seasons in which bats are active. Firelands

argues (at 20) that placing its turbines in farm fields will minimize wildlife impacts. Firelands also contends (at 19, 20) that turbines will not be located near forests, wetlands and streams. Actually, ODNR's protocol finds that bat mortalities are being documented on agricultural land as well as in forest. Applic. Exh. 47, p. 4. Mr. Good testified that "[b]at mortality rates can be higher in projects with or without forests." Good, Tr. II 222:14-15. Even worse, many of Firelands' proposed turbine sites are located within 200 meters of forest patches and bodies of water, which increases the risk of turbine collisions. Smallwood Testimony, p. 40, lines 10-12.

Firelands represents (at 45) that it "may also elect" to develop a Habitat Conservation Plan ("HCP") to reduce potential bat impacts, but neither the Application nor the Stipulation make any such commitment. So this statement is unenforceable and meaningless.

The TAL does not satisfy Firelands' obligation under OAC 4906-4-09(D)(4) to "submit a post-construction avian and bat monitoring plan to the board." It requires submission of this plan only after the certificate is issued.

The foregoing shortcomings threaten the viability of bat populations that are essential to the ecosystem, as well as to the recreational and economic welfare of humans. As explained in our initial brief, the bats provide about \$22.2 of benefit to farmers in Huron and Erie Counties by eating crop pests. Farmers would be forced to compensate for the loss of bats by using more insecticides. Smallwood, Tr. VIII 1143:12-15.

The limited mitigation measures proposed by Firelands' Application, the TAL, and the Stipulation fall far short of protecting these important species. The Board should deny the certificate on the grounds that Firelands has failed to comply with R.C. 4906.10(A)(2), (3) and (6). If the Board does issue a certificate, the certificate should bolster the bats' protections by adding the requirement to feather all turbines at wind speeds below 6.9 meters per second during

the summertime and requiring all turbines to be located at least 200 meters away from forests, streams, and other surface water bodies. Submission of the post-construction avian and bat monitoring plan should be required as part of this proceeding. Finally, the certificate should require all post-construction mortality monitoring results to be filed on OPSB's online docket for public review to increase honesty and transparency in the monitoring procedures and results.

X. Firelands' Flawed Bird Surveys Do Not Provide The Board With Sufficient Information To Issue A Certificate.

A. The Project Area Is Located In An Important Migratory Pathway That Must Be Kept Free Of Dangerous Obstacles, Such As Wind Turbines, To Avoid Bird Mortalities.

Erf and Yingling contend (at 7-8) that wind projects are desirable for controlling climate change. Not only do Erf and Yingling lack the expert credentials to express such an opinion, but their position is beyond the purpose of this proceeding. The question before the Board is not whether wind-powered energy should be encouraged as a public policy, but whether this Project, at its proposed location, complies with the criteria of R.C. 4906.10(A). It does not.

As Mark Shieldcastle testified, seeking to address climate change does not mean that wind projects have "to be anywhere and everywhere." Shieldcastle, Tr. VII 1019:17-24. "[S]iting is extremely important to not have major collateral damage." Shieldcastle, Tr. VII 1019:10-12. Some places, such as the Project Area in a major migratory bird route, "just are not the right place for that type of ... energy production." Shieldcastle, Tr. VII 1019:13-16.

Firelands states (at 45) that the turbines will use flashing lights instead of burning lights on the turbine towers to reduce the potential for birds to be confused during migration or attracted to the lights. However, the company also notes (at 32) that the lights will be red. ODNR's 2009 protocol for wind projects, which Firelands professes to follow, provides that white lights are preferred to reduce the disorientation of birds that are trying to use celestial cues

for navigation, which increases deaths through collisions with turbines or through exhaustion. Applic. Exh. 47, “On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio,” p. 9. Red turbine lights do not represent the minimum adverse environmental impact under R.C. 4906.10(A)(3).

Firelands asserts (at 20) that the anticipated avian mortality rate for the Project “is not reasonably considered a biologically significant impact,” citing Page 159 of its Application Narrative. Page 159 of the Application Narrative reveals that Firelands computed this avian mortality rate by using the “average regional mortality rate of 3.845 birds killed” per megawatt per year as advocated in two papers authored by Loss and Erickson. That is, Firelands did not base its prediction of bird deaths on any surveys of the Project Area, which are inadequate to quantify estimated risk, but just used an average of mortalities at some other wind projects from some old literature.

Relying on such generic information would defeat the purpose of the project-specific avian surveys required by the Board’s rules. These surveys are supposed to find out what harm this project will have, not what other projects have done to harm their bird populations. A good illustration of the fallacy of using other wind projects’ data to predict this Project’s mortalities comes from a question by Firelands’ counsel at the hearing asking Mr. Shieldcastle whether he was aware of any tundra swan fatalities at existing Ohio wind projects. Mr. Shieldcastle answered in the negative, but explained that tundra swans do not frequent the areas in which other wind projects are located. Shieldcastle, Tr. VII 926:4-14, 1000:10-17. In contrast, thousands of tundra swans overwinter in the Project Area, and tundra swans are prone to flying into objects because they fly during low light conditions in the turbines’ rotor-swept zone. LR Exh. 2, Beck Testimony, p. 9, Answer 15; Shieldcastle Testimony, p. 17, lines 1-12.

Relying on old, generic data such as the Loss and Erickson papers is uninformative for this Project, because this Project likely will kill more birds than other wind projects. As explained in BSBO's and the Residents' initial brief, Firelands unwisely plans to site its Project in the migration pathway for birds that are flying north towards or south away from one of the greatest bird congregation areas in North America. And, because Firelands has conducted flawed bird surveys and has refused altogether to conduct nighttime bird surveys when migration is occurring, Firelands has no reliable data upon which to base any estimates of avian mortality for this Project.

With regard to the generic avian mortality rate it uses, Firelands contends (at 20) that "[i]t is also noteworthy that this rate is comparable to the impacts associated with previous Board-approved wind farms." Firelands cites Page 159 of its own Application Narrative as its sole source of information for this statement, but this page just makes the same statement without identifying any source of information. But Firelands has no basis for comparing expected bird mortalities at the Project to operating Ohio wind projects, since this Project is in a unique area of avian importance and since Firelands' flawed bird surveys cannot be used to make any predicted estimates of bird losses.

Besides being unrepresentative of avian use of the land and air column of the Project Area, the generic mortality rate referenced by Firelands' brief is and always has been untrustworthy. First of all, these papers are based on outdated data. Shieldcastle, Tr. VII 955:15 – 956:2. For example, even the Erickson and Loss papers noted that taller turbines may cause more bird fatalities. Applic. Exh. 84, Wallace Erickson, *et al.*, "A Comprehensive Analysis of Small-Passerine Fatalities from Collision with Turbines at Wind Energy Facilities," p.12. Second, the wind company mortality data used by these papers and other literature are the

products of faulty design and statistical manipulations ingrained in the wind industry purposed to mislead the public and regulatory agencies about the number of birds killed by the turbines.

Shieldcastle Testimony, p. 30, lines 1-9. Mr. Shieldcastle's review of wind project mortality data generated by Firelands' consultant WEST has uncovered three types of shortcomings: proofreading errors, inferior search methods (where current science offers better methods), and errors in data handling, manipulation, and analysis. *Id.*, p. 30, lines 7-9. The following is a bullet list of systematic analytical faults in these data:

- The searches for carcasses do not cover all of the area in which the dead birds fall after colliding with the turbines.
- The mortality reports underestimate the number of dead birds removed by scavengers.
- The mortality reports overestimate the mortality detection rates for some categories of birds by classifying large birds as small birds, or vice versa, to provide the appearance that the searches for carcasses found more large birds than were actually found, or vice versa.
- The reports overestimate the percentage of the bird carcasses that are found by the searchers.
- The frequency of the carcass searches varies from turbine to turbine and are then averaged, which underestimates the mortality numbers.
- The mortality reports utilize inappropriate parameters (e.g., quantifying the mean without identifying the variability of carcass numbers) to quantify the mortalities, which underestimates the actual risk of mortalities.
- The mortality reports provide numbers of bird mortalities for an entire year, even where mortality searches are not conducted for the entire year.

