

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

**APPLICATION FOR REHEARING OF THE LOCAL
RESIDENTS AND THE BLACK SWAMP BIRD OBSERVATORY**

This Application for Rehearing is filed pursuant to R.C. 4903.10 and Ohio Administrative Code (“OAC”) 4906-2-32(A) 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 Application and its Memorandum in Support are filed on behalf of the Residents. The facts and arguments in the Application and Memorandum in Support about birds, bats, and economics are also filed on behalf of BSBO.

As their grounds for rehearing, the Residents and BSBO submit that the Opinion, Order, and Certificate (“Opinion”) of the Ohio Power Siting Board (“Board”) dated June 24, 2021 is manifestly against the weight of the evidence, is so clearly unsupported by the record as to show misapprehension, mistake, or willful disregard of duty, fails to show in sufficient detail the facts in the record upon which the Opinion is based and the reasoning followed in reaching its conclusion, and is unlawful and unreasonable for the following reasons:

The Board did not find and determine the nature of the probable environmental impact of the wind project (“Project” or “Facility”) under R.C. 4906.10(A)(2), because Firelands Wind, LLC (“Firelands”) failed to provide the information in the evidentiary record required by the Board’s rules necessary to make such a finding and determination.

The Board erred in finding and determining that the Project will serve the public interest, convenience, and necessity under R.C. 4906.10(A)(6), since local opposition to the Project is overwhelming.

The Board erred by failing to identify, consider, and/or evaluate the detrimental socioeconomic impacts of the Project.

The Board erred in issuing a certificate that fails to establish setbacks and other protections necessary to prevent wind turbine noise from causing discomfort, annoyance, sleep deprivation, and health disorders, for the following reasons: (1) the Board erred in accepting Firelands’ improperly conducted and inaccurate background sound survey, which was designed to make the ambient sound level appear to be higher than it actually is, including measuring unrepresentative noisy locations, thus preventing the Board from determining the nature of the Project’s probable environmental impact; (2) the Board erred in accepting background sound measurements from locations outside of the Project Area in contravention to OAC 4906-4-09(F)(2); (3) the Board erred in basing its noise limit on an average of widely varying background sound measurements inside and outside of the Project Area, which fails to protect the quieter areas from large noise increases above five dBA, instead of basing its limits on the background sound level at the site of the nonparticipating receptor; and (4) the Board erred in allowing turbine noise to exceed 40 dBA, which can cause discomfort, annoyance, sleep deprivation, and health disorders.

OPSB's interpretation of OAC 4906-4-09(F)(2) to require Project-wide averaging of background sound measurements throughout the Project Area and then to use the average background sound level to calculate a Project-wide noise limit even where such averaging exposes the quieter areas to intolerable noise increases makes this certificate and OAC 4906-4-09(F)(2) arbitrary, capricious, unlawful, unreasonable, and unconstitutional on its face and/or as applied. Moreover, for the same reason, the certificate and the rule violate procedural and substantive due process under the federal and Ohio constitutions and have no real or substantial relation to the public health, safety, or general welfare of the public.

The Board erred by allowing turbines to be sited in a known karst plain, which threatens underground water supplies used by the area's residents.

The Board erred by allowing turbines to be sited without first conducting a hydrogeological study, which is necessary under R.C. 4906.10(A)(2) to determine whether turbine construction will damage the quantity or quality of underground water supplies.

The Board erred by not requiring detailed geological and hydrogeological studies of turbine sites to be submitted during the adjudicatory process so that the Board can exercise its duty under R.C. 4906.10(A) to approve or disapprove those turbine sites and which is necessary under R.C. 4906.10(A)(2).

The Board erred in allowing grout to be used to plug karst openings at sites for turbine foundations.

The Board erred by allowing the Staff to make post-certificate decisions to approve the siting of turbines in locations where karst are located or may be located and to decide whether grout can be used to fill karst openings under the turbine foundations, so that the Board violated its duties under R.C. 4906.10(A)(2), (3), and (6).

The Board erred in approving the Project, where the Project will destroy the visual landscape.

The Board erred in approving the Project even though the record does not demonstrate that the Project will comply with the 30-hour per year shadow flicker standard in OAC 4906-4-09(H)(1), which contravenes R.C. 4906.10(A)(2).

The Board erred in allowing the approved turbines to cast shadow flicker on their neighbors, since all shadow flicker can be avoided with a minimal loss of income;

The Board erred in approving the Project where the record shows that the Project will reduce neighboring property values.

The Board erred in finding that the Project will serve the public interest, convenience, and necessity, despite its lack of efficiency and reliability in producing electricity.

The Board erred in approving the Project even though the turbines will slow down emergency response times for emergency medical flights.

The Board erred by failing to clearly enunciate the mitigation requirements for televisions and real-time kinematic GPS locator systems whose reception is impaired by turbine blades.

The Board erred in approving the Project without establishing adequate setbacks against property damage, injury, and death from fires and blade shear.

The Board erred in approving the Project despite its destruction of bat populations.

The Board erred by not requiring Firelands to conduct accurate bat surveys and calculate accurate numbers of projected bat mortalities, which contravenes R.C. 4906.10(A)(2).

The Board erred by not including its own mitigation measures in the certificate to protect birds and bats, instead of deferring to Staff and other government agencies to decide on those measures.

The Board erred by not requiring Firelands to conduct accurate bird surveys and calculate accurate numbers of projected bird mortalities, especially during nighttime bird migration, which contravenes R.C. 4906.10(A)(2).

The Board erred by neglecting to properly site turbines in order to minimize bat and bird mortalities from blade strikes, including eagle mortalities, on the stated grounds that the U.S. Fish and Wildlife Service and Ohio Department of Natural Resources will deal with bird and bat safety. The Board erred by allowing turbines to be sited within 2.5 miles or less from known bald eagle nests.

The Board erred in finding and determining that the Project represents the minimum adverse environmental impact, considering the state of available technology and the nature and economics of the various alternatives, and other pertinent considerations, pursuant to R.C. 4906.10(A)(3). All of the errors described in the paragraphs preceding this paragraph constitute Board failures to recognize that the Project does not represent the minimum environmental impact under R.C. 4906.10(A)(3).

The Board erred in finding and determining that the Project will comply with R.C. 4906.10(A)(6). All of the errors described in the paragraphs preceding this paragraph constitute Board failures to recognize that the Project will not serve the public interest, convenience, and necessity under R.C. 4906.10(A)(6).

The Board erred in ruling that the evidentiary record contains enough information for the Board to find and determine the nature of the Project's probable environmental impact under R.C. 4906.10(A)(2), to find and determine that the Project represents the minimum adverse impact under R.C. 4906.10(A)(3), and to find and determine whether the Project will serve the public interest, convenience, and necessity under R.C. 4906.10(A)(6), with respect to the

Project's visual impacts, destruction of karst openings and the resulting flooding and blockage of underground water flows to wells, operational noise, lower property values, shadow flicker, delays of airborne emergency response, interference with GPS and television signals, destruction of birds and bats, blade shear and fires, pollution of groundwater and surface water flows, traffic impacts and congestion, and inadequate setbacks between turbines and neighboring properties and homes.

The Board erred in finding and determining that the Project represents the minimum adverse impact under R.C. 4906.10(A)(3) and will serve the public interest, convenience, and necessity under R.C. 4906.10(A)(6), because such findings and determinations are inconsistent with the adverse effects from the Project's visual impacts, destruction of karst openings and the resulting flooding and blockage of underground water flows to wells, operational noise, lower property values, shadow flicker, delays of airborne emergency response, interference with GPS and television signals, destruction of birds and bats, blade shear and fires, pollution of groundwater and surface water flows, traffic impacts and congestion, and inadequate setbacks between turbines and neighboring properties and homes.

The Board erred by delegating its duties to the Staff and other governmental agencies for approving post-certificate plans and submittals, which unfairly undermines the purpose of the evidentiary hearing, relieves Firelands of its burden of proof during the adjudication, circumvent the Board's application of the statutory criteria under R.C. 4906.10(A), circumvent statutory rights of public participation and public notice, and deprive the intervenors of due process.

The Board erred by finding the Stipulation to be in the public interest and by approving it.

The basis for this Application for Rehearing and more detailed descriptions of the

Board's errors are set forth in the attached Memorandum in Support, which is incorporated in its entirety as part of this Application for Rehearing.

Respectfully submitted,

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MEMORANDUM IN SUPPORT OF APPLICATION FOR REHEARING

I. Public Opposition To The Project Shows That The Project Does Not Serve The Public Interest, Convenience, And Necessity Under R.C. 4906.10(A)(6).

The Residents agree with the Board's statement (at Page 64, ¶ 168) that public support or opposition to a power project is a factor that may be considered in determining whether a project serves the public interest, convenience, and necessity. However, although the Board may have the impression that support and opposition to this Project is evenly divided, a careful analysis of the docket reveals that the people actually affected by the Project are substantially opposed to the Project.

The Board's Opinion notes (at Page 64, ¶ 168) that the Huron County Board of Commissioners, the City of Willard, and the Boards of Trustees of Richmond and Norwich Townships have supported the Project by signing the Stipulation. The City of Willard has no territory in the Project Area, while the Application shows that the Project Area is located in seven townships. Applicant's ("Applic.") Exh. 1, Application Narrative, p. 2. Notably, the Erie County Board of Commissioners and the Boards of Trustees of Groton, Ridgefield, Lyme, Oxford, and Sherman Townships have declined to sign the stipulation, thus signaling that they do

not support the Project. Contrary to the Board's Opinion (at Page 64, ¶ 168), the Stipulation does not establish that no local governments oppose the Project. Thus, only two of the seven governments at the most local level, the township trustees, are supporting the Project.

The public input by local citizens provides a more accurate portrayal of public opinion. In the public informational meeting held by the applicant on April 3, 2019, 134 of the approximately 200 people in attendance signed a petition opposing the Project, or about 67% of the persons in attendance. See the public comment of Walt Poffenbaugh, docketed on March 23, 2020 at 10:31:29 am and the attached petition. In another email docketed on March 23, 2020 (at 10:30:51 am), Mr. Poffenbaugh submitted petitions signed by an additional 285 local residents opposing the Project. These petitions were signed during public awareness events that local residents held in 2019 in Huron County. By that time, 331 local residents had signed petitions against the Project filed on May 9, 2019. Another 332 signatures of local residents opposing the Project were submitted by public comment on May 9, 2019. Although there may be some overlap of signatories among the various petitions, the number of people joining these petitions is undeniably large.

A review of the comment cards submitted at both public informational meetings show a total of 186 cards submitted. Of this number, 135 were opposed to the Project, and 47 were in favor, with 74% being opposed. There were four cards which were undecided on the issue. See the public comments of April 5, 2019 and April 9, 2019 for copies of the cards.

The Residents have analyzed all public comment letters submitted to the docket in this case as of June 24, 2021 when the Board issued its Opinion. See the attached spreadsheet. Writers located in and near the Project Area submitted 428 comments. See the first page of the spreadsheet. Of that number, 308 comments (72%) opposed the project, while 102 (70%)

supported the Project. Of those 102 letters of support, 74 (62%) were form letters from people who did not feel strongly enough about the Project to bother with writing their own comments. None of the Project opponents used form letters.

In the adjudicatory hearing in this case, the 19 local residents filing this Application for Rehearing have intervened to oppose this Project, while only two local residents have intervened to support the Project.

In its Opinion, the Board noted that “this statutory criterion regarding public interest, convenience, and necessity, must also encompass the local public interest, ensuring a process that allows for local citizen input, while taking into account local government opinion and impact to natural resources.” Page 63, ¶ 168 (emphasis added). Recognizing that local input is paramount, the administrative law judges during the public hearing in this case asked the commenters to specify whether they lived within the Project footprint, i.e., the Project Area. The Board granted intervention only to persons within or adjacent to the Project Area. In Firelands’ depositions of Residents, its attorneys asked them if they lived in the Project footprint. Thus, as established by the Board, it is local public input that applies to the criterion in R.C. 4906.10(A)(6).