Id., p. 30, line 9 – 31, line 2. These improper estimators can underestimate the total mortalities by significant amounts. *Id.*, p. 31, lines 5-6. The wind industry has exploited these tricks to convey the appearance that turbines kill far fewer birds (and bats) than they actually do.

Mr. Shieldcastle's conclusion that published wind mortality data does not paint an accurate picture of avian mortalities is substantiated by a Firelands hearing exhibit authored by a group of pro-wind advocates. Applic. Exh. 85, Taber Allison, *et al.*, "Impacts to Wildlife of Wind Energy Siting and Operation in the United States," pp. 2, 4-5, 17 (expressing their avid support for wind power). The Allison paper, published in 2019, benefits from information that is more up-to-date than the data used in the 2013 and 2014 Loss and Erickson papers. The Allison paper notes that the accuracy of wind industry estimates of bird and bat fatalities "is uncertain for several reasons." *Id.*, p. 7. One reason for this uncertainty is that "results from fatality-monitoring studies are only available for a subset of all wind energy facilities in the U.S." *Id.* Some regions of the country with high installed wind energy capacity have "relatively few available studies. *Id.* Another reason for this uncertainty is that, "although survey methods are becoming more standardized, older studies included in cumulative estimates varied more widely in methods and may have had insufficient sampling intensity, leading to questions about the validity of aggregating estimates from different studies." *Id.* "[T]he uncertainty around existing fatality estimates leads to uncertainties around the potential for population-level effects" *Id.*, p. 9.

Allison, *et al.* provides yet another reason for rejecting Firelands' bird mortality prediction on which it bases its argument (at 20) that the anticipated avian mortality rate for the Project "is not reasonably considered a biologically significant impact." Allison, *et al.* advised that radar surveys have indicated that 90% of avian nocturnal migrants fly above the height of

the “current, rotor-swept zone of turbines (140 m; 460 feet) in most operating wind energy facilities.” *Id.*, p. 8. However, “[l]and-based turbines have been developed that extend almost twice the height of existing turbines reaching higher into the space used by nocturnal migrants, and there are concerns that this will increase bird collisions.” *Id.* As noted above, the Erickson and Loss papers found that taller turbines may cause more bird fatalities, and turbine models have become taller over the years. Applic. Exh. 84, p.12; Good, Tr. II 252:5-14. Firelands’ turbines will be as tall as 199.5 meters, or 655 feet. Application Exh. 5, Attachment 1. This substantially increases the height of the rotor-swept zone in which the birds will be flying. Compounding this risk is that migrating birds flying towards Lake Erie, even if previously flying higher than the turbines’ rotor-swept zone, descend through the Project Area towards the lake through the elevation of the turbines’ rotor-swept zone, and reverse that process by ascending through the Project Area on their way back south. Shieldcastle, Tr. VII 949:16-21, 1013:23 – 1014:1, 1015:20 – 1016:16. Migrating birds also fly through the rotor-swept zone at times other than ascent and descent. Shieldcastle, Tr. VII 1017:17-22, 1036:1-9. Thus, this Project will pose a higher risk to birds than the much shorter turbines whose mortality statistics provide the basis for Firelands’ mortality estimate. Yet Firelands refuses to conduct the radar surveys necessary to measure the elevation of the migrants’ flights over the Project Area and to quantify their numbers.

Firelands’ assertion (at 20) that the anticipated avian mortality rate for the Project “is not reasonably considered a biologically significant impact,” is not even supported by the page of the Application it cited for this proposition. Application Narrative, p. 159. Even using the generic avian mortality rate plagued by the uncertainties and manipulations described above, Firelands

admits that the Project would kill 1,145 birds per year. Application Narrative, p. 159. Firelands acknowledges that “this number may appear large.” *Id.*

Even this number is based on outdated data, since it is based on the Loss and Erickson papers of 2013 and 2014, respectively. At the hearing, Firelands used the 2014 Erickson paper as an exhibit and Mr. Good asserted that he expected Firelands to kill about the same number of birds as portrayed in the paper’s mortality rates. Good, Tr. II 213:18 – 218:15. But, according to another Firelands’ exhibit, Erickson’s mortality rate is substantially lower than more recent estimates of bird fatalities by the wind industry. The pro-wind paper by Allison, *et al.* states that recent published papers estimate avian deaths vary from about three to six birds per megawatt of installed energy capacity, i.e., numbers that are 50% higher than Erickson’s projected rate. Applic. Exh. 85, p. 6. Mr. Good said that he agreed with this estimated mortality rate too, even though it is different than Erickson’s rate. Good, Tr. II 219:13 – 220:5. Using this estimate, Firelands’ Project of 297.66 megawatts could kill up to 1,786 birds per year and 44,649 fatalities over 25 years. Importantly, however, this estimate is based on wind industry mortality statistics whose sizes have been suppressed by the wind industry manipulations as discussed above, for turbines far shorter than Firelands’ machines, and for wind projects not sited in an important migratory bird pathway.

Firelands rationalizes in its Application (*id.*) and brief (at 20) that the avian victims will be from many species and will be a small percentage of the migrating birds. Firelands argues (at 20) that buildings, vehicles, cats, and other things kill more birds than wind turbines. Thus, Firelands wants the Board to give Firelands the unrestricted opportunity to kill numerous birds just because some other things may kill more birds, with no discussion or explanation of cumulative mortalities on risk to bird populations.

The pro-wind Allison paper refutes Firelands’ position. Applic. Exh. 85. First, Allison advised that “substantial uncertainty exists around estimates of fatalities caused by other anthropogenic sources such as poisoning or collisions with buildings.” *Id.*, p. 7. Second, as explained above, Allison found that the studies providing the bird mortality estimates being compared to other causes of avian fatality are plagued with “uncertainty.” *Id.*, p. 9. This leads to “uncertainties around the potential for population-level effects” from the turbine kills. *Id.* Third, comparing one mortality estimate to compare to other causes of death is misleading, because this disguises the fact that turbines’ pose a greater threat to some bird species than others. *Id.*, p. 9. “Demographic models, such as population viability analyses designed around the biology of specific species, suggest the population size or dynamics of some species may be negatively affected from increases in mortality from collisions at wind turbines, particularly as more turbines are placed within the species’ range.” *Id.* In particular, “[l]ong-lived species, including most raptors, that have higher adult survival and fewer offspring each year, may be more susceptible than short-lived species to population-level effects from collisions with wind turbines.”⁶ *Id.* Few peer-reviewed studies in the United States have investigated turbines’ impacts on raptors, but modeling in Europe has suggested that some of its raptor species are at risk of population declines from turbine collisions. *Id.*

This is consistent with Mr. Shieldcastle’s testimony as well, where he noted that bird mortalities from turbines alone might not threaten the existence of the entire bird kingdom, but they may threaten the viability of individual bird species. Shieldcastle, Tr. VII 956:17 - 957:7. Further, even as to bird populations as a whole, the cumulative impact of fatalities from turbines in combination with other causes of mortality is concerning. Shieldcastle, Tr. VII 956:17-24.

⁶ Eagles are species of raptors. Good, Tr. II 141:17.

ODNR would agree with Mr. Shieldcastle and Allison on this point and disagree with Firelands' position, since it stated in its 2009 protocol:

Numerous incidences exist of nocturnally migrating songbirds colliding with tall structures such as lighthouses, cell phone towers, and tall buildings. It is unclear what the cumulative impact of potentially 100s of turbines on the landscape will be to migrating birds.

Applic. Exh. 47, p. 4. Thus, while ODNR acknowledges that birds collide with structures besides wind turbines, ODNR is concerned about adding even more bird mortalities from wind projects.

These concerns are becoming more pronounced as wind projects multiply throughout Ohio and the rest of the country, and increase the wind industry's body count. The estimate of total bird mortalities from wind projects nationwide was based on the number of turbines in operation before 2013 and 2014 when Loss and Erickson, respectively, wrote their papers. Application Narrative, p. 158. In 2012, the United States had an installed capacity of 51,630 megawatts, but by 2019 that capacity had almost doubled to 100,125 megawatts. BSBO Exh. 8, p. 1. Obviously, the bird mortalities have multiplied, too, and they will skyrocket as more wind power capacity is added.

As explained in our initial brief and in the above text, any comparison of bird fatalities from turbines and other mortality causes is suspect due to the inaccuracy of the mortality data. The public mortality data for wind turbines is scarce and questionable due to wind company manipulation of published mortality data and its concealment of most data. Similarly, the Allison paper noted that its comparison of mortalities from wind projects and other causes was based on its "best estimates" given the available data. Applic. Exh. 85, p. 7. In this case, Firelands joins its wind industry colleagues in suppressing information about turbine threats to migrating birds, by refusing to collect data about the birds migrating through the Project Area at

night and by engaging in other flawed techniques to gather information. It is regrettable that ODNR and USFWS are, so far, allowing Firelands to get away with this malfeasance in such an important bird migratory route. However, the Board is not allowed to abdicate its duty under R.C. 4906.10(A)(2) to obtain the data necessary to determine the extent to which Firelands' turbines will kill these birds.

B. Firelands' Bird Surveys Were Designed To Avoid The Detection Of Most Birds, Not To Find Them.

Firelands represents (at 21, 22, 24) that it found no threatened and endangered bird species and not many bird species of concern of birds in the Project Area. But Firelands' conclusion came from its lack of competent search for these species, not because of their absence.

People other than Firelands' consultants have reported the presence of threatened bird species in the Project Area, including black-crowned night herons, trumpeter swans, and sandhill cranes. Shieldcastle Testimony, p. 28, lines 19-20. Persons other than Firelands' consultants have found bird species of special concern in the Project Area that include the sharp-shinned hawk, prothonotary warbler, sora, Virginia rail, grasshopper sparrow, vesper sparrow, red-headed woodpecker, and black-billed cuckoo. *Id.*, lines 19-23. Firelands found some of these species, such as the red-headed woodpecker, but failed to find most of them. As explained in the initial brief of BSBO and the Residents, Firelands tailored its surveys to concentrate on common bird species and to miss uncommon species.

While Firelands has concentrated on looking for common species, the less populous species are of more concern. The actual numbers of bird deaths from turbines do not reveal the true extent of potential harm to less populous species. Shieldcastle Testimony, p. 31, lines 10-11. For example, killing three bald eagles per year does substantially more damage to that

species' population than does killing three of the numerous red-winged blackbirds. *Id.*, lines 12-13. For this reason, Firelands' emphasis on common bird species ignores the greater potential harm that could befall rarer species whose presence Firelands has largely overlooked due to its flawed survey methods.

C. Firelands Did Not Conduct The Survey Necessary To Quantify Passerine Migration At Night, When Most Of The Passerines Are Flying Over The Project Area.

Passerines have been the most abundant bird fatality at wind energy facilities outside California, often comprising more than 80% of bird fatalities. Application Exh. S-3, p. 37. Firelands contends (at 24) that its "migration" survey of daytime point counts indicated that the Project Area is not heavily used as "stopover habitat" by migrating passerines. But the birds that can be found during daylight with point counts while on a stopover are not representative of those flying through at night. Shieldcastle, Tr. VII 963:17 – 964:6. Mr. Shieldcastle testified, based on his extensive experience with designing wildlife surveys, that daytime point counts of birds are not a "comparable methodology" to radar surveys at night. Shieldcastle, Tr. VII 1007:17 – 1008:15. Most migrating passerines will not stop in the Project Area due to its lack of suitable stopover habitat, but instead will push forward to land in the ideal habitat along Lake Erie. Shieldcastle, Tr. VII 1008: 16 – 1009:15. Thus, Firelands' sole reliance on daytime point counts did not assess the risk from turbines to nocturnally migrating birds.

A Firelands' exhibit authored by the American Bird Conservancy ("ABC") with a Wind Risk Assessment Map reveals the importance of conducting nocturnal surveys of migrating passerines by radar instead of merely looking for stopovers in the Project Area as described in Firelands' brief (at 24). Applic. Exh. 77. The Project Area is "immediately south" of areas shown by the map to be of critical (in red on map) or high (in orange) importance to birds, which

ABC recommends be avoided or approached with caution by wind developers. Applic. Exh. 77, pdf. pp. 4, 5, 8 (showing the proximity of these areas to Interstate 80, which is on the north edge of the Project Area). Mark Shieldcastle is knowledgeable about this map, since the BSBO contributes bird use data to ABC for its creation. Shieldcastle, Tr. VII 931:12-14. Although the Project Area is not coded red or orange on the map, Exhibit 77 warns that “[a]t present, insufficient quantitative data exist to establish firm boundaries for most migration corridors.” Applic. Exh. 77, pdf p. 6. The Project Area is located in a migration route to the red and orange-coded territory to the north. Shieldcastle, Tr. VII 1002:16 – 1003:5. The exhibit further cautions:

This map does not, nor is it intended to encompass all areas of importance to birds, and is not a substitute for on-the-ground survey data. Further, we note that bird use data are scarce in many offshore locations on the coasts and in the Great Lakes, so populations in any such location should be thoroughly evaluated for any development being considered.

Applic. Exh. 77, pdf p. 6. The Project Area is not colored red or orange on the wind turbine risk map simply because no one has collected data on the birds’ migration there. Shieldcastle, Tr. VII 1001:10 – 1002:8. Nighttime radar surveys of nocturnal migrants, not the daytime point counts advocated by Firelands (at 24), are the only way to obtain that data. Shieldcastle, Tr. VII 1004:13-24. Notwithstanding the now outdated statement in USFWS’ outdated “Land-Based Energy Guidelines” (Applic. Exh. 48) that the results of radar surveys do not correlate with turbine mortalities, the USFWS now routinely uses radar to measure nocturnal bird movements along the Great Lakes. Shieldcastle, Tr. VII 954:17 – 955:7, 1004:17-18, 1005:1 – 1006:2, 1011:8-25. The Allison paper advises that “[b]ird activity at land-based projects is typically estimated from visual surveys and radar” to support the prediction of collision fatality risk for

birds. Applic. Exh. 85, p. 15 (emphasis added). The Board should insist that Firelands do the same.

D. The Administrative Law Judges Correctly Ruled On Firelands' Motion To Strike Portions Of Mark Shieldcastle's Testimony.

BSBO does not object to the ALJs' decision to strike the sentence on lines 11-13 of Answer 8 of Mark Shieldcastle's written direct testimony. BSBO Exh. 1, p. 5. Contrary to Firelands' request, however, the ALJs correctly denied the rest of Firelands' motion to strike Question and Answer 18 of Mr. Shieldcastle's direct testimony. Tr. VII 917:25 – 919:8.

Firelands challenges Answer 18 of Mr. Shieldcastle's testimony on the asserted grounds that it is irrelevant, and that Mr. Shieldcastle is unqualified to discuss its topics. Firelands challenges Mr. Shieldcastle's observations about the health benefits of watching birds, but fails to mention that these observations cover only five lines of his four-page answer. *Id.*, p. 33, lines 8-12. And even those five lines pertain to health benefits that an officer of an organization devoted to birds and bird-related recreation are expected to know. The discussion in his answer about "health benefits" was based on his own personal experiences as well as literature on the topic. Shieldcastle, Tr. 915:7 – 916:10.

Firelands also criticizes Answer 18 for describing the importance of birds to the people residing in Huron County, Erie County, and the shore of Lake Erie to the north of these counties. Firelands flippantly, and misleadingly, refers to this answer as describing the "feelings and beliefs" of others. To the extent this answer does describe a person's reactions to seeing a bird, Mr. Shieldcastle is well within his experience as a lifelong birdwatcher to know how it feels to watch birds. Just as importantly, Answer 18 goes way beyond the emotional value of bird-related recreation to also discuss the economic, social, and ecological values of birds to the area. The BSBO, and Mr. Shieldcastle as one of its officers, are well qualified to provide this information.