In contrast to the numerous petition signatures and letters submitted by local residents with a personal stake in the outcome of this case, Firelands’ strategy was to generate the false impression of support for its Project by soliciting numerous comments from people who are not local and who wanted to express their generic support for wind power. There are 1092 letters supporting the project, and of that number, 1000 (91%) are form letters. The verbiage of these form letters is exactly the same as form letters available on the Emerson Creek Wind website maintained by Apex and the website maintained by Northern Ohioans for Wind and are

accessible on the “Get Involved” tab. The people sending these form letters to the Board merely had to type their names in a box on a computer screen and hit the send button, depositing a canned pre-written form letter directly into the OPSB inbox. As explained above, only 102 of these form letters were even from persons living in the Project Area. The docket contains only 46 comments from persons living in the Project Area that felt strongly enough about their support to draft their own comments.

Therefore, the vast majority of the public comments supporting the Project were from peoples living outside of the Project Area in Ohio and other states. These comments were received from such faraway Ohio addresses as Cleveland, Cleveland Heights, Ashtabula, Medina, Mayfield Heights, Conneaut, Parma, Canton, Solon, Westlake, Norwalk, Oberlin, Ravenna, Marblehead, Fremont, Painesville, Willoughby, Lorain, Brook Park, Delaware, Kent, Strongsville, Mentor, Fairlawn, Massillon, Middle Bass, Akron, Berea, North Ridgeville, Fostoria, Upper Sandusky, Carey, Harpster, Findlay, Marysville, Marion, New Albany, Newark, Defiance, Hudson, Hamilton, Oxford, Garfield Heights, Lakewood, Berea, Toledo, Eastlake, Perrysburg, Chardon, Warren, Cuyahoga Falls, Van Wert, Richfield, Ashland, North Canton, Mentor, Groveport, Broadview Heights, Columbus, Grove City, Dublin, Worthington, Athens, Centerville, Upper Arlington, Zanesville, Bexley, Reynoldsburg, Cambridge, Avon Lake, Coshocton, Urbana, Dayton, Hilliard, Obetz, Bucyrus, Lima, Wooster, Chillicothe, Waverly, Mount Gilead, Shaker Heights, Lebanon, Youngstown, and Cincinnati. Some of these form letters, which begin with the words “As an Ohioan”, were actually filled out by people who list their addresses as McFarland, Wisconsin, Warr Acres, Oklahoma, Athens, Georgia and Covington, Kentucky. As revealed by the above partial list of locations for non-local commenters, Firelands deceptively recruited pro-wind people from all over the state to send in

form comments in an attempt to give the Board the appearance of local support for the Project. Had the Residents employed this strategy, they could have recruited as many or more comments from people around Ohio to oppose the Project. The Board should give no weight to pro-Project comments from people who are not local to the Project.

The Board's Opinion mentions (at Page 9, ¶ 45) that 35 of the 45 witnesses at the public hearing were opposed to the Project. However, this metric does not representatively poll the local public views on the Project due to the use of virtual technology to conduct the hearing instead of entertaining in person testimony. As stated in a public comment from Dennis Schreiner docketed on April 30, 2020:

A significant portion of the rural population struggles with video conferencing and teleconferencing. Some lack computer life skills, others do not have hardware or software to video conference due to low band width on the part of their Internet Service Providers. Some do not have affordable internet capability due to location. Land lines in some rural locations are still analog technology – a tremendous amount of noise exist on some of these lines.

For these reasons, the Residents' counsel objected to holding the public hearing virtually in this case at the time the Board decided to use that technology. Mr. Schreiner further noted that other public hearings on energy projects in north central Ohio have been attended by over 300 people. This is a marked contrast to the substantially lower attendance at the Emerson Creek Wind public hearing.

Consequently, the Board should weigh more heavily the input from local residents, which more accurately reflects the actual local view of this Project, including the following indicators of local public opinion:

1. Petitions against the Project have been signed by as many as 1082 local residents, with some leeway for duplicate signatures.
2. Comment cards at the public informational sessions were 135 (74%) to 47 (26%)

against the Project.

3. Among docketed public comments from citizens in and near the Project Area, 308 comments (72%) opposed the project, while 102 (70%) supported the Project. Of those 102 letters of support, 74 (62%) were form letters. None of the letters in opposition were form letters.
4. In the adjudicatory hearing in this case, 19 local residents (plus others who were not represented by counsel) have intervened to oppose this Project, while only two local residents have intervened to support the Project.

In balance, the local opposition to this Project is overwhelming. In light of this data, the Board should find that this Project does not serve the public interest, convenience, and necessity and should deny the certificate.

II. The Stipulation Is An Unlawful Attempt To Circumvent The Board's Statutory And Regulatory Mandates For A Complete Evidentiary Record So That Citizens Can Provide Meaningful Input On Siting Decisions That Affect Them.

As explained in Section III below, the evidentiary record is missing some of the studies and information needed to evaluate the Project's threats and the mitigation of those threats. Seeking to compensate for the record's deficiencies, Firelands, the Staff and other parties filed a Joint Stipulation and Recommendation designed to allow them to fill the gaps with post-certificate studies and plans that would be proposed and approved without public involvement. The Board then held an adjudicatory hearing, and the parties thereafter filed their post-hearing briefs.

The Stipulation tried to compensate for the lack of information in the record by requiring the following studies and plans to be performed after certification: (1) a final delivery route plan and traffic studies under Condition 9; (2) a post-construction avian and bat monitoring plan

under Condition 22; (3) an eagle conservation plan under Condition 31; (4) a shadow flicker study under Condition 34; (5) a microwave path study under Condition 37; and (6) karst geological information. So the Stipulation and certificate require Firelands to perform and submit five studies and plans to the Staff after the certificate is issued, instead of properly testing them in the adjudicatory process.

OAC Chapter 4906-4 describes the information that the Board must obtain, and the applicant must supply, in order to determine whether the criteria of R.C. 4906.10(A) have been met. In this case, the evidentiary record does not contain much of the information required by OAC Chapter 4906-4, and the Board cannot issue a certificate without an evidentiary record containing this information. An administrative agency such as OPSB is required to follow its own rules, as well as applicable statutes. *State ex rel. Cuyahoga Cty. Hosp. v. Ohio Bureau of Workers' Comp.*, 27 Ohio St.3d 25, 27–28 (1986); *Parfitt v. Columbus Corr. Facility*, 62 Ohio St.2d 434, 436 & 437 (1980). The rules being violated are designed to benefit the Residents by providing them with the information about the Project that they need to provide the Board with their input on a Project that could seriously impact them, and the Residents are prejudiced by OPSB's failure to comply with these authorities. *Cf., id.*, at 436-37.

The Residents' rights to vet Firelands' studies through the application and adjudicatory process, including a review of the study, receiving a Staff investigation and Staff Report, conducting discovery, submitting comments at the public comment session of the hearing, and participating in the adjudicatory session of the hearing, will be bypassed by the Stipulation's acquiescence to receiving studies only for Staff review and approval after this case has ended. The post-certificate studies will not be submitted to the public for review and comment, nor will they be subject to adjudication.

III. The Evidentiary Record Lacks The Information Required By The Board's Rules, The Board Has Erred In Determining That It Has The Information Necessary To Find And Determine The Nature Of The Project's Probable Environmental Impact Under R.C. 4906.10(A)(2), The Board Has Erred In Opining That The Project Represents The Minimum Adverse Impact Under R.C. 4906.10(A)(3), And The Board Has Erred In Opining That The Project Will Serve The Public Interest, Convenience, And Necessity Under R.C. 4906.10(A)(6).

R.C. 4906.10(A)(3) prohibits OPSB from issuing a certificate, unless “the facility represents the minimum adverse environmental impact, considering the state of available technology and the nature and economics of the various alternatives, and other pertinent considerations.” Emphasis added. The dictionary meaning of “minimum” is “the least quantity assignable, admissible, or possible.” See the Merriam-Webster Dictionary, found online at <https://www.merriam-webster.com/dictionary/minimum>. Thus, Firelands does not satisfy its obligations by just somewhat reducing the adverse impacts of its Project. Angelina must reduce the impacts to the least amount possible considering the state of available technology, the nature and economics of the various alternatives, and other pertinent considerations. As explained below, Firelands has not demonstrated that its Project achieves the minimum adverse environmental impact with respect to the many harms that the Project will cause. Firelands also has not provided the information required by the Board's rules that is necessary for the Board to determine the nature of the Project's probable environmental impact. Finally, the company has not demonstrated that the Project will serve the public interest, convenience, and necessity.

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

The Board erred in finding (at Page 36, ¶ 87) that Firelands' background sound study was reasonable and that the Project's operational noise will comply with R.C. 4906.10(A)(3), for the reasons explained below.

1. **Firelands' Poor Site Selection Has Incentivized Firelands To Follow Deceptive Practices To Disguise The Harmful Noise Impacts Of Its Turbines.**

Wind turbines are noisy. They generate a variety of sources of sound, including mechanical sounds from the turbine hub and “swishing” and “whooshing” sounds from the blades moving through the air. Duncan, Tr. IV 504:16 – 505:20.¹

There is nothing pleasant or soothing about the clanging or whooshing sound of a loud wind turbine. Firelands has cited 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.

The Board has been tasked with protecting the health and comfort of the neighborhood in and near the Project Area by keeping the turbines far enough from non-participating homes and land to prevent the neighbors from hearing annoying and harmful levels of turbine noise. Because Firelands Wind, LLC (“Firelands”) is trying to shoehorn its turbines into a well-populated area, Firelands has employed deceptive acoustic techniques in an attempt to justify siting turbines close to neighboring homes and land. The Staff has acquiesced to Firelands’ deception and has compounded the harmful outcome of this deceit by misapplying its own rule to allow Firelands to impose noise levels of up to 49.1 dBA on non-participating neighbors.

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

¹ References to verbal testimony at the hearing are cited to the witness’ last name, transcript page number, and line numbers. References to prefiled written testimony are cited to the witness’ last name prior to the word “Testimony.”

An accurate calculation of the ambient (background) sound level of a project area is important to find out how much environmental sound is consistently present and available in a community to mask or obscure potential noise from a new facility. Applicant's ("Applic.") Exh. 1, Application Narrative, p. 63; Duncan, Tr. IV 509:20-25. The adverse impact of new noise from a wind turbine is a function of how much, if at all, the turbine noise exceeds the pre-existing background sound level. *Id.* Consequently, the comfort and livability of the surrounding community relies on an accurate assessment of the existing ambient sound level.

OAC 4906-4-09(F)(2) provides that turbine noise at non-participating sensitive receptors must not exceed "the project area ambient nighttime average sound level (Leq)" by five dBA. Emphasis added. To calculate the project area ambient nighttime average sound level, an applicant must "[s]ubmit a preconstruction background noise study of the project area." OAC 4906-4-08(A)(3)(e) (emphasis added). Accordingly, an applicant must measure the ambient sound level inside a project area, not outside of it.

Firelands' map of its ambient sound monitoring sites shows that two of its nine sites were not located in the Project Area: (1) Monitor 1; and (2) Monitor 6. Application Exh. G, p. 6. Monitor 1 was located to the northwest of the Project Area about 1.2 miles from the nearest proposed turbine location. *Id.*, pp. 6-7. Monitor 9 was located west of the Project Area about 1.4 miles from the nearest proposed turbine location. *Id.*, p. 14.

Firelands' noise report betrays the reasons why Firelands sited these monitors outside of the Project Area. Monitor 1 was placed at a location at which "I-80 was clearly audible." *Id.*, p. 7. Monitor 6 was sited near two state highways and a rail line. *Id.*, p. 14. State Highway 4 was only 154 feet away. *Id.* That is, Firelands chose these locations because they were guaranteed to be noisy in order to raise the ambient average of the Project Area.

The background noise testing results reveal that this was exactly the result of Firelands' scheme. The average nighttime Leq for Monitor 1 was 50.1 dBA, the third highest ambient nighttime sound level among the nine testing sites. Applic. Exh. 12, Responses to 6th Interrogatories, Attachment 7 (pdf pg. 89). Not surprisingly, the noise at this site was driven by "the consistent source of traffic noise from I-80." Application Exh. G, p. 23. The average nighttime Leq for Monitor 6 was 51.6 dBA, the second highest ambient nighttime sound level, due to "passing traffic on OH-4" and "occasional sound from train passbys on the nearby rail line." *Id.*, p. 33; Applic. Exh. 12, Attachment 7 (pdf pg. 89). By including these sites, Firelands was able to raise the average nighttime ambient Leq level from 42.1 dBA to 44.1 dBA. *Id.*

Monitors 1 and 6 do not measure the ambient sound of the Project Area; they measure noisy locales outside of the Project Area. Consequently, their sound measurements must be excluded from the calculations of the project area ambient nighttime average sound level in order to comply with OAC 4906-4-08(A)(3)(e) and OAC 4906-4-09(F)(2). The Board's Opinion errs by not doing so.

3. **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 conducted background sound measurements at nine locations. Duncan, Tr. IV 511:5-6. The sound level at any one of these locations was not necessarily representative of the sound level at another location. Duncan, Tr. IV 512:11-16; 524:17-23.

Firelands has stated 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. Firelands' strategy complies with neither the letter nor the spirit of the Board's rules.

In order to make the existing sound level in the Project Area appear to be louder than it actually is, Firelands chose several ambient monitoring sites because they are noisier than the rest of the Project Area. Two of these noisy locations, the sites for Monitors 1 and 6, were extraordinarily noisy for the reasons described in the previous section of this brief. A third monitoring station was Monitor 9, which was the site of noisy nighttime agricultural operations. Application Exh. G, p. 39. This site was monitored from September 13-27, 2018. *Id.*, p. 5. Firelands noted that "notable agricultural activity" "accounted for sound levels rarely dipping below 50 dBA during the second week." *Id.* "[F]requent passing traffic on US- 224 and occasional train passbys" added to the din. *Id.* The result, as Firelands expected before placing the monitoring station there, was an average nighttime Leq level of 51.9. Applic. Exh. 12, Attachment 7 (pdf pg. 89).

The average nighttime Leq levels at these three sites exceeded 50 dBA. That is, these nighttime sound averages were higher than a bulldozer or an accelerating tractor trailer at a distance of 1469 feet. Application Exh. G, p. 46.

Firelands' strategy for selecting noisy monitoring sites had its planned outcome of producing a high ambient sound average for the Project Area. By averaging measurements from three abnormally noisy locations – two of which are not even in the Project Area -- with normal sites, Firelands was able to calculate a high, non-representative ambient level of 44.1 dBA. Applic. Exh. 12, Attachment 7 (pdf pg. 89). Firelands and the Staff then concluded that five dBA could be added to this level so that Firelands would be allowed to impose noise at levels of 49.1 dBA on the neighborhood. Staff Exh. 1, Staff Report, p. 50; Application Exh. G, p. 4.

Firelands' ploy for including noisy sites in a Project-wide average, if allowed by the Board, would have serious adverse impacts on the community. Because a 49.1 dBA nighttime limit would apply to the entire Project Area, this limit would apply even where the ambient nighttime level is substantially quieter than the three noisy sites included in the Project-wide average. For example, in a neighboring area like the site for Monitor 7, the turbines could increase the nighttime noise level by 15.5 dBA to a total of 49.1 dBA even though the ambient level is only 34.6 dBA. By comparison, a 10 dBA increase doubles the sound perceived by the listener and a 20 dBA increase magnifies the sound pressure by a factor of 10. Duncan, Tr. IV 507:11-19; Application Exh. G, p. 49. Firelands would be allowed to increase the average nighttime noise levels for people living in the vicinity of Monitor 8 by 12.8 dBA from 36.3 dBA to 49.1 dBA. People living near monitoring sites 2, 4, and 5, with their ambient levels of 43.5 dBA, 43.4 dBA, and 40.2 dBA, could be exposed to increases of more than five dBA at 49.1 dBA. A five dBA increase above background causes complaints, which is why OAC 4906-4-09(F)(2) prohibits noise increases of five dBA or greater. Bellamy, Tr. III 462:16-25; Staff Exh. 1, Staff Report, p. 51.

Thus, the noise levels at monitoring sites 1, 6, and 9 are not typical of ambient sound levels throughout the Project Area. The data for these three monitors should be excluded from the project area ambient nighttime average sound level for the Project Area. Including the non-representative sound data from these stations will skew the project area ambient nighttime average sound level for the Project Area and result in large noise increases throughout all other areas exposed to turbine noise inside and near the Project Area. The Board's Opinion erred by failing to exclude the sound measurements from these sites.

In the alternative, the certificate should prohibit turbines from increasing the noise level by five dBA or higher above the ambient sound level at the location of each nonparticipating sensitive receptor. This option would most accurately and effectively prevent annoying and harmful noise increases, since it eliminates the subterfuge attendant to averaging non-representative sound levels at noisy sites with normal sound levels elsewhere in the Project Area. The Board erred by failing to do this.

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

According to the World Health Organization ("WHO"), "[s]leep is a biological necessity and disturbed sleep is associated with a number of adverse impacts on health." Local Residents' ("LR") Exh. 8, "Night Noise Guidelines for Europe," World Health Organization 2009 ("WHO Noise Guidelines"), p. XII. Long-term exposure to noise of 40 dBA or more leads to a reliance on somnifacient (sleep-inducing) drugs and sedatives. WHO Noise Guidelines, p. XIII. Self-reported sleep disturbance and environmental insomnia inflict noise victims starting at levels of 42 dBA. WHO Noise Guidelines, p. XIII.

Based on its research, WHO recommends that people not be exposed to nighttime noise levels greater than 40 dB of $L_{\text{night, outside}}$. WHO Noise Guidelines, p. XVI. $L_{\text{night, outside}}$ is defined as the one year Leq over eight hours outside at the most exposed façade outside of a person's house.² *Id.*, p. 8, § 1.3.4. Yet Firelands seeks approval to impose noise levels of up to 49.1 dBA on its neighbors.

Complaints from persons annoyed by noise begin at 35 dBA. WHO Noise Guidelines, p. XIV. Firelands wants to slam the neighborhood with noise levels of up to 49.1 dBA – 14.1 dBA higher than the annoyance threshold.

The Staff Report acknowledges that “[a]nnoyance can lead to stress and stress can lead to adverse health effects.” Staff Exh. 1, Staff Report, p. 51. Therefore, “in non-industrial settings, the ambient noise level at any given receptor should probably not be exceeded by more than 5 dBA, and an increase of 5 dBA may cause complaints.” *Id.*

The noise from Firelands' project will exceed the sound levels in all of these warnings. Firelands wants permission to subject its neighbors to noise levels of up to 49.1 dBA, *i.e.*, seven dBA above the WHO recommendation for preventing bodily harm, 14 dBA above the 35 dBA annoyance level, and more than five dBA above the background levels in most of the Project Area.

Firelands argued in its post-hearing brief (at Page 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

² WHO also provides an “interim target” of 55 dB $L_{\text{night, outside}}$ where 40 dB is not achievable in the short run. *Id.* However, WHO warns that 55 dB does not protect public health. *Id.*

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 contended in its post-hearing brief (at Pages 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' post-hearing brief cited (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 cited 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 did 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.

Dr. Mundt admitted that the WHO Noise Guidelines contain the advisories and warnings described above. He did not contradict these advisories and warnings. This testimony is inconsistent with the Board’s statement (at Page 36, ¶ 87) that it relies on Dr. Mundt’s testimony as grounds for finding that the Project’s sound effects will not cause a safety problem. The Board cannot find that the Project complies with R.C. 4906.10(A)(3) and (6) as long as it threatens to impose such high noise levels on its neighbors.

5. Conclusions

As explained above, the evidence demonstrates the following points:

- The sound data from Monitors 1 and 6 should not be used to calculate the nighttime ambient average sound level, because these sites are located outside of the Project Area.
- The sound data from Monitors 1, 6, and 9 monitoring sites should not be used to calculate the nighttime ambient average sound level, because they are uniquely noisy locations that are in no way representative of the Project Area.
- Employing a project-wide average to set the noise limit for the entire Project Area will not protect the quieter areas from large noise increases above five dBA where one or more noisy monitoring sites raise the average. In this case, Firelands’ emphasis on monitoring noisy sites has skewed the average so badly that it would allow noise increases of 15.5 dBA in the quietest area of the Project Area even though a 10 dBA increase doubles the sound perceived by the listener and a five dBA increase may result in complaints.

- OPSB's interpretation of OAC 4906-4-09(F)(2) to require Project-wide averaging of background sound measurements throughout the Project Area and then to use the average background sound level to calculate a Project-wide noise limit even where such averaging exposes the quieter areas to intolerable noise increases makes this certificate and OAC 4906-4-09(F)(2) arbitrary, capricious, unlawful, unreasonable, and unconstitutional on its face and/or as applied. Moreover, for the same reason, this decision and the rule violate procedural and substantive due process under the federal and Ohio constitutions and have no real or substantial relation to the public health, safety, or general welfare of the public.

- The WHO finds that long-term exposure to noise of 40 dBA or more leads to a reliance on somnifacient (sleep-inducing) drugs and sedatives and that levels of 42 dBA or more cause self-reported sleep disturbance and environmental insomnia. WHO finds that complaints from persons annoyed by noise begin at 35 dBA. Exposing the population to turbine noise levels of up to 49.1 dBA, as proposed by the Staff and Firelands, will harm public health.

- The Staff acknowledges that annoyance with noise and complaints begin once a new noise source increases the noise level by five dBA. Yet the Staff and Firelands propose a noise limit of 49.1 dBA, which would raise the noise levels from 5.6 dBA to 15.5 dBA higher in the portions of the Project Area represented by five of the monitoring sites (Monitor 2 at 43.5 dBA, Monitor 4 at 43.4 dBA, Monitor 5 at 40.2 dBA, Monitor 7 at 34.6 dBA, and Monitor 8 at 36.3 dBA).

- Turbines that produce 49.1 dBA of noise or that increase the existing noise level by five dBA or more would not meet the statutory criteria in 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). Firelands' turbine layout as currently designed will result in an annoyed and sleep-deprived community.

Applying these principles, the Residents request that OPSB calculate the nighttime ambient average sound level by averaging the sound measurements from the following monitoring stations:

Monitor 2	43.5 dBA
Monitor 3	45.1 dBA
Monitor 4	43.4 dBA
Monitor 5	40.2 dBA
Monitor 7	34.6 dBA
<u>Monitor 8</u>	<u>36.3 dBA</u>
Average	40.5 dBA

This calculation produces a nighttime ambient average sound level of 40.5 dBA. Using this number, OAC 4906-4-09(F)(2) prohibits turbine noise of 45.1 dBA or higher. However, OPSB should not allow the turbines to produce more than 40 dBA in recognition of WHO's warning against turbine noise higher than 40 dBA. In the alternative, OPSB could comply with the criteria in R.C. 4906.10 by establishing a limit that prohibits turbine noise at a level of five dBA or more above the validly measured nighttime ambient Leq at the location of the sensitive receptor.

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

The Residents agree with the Board's decision (at Pages 34-35, ¶ 83) denying Firelands' request to site turbines at locations T24, T25, T26, T42, T43, T73, T74, and T75. The Board based this decision on the following criteria:

According to Firelands' geotechnical expert witness, these sites have been identified as locations where either (1) potential solution cavities within bedrock were encountered during drilling activities, (2) available geologic maps and literature document mapped karst features, or (3) boring logs, geological maps, and literature demonstrate a moderate to high probability of karst development (Fireland Ex. 38 at 6-8). We reject the contention that these sites may be further reviewed using additional testing to determine whether they can be considered for installation using grouting techniques. Nevertheless, we disfavor the use of grouting on a widespread basis, particularly in areas where karst activity is prevalent. Here, much of the proposed project lies outside of areas where karst is expected to be encountered at a moderate to high level. We find that construction in these areas is reasonable.

Board's Opinion, Pages 34-35, ¶ 83 (emphasis added). Under the second and third criteria of the foregoing test, the Board also must prohibit turbine construction at the other turbine sites located in the portion of the Bellevue-Castalia Karst Plain mapped out in the green area of Figure 9, "Site Vicinity Karst Map," of the Geotechnical Report of April 2020 prepared for Firelands by RRC. Firelands Exh. 38, Williams Direct Testimony, Attachment AW-2, pdf pg. 69. This report describes the green area of Figure 9 as follows:

Based on the available geologic maps and studies, WTG foundation sites in the northwestern portion of the project site are located within an area where carbonate rocks (limestone) are present and may be susceptible to karst features such as voids and other solution cavities. Karst features typically occur in limestone, dolomite, or dolomitic limestone bedrock, as well as evaporite deposits such as gypsum. Figure 9 within Appendix A depicts the project boundaries in conjunction with mapped karst zones near the project site.