The BSBO is intimately involved in the protection and promotion of birdwatching in this area. As stated in Answer 18, BSBO initiated and sponsors a festival known as the “Biggest Week in American Birding” that draws 100,000 people to the area with an estimated economic benefit of \$40 million to \$90 million. See Lines 3-10 on Page 32 and Lines 15-18 on Page 34. BSBO, including Mr. Shieldcastle, are involved in offering the bird-related recreational services described in Lines 6-18 on Page 34 that serve the economic, recreational, and ecological benefits of the area. BSBO, and Mr. Shieldcastle, are knowledgeable about the recreational, ecological, and economic importance of Magee Marsh and are familiar with its status as one of North America’s premier bird habitats, as expressed in Lines 10-13 on Page 32 and Line 22 of Page 33 to Line 5 of Page 34. In fact, BSBO’s headquarters is located at the entrance to the access road to Magee Marsh. Mr. Shieldcastle also knows, as expressed in Lines 11-12 on Page 32, that many of the birds seen at Magee Marsh fly through the airspace of Erie, Huron, and Seneca Counties to get to the marsh, *i.e.*, many of them migrate through the project area where they will in the future be threatened by the Emerson Creek wind project if constructed. Mr. Shieldcastle knows why the birds concentrate along Lake Erie in this area, as explained in Lines 14-23 on Page 33. In summary, Mr. Shieldcastle is personally involved with and knowledgeable about the contents of Answer 18.

Firelands also objects that Answer 18 references some reports as sources of information, but did not attach them. Firelands’ position is curious, given that most of its Application and most of its witnesses’ testimony do the same thing. As the Board knows, an administrative agency has considerable discretion to admit hearsay, and it should not discriminate against Intervenor by denying them the opportunity utilize hearsay information even while Firelands is engaged wholesale in that practice. For example, Firelands cannot seriously contend that the

information in Answer 18 is irrelevant and inadmissible while simultaneously arguing that the economic conclusions of its hearsay JEDI model should be admitted. Firelands' motion to strike Question and Answer 18 of Mr. Shieldcastle's testimony is meritless and should be rejected.

XI. Firelands' Bat and Bird Surveys Are Fatally Flawed, Notwithstanding Firelands' Claims That It Complied With USFWS' And ODNR's Survey Protocols.

Firelands argues (at 22, 26) that it used survey methods for birds and bats recommended by USFWS and ODNR and that it completed more surveys and logged more minutes of observation than requested by those agencies. Firelands has provided (at 22) a table of bird surveys and their years. Based on this table, only nine of these 23 surveys occurred in the last five years. The other 14 surveys no longer accurately represent current conditions. For example, Mr. Farmer testified that eagle surveys are considered to be "stale" and "probably less applicable" after five years. Farmer, Tr. II 281:7-20. Additional eagle studies were done because eagle population has increased. Good, Tr. II 260:6-10. Moreover, Firelands fails to acknowledge that none of the surveys were conducted on the entire Project Area, but only in portions of it, and thus do not represent cumulative data points. Thus, it should come as no surprise, nor is it cause for acclamation, that Firelands' has conducted additional surveys and logged extra observation minutes to supplement its many outdated surveys.

Firelands makes a big deal (at 17, 22, 23, 24, 25, 45) about its surveys supposedly following USFWS and ODNR protocols and recommendations and about the agencies' purported acceptance of the results without requesting more work. This argument does not demonstrate that Firelands' wildlife surveys were accurate or complete, for five reasons.

First, the ODNR and USFWS protocols used by those agencies and Firelands are old, obsolete, and badly in need of updating. Shieldcastle, Tr. VII 1010:24 - 1011:25. The effectiveness of USFWS' 2012 "Land-Based Energy Guidelines" (Applic. Exh. 48) was blunted

from the beginning by politically-based compromises made in its drafting, and now additional scientific information gleaned over the last eight years calls for its update. Shieldcastle, Tr. VII 1011:13-25. Even the Ohio Division of Wildlife believes these guidelines need revision. Shieldcastle, Tr. VII 1011:3-4. Similarly, ODNR's 2009 protocol is 11 years old and is outdated. Applic. Exh. 47; Smallwood Testimony, p. 49, lines 1-2.

Second, Firelands did not produce any witnesses from ODNR or USFWS to testify that Firelands complied with the agencies' protocols, and the evidentiary record reveals that Firelands actually did not comply with these protocols in critical respects. Shieldcastle, Tr. VII 938:16-20. Correspondence between the government agencies and Firelands reveals that the agencies were letting Firelands get away with breaches of the agencies' protocols. For example, the USFWS allowed Firelands to reduce its Indiana bat surveys and use a buffer of only 2.5 miles from Indiana bat roosts in the northern portion of the Project Area, even though USFWS' "outer-tier" guidance did not allow for this break. Application Exh. K-2, pp. 2, 4. In a second example, an ODNR representative on December 19, 2017 reluctantly informed Firelands that, since her predecessor at ODNR had accepted Firelands' acoustic bat surveys, she would not require additional acoustic bat surveys if Firelands' OPSB application was submitted "in the coming year." Application Exh. K-4, pdf p.1. Firelands did not submit its Application during 2018 and waited until the end of January 2019, but ODNR nevertheless did not require Firelands to update its acoustic bat surveys even though they are nine years old. Application Narrative, pp. 136-137.

In another example of Firelands' failure to comply with the agencies' wildlife survey protocols, ODNR's protocol requires the tracking of adult raptors (which includes eagles) whose nests are within two miles of the project for at least four hours twice per week during the egg incubation and nestling rearing stage until consistent patterns are established. Applic. Exh. 47,

“On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio,” p. 3, § 1.2.1. But Firelands’ 2018 eagle nest monitoring was conducted for only one hour twice per week, i.e., only one quarter of the time requested by ODNR’s protocol.⁷ Farmer Testimony, p. 5, lines 13-18; Application Exh. R-2, p.4. And, whereas ODNR’s protocol calls for monitoring every active eagle nest within two miles of the Project Area (Applic. Exh. 47, p. 3, § 1.2.1), Firelands’ 2018 monitoring covered only two of the six eagle nests within two miles of the Project Area known to be active in 2018. See Application Exh. R-2, p. 1 (stating that only two nests were monitored); Farmer Testimony, Attachment CF-2 (identifying six active eagle nests within two miles of the Project Area in 2018).⁸ In 2020, Firelands monitored the newly discovered Nest # 25 (the Bellevue Reservoir 5 nest) for four hours between April 3 to July 8 (Farmer Testimony, p. 13, lines 22-27), which obviously also does not comply with ODNR’s protocol to monitor for four hours twice per week. Now 11 active eagle nests are known within two miles of the Project Area, so eight of those nests have not been monitored, in contradiction to the ODNR protocol. Beck Testimony, pp. 4-5 (identifying 11 active eagle nests within two miles of the Project Area in 2020). Remarkably, the two-nest study in 2018 and the one-nest study in 2020 are the only eagle nest monitoring surveys conducted since 2010. Farmer Testimony, p. 4, line 12 – p. 15, line 20 (summary of all reports on eagles and other raptors, which includes some eagle survey points located randomly around the Project Area and some surveys looking for eagle nests, but no eagle nest monitoring studies since the September 10, 2010 eagle nest monitoring report (Application Exh. R-8)). Eagle surveys are considered to be “stale” and “probably less applicable” after five years. Farmer, Tr.

⁷ Section 1.2.1 is included in the “minimum” level of surveying effort, so it applies to all projects. *Id.*, p. 1, 2nd paragraph.

⁸ Separately, Firelands watched another eagle nest (# 20) for four hours on two days in 2018 and concluded it was inactive. That nest subsequently was found to be active in 2020. Farmer Testimony, Attachment CF-2.