Id., Attachment AW-2, pp. 5-6 (pdf pgs. 23-24). Firelands' expert Alfred Williams further explained the content of Figure 9:

Q. Now, what is depicted by the different shades of green color in Figure 9:

A. Those are sinkholes or karst, I guess land features that have been identified by the ODNR. Some are field-verified sites. And some are not field-verified. They may be suspected karst features at the ground surface.

Q. And the area in which karst has been documented to occur is shown by the light green color on Figure 9?

A. Correct.

Williams, Tr. VI, 755:13-23. Thus, the light green area of Figure 9 is a geologic map and a literature document that maps karst features in the Project Area. Consistent with Figure 9, Firelands' Application states that "the extreme northwestern portion" of the Project Area is located within the Bellevue-Castalia Karst Plain, which is characterized by numerous sinkholes, large solution features, springs, and caves. Application Narrative, p. 80. Dr. Ira Sasowsky testified that "karst is clearly a concern within all of the mapped limestone area." LR Exh. 3, Sasowsky Direct Testimony, p. , A. 13, line 14. Consequently, the Board should prohibit turbine development in this area to protect its water supplies and geology.

Mr. Williams testified that 20 proposed turbine sites are located in the area identified as potential karst area, which are denoted as green circles with "x"s in them in the light green area on Figure 9 of the RRC report. Williams, Tr. VI 758:16-21. Some of these turbine sites are numbered on Figure 9, but others are not. For example, turbine sites T37, T38, and T87 are numbered in a group of four turbines shown on the map, but the other turbine site in that group is not numbered. The identities of the turbine sites not numbered on Figure 9 can be obtained by comparing turbine locations on Figure 57 of the RSG "Noise Assessment" of June 25, 2019 in the Third Supplement to the Application. Applicant's Exh. 4, Attachment 1, Appx. C, pdf pg. 79 of 199. With the assistance of Figure 57, a review of Figure 9 shows that the following turbine sites are located within the mapped karst area: T1, T2, T6, T7, T8, T9, T10, T11, T12, T13, T18, T24, T25, T26, T34, T37, T38, T72, T73, T74, T75, T84, T85, T86, T87,

The Board's Opinion prohibits turbine construction at the foregoing turbine sites that are underlined.

The Board also should prohibit turbine construction at the other sites in this list, since they are in the mapped karst area. As the Board's Opinion justifiably stated (at Pages 34-35), Firelands should not be allowed to conduct further testing on the sites it banned to determine whether sites can be considered for installation using grouting techniques. This rationale applies equally to the other turbine sites located in the same karst area, which have been mapped inside the Bellevue-Castalia Karst Plain. RRC's geotechnical report advises that "[i]t is likely soil conditions will vary between or beyond the points explored" and that "further void assessment" will be made with pilot holes (i.e., borings) at the turbine sites. *Id.*, pp. 15, 34; Williams, Tr. VI 764:8 – 765:3. While some of Firelands' borings in the karst plain did not detect karst, a single soil boring at a turbine site does not establish that the site is karst-free since karst can still be present a short distance away from the boring. Williams, Tr. VI 752:16-23. As Dr. Ira Sasowsky testified, karst can be located beneath the elevation of a turbine foundation, where it may not be evident until the soil column collapses under the turbines. Consequently, testing or not testing, siting turbines in the karst plain imposes too great a risk to precious groundwater supplies upon which the populace depends.

Moreover, Firelands has not submitted the necessary geological testing information for the presence of karst or hydrogeologic data on the risk to groundwater at these turbine sites. Since Firelands knew beforehand about the risk of karst in the karst plain, it should have thoroughly tested its turbine sites and included that information in the record for public vetting. Thus, the Board cannot satisfy the

requirement in R.C. 4906.10(A)(2) to determine the nature of the probable environmental impact or the requirement in R.C. 4906.10(A)(3) to determine that the facility represents the minimum adverse environmental impact with respect to these turbine sites. The following sections of this Application for Rehearing further explain why it would be dangerous to the water supplies and other area resources to allow turbine construction at the other sites in the karst plain.

In addition, no turbine site outside of the karst plain should be authorized without first conducting responsible geological and hydrogeological field work to find out whether the site has karst and, if so, whether siting and/or grouting a turbine foundation at that location will disrupt or pollute groundwater supplies. This is necessary, because Dr. Sasowsky's review of the locale of these turbine sites shows that there is a high risk of karst there. The testing results for these sites should be included in the evidentiary record, rather than delegating it to the Staff after Project certification. R.C. 4906.10(A)(2) and (3) require the Board, not the Staff after certification, to ascertain the nature of the probable environmental impact and to determine whether the facility represents the minimum adverse environmental impact with respect to these turbine sites. In no instance should the Board allow the Staff to approve the construction of turbines on karst or to approve grouting of karst openings, and the Board's current intent to allow them to do so is erroneous (see the Board's Opinion at Page 35, ¶ 85). None of the Staff members testifying in this case were revealed to be geologists or hydrogeologists, including Andrew Conway, who was the primary Staff analyst on geotechnical issues pertaining to turbine foundations. Conway, Tr. V 695:19-23, 700:25 - 706:4; Staff Exh. 5, Conway Direct Testimony,

Answer 4 (stating that Mr. Conway is an engineer with a degree in engineering and a minor in chemistry, with only a continuing education course or courses in geotechnical engineering). Entrusting the area's irreplaceable groundwater to the Staff's uninformed and unfettered discretion is not reasonable or lawful.

1. **Clean, Uninterrupted Groundwater Is Essential To The Residents In And Around The Project Area.**

Firelands found that "many residents in the vicinity of the Project Area rely upon private wells for their potable water," including the supply of water for drinking, livestock and agriculture. Application Narrative, p. 75. The majority of residences are supplied by individual private wells, which make use of groundwater from underneath their property. Sasowsky Testimony, p. 16, lines 15-17. The availability of suitable water for drinking, agriculture, and other purposes is critical in a rural area such as this one. Sasowsky Testimony, p. 16, lines 14-15.

The principal source of groundwater in the Project Area is a carbonate limestone bedrock aquifer. Application Narrative, p. 75; Application Exh. E, p. 4. Some of the groundwater utilized by the area's residents can be found at shallow depths; a survey of residents in the Project Area found that well water was found as close as eight feet from the ground surface. Application Narrative, p. 75; Application Exh. E, p. 6. The well owned by Residents Dennis and Sharon Schreiner has a water level of up to six feet below ground surface. Schreiner Testimony, p. 1, lines 25-26.

In addition, a number of source water protection areas ("SWPAs") for public water systems are located inside the Project Area. Application Narrative, p. 75; Application Exh. E, pp. 4-5. SWPAs are recharge areas defined and approved by Ohio EPA to protect drinking water resources from contamination. *Id.*, p. 4. Firelands wants to site turbines in these SWPAs,

including four turbines in the SWPA for the groundwater supply of Capital Aluminum and Glass. *Id.*

Firelands notes that no government program has adopted rules to prohibit the siting of wind turbines in SWPAs. Application Narrative, p. 77; Application Exh. E, p. 5. However, the designation of SWPAs is not meant to exclude all potential sources of water pollution. Williams, Tr. VI 791:12-21. The lack of oversight over turbine installation by other government agencies does not excuse the OPSB from exercising its mandate to protect these essential water supplies from damage by energy facilities. As explained below, Firelands' Project threatens to obstruct and contaminate the flow of groundwater that is used by the area's groundwater wells.

2. **Firelands And The Staff, In The Absence Of A Groundwater Investigation, Have Mistakenly Opined That The Turbines Cannot Damage The Community's Water Supply Wells Simply Because The Turbines Are At Least 1371 Feet From The Wells.**

Firelands opines that these essential groundwater resources will be protected from damage simply because the setback in OAC 4906-4-08(C)(2)(b) will keep the turbines at least 1371 feet away from neighboring homes. Application Narrative, p. 76. The Staff Report repeats this assertion without any analysis or independent research to demonstrate that the water supply wells cannot be damaged at this distance. Staff Exh. 1, Staff Report, p. 35. This position betrays Firelands' and the Staff's fundamental lack of understanding about the karst geology and the hydrogeology of this area, as explained below.

Perhaps Firelands and the Staff would have better understood the Project's risk to groundwater if Firelands had satisfied its obligation under OAC 4906-4-08(A)(4)(a) to evaluate the impact to public and private water supplies due to the construction and operation of the wind project. However, no meaningful field investigation of the groundwater has been conducted. In

the absence of this information, Firelands and the Staff have failed to appreciate and inform the Board about the turbines' potential threats to groundwater in karst geology, as described below.

Firelands keeps repeating 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' ignorance about its Project's threats to the area's karst features and groundwater supplies stems from its failure to meaningfully study these issues. Instead, Firelands, and the Staff, have concentrated primarily on the civil engineering challenges from

building heavy turbines on karst. That is, they have focused mostly on what it will take to keep the turbines standing if they are constructed on karst.

3. The Protection Of The Karst Geology That Dominates The Project Area Is Necessary To Protect The Community's Groundwater Supplies.

Firelands states that “the extreme northwestern portion” of the Project Area is located within the Bellevue-Castalia Karst Plain, which is characterized by numerous sinkholes, large solution features, springs, and caves. Application Narrative, p. 80. The Staff recounted that ODNR has found sinkholes in and near the Project Area. Staff Exh. 1, Staff Report, p. 37. Firelands’ Application states that six turbines sites are located in the karst plain as delineated by Firelands. Application Narrative, p. 80; Application Exh. E, p. 3. However, Alfred Williams testified that 20 proposed turbine sites are located in the area identified as potential karst area, which is colored light green on Attachment AW-2 of his testimony. Williams, Tr. VI 758:16-21. Dr. Ira Sasowsky, a geoscientist with substantial karst experience in northwest Ohio, noted that the northwest part of the Project Area contains karst as evidenced by visible surficial features such as sinkholes. Sasowsky Testimony, p. 7, lines 20-21. Karst also may be present in the rest of the Project Area. *Id.*, p. 7 line 21 – p. 9, line 16. In fact, Firelands discovered that one of its proposed turbine sites outside of the known karst area has karst. Williams, Tr. VI 759:12-22. Thus, even in areas not currently mapped as karst, it is imperative that steps be taken to characterize the geologic conditions to look for karst in order to prevent environmental impacts. Sasowsky Testimony, p. 9, lines 14-19.

Karst is a type of topography that is formed on limestone, gypsum, and other rocks, primarily by dissolution, and that is characterized by sinkholes, caves, and underground drainage. Sasowsky Testimony, p. 3, lines 18-20. Karst regions are those, usually underlain by

limestone or dolostone, which are types of carbonate-rich bedrock where dissolution of the rocks has produced a characteristic set of features and behaviors. *Id.*, lines 21-23. Karst forms on, and in, these particular rocks because they are easier to dissolve than many other rocks. *Id.*, p. 3, line 23 – p.4, line 2. The primary features of karst regions are sinkholes and caves, along with disappearing streams. *Id.*, p. 4, lines 2-3. These features originate by the movement of naturally acidic water through the bedrock, which wears away the rock. *Id.*, lines 3-4. This can create relatively large, and laterally extensive, routes for water to move through the rock. *Id.*, lines 4-6. When these pathways are large enough for humans to traverse, they are called caves. *Id.*, line 6.

To understand the basic process by which karst features form, it is useful to consider them in the context of the water cycle. *Id.*, lines 14-15. One pathway in this cycle is for the rainwater to infiltrate, or soak into, the soil. *Id.*, lines 20-21. When this occurs, the water can make its way downward to join with the groundwater flow system. *Id.*, lines 21-22. This is called groundwater recharge. *Id.*, line 22. Along this pathway, which is typically quite slow in non-karst areas, water is driven by hydraulic gradients in downward, lateral, or even upward directions. *Id.*, p. 4, line 22 – p.5, line 1. It eventually makes its way back to the surface, emerging as springs or seeps, or as base flow in streams. *Id.*, p. 5, lines 1-2. In those cases where the bedrock is a carbonate material, such as limestone or dolomite, the water traveling along the path can act to dissolve away the rock creating larger pathways. *Id.*, lines 4-6. This process is known as karstification, which develops extensive pathways and large features. *Id.*, lines 7-10. In some cases, the openings within the bedrock can become in filled with loose geological materials, which may be called soil, or regolith. *Id.*, lines 10-11. This material may partially or fully block water movement through the bedrock openings, at least temporarily. *Id.*, lines 11-12.

Karst pathways allow the very rapid and focused movement of water. *Id.*, p. 4, lines 9-11. For example, Firelands’ application recounts 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. Firelands’ interview of a district manager for the Ohio Department of Transportation revealed that an “underground river” associated with the cave system in the area flows between Bellevue and Bloomville, Ohio. Application Narrative, p. 82; Application Exh. E, p. 7. Although this underground river is located in Seneca County, its presence in karst has “relevance to the general area” of the Project. Application Narrative, p. 82. These underground groundwater pathways lead to significant challenges for the safe development of any infrastructure in these settings, even in the absence of large sized openings. Sasowsky Testimony, p. 4, lines 9-13.

The foregoing information is in marked contrast to Firelands’ sole basis for opining that the turbines cannot damage water wells that are at 1,371 feet away. Groundwater travels much faster in karst. At a travel rate of 3,500 to 8,600 feet per day, as found by Ohio EPA, groundwater from the vicinity of a turbine could travel 1,371 feet in four to nine hours. That means that contaminants drawn into the bedrock from the turbine’s construction could reach a neighboring well in four to nine hours. And Firelands neglected to calculate the time-of-travel for groundwater in the rest of the Project Area to find out how fast the groundwater traveled. Williams, Tr. VI 782:15 – 783:3. If a turbine foundation is blocking groundwater recharge supplying the well, the well could lose all or part of its water supply in four to nine hours. These threats are analyzed in more detail below.

4. **As Confirmed By Dr. Ira Sasowsky's Extensive Field Experience With Karst In And Near The Project Area, The Groundwater Flows Rapidly Throughout The Bedrock In The Area Whether Or Not Karst Features Are Noticeable On The Land Surface.**

The Residents retained Dr. Ira Sasowsky to analyze the turbines' threat to the community groundwater supplies. Dr. Sasowsky is a geoscientist who holds bachelor, masters, and doctorate degrees in geology. Sasowsky Testimony, p. 1, lines 19-28. He is a principal in Sasowsky Earth Science Consultants, Ltd. ("SESC"), a professional services company providing geologic, hydrologic, and soils consulting, and is a Professor of Geosciences at the University of Akron. *Id.*, lines 25-28. He has advised a wide variety of clients on geologic issues, much of which has involved karst (carbonate). *Id.*, p. 2, lines 3-8.

Dr. Sasowsky has extensive experience with karst, including extensive experience in Northwest Ohio. Over his career, he has specialized in research on karst (cave and sinkhole) development. *Id.*, p. 5, line 15. He has been examining and working in karst terrains for about 40 years. *Id.*, line 16. This work has included academic research, as well as consulting for technical concerns. *Id.*, lines 16-17. The technical subfields within which he has worked in karst settings include geomorphology, hydrogeology, geochemistry, and environmental chemistry. *Id.*, lines 17-19.

Dr. Sasowsky has had field experience in karst areas in more than 25 U.S. states, South America, the Caribbean, and Europe. *Id.*, lines 20-21. He has entered and examined over 500 caves throughout the world. *Id.*, lines 22-23. In Ohio, he has directed several research projects in various karst areas. *Id.*, p. 5, line 23 – p. 6, line 1. He has edited 11 scientific books on karst, has been an author of numerous technical reports, and has published close to 50 scientific articles that have appeared in scientific journals. *Id.*, p. 6, lines 1-5. He has presented the results of scientific work and published more than 100 abstracts at national and international meetings, as

well as giving invited lectures at universities in North America and Europe. *Id.*, lines 5-8. His knowledge has been shared with hundreds of students, colleagues, professionals, and the public through classes, field trips, sessions, and conferences. *Id.*, lines 8-9. During his 15-year tenure as the earth sciences editor of the Journal of Cave and Karst Studies, he has overseen the publication of cutting-edge research in this discipline. *Id.*, lines 10-11.

Dr. Sasowsky's expertise in karst has led to research contracts with environmental agencies of the federal and state governments. In one such study, the U.S. Department of Agriculture commissioned him to examine methods and make recommendations for handling storm water in karst terrains. *Id.*, p. 6, lines 17-20. In a research project of particular application to the Firelands case, he was retained by Ohio EPA with U.S. Environmental Protection Agency funding to research a source water protection plan for the Bellevue - Castalia Karst Plain, which overlaps the proposed Firelands Project Area. *Id.*, lines 14-17. This undertaking involved an extensive desktop study which developed a lengthy annotated bibliography for the area. *Id.*, p. 7, lines 7-8. Following that, his investigations in the Bellevue - Castalia Karst Plain included field mapping, dye tracing, well video, statistical analysis of drilling records, geophysical investigations, and geochemical modeling. *Id.*, lines 8-10.

Dr. Sasowsky has made many other visits to areas within or near the Project Area to examine the karst features and conduct research. *Id.*, lines 1-3. These visits started 20 years ago with colleagues from the geology department at Oberlin College. *Id.*, lines 1-2. Since that time, he has made many other visits to examine the karst features and conduct research. *Id.*, lines 2-3. Currently, he has an ongoing project looking at the characteristics of springs in the area, involving the monitoring of groundwater discharge conditions at high frequency. *Id.*, lines 15-18.

Based on his personal observations, Dr. Sasowsky is well-versed about the karst in northwest Ohio. During his studies on Ohio karst, he discovered that, even in certain areas that did not appear to be karst due to the absence of known sinkholes or caves on the land surface, the bedrock had openings that allow the fast movement of water. *Id.*, lines 12-14; *id.*, p. 12, line 13 – p. 13, line 4; *id.*, p. 14, lines 16-18. The Bellevue – Castalia Karst Plain is characterized by loose sedimentary material such as sand and silt that hides the underground sinkholes, caves, and groundwater conduits. *Id.*, p. 9, line 21 – p. 10, line 7. Generally, to be sufficiently protective against karst threats, when there is carbonate bedrock present below, or adjacent, one should assume that it is karstified unless it can be demonstrated otherwise. *Id.*, p. 10, lines 8-10.

5. Karst Openings Can Develop Under And Collapse Wind Turbines.

Dr. Sasowsky observed that karstification (the creation of holes and pathways) in the Project Area is occurring via two processes. *Id.*, p. 11, lines 19-20. There is evidence of the typical top-down karstification that occurs when water moves down into the ground. *Id.*, lines 20-21. This is seen, for example, in sinkholes and sinking stream points in much of the region. *Id.*, lines 21-22. However, there is another significant process at work. Relatively deep groundwater circulation, moving in a generally north direction, is dissolving certain beds in the underlying Salina Group. *Id.*, p. 11, line 23 – p. 12, line 2. This is causing upwards collapses which in some cases reach the land surface, creating very large sinkholes in the overlying carbonate rocks. *Id.*, p. 12, lines 2-3. For example, in a community thought to have stable geology, a collapse sinkhole unexpectedly opened up under a man's bedroom in Florida in 2013 and killed him. *Id.*, p. 10, lines 12-15.

Wind turbines are equally susceptible to this hazard, which can result from either slow land subsidence, or rapid collapse. *Id.*, p. 13, line 16 – p. 14, line 13. Additional weight on the

land surface can create a hole by compressing sedimentary material, by breaking the bedrock, or by eroding sedimentary fill from existing karst cavities by directing water into them. *Id.*, p.13, line 21 - p. 14, line 3.

Firelands realizes that karst areas may have sinkholes, solution cavities, and cave systems. Application Narrative, p. 82; Application Exh. E, p. 8. Recognizing the threat of subsidence or collapse, Firelands' geotechnical consultant Hull & Associates has advised Firelands to pump grout into the karst openings to provide adequate foundation support. Application Narrative, p. 82. Firelands witness Alfred Williams testified that grout may be used to fill the voids (cavities) in the karst formations under the turbine foundations. Applic. Exh. 38, Williams Testimony, p. 7, lines 2-10. Firelands witness Alfred Williams testified that grouting could be used to fill the karst openings in the bedrock. Williams Testimony, p. 7, lines 2-10. Grout is a bentonite or cement mixture that is pumped into the ground to fill the holes. Williams, Tr. VI 765:8-10.

Firelands admitted in its post-hearing brief (at Page 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.

Ironically, Firelands' proposal to grout the karst cavities under its turbine foundations to promote foundation stability actually may increase karst collapses elsewhere in the area. The grout would block the natural drainage of surface water into the cavities, thereby rerouting the water flow elsewhere where it could erode sediments in the subsurface and induce surface collapses. Sasowsky Testimony, p. 23, lines 7-9.

To prevent the subsidence problems described above, the subsurface must be thoroughly explored with borings or other methods. *Id.*, p. 22, lines 18-23. However, Firelands has provided only a general promise to conduct subsurface exploration after certification and a vague assurance that Firelands will stabilize the turbines' foundations if problematic karst features are found. OPSB cannot issue a certificate for this Project without knowing whether the turbines can be safely built in this karst terrain.

6. **Constructing Turbines In A Karst Area Can Pollute The Water Supply, But Firelands Has Conducted No Studies To Determine Whether Its Project Will Pollute The Neighbors' Water Supplies.**

Groundwater contamination occurs in karst areas because there may be open and quick pathways that connect surface water to the groundwater. Sasowsky Testimony, p. 14, lines 16-18. In fact, Firelands' contractor, RRC, lost drilling fluids in karst cavities uncovered by some of its borings. Williams, Tr. VI 761:5 – 762:11. This rapid water movement is in contrast to what happens in non-karst areas, where the slow movement of water through tiny openings usually filters and cleans surface water before it can reach the groundwater. Sasowsky Testimony, p. 14, lines 18-20. Risks of groundwater contamination primarily result from changes to the surface that facilitate the rapid movement of surface water into the ground. *Id.*, lines 20-22.

This is a well-known problem in the Bellevue Castalia Karst Plain area. *Id.*, p. 15, line 1. For example, there was severe and widespread damage to drinking water supplies in the Bellevue area just north of the Firelands Wind Project from the early 1900s through the early 1960s. *Id.*, lines 1-4. This occurred due to contaminated water making its way in to wells and sinkholes. *Id.*, lines 4-5.

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. *Id.*, 9-12. This water is generally of lesser quality than existing groundwater, and can be unhealthy for human consumption. *Id.*, lines 12-13.

Firelands' Application contains information confirming these facts. An article in Exhibit E of the Application explains:

The many passageways formed in karst terrain allow for high connectivity between the land surface and the water table. These passageways permit water

to bypass soil and rock layers that filter out contaminants. Consequently, when compounds such as fertilizers, pesticides, and water enter sinkholes, they are rapidly transported to the water table and quickly pollute water wells, streams, and rivers.

Application Exh. E, “Karst of the Fireside Quadrangle and Portions of the Flat Rock and Clyde Quadrangles, Ohio,” by Douglas J. Aden, *et al.*, p. 1 (pdf p. 95).

This is why it is important to have a specific understanding of the movement of water at each site. Sasowsky Testimony, p. 15, lines 13-14. This can be accomplished in a number of ways, but almost always requires more than simple visual inspection. *Id.*, lines 14-15. Dye tracing is a common approach to identifying flow directions and recharge zones. *Id.*, lines 15-16. This has been carried out in some parts of Ohio by ODNR and other entities. *Id.*, lines 16-17.

Firelands’ Application identifies several SWPAs overlapped by the Firelands Wind Project, in which 49 proposed turbine sites are located. *Id.*, p. 16, lines 3-4, 8. One of them is a groundwater SWPA for Capital Aluminum and Glass. *Id.*, p. 15, lines 5-6. This area is noted to have a high vulnerability to contamination. *Id.*, lines 6-7. Firelands’ Application recounts 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. In such an aquifer, contaminants can travel rapidly and destroy this important water resource. If karst is present, groundwater quickly flows through the open karst features and, if contaminated by turbine construction, will carry the contaminants into neighboring wells through the intervening 1,371 feet between turbines and water supply wells. Sasowsky Testimony, p. 19, lines 13-19. The City of Bellevue discovered the fast movement of contaminants through karst the hard way, after its contaminants polluted

wells 30 miles away. *Id.*, lines 16-19. For that reason, it is vital that Firelands be required to conduct an adequate hydrogeological investigation to protect the neighborhood wells.