II 281:7-20. In this case, Firelands has monitored only three eagle nests in the last 10 years, it did not comply with ODNR protocol for even that monitoring, and it has not monitored eight of the 11 currently active nests at all.

With that record, Firelands cannot accurately represent that it has complied with all agency protocols for monitoring wildlife. And if the agencies have expressly or tacitly allowed Firelands to get away with such deviations from their protocols, then it is not surprising that the record contains so little useful data on bird and bat presence in the Project Area.

Third, notwithstanding Firelands' assertion that it followed the agencies' protocols, its supposed adherence to them did not produce surveys that were accurate and adequate. For example, according to Firelands, ODNR and USFWS have accepted Firelands' eagle nest surveys as compliant with their protocols. Yet a local Resident was able to find seven bald eagle nests in 2020 within two miles of the Project Area that Firelands' Copperhead consulting company missed while flying its airplane back and forth over the area. Beck Testimony, pp. 4-5, Answers 10, 11. Still, Firelands claims (at 23) that Copperhead's 2020 survey was "conducted in accordance with the USFWS ECPG [Eagle Conservation Plan Guidance]." Missing seven out of 11 eagle nests is hardly a valid survey, notwithstanding that Firelands contends that Copperhead followed USFWS guidance and even if the government agencies failed to request additional information.

Fourth, implementing USFWS' and ODNR's protocols is not a license to disregard all scientific standards for conducting bird and bat surveys. The survey methods utilized in the agency protocols are not unique to pre-construction studies for wind projects, but are standard methods that every experienced wildlife biologist uses in bird and bat surveys. Accordingly, while Firelands might point out that Mr. Shieldcastle himself does not perform pre-construction

bird surveys for wind projects under these protocols, the agency protocols call for survey methods that Mr. Shieldcastle has used for 46 years. Similarly, Shawn Smallwood has decades of experience in conducting bat surveys using the same methods as contained in the agency protocols. Notably, the biologists in USFWS and ODNR probably do not conduct their own pre-construction surveys for wind projects under their protocols, but Firelands still claims to value their acquiescence to Firelands' surveys. Mr. Shieldcastle and Mr. Smallwood have identified a multitude of mistakes and deceptive techniques in Firelands' survey methods, and Firelands' use of the agency protocols does not excuse the company's breaches of commonly accepted survey methods.

Fifth, notwithstanding Firelands' blaming USFWS and ODNR for Firelands' deficient studies, Firelands is responsible for the contents of its Application and not the agencies. For example, even though Firelands represents that USFWS and ODNR said they would not require nocturnal radar surveys of migrating birds (Good, Tr. II 203:12-19), Firelands is still responsible for assessing its turbines' threat to nocturnally migrating birds for the OPSB in this major migratory route. From Mr. Good's testimony (*id.*), it appears that those agencies provided that ill-advised recommendation based solely on how many birds stop over in the Project Area without considering how many birds travel at night in the air column there to reach the stopover areas along Lake Erie. Firelands' blind adherence to this recommendation has left OPSB without the data to determine the degree to which Firelands' turbines may harm those migrants. If Firelands wants to argue that its turbines will not kill inordinate numbers of migrants, it is Firelands, not the agencies, that has the responsibility to prove its argument. Firelands' success in persuading the agencies to cut corners on wildlife studies does not excuse Firelands' duty to make sure the studies accurately and adequately assess the potential threats of its turbines to

wildlife. The USFWS made this principle abundantly clear to Firelands early in the development of this project, stating:

These recommendations are intended to be a “starting point” for a developer in their pre-construction monitoring for bald and golden eagles. Ultimately, it is the responsibility of the developer to conduct their own **sufficient** monitoring for eagles and to site any wind turbines at the most appropriate location to avoid take of eagles.

Application Exh. K-12, pdf p. 2 (emphasis in original). Dr. Smallwood, an expert in bird and bat surveys, testified that protocols are not meant to restrict the amount of data collected, and that the “impacts that need to be analyzed cannot be so analyzed by sticking solely to protocols on data collection.” Smallwood Testimony, p. 50, lines 10-17 & p. 51, lines 3-5. He often exceeds minimum protocol standards in order to obtain accurate results. Smallwood Testimony, p. 50, lines 17-21. Although ODNR and USFWS have provided Firelands with recommendations for the studies, Firelands is not free to shift its duties under R.C. Chapter 4906 and OPSB’s rules to the agencies.

XII. The Certificate Should Contain A Turbine Curtailment Plan For Reducing Bird Collisions With Turbines.

The initial brief of BSBO and the Residents requested that any certificate, if issued, require the turbines to be feathered during the birds’ spring and fall migratory seasons.⁹ Firelands’ initial brief contains no information demonstrating that this request is unreasonable. As requested in our initial brief, the certificate should require all post-construction mortality monitoring results for birds to be filed on OPSB’s online docket for public review to increase honesty and transparency in the monitoring procedures and results.

⁹ ODNR identifies the bird migratory seasons as April 1 to May 31 and August 15 to November 15 for passerines, March 15 to May 1 and September 1 to October 31 for diurnal birds and raptors, and April 15 to May 31 and July 15 to October 15 for shorebirds.

XIII. OPSB Should Not Issue A Certificate Allowing The Construction Of A Wind Project In An Area With A Flourishing And Expanding Bald Eagle Population.

A. Because The Ongoing Discoveries Of New Bald Eagle Nests Demonstrates That Bald Eagles Will Continue To Establish New Nests Throughout And Near The Project Area, The Board Should Not Approve The Emerson Wind Project.

As evidence for its hypothesis that turbines pose little risk to bald eagles, Firelands cites (at 23) testimony from its WEST consultant Christopher Farmer that news stories have reported only one bald eagle death from a turbine strike in Ohio. Firelands argues (at 23) that, for context, Ohio has 39 operating wind projects with a total of 419 turbines and that 11 of these projects are closer to Lake Erie, where eagle densities are highest, than Firelands' Project. All of these statements are misleading, and none of them indicate that bald eagles are at low risk for turbine collisions.

First, looking at news articles for eagle mortalities in Ohio is hardly a scientific or reliable method for determining risk to eagles. Mr. Farmer said that he "did an online search" for news stories on eagle mortalities, looked for eagle mortalities reported pursuant to Take Permits (but no Ohio wind projects have such a permit), and looked at WEST's database of fatalities it had recorded. Farmer, Tr. II 295:19 - 297:5. That is, Mr. Farmer relied primarily on non-scientific internet news stories about eagle mortalities in Ohio. But the likelihood of any eagle death at a wind project being known to the news media is slim. Ohio's wind companies keep their bird mortalities secret, and OPSB's Staff are complicit in that subterfuge by allowing them to keep the mortalities secret just as they propose Firelands to conceal its mortality data in this case.

Second, except for isolated, uncertificated turbines of unspecified size, Ohio's operating wind turbines are not located in populous bald eagle territories. Mr. Farmer tried to portray the

opposite picture by testifying that “11 projects” out of 39 operating Ohio wind projects are located “close to the shore of Lake Erie, where bald eagle population densities are the highest.” Farmer Testimony, p. 20, lines 20-23. He said that these 11 projects are located in Sandusky County or other counties abutting Lake Erie. Farmer, Tr. II 299:21 – 300:11. But he did not know whether those 11 “projects” each had only one turbine nor did he know the turbines’ heights or diameters. Farmer, Tr. II 298:1-11, 299:7-17, 300:12-18. He did not know whether these 11 projects were subject to OPSB jurisdiction or whether they were required to report eagle mortalities. Farmer, Tr. II 299:7-17, 301:2-6.

Staffer Mark Bellamy, who unlike Mr. Farmer knows where Ohio’s certificated wind projects are located, exposed the fallacy of Mr. Farmer’s logic. He testified that all of the 364 wind turbines regulated by OPSB are located in counties that do not abut Lake Erie. Bellamy, Tr. III 445:4 - 447:1. This means that Ohio hosts only 55 additional turbines, which must be in groupings below the five megawatt threshold subject to OPSB regulation. R.C. 4906.13(A); R.C. 4906.20(A). Mr. Bellamy could think of only two unregulated turbine installations with more than one turbine, and they have no more than “several” turbines. Bellamy, Tr. III 449:17 – 450:4. Moreover, a single turbine of the sizes of those proposed by Firelands has a capacity of 3.0 to 5.7 megawatts (Applic. Exh. 4, Attachment 1, pdf p. 6), so few turbine groups are likely to contain more than one turbine. Consequently, the 11 wind “projects” stated by Mr. Farmer to be in counties abutting Lake Erie are likely to have few and shorter turbines in them and probably only one apiece. Mr. Farmer’s attempt to equate the risk to eagles from an isolated turbine here and there with the threat from Firelands’ large wind installation is not credible.

The foregoing facts expose Mr. Farmer’s inexperience with bald eagles and wind turbines in Ohio. In Mr. Farmer’s 21 years of experience in conducting wildlife studies, he has

performed only one wildlife project in Ohio, in contrast to Mark Shieldcastle's 46 years of experience in wildlife studies in Ohio. Farmer Testimony, Attachment CF-1, Resume, p. 1; Farmer, Tr. II 266:15-20; Shieldcastle Testimony, Exh. A, Resume, pp. 1-2. And while Mr. Shieldcastle conducted surveys of eagles and other wildlife throughout Ohio, including the Project Area, as an official in the Ohio Division of Wildlife for 30 years (Shieldcastle, Tr. VII 935:11 – 936:14), Mr. Farmer has no experience in a government wildlife agency. Shieldcastle Testimony, Attachment CF-1, Resume. Mr. Farmer's sole Ohio project was situated in Crawford County, which is south of the Project Area. Farmer, Tr. II 266:18-25. So, unlike Mr. Shieldcastle, who has studied bald eagles throughout all of Ohio for decades, Mr. Farmer has not studied or observed the eagles "close to the shore of Lake Erie" or elsewhere in Ohio other than, possibly, a single project in Crawford County. Without that knowledge, Mr. Farmer cannot say whether that any bald eagles "close to the shore of Lake Erie" or elsewhere in Ohio are situated near wind turbines.

Mr. Farmer's assertion also betrays his willingness to slant the facts to advocate his customer's position. No credible expert witness would base a scientific opinion about the number of eagle mortalities in Ohio on an internet search of newspapers and other lay sources. Nor would a credible expert opine that turbines in Ohio have rarely killed eagles without knowing whether eagles are actually present in the vicinity of turbines.

B. If The Board Does Approve The Project, The Board Should Establish A 2.5-Mile Buffer Between All Turbines And Any Existing Or Future Eagle Nest In And Near The Project Area For The Eagles' Safety.

Firelands claims (at 23) that its eagle nest monitoring surveys revealed that eagle activity was concentrated within a half mile of each nest location. But Firelands conducted its eagle surveys in a manner that precluded an accurate portrayal of the eagles' travel distances. And

even Firelands' limited eagle observation data refutes any concept that bald eagles stay within a half mile of their nests.

For this proposition, Firelands cites (at 23, fn. 78) two surveys: (1) Application Exh. R-2, a WEST report of September 27, 2018 entitled "Eagle Nest Monitoring Surveys for the Emerson North Wind Project in Erie, Huron and Seneca Counties, Ohio; and (2), Application Exh. R-3, a WEST memorandum of June 13, 2018 from Goniela Iskali to Jennie Geiger about a raptor nest survey. The apparent intent of Firelands' assertion is to imply that turbines farther than a half mile from eagle nests do not threaten the eagles' safety, since the eagles stay close to the nest. This conclusion is inaccurate. Shieldcastle Testimony, p. 23: lines 18-19. Neither of Firelands' exhibits, nor the evidence in the record, supports any such conclusion, for five reasons.

First, the two cited reports on eagle nest surveys do not even establish that eagle activity observed on those occasions was concentrated within a half mile. Mr. Farmer's written testimony states that Application Exhibit R-2 summarized observations of bald eagle activity "concentrated within 0.5-1.0 miles of the nests." Farmer Testimony, p. 5, lines 23-24. Application Exhibit R-3 provides no information about how far the eagles travel.

Second, Firelands limited the distances in which it reported eagle activity in the eagle nest surveys, such as Exhibit R-2, and its point count surveys. Exhibit R-2 shows this clearly in Figures 2 and 3, which use lines to record eagle flights. Application Exh. R-2, pp. 6-7. In both figures, numerous eagle flight lines end abruptly without showing the eagles' return to the nests. This means that the observer lost sight of the eagles, or for some reason did not record the rest of the flights. Many of those flight lines ended as the eagles are still flying away from the nest, thus failing to record how far the eagles flew. Naturally, if the observers stopped observing or recording eagle movement beyond a mile, the average of recorded eagle movements cannot

exceed a mile and will paint a misleading portrait of eagle traveling distance. Shieldcastle Testimony, p. 24, lines 13-17. Yet Firelands is relying on this purposely truncated data to argue that eagle activity was concentrated within a half mile of the nests.

Third, the amount of time spent on the surveys in Exhibit R-2 was so limited, that it failed to provide an accurate portrayal of eagle activity. In that survey, one eagle nest was watched for one hour twice per week between April 17, 2018 and June 27, 2018, and another nest was watched for one hour twice per week between May 2, 2018 and June 28, 2018. Application Exh. R-2, p. 4. That is, these nests were watched during part of the nesting period, when eagles are more likely to stay close to the nest. Shieldcastle Testimony, p. 23:14 – p. 24:2. This does not account for the eagles' larger range at other times of the year. *Id.*

Fourth, other Firelands' surveys find considerable activity away from the eagle nests. For example, the point count surveys in the northern Project Area in 2016-2017 found almost as many eagle sightings (7) at a location not close to an eagle nest as they did at another location within 0.3 mile of an eagle nest (11 sightings). Application Exhibit S-1, "Large Bird and Eagle Use Surveys for the Emerson Creek Wind Project, Huron and Erie Counties, Ohio," May 8, 2018, p. 10. Another Firelands eagle survey, which included 10 survey points within three miles from a bald eagle nest, showed just as much eagle activity over a year's time at a point three miles from the nest (at Point B4) as it did at the nest (Point B1). See Application Exh. S-3, "Wildlife Baseline Studies for the Emerson Creek Wind Resource Area, Seneca and Huron Counties, Ohio," Feb. 6, 2013, p. 10 (recounting that survey points were set up on three-mile transects from the eagle nest), p. 26 (stating that eagle activity was highest at the eagle nest located at Point B1 and southwest of the nest at Point B4), pp. 27-28 (figures showing the eagle flights, quantifying eagle use minutes, and containing a scale showing that Points B1 and B4

were three miles apart). Rather than supporting Firelands' implication (at 23) that eagle activity is concentrated within a half mile of a nest, the two studies in Applicant's Exhibits S-1 and S-3 are more consistent with the Ohio Division of Wildlife reports finding that eagles concentrate their activities within 2.5 miles of the nest based on 30 years of statewide surveys conducted under Mr. Shieldcastle's supervision. Shieldcastle, Tr. VII 977:8-19.

Fifth, the premise that eagles are at risk only within a half mile of the nest is inconsistent with the agency guidance that Firelands professes to follow in its wildlife surveys. Recently, the USFWS recently revised its Eagle Conservation Plan Guidance to require eagle surveys within two miles of a wind project's boundary to match the eagles' common flying range. Applic. Exh. 46. ODNR's protocol has always required wind project developers to track any raptors (which include eagles) whose nests are located within two miles of the proposed site. Applic. Exh. 47, p. 3, § 1.2.1. Obviously, USFWS and ODNR do not believe that eagles stay within a half mile of their nests. Nor should the Board accept Firelands' representation that they do.