Firelands' proposal to grout the karst cavities under the turbine foundations also will threaten the groundwater supplies with contamination. The grout will block the natural drainage of surface water into the cavities. *Id.*, p. 23, lines 6-7. Since the surface water has to go somewhere, it will open new pathways for surface water movement into the groundwater system that may convey contaminants into the water supply. *Id.*, lines 7-9.

Firelands has conducted no field work to determine whether its turbine construction could contaminate the area's water supplies. Without this field work, no turbine sites should be authorized. Given Firelands' failure to investigate the underground water conduits at the turbine sites, the Board cannot fulfill its duty under R.C. 4906.10(A)(2) to determine "[t]he nature of the probable environmental impact" from the turbine sites that it has authorized inside and outside of the karst plain. Without this hydrogeologic field work, the Board also lacks the information necessary to determine whether the Project represents the minimum adverse environmental impact under R.C. 4906.10(A)(3) and serves the public interest, convenience, and necessity under R.C. § 4906.10(A)(6). OPSB cannot issue a certificate for this Project without knowing whether the authorized turbines will contaminate the water supplies on which the community depends.

7. The Project May Increase Flooding Hazards In The Area.

Firelands' Application acknowledges that the Project Area has a flooding problem. According to the Application, the district manager for the Ohio Department of Transportation and the Sandusky County engineer's office both noted that the most common geotechnical issue encountered in the Project Area is sinkholes from karst features. Application Narrative, p. 81;

Application Exh. E, p. 7. Sinkholes have been associated with flooding in the area. *Id.* The Staff Report also acknowledges that much of the Project Area is prone to flooding. Staff Exh. 1, Staff Report, p. 36. The Staff further found that, even in the absence of flooding, groundwater levels rise rapidly in high precipitation events. *Id.* In recognition of these potential flooding conditions, the Application notes that site dewatering may be necessary during construction if significant precipitation events occur when the foundation excavations are exposed. Application Exh. E, p. 8.

While Firelands' Application acknowledges these flooding risks, it proposes nothing to prevent its turbine construction from worsening the flooding. Even more, its proposal to grout the karst openings under the turbine foundations will block the natural surface water drainage into the sinkholes and increase flooding. Sasowsky Testimony, p. 23, lines 6-9. OPSB cannot issue a certificate for this Project without knowing whether the authorized turbines will cause flooding that will harm the community.

8. Firelands' Plans To Install Turbine Foundations In Shallow Bedrock And To Grout Karst Openings May Obstruct The Groundwater Flow Necessary To Recharge The Community's Water Supply Wells.

Bedrock in the Project Areas can be found at depths as shallow as two feet, or even two inches, below the surface. Williams Testimony, Attachment AW-2, p. 6, § 4.2; Williams Tr. VI 767:19-24. Firelands' survey of residents in the Project Area found that well water was found as shallow as eight feet from the ground surface, and the water in the Schreiners' well is six feet below surface. Application Narrative, p. 75; Application Exh. E, p. 6; Schreiner Testimony, p. 1, lines 25-26. Turbine foundations typically are 8 ½ to 12 feet deep and 60 to 70 feet wide. Williams, Tr. VI 747:6-21. The excavations for the turbine foundations can be 80-100 feet deep.

Id., lines 9-10. So turbine foundations may be installed in the community's groundwater supply, after excavating the aquifer to depths of 80-100 feet.

Firelands may need to excavate the shallow bedrock to install turbine foundations. Application Narrative, p. 66. Blasting may even be necessary to install the turbine foundations. *Id.* By digging or blasting away the bedrock to install the foundations, Firelands may construct its turbine foundations in karst openings that transmit surface water to and replenish the groundwater table and in karst pathways that convey groundwater through the bedrock to people's wells. Firelands tacitly admits this problem when it predicts that site dewatering may be necessary during construction if excavations extend below the water table. Application Exh. E, p. 8; Pedder, Tr. I 53:17 – 54:6. Blasting also can collapse and pollute nearby water supply wells, as well as disrupt recharge pathways to the wells. Sasowsky Testimony, p. 23, lines 15-20. By dewatering the foundation excavations, Firelands also could pump water out of the aquifer that is needed in a nearby well.

The installation of concrete turbine bases and grouting the karst openings under the foundations can limit the water recharge to an underlying aquifer. Sasowsky Testimony, p. 16, line 22 – p. 17, line 1; *id.*, p. 23, lines 6-7. In fact, Alfred Williams testified that the “purpose of grouting is to reduce the movement of water in soluble bedrock. Williams Testimony, p. 7, lines 5-6, 28-30. Installing concrete turbines bases and grout in karst openings need to be avoided or managed to preserve the recharge. Sasowsky Testimony, p. 16, line 22 – p. 17, line 1. Otherwise, the proposed Project could disrupt residential or other water supplies. *Id.*, p 17, lines 1-2.

The availability of suitable water for drinking, agriculture, and other purposes is critical in a rural area such as this. *Id.*, p. 16, lines 14-15. The majority of residences are supplied by

individual private wells, which make use of groundwater from underneath their property. *Id.*, lines 15-17. If such supply were to be lost, it would be devastating for the residents. *Id.*, lines 17-18. Yet Firelands has done nothing to investigate the Project's potential threat to the community water supplies and even promises to grout the natural karst features necessary to replenish these water supplies. Without a groundwater investigation, the Board cannot fulfill its duty under R.C. 4906.10(A)(2) to determine "[t]he nature of the probable environmental impact" from the Project. The Board also lacks the information necessary to determine whether the Project represents the minimum adverse environmental impact under R.C. 4906.10(A)(3) and serves the public interest, convenience, and necessity under R.C. § 4906.10(A)(6). OPSB cannot issue a certificate for this Project without knowing whether the turbines will impair the area's water supplies.

9. **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 Tentatively Approved By The Board's Opinion.**

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).³

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 the Stipulation, so even those promises are unenforceable if the certificate is approved. The Stipulation does not fix this deficiency, but only vaguely 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

³ 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.

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.⁴ Williams Testimony, Attachment AW-2, pdf p. 69; Williams, Tr. VI 758:16-21. It is especially suspicious that the 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.

⁴ 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.

10. **The Application And Stipulation Accepted By The Board's Opinion 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 has stated that 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 record 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.

11. **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.**

As explained above, the construction of turbines on karst could destabilize the land surface elsewhere, increase flooding, contaminate the community's vital water supplies, and cut off the flow of groundwater to neighboring wells. This is especially the case if grout is used to fill karst openings to stabilize the foundations. Before OPSB authorizes any turbines, the Board should require Firelands to conduct a thorough field investigation of each proposed turbine site to identify karst features and to evaluate the turbines' potential impacts on the quantity and quality of the community's groundwater supplies. This investigation should be performed by a hydrogeologist with meaningful experience with karst. The Board's Opinion fails to require this common sense step for the turbines it has tentatively authorized pending post-certificate Staff evaluation.

Firelands keeps stating 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, 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.” It. 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 has stated that the installation 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. 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.

This hydrogeological investigation needs to result in an understanding of the source of water for each neighborhood well. Sasowsky Testimony, p. 16, lines 19-20. This includes identifying the aquifer, as well as the recharge zone for the well which is extracting the water. *Id.*, p. 17, lines 20-21. Firelands and the Staff must identify the aquifers present, the groundwater flow directions, the karst features, ground support characteristics, the recharge and discharge areas, the water users, and the capture zone for the users' water extraction. *Id.*, p. 20, lines 1-7; *id.*, p. 21, lines 9-14. This information could then guide the design and construction of the Facility to avoid the disruption of recharge to the wells. *Id.*, p. 16, lines 20-21. It is essential that this investigation be conducted by a hydrogeologist with karst experience. *Id.*, p. 20, lines 7-9.

Firelands undoubtedly will argue that OAC 4906-4-09(A)(2)(b) excuses it from drilling borings or conducting a geologic investigation until after certification. However, OAC 4906-4-09(A)(2)(b), by its own terms, applies only to "geotechnical exploration and evaluation." According to its dictionary meaning, a geotechnical evaluation pertains to the application of geology to engineering, which in this case pertains to the design of turbine foundations to keep the turbines standing. On the other hand, OAC 4906-4-08(A)(4)(a) requires Firelands to evaluate the impact of its Project on public and private water supplies due to the construction and operation of the wind project before a certificate is issued so that the Board can determine whether the Project meets the statutory criteria in R.C. 4906.10(A)(2), (3), and (6). The Board's Opinion authorizing most of the Project's turbines is contrary to that rule.

Firelands also may contend that it has already drilled some borings, and that groundwater levels were measured in the borings. However, the borings drilled so far by Firelands were designed for geotechnical purposes to make sure the turbines do not fall over, not to investigate the potential for the Project's contamination or disruption of water wells. Sasowsky Testimony, p. 18, lines 13 – p. 19, line 2. The measurements of water levels in the borings do not provide significant insight about groundwater conditions necessary to evaluate the potential impacts of turbine construction. *Id.*, p. 24, lines 1-6. In that regard, the report by RRC, Firelands' consultant on the geotechnical borings, admits:

It is imperative to note that the short-term groundwater level observations performed as part of this study are not an accurate evaluation of groundwater levels at the project site, and this report should not be interpreted as a comprehensive groundwater study.... If a detailed groundwater study is desired, a groundwater hydrologist should be retained to provide these services.

Applic. Exh. 38, Williams Testimony, Attachment AW-2, p. 10.

Besides conducting a groundwater investigation, Firelands should be required to finish its geotechnical exploration to look for additional karst features not found at the proposed turbine sites tentatively approved by the Board. RRC's geotechnical report advises that "[i]t is likely soil conditions will vary between or beyond the points explored" and that "further void assessment" will be made with pilot holes (i.e., borings) at the turbine sites. *Id.*, pp. 15, 34; Williams, Tr. VI 764:8 – 765:3. Mr. Williams acknowledged that finding no karst in one boring does not mean that no karst is located a short distance away, such as 50 feet. Williams, Tr. VI 752:16-23. Moreover, some of the proposed turbine sites did not receive a single boring. Williams Testimony, p. 4, lines 25-26. Consequently, the failure to find karst in some of Firelands' soil borings does not mean that no karst is there.

Firelands was required to submit this hydrogeological information 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. Because Firelands has not complied with OAC 4906-4-08(A)(4)(a), its certificate should be denied. If the certificate is issued, then a comprehensive groundwater field investigation should be required.

12. Before Issuing A Certificate Authorizing Any Turbine Sites, The Board Should Exclude Turbine Construction In The Known Karst Plain And At Any Other Site In Which Karst Features Are Detected Following A Competent Geotechnical And Hydrogeological 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 all 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. This information should be vetted through the hearing process. Following this adjudication, 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.

13. Conclusion

Given Firelands' failure to investigate the groundwater and karst features at the turbine sites, its failure to determine whether its turbine foundations will cause flooding, and its failure to identify the BMPs that will be used to protect SWPAs, the Board cannot fulfill its duty under R.C. 4906.10(A)(2) to determine "[t]he nature of the probable environmental impact" with respect to the Project turbine sites tentatively authorized by the Board's Opinion. Moreover, the Board lacks the information necessary to determine whether the Project as certificated represents the minimum adverse environmental impact under R.C. 4906.10(A)(3) and serves the public interest, convenience, and necessity under R.C. § 4906.10(A)(6). Therefore, the Board should reconsider its Opinion and deny the certificate for all turbine sites.

If the Board declines to reconsider and deny the certificate for the tentatively authorized turbine sites, the certificate should require the detailed groundwater and karst investigations described above to be performed and their results subject to additional public and evidentiary hearings. Following these hearings, the certificate should prohibit turbine construction on any site found by these studies to possess karst features or found to threaten groundwater supplies. Any certificate issued should ban the use of grout in karst openings and prohibit blasting, for the reasons explained above. The Board should not give the Staff leave to allow grouting for other turbines as provided in the Board's Opinion (at Page 35, ¶ 85), as this will cause the harm described above.

Finally, any issued certificate should prohibit the installation of every turbine in the karst plains identified by Figure 9 in Appendix A of the RRC report. Williams Testimony, Attachment AW-2, pdf p. 69. This area is indicated by the light green color on AW-2, which signifies that karst has been found in this area. Williams, Tr. 755:1-22, 758:1-14.

As explained above, the presence of karst at a turbine site and/or grouting and/or blasting its foundation threatens the quality and quantity of the groundwater resources on which the community depends. Even a comprehensive investigation for karst at a turbine site does not guarantee that all existing karst will be found, since underground conditions horizontal to and below the borings can be missed and can cause sinking at the surface. In fact, 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. Therefore, turbines should not be sited in the area known to harbor karst, as depicted in AW-2.

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 take the actions described above with respect to the geotechnical and hydrogeological problems posed by Firelands' Project.

C. 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 Board erred by finding (at Page 34, ¶ 82) that the Project setbacks are adequate to protect human safety. One of the many threats to human health and the environment posed by wind turbines is blade shear. Blade shear occurs when a wind turbine blade, or segment, separates from the rotor and is thrown or dropped from the tower. Staff Exh. 1, Staff Report, p. 48.

Mr. Pedder admitted that blade shear has occurred in Ohio. Pedder, Tr. 93:1-5. Even though he is the Project's development manager, his cross-examination revealed his ignorance about this important topic. *Id.*, 92:18 - 93:7. In contrast, Staff member Mark Bellamy was aware of five incidents of blade throw that have occurred in Ohio alone. Bellamy, Tr. III 454:9-19. Blade shear is a dangerous turbine habit that the Board should address in this case.

Turbine blade parts can fly for long distances. A Nordex safety manual warns that employees and the public must stay at least 500 meters (1640 feet) away from a burning turbine to avoid flying turbine parts, stating:

DANGER

Life-threatening injuries due to falling turbine parts

In case of a fire in the tower, in the nacelle or on the rotor, parts may fall off the WT. Keep a safety distance of 500 m around the WT.

Exhibit 82, “Safety Manual, Rules of conduct on, in and around wind turbines, Wind turbine class Delta4000,” p. 47 (p. 153 of pdf), § 9.3 (emphasis in original). The Staff refers to this 500 meter distance as an area that would need evacuation during a fire. Applic. Exh. 12, Responses to 6th Interrogatories, pdf p. 10, questions 27, 28. Although Firelands, and Nordex, argue that the manual’s safety zone was not meant to establish a setback for blade shear, the manual would not have establish a 1640-foot safety zone during fires if blade pieces were not propelled that distance during turbine fires.⁵ The Board’s acceptance (at Page 34, ¶ 82) of Firelands’ position ignores the fact that a 1640-foot safety zone during fires would be unnecessary if blade parts were not propelled that distance during fires.

The Application recounts that past blade throw incidents in the wind industry have been caused by manufacturing defects in the blades, lightning strikes, and control system failures leading to over-speed. Application Narrative, p. 86. To assure OPSB that blade throw risks will be minimized for the Project, the Application describes braking systems that can be installed on turbines to stop their rotation in the event of blade shear, quality certifications by manufacturers, and other technological advances designed to improve turbine safety. *Id.* However, this technology has been employed since 2012, and blade shear has occurred as recently as 2012, 2018, and September 2020. Bellamy, Tr. III 455:6-23, 457:7-13. Thus, this technology did not prevent blade shear incidents occurring at other Ohio wind projects. Since these safety systems are not foolproof, only a suitable setback will protect the public. In light of the history of blade shear at Ohio wind projects despite their employment of these safety features, the Board erred by finding that these safety features are adequate to prevent the public from blade shear.

⁵ In his direct testimony, Nate Pedder did not mention the manual’s safety advice for preventing blades from striking people within 500 meters during fires. Instead, he described a different safety zone of 1000 meters for preventing lightning from striking wind project employees during thunderstorms. Pedder Testimony, p. 9, lines 1-9. This testimony appears to be an attempt to divert attention from the 500-meter safety zone for blade shear.

Firelands touts 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 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 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.

The Application notes that the turbine sites are as close as 1,468 feet and 1,372 feet to neighboring nonparticipating homes and property lines, respectively. Application Narrative, p. 87. For example, turbine site 86 is closer than 1640 feet to about 26 structures and turbine site is closer than that distance to I-80. Applic. Exh. 12, Responses to 6th Interrogatories, pdf p. 10, questions 27, 28. Because blade shear can send blade parts flying for 1640 feet, a 1640-foot setback between turbines and neighboring properties, including roads, is necessary to protect public safety. The Residents request that OPSB mandate such a 1640-foot setback in this case and prohibit the construction of any turbines closer than 1640 feet from nonparticipants' residences and property lines. Without this setback, the Board cannot reasonably find that the Project complies with R.C. 4906.10(A)(3) and (6).

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

The Board erred by opining (at Page 36, ¶ 88) that the Project complies with the Board's shadow flicker limitations, when the Application and hearing testimony expressly stated that the

Project as presently designed and approved does not meet those limits. The Board further erred by allowing the Staff to make the determination that the Board is required to make about the Project's compliance, based on future reports and plans to be submitted to the Staff after certification.

Shadow flicker refers to the moving shadows that an operating wind turbine casts at times of the day when the turbine rotor is between the sun and a receptor's position. Application Exh. H, p. 1. During intervals of sunshine, turbines will cast a shadow on surrounding areas as the rotor blades pass in front of the sun, causing a flickering effect. *Id.*, pp. 1-2. Shadow flicker is the flickering of alternating light and shadow resulting from wind turbine blades intercepting sunlight. Pedder, Tr. I 56:21-24. Shadow flicker can pass through windows. Pedder, Tr. I 57:3-5. They can cast flickering shadows on neighbors in their yards. Pedder, Tr. I 57:6-8.

OAC 4906-4-09(H)(1) prohibits a wind facility from casting more than 30 hours of shadow flicker on a nonparticipating receptor per year. A "non-participating receptor" is a property whose owner has not signed an agreement waiving this standard. OAC 4906-4-08(H)(1).

Firelands has submitted shadow flicker models to OPSB, but it failed to comply with the 30-hour per year standard. Firelands' first submission of flicker modeling results for some of its potential turbine models showed that shadow flicker from the Project alone will exceed the standard at 55 receptors (occupied buildings). Application Narrative, p. 92; Pedder, Tr. I 61:15 – 62:3. Firelands' latest supplemental submission of flicker modeling results for additional turbine models showed that shadow flicker from the Project alone will exceed the standard at 49 nonparticipating houses and one business. Applic. Exh. 7, Attachment C, pdf pp. 165-167. Flicker exposures for these neighbors range up to almost 100 hours per year. Applic. Exh. 7,

Attachment C, pdf p. 167 (receptor 1179). An additional 16 receptors will be exposed to more than 30 hours per year from a combination of the Project and other wind projects. *Id.*, Attachment D, pdf pp. 169-170. Consequently, the Project as currently configured does not comply with the Board's standard. Bellamy, Tr. III 463:11-17.

Nevertheless, the Staff proposes to give Firelands a certificate on the bare promise that Fireland in the future will take actions to bring the facility into compliance. *Id.*, Tr. 464:12-17; Jt. Exh. 1, Jt. Stip. and Recommendation, p. 8, Condition 34. A future promise to design its facility in a manner that complies with legal requirements does not satisfy the Board's rules. A promise to submit a compliant shadow flicker design in the future also violates the Residents' right to test the accuracy and sufficiency of that design during this proceeding. Firelands, based on the current evidentiary record, has the burden to demonstrate that its Project represents the minimum adverse environmental impact under R.C. 4906.10(A)(3) and serves the public interest, convenience, and necessity under R.C. § 4906.10(A)(6). As currently designed, the Project does not satisfy these criteria due to its shadow flicker problem. OPSB may not approve a certificate unless the applicant produces a Project design that demonstrates compliance with the Board's requirements.

The Residents also note that Firelands' shadow flicker modeling uses an input that makes its results inaccurate. This model assumes that each property receiving shadow flicker is only one square meter in size located one meter above the ground. Application Narrative, p. 92; Pedder, Tr. I 65:1-11. So the actual dimensions of a home were not used in the model. But no house or yard is one square meter in size. This assumption unfairly underestimates the time in which the shadows are hitting the receptor. In its future modeling, Firelands should be directed to use accurate assumptions to calculate compliance with the 30-hour standard.

Moreover, Firelands states that, in order to meet the 30-hour limit, it could adopt mitigation measures such as vegetative screening, window treatments, or curtailment of certain turbines' operation during select times. Application Narrative, p. 99. Firelands' revelation that it could curtail its turbines' operation to reduce shadow flicker suggests that all shadow flicker can be easily prevented simply by turning off the turbines at times when they otherwise would cast annoying shadow flicker on their neighbors. Because Firelands' shadow flicker model reveals the times of the day that each turbine casts shadow flicker on its neighbors, Firelands knows when to shut off these turbines to prevent shadow flicker altogether. Application Narrative, pp. 93-95, Table 08-4; Pedder, Tr. I 67:10-13. Even if a turbine is guilty of casting shadow flicker on a neighbor for 30 hours per year, the curtailment of operation for 30 of the year's 8760 hours would reduce its annual operation by only 0.003%. Firelands has no right to annoy any of its non-participating neighbors with shadow flicker that can easily be prevented with such an insignificant loss of income.

Firelands used 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, the flicker model actually underestimated flicker minutes by assuming that the receiving building or yard is only one square meter in size.

Firelands noted 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.

R.C. 4906.10(A)(3) prohibits OPSB from issuing a certificate, unless “the facility represents the minimum adverse environmental impact, considering the state of available technology and the nature and economics of the various alternatives, and other pertinent considerations.” Emphasis added. As explained above, the dictionary meaning of “minimum” is “the least quantity assignable, admissible, or possible.” See the Merriam-Webster Dictionary, found online at <https://www.merriam-webster.com/dictionary/minimum>. In this case, Firelands can eliminate the shadow flicker nuisance altogether without any significant loss of income. Accordingly, the elimination of shadow flicker is the minimum adverse environmental impact, and this is necessary for the Board to find that the Project complies with R.C. 4906.10(A)(3). Therefore, the Residents request that Firelands be directed to eliminate shadow flicker on non-participating neighbors.

In defense of its failure to demonstrate compliance with the shadow flicker standard, the Board’s Opinion states only that Condition 34 requires Firelands to comply with the standard in the future. Condition 34 would require Firelands to submit a study to the Staff showing how the

Project will achieve the standard. Firelands promises to comply with the standard in the future, perhaps by using mitigation measures.

To comply with OAC 4906-4-09(H)(1), the applicant 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, the record contains no information from which the Board can satisfy its obligation under R.C. 4906.10(A)(2), (3), and (6).

E. The Project Does Not Serve The Public Interest, Convenience, And Necessity Due To Its Lack Of Efficiency And Reliability In Producing Electricity.

The Board erred in ruling that the Project serves the public interest, convenience, and necessity as required by R.C. 4906.10(A)(6). In addition to the many other reasons that the Project does not comply with R.C. 4906.10(A)(6) as explained elsewhere in this Application for Rehearing, the testimony of Resident Dennis Schreiner further demonstrates that this Project does not serve the public interest, convenience, and necessity. Accordingly, the requested certificate should be denied.

The Board stated (at Page 64, ¶ 169) that it found the testimony of Firelands' witness Deepesh Rana to be more probative on grid reliability and cost issues than Mr. Schreiner's testimony. It should not have done so. Schreiner is well qualified to testify about this topic. His

post-high school education in the U.S. Navy was equivalent to an engineering degree, as confirmed by the engineering director of the Davis-Besse nuclear power station. Schreiner Testimony, p. 2, lines 8-23. His naval curriculum included training on electricity and electronics. *Id.*, lines 9-13. All of his job positions with Davis-Besse were available only to persons with engineering degrees or equivalent, for which he was determined by Davis Besse to be qualified. *Id.*, lines 21-23.