Firelands recounts (at 23) that it moved the Project boundary to get away from two eagle nests that otherwise would have been inside the Project Area. This act shows that Firelands knows that its Project Area should not include eagle nests. Continuing that theme, Firelands represents (at 47) that its Application provides that "[t]urbines will be sited to avoid known bald eagle nests and known areas of concentrated eagle use." Emphasis added. This is a good idea. In fact, even Firelands' consultant WEST made that recommendation, stating in the report on one of its eagle surveys that "[t]he presence of an active bald eagle nest within the Project may warrant management consideration such as avoiding siting turbines in close proximity to the nest to reduce potential collision risk." Application Exhibit S-1, p. 15. But the Application makes no such promise. The Application actually states, falsely, that the "turbines have been sited to avoid

bald eagle nests and areas of concentrated eagle use.” Application Narrative, p. 160. Neither the Application nor the Stipulation requires Firelands to abandon any turbine site to avoid eagle nests or use areas. The Board should require Firelands to honor the commitment in its brief (at 47) that “[t]urbines will be sited to avoid known bald eagle nests and known areas of concentrated eagle use,” and add that condition to the certificate.

XIV. OPSB Should Deny The Certificate For The Project Or Require Firelands To Perform The Bird And Bat Surveys Necessary To Accurately Assess The Project’s Threats To Wildlife.

The pro-wind Allison paper acknowledges that many states and federal agencies have developed guidelines for siting practices intended to prevent adverse impacts from wind turbines to wildlife, such as avoiding major avian migratory routes. Applic. Exh. 85, p. 14. The Project Area is in a major avian migratory route and is populated with bald eagles, and no turbines should be built there. Consequently, the Board should deny the certificate requested by Firelands. After all, Firelands knew that the Project Area was in this migratory route and that it was occupied by bald eagles well before the company filed its Application.

If OPSB decides not to deny the certificate immediately, it should not issue a certificate without the data necessary to evaluate the Project’s threat to birds and bats. Instead, the Board should direct Firelands to re-do its avian surveys, including the performance of a spring and fall radar survey of nighttime passerine migration and properly conducted eagle survey. Firelands’ reports on these surveys should then be subjected to reopened discovery, staff investigation and report, and hearing before OPSB acts on the Application.

XV. Firelands Has Not Done The Investigation Necessary To Find Out Whether The Wind Project Will Impair Emergency Evacuations By Air.

Firelands argues (at 41) that helicopters for emergency medical service (“EMS”) can be safely operated inside and near the Project. Firelands, citing Francis Marcotte’s testimony,

represents (at 41) that there should be no significant time delay for an EMS helicopter to arrive on the scene “during a flight with clear weather, good visibility, and ceilings above 1,000 feet.” This begs the question about what delay will occur when a helicopter needs to evacuate a patient in conditions of poor weather, poor visibility, or ceilings lower than 1,000 feet. After all, bad weather and poor visibility are prone to increasing traffic accidents that necessitate victim evacuation. A local nurse who for 30 years has worked in a rural hospital emergency department testified about her concerns at the public hearing that Life Flight evacuations could take longer and jeopardize their ability to timely transport victims to hospitals. Transcript of Public Hearing, Aug. 20, 2020, pp. 99-100 (testimony of Catherine Limbird). She noted that accidents occur in the area, which experiences a great deal of tourist traffic. *Id.*, p. 100.

Mr. Marcotte admitted that the wind project can make a helicopter fly for a longer distance to reach an evacuation scene, thus delaying the flight by what he characterized as “not necessarily a significant delay.” Marcotte, Tr. V 657:7 – 658:17. He opined that initial responders would already stabilize the patient while awaiting the helicopter, but he admitted that he could not say whether the delay would adversely impact the patient because he is “not a specialist in that area.” Marcotte, Tr. V 657:19-23, 658:18-23. He could only “recognize that the response time to all of these crews are essential. Marcotte, Tr. V 658:23-24. Unfortunately, Mr. Marcotte could not answer these questions, because he did not even consult with local EMS agencies to find out how the wind turbines will affect their operations. Marcotte, Tr. V 654:1-4. The Board should not issue a certificate for this Project until the answers to these questions have been provided.

XVI. The Project Will Lower Property Values In The Community.

Firelands contends (at 40) that the presence of wind turbines will not reduce the value of the neighbors' homes and land, based on the testimony of Michael MaRous. Mr. MaRous is a real estate appraiser whose work is in major part tied to providing expert testimony to litigants. Applic. Exh. 40, MaRous Testimony, Attachment MM-1, pdf p. 149 (resume). That is, he is an advocate for whomever hires him to testify rather than an impartial arbiter on property valuation. He has provided services for 27 wind projects (*id.*, pdf p. 156), so he is beholden to wind power companies. In short, Mr. MaRous' opinions are tainted with bias.

Firelands argues (at 40) that Mr. MaRous conducted a Market Impact Analysis "specific to Ohio and the Project Area" concluding that wind projects do not reduce neighboring property values. In this study, Mr. MaRous employed a technique known as paired sales analysis to make his argument that the presence of wind turbines does not reduce neighboring property values. MaRous Testimony, p. 4, lines 17-30. In this analysis, the sales price in dollars per square foot for one property is compared with the sales price for another property that has similar characteristics, except for the one factor whose impact on sales price is being measured. *Id.*, lines 26-30; MaRous, Tr. IV 540:20-25. For such an analysis to be valid, the compared properties must be nearly identical except for the factor being evaluated. MaRous, Tr. IV 541:1-5. However, "identical is not something that generally happens in market condition." MaRous, Tr. IV 541:5-6. This results in rampant subjectivity by the reviewer as to whether the compared properties are actually comparable.

Mr. MaRous compared four pairs of properties in Paulding County with the stated goal of determining whether wind projects there were affecting sales prices. MaRous, Tr. IV 541:12-16. Each pairing compared the sales price of a property near a wind project with a property not near a wind project. MaRous, Tr. IV 541:17-21. But "probably in excess of 50" homes with views

of wind turbines have been sold since wind farms opened there around 2012. MaRous, Tr. IV 541:25 – 542:8. Surely, out of more than 50 sales of homes near turbines, Mr. MaRous could have found more than four properties comparable to other homes sold in Paulding County since 2012. The fact that he chose only four homes for his comparisons undoubtedly indicates that the other sales did not support the testimony that Firelands had hired him to render.

Instead, Mr. MaRous paired 26 additional properties in seven other states to complete his paired sales analysis. MaRous Testimony, p. 4, lines 24-26; *id.*, Attachment MM-1, p. iii (pdf p. 15) (a table of contents listing the pairs). Thus, contrary to Firelands’ claim (at 40), this study actually is not “specific to Ohio and the Project Area.” Instead, Mr. MaRous cherry-picked a limited number of paired sales from around the country that supported the opinion he wanted to give.

Firelands contends (at 40) that a survey of county auditors concluded that wind projects do not reduce property values. Mr. MaRous conducted this survey, which consisted of just some phone calls to county auditors and deputy auditors. MaRous, Tr. IV 548:5-8. MaRous made these calls to solicit information from the auditors, because he has little practical experience of his own in selling or buying homes that would inform his opinions. He spends less than 5% of his time as a broker for purchasing and selling properties and has been involved in only 5 to 10 property transactions in the last year. MaRous, Tr. IV 539:19 – 540:7. And even those transactions were not in Ohio, as he is licensed as a real estate broker only in Illinois. *Id.*, Tr. IV 539:15-18.

Lacking his own transactional experience, Mr. MaRous talked to auditors or deputy auditors in three Ohio counties that host wind projects to find out what they thought about turbine impacts on nearby property values. MaRous Testimony, p. 5, lines 1-8. According to

Mr. MaRous' rendition of this hearsay, the auditors said they did not believe wind turbines were reducing property values. *Id.*, lines 10-13. Of course, the auditors would take this position, because, as Mr. MaRous admitted from his perspective as a former public official, their mission is to "maintain and increase tax levels where possible and where legal." MaRous, Tr. IV 545:6-21. Certainly, the auditors realized that if they admitted that turbines decrease property values, those statements could be used against them in property tax appeals. So they would not admit any devaluation that had occurred.

Mr. MaRous also asked the auditors' offices whether, in the prior 18 months, they had had any appeals for property values impacted by wind projects. MaRous Testimony, p. 5, lines 15-17. However, the wind projects in these counties had opened as long ago as 2011. MaRous, Tr. IV 548:17 – 549:13. So any appeals would have been filed prior to the 18-month period about which Mr. MaRous inquired, since neighboring properties would have experienced their loss of value as soon as the wind project opened.

Mr. MaRous also noted that agricultural land is not appraised according to market value, but instead is assessed based on the income from the crops grown on that land. MaRous Testimony, p. 5, lines 24-25; MaRous, Tr. IV 553:5-21. However, the auditors' assessments of homes are not subject to that productivity formula, so their values are still vulnerable to wind turbine impacts.

Firelands asserts (at 40) that some peer-reviewed studies performed by persons other than Mr. MaRous have found no statistical evidence that turbines reduce property values. Mr. MaRous described these studies in his testimony. The study on which he placed the most emphasis was conducted by Lawrence Berkeley National Laboratory ("LBNL"). MaRous Testimony, p. 6, line 3 to p. 7, line 9. Mr. MaRous cites several other studies, too, but he does

not reveal whether they were sponsored by the wind power industry or their paid surrogates in the educational and professional fields. MaRous Testimony, p. 7, line 11 to p. 8, line 27.

Firelands emphasizes (at 40) that the foregoing studies were peer-reviewed, and Mr. MaRous' testimony states that no peer-reviewed studies have found that turbines reduce property values. MaRous Testimony, p. 8, lines 31-32. However, peer review is not necessary to establish accuracy, as Mr. MaRous admitted. In fact, Mr. MaRous' Market Impact Analysis has not been peer reviewed, but yet Mr. MaRous considers it to be accurate. MaRous, Tr. IV 544:22 – 545:5. Mr. MaRous acknowledges that other real estate appraisers have found negative impacts from wind turbines on property values. MaRous, Tr. IV 557:20-22.

In June 2020, a published study sponsored by the Dutch Ministry of Economic Affairs and Climate Policy ("Ministry") found that tall (> 150 m.) wind turbines depress house prices within two kilometers by 5.4%. LR Exh. 7, abstract, pdf. pp. 3-4. The report was based on detailed data from the Netherlands between 1985-2019. *Id.*, abstract, pdf p. 4. A previous draft of the report had been reviewed by a discussion group organized by the Ministry, so the paper was peer-reviewed. *Id.*, abstract, pdf. pp. 3-4. The study's authors had no bias against wind turbines, as they opined that they are "an important step" towards controlling climate change. *Id.*, p. 25 (pdf p. 29). This comprehensive study, based on 35 years of data in a country with numerous wind turbines, demonstrates that turbines reduce property values within two kilometers, or 6561 feet. This means that the Residents, and many of their nonparticipating neighbors, will be the victims of reduced property values due to Firelands' turbines.

XVII. The Application And Firelands' Evidence Fail To Identify And Quantify The Economic Damage The Project Will Impose On Local Residents And Businesses.

Firelands represents (at 58-60) that the Project will serve the economic welfare of the community. Erf and Yingling (at 5-7) that the community around the Project will benefit

financially from income derived from the wind project. They presumptuously entitled their initial brief as the brief of the “Local Farmers” as if to imply that they represent the wishes of all local farmers. They do not, as Resident farmer Gerard Wensink would attest.

Firelands touts (at 59) the economic benefits projected for the Project by the Jobs and Economic Development Impact (“JEDI”) model created by the U.S. Department of Energy (“DOE”). Erica Tauzer of EDR performed the modeling for the Project, but she is trained as a biologist and environmental scientist, not an economist. Applic. Exh. 36, Tauzer Testimony, p. 2, lines 14-16. The results of her modeling analysis are provided in Application Exhibit F.

Neither Exhibit F nor Ms. Tauzer’s testimony attempt to identify the economic costs and damage to the public from this Project. For example, there are no analyses of the losses of property values suffered by the Project’s neighbors (Tauzer, Tr. V 638:6-9), the costs to taxpayers from government subsidies for the Project (*id.*, 637:24 – 638:5), losses to farmers from killing bats that otherwise would eat insects that destroy the farmers’ crops (*id.*, 640:3-21), or the losses from the reduction in bird populations to local businesses who depend on birdwatching tourism (*id.*, 641:5-20). Firelands did not determine whether its electricity production would displace and reduce the electricity sales of the Davis-Besse Nuclear Plant or any other energy providers, nor did it quantify the direct and indirect losses of any such energy suppliers in terms of lost jobs, lost tax revenues, and the ripple effects on the local economy from the loss of revenue from the loss of jobs. *Id.*, 642:14 – 645:7. Ms. Tauzer testified that the JEDI model takes into account “a small degree of negative impacts to the sectors.” Tauzer, Tr. V 646:11-17. However, Application Exhibit F and the Application do not analyze or even mention any of the negative economic impacts on local commercial and industrial activities, nor do they do any analysis to conclude that no such negative impacts will occur. See Application Narrative, p. 38

(discussing only the positive impacts on local commercial and industrial activities).

Consequently, Firelands' Application does not comply with the mandate in OAC 4906-4-06(E)(4) to "provide an estimate of the economic impact of the proposed facility on local commercial and industrial activities."

Erf and Yingling also argue (at 7-8) that, based on their testimony and internet articles that are not part of the evidentiary record, this Project will reduce climate change. Erf and Yingling have no scientific expertise to render this opinion, and their testimony was not admitted for that purpose. Tr. VI 799:2-22. The Board may not consider the internet articles cited in their brief for this proposition.

Firelands states (at 58-59) that the Project complies with all local land use plans. But Nate Pedder, Firelands' project manager, admitted that none of the local land use plans have any provisions related to wind projects. Pedder, Tr. I 105:3-12.

Erf and Yingling cite (at 6-7) the testimony of four citizens at the public hearing in this case who believed that the Project would benefit the community financially. Similarly, Firelands states (at 58) that "testimony from the community" supports the idea that the Project will promote farmers' viability by supplementing their income. However, the testimony at the public hearing dispelled any thought that the community as a whole supports this Project, with only 18 local citizens testifying in support of the Project and 25 testifying against it. Transcript of Public Hearing, August 20, 2020.

The Residents believe that there is nothing wrong with taking responsible actions to earn an income. However, when a person makes money by taking someone else's property or jobs, as Firelands intends to do, its actions are the product of greed. One concerned resident testified at the public hearing about her perception that big wind "is really promoting the biggest scheme of

modern time to transfer ... wealth from the poor to the rich.” *Id.*, p. 21 (testimony of Cheryl Mira). That comment aptly sums up the economic impacts of this Project.

XVIII. Conclusion

The Stipulation proposed by some of the parties to this case, if accepted, would grant a certificate for the Project based on an Application that violates the Board’s rules in a multitude of ways as described herein and in our initial brief. The Board cannot circumvent its own rules by approving a deficient application or by issuing a certificate that violates those rules. Nor can it accept a Stipulation that (1) proposes to approve an Application that has not identified and described the nature of the probably environmental impact under R.C. 4906.10(A)(2) and (2) lacks the conditions necessary to protect the public. The Board cannot approve a Project that does not meet the statutory criteria under R.C. 4906.10 for representing the minimum adverse environmental impact under R.C. 4906.10(A)(3) and serving the public interest, convenience, and necessity under R.C. § 4906.10(A)(6). For these reasons, the Stipulation violates important regulatory principles and practices and is contrary to the public interest.

Respectfully submitted,

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CERTIFICATE OF SERVICE

On December 4, 2020, the docketing division's e-filing system will electronically serve notice of the filing of this document on the persons listed below. On December 4, 2020, I also served a copy of this filing by electronic mail on the following persons:

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Summary: Brief (Post-Hearing Brief) electronically filed by Mr. Jack A Van Kley on behalf of Erie, Huron & Seneca County Residents