After operating a nuclear submarine in the Navy, Mr. Schreiner embarked on a private sector career spanning more than 40 years. *Id.*, p. 4, line 1 to p. 4, line 12. During these four decades, he operated a nuclear power station (Davis-Besse) or trained others to operate nuclear power plants. *Id.*

As a control room operator and supervisor of Davis-Besse, Mr. Schreiner had conversations on more than a daily basis with the grid power dispatchers and planners to schedule increases and decreases in power production by Davis Besse in order to match increases and decreases in power production by other energy producers on the electric grid now known as PJM and in power demand by electricity consumers. *Id.*, p. 4, lines 13-18.

Mr. Schreiner's greater than 40 years of experience in operating a major energy production facility, as well as his constant interaction with grid operators, is in stark contrast to the inexperience of Deepesh Rana, the Apex Clean Energy employee who testified in an attempted rebuttal of Mr. Schreiner's testimony. Mr. Rana's seven years of job experience has not included the operation of any energy facilities, not even a wind facility. Applic. Exh. 90, Rana Testimony, Attachment DR-1; Rana, Tr. IX 1172:7 – 1174:21. He has just developed the projects, arranged for connecting them to the grid, and then handed them off to the operators. *Id.* And for 1.5 years with Enel Green Power, he interacted with the operators for only two months

after the development of a project to make sure the project had been developed correctly.

Attachment DR-1; Rana, Tr. VII 1173:17 – 1174:3. In short, Mr. Rana has almost no experience with grid reliability or costs.

In Mr. Schreiner's firsthand experience with operating a major electricity production facility, he became familiar with the grid's challenges with intermittent energy sources, which are sources that operate periodic rather than constantly. *Id.*, p. 4, line 21 to p. 5, line 4 & p.5, line 22 to p.6, line 5. Some intermittent energy sources are periodic due to the fact that they are dependent upon meteorological conditions, which adds variability and uncertainty to the amount of power available for the grid. *Id.*, p. 4, line 22 to p. 5, line 1. Wind farms are one such type of intermittent source of energy, because it produces electricity only when wind conditions are favorable. *Id.*, p. 5, lines 7-19. Other intermittent energy sources, such as peaker electric production plants fueled by diesel fuel or natural gas, produce dispatchable energy. *Id.*, p. 5, lines 1-2. That is, they can start energy production whenever the electricity is needed rather than waiting for weather conditions that enable production. *Id.*, lines 2-4.

Based on Mr. Schreiner's experience and knowledge of electricity production, he testified about the following reasons that the Emerson Creek wind project does not serve the public interest, convenience, and necessity.

First, because wind farms' dependence on favorable winds enable them to produce only 27.2% of their nameplate capacity in Ohio, they are not constant, reliable sources of electricity upon which grid operators can depend. *Id.*, p. 6, lines 7-14. This problem is true for the Project individually, since it is predicted to produce only 34% of its nameplate capacity. Schreiner, Tr. VII 866:19-25.

Second, a small energy facility such as the Project introduces additional conductors and cabling, which reduces the amount of electricity reaching the grid and which increases energy production costs. Schreiner, Tr. VII 869:11-19; Schreiner Testimony, p. 7, lines 3-9. To offset the changing power factor, large energy generators often need to over-excite or under-excite their generators to bring the grid into optimum efficiency. *Id.*, lines 9-13.

Third, if a wind farm such as the Project suddenly stops sending electricity to the grid, other larger and more reliable energy sources have to compensate for the interruption in the wind facility's contributions by producing more electricity to maintain the grid's inertia, *i.e.*, maintaining a ready store of energy available when the transient source stops. *Id.*, p. 7, line 13 to p. 8, line 6. If and when more transient energy sources displace larger stable sources, the transient sources will lack the ability to provide for this stable backup of power. *Id.*, p. 8, lines 3-6.

Fourth, as more wind facilities such as the Project come into existence and displace more reliable non-intermittent sources, Ohio's electricity supply will become unreliable just as it is in California as revealed by last summer's blackouts. *Id.*, p. 8, line 9 to p. 10, line 20; Schreiner, Tr. VII 865:4-21. California's reliance on renewables for a substantial percentage of its energy has left that state without enough traditional power sources to compensate for the downtime of renewables and has made California dependent on electricity purchases from out-of-state sources. Schreiner, Tr. VII 872:23 – 873:4. Mr. Rana reinforced this point when he attempted to distinguish between PJM and CAISO, the system operator in California, by saying that CAISO has a greater percentage of its sources in renewables. Rana, Tr. VII 1196:9 – 1197:12. As renewable energy facilities such as the Project come online and displace traditional energy sources, Ohio will face the same problem.

Fifth, wind farms have considerable amounts of downtime that make them unreliable. Schreiner Testimony, p. 8, line 21 to p. 9, line 8. Batteries are not able to store electricity from wind farms for long-term use during wind farm downtime. *Id.*, p. 9, line 22 to p. 10, line 8. And Firelands has no plans to store its electricity in batteries anyway. Pedder, Tr. I 103:4-13.

Sixth, Ohio winds are of marginal efficiency for energy production. Schreiner Testimony., p. 10, lines 15-20.

Seventh, wind energy is more expensive than non-intermittent energy sources. *Id.*, p. 11, lines 1-13. The consumers have to bear the extra cost. *Id.* The Project will contribute to higher electricity costs in Ohio as wind energy facilities multiply and displace traditional energy sources. The growth of renewable energy is largely driven by renewable portfolio mandates, not by the technical merit of wind power production. Schreiner, Tr. VII 869:7-10.

Accordingly, this Project is not good for Ohio or Ohio's energy consumers. The Board should deny the requested certificate for failure to serve the public interest, convenience, and necessity under R.C. 4906.10(A)(6).

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

Rotating wind turbine blades can disrupt over-the-air television reception for a few miles from the turbine. Application Exh. Q, p. 43. This interference takes the form of a frozen picture, tears, pixelated squares, and/or a blank screen. Evans, Tr. III 400:21 – 401:9.

B. Benjamin Evans of Evans Engineering Solutions estimated that about 2,334 households rely on off-the-air television signals in the area of 228 square miles where television reception is most likely to be affected by interference from the Project's wind turbines. Application Exh. Q, p. 45. Mr. Evans estimated that the reception of about 233 of these households will be impaired. *Id.* This is based on a "rule of thumb," stated by Exhibit Q to be

based on his experience with other wind projects, that about 10% of receiver locations within three miles of a large turbine are affected to some extent when the turbine is between the television station and the receiver. *Id.*, p. 43.

Although Exhibit Q represented that Evans' 10% "rule of thumb" was based on Mr. Evans' experience with other wind projects, he admitted at the hearing that he did not know the origin of this figure. Evans, Tr. III 3995-14. He had dealt with 16 complaints about television interference provided to him by a wind project in Maine, but the developer of that project may not have conducted a survey to find out whether other neighbors also were harmed. Evans, Tr. III 435:8-24. So Mr. Evans' estimate of the number of Project neighbors who may lose their television reception is suspect.

Mr. Evans stated that the turbines' interference with television reception can be mitigated by installing an upgraded outdoor antenna for about \$200 per household or by paying about \$450 per year for satellite or cable services. Application Exh. Q, p. 45. Proposed Condition 38 provides that the Project's interference with television reception is subject to "avoidance or mitigation." Jt. Exh. 1, Jt. Stip. and Recommendation, p. 9. The condition does not specifically state that Firelands must pay for monthly subscription fees for cable or satellite television service if such a mitigation measure is necessary. Mr. Pedder represented that Firelands would pay for this service. Pedder, Tr. I 41:16-24. The Board's certificate should make it clear that this will be required.

Firelands has represented that it will pay the monthly subscription fees for cable television where cable is necessary to overcome the turbines' impacts on reception. The Board's Opinion does not specifically add that commitment to Condition 38, but it should do so that Firelands or a successor does not later dispute its responsibility to pay the subscription fees.

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

A real-time kinematic GPS locator (“RTK”) system enables farming equipment to accurately plant seeds and conduct other activities in the fields with precision. Evans, Tr. III 408:17 – 409:8. Resident Gerard Wensink has an RTK system. Evans, Tr. III 409:22 – 410:2.

Mr. Evans’ testimony revealed that he had little understanding about how RTK systems function or about whether turbine blades will interfere with the systems’ operation. He had to look up information on the internet to come up with his testimony about RTK systems. Evans, Tr. III 409:9-16. He could not find any statements about whether or not turbines interfere with RTK signals. Evans, Tr. III 410:3-8, 17-21.

Based on his flimsy research, Mr. Evans opined that a farm implement could function without a GPS signal from its base station for 15 minutes if a turbine blocked the signal, and then the implement could re-establish a line-of-sight connection with the base station as the implement crossed the field. Evans Testimony, p. 4, line 26 to p. 5, line 2. However, the implement could be traveling in a direction that does not restore the line of sight. Evans, Tr. III 412:8-21. He also opined that the base station could latch onto more than one satellite to stay connected to a satellite. Evans Testimony, p. 4, lines 14-24. However, since the farm implement does not connect to a satellite, but is only connected to the base station, the availability of multiple satellites does not help to restore a lost line-of-sight connection between the base station and the implement. Evans, Tr. III 415:21 – 417:16.

Proposed Condition 38 requires avoidance or mitigation for interference with all licensed communication systems. While Mr. Evans believed that Mr. Wensink’s RTK system is a licensed communications system, he was not sure whether all other RTK systems are licensed Evans, Tr. III 424:23 – 425:12. Firelands represented in its post-hearing brief that it will fund

the purchase and installation of a new RTK system if the Project interferes with any such system. Consequently, the Board's certificate should add a statement to Condition 38 clarifying that all RTK systems are subject to its protections. Although the Board's Opinion states (at Page 37, ¶ 90) that Condition 38 "as supplemented" by hearing testimony, makes it clear that all GPS signal disruptions must be corrected, the hearing testimony is not part of the certificate and the language of the Board's certificate must contain that requirement. The Residents request that a simple sentence be added to the Opinion confirming this requirement so that Firelands or a successor does not later dispute this responsibility.

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

Turbines will be potentially visible from more than half of a 10-mile radius around the Project Area, in about 544 square miles of land. Applic. Exh. 46, Robinson Testimony, p 10, lines 11-13; Robinson, Tr. V 671:18 – 672:9; Applic. Exh. 2, p. 30. The tallest turbine model being considered by Firelands, at 655 feet tall (*id.*, p. 2), will tower above the mature 40 to 60-foot tall trees in the area (Robinson, Tr. V 672:22 – 673:7). The residents will see the turbines from their homes, yards, fields, roads, parks, and businesses. The turbines will mar the night sky with blinking red lights. Applic. Exh. 2, p. 3. These lights will be potentially visible from almost half of the 10-mile radius around the Project, in about 455 square miles. *Id.*, p. 30; Robinson, Tr. V 673:17 – 674:4; Robinson Testimony, p. 10, lines 27-28.

The turbines will disfigure 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 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 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).

Firelands’ towering machines will inflict a visual blight on the Residents and the rest of the community. As nearby neighbors of the wind project, the Residents will suffer from close and imposing views of the turbines. Some of them will be inflicted with views of many turbines.

The Board’s Opinion (at Page 57) does nothing meaningful to mitigate these visual impacts. Although reducing the number of turbines reduces the impact to persons living in areas freed of turbines, it does nothing for the people victimized by the remaining turbines. And making all of the turbines look alike does not conceal them as they loom above the yards and homes of their neighbors. Thus, the Board erred in finding that the Project represents the minimum adverse environmental impact under R.C. 4906.10(A)(3) and serves the public interest, convenience, and necessity under R.C. § 4906.10(A)(6).

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

Bats are an important component of the environment. As insectivores, they eat insect pests that otherwise would consume the farmers' crops. BSBO Exh. 2, Smallwood Testimony, Exh. B, pp. 1-2. A single bat can eat an amount of insects equivalent to a teenage boy's consumption of 200 quarter pound hamburgers. *Id.* They consume mosquitos. Leftwich, Tr. III 321:25 -322:1. They serve as a food source for predators. Leftwich, Tr. III 321:2-11.

The importance of bats to Ohio's ecosystems and economy led the Governor of Ohio to proclaim October 24-31 to be "Bat Week." Smallwood Testimony, Exhibit C. According to Governor Mike DeWine, "Studies have shown that the loss of bats could cost the nation's agricultural industry more than \$3.7 billion per year because of the pest-control benefits they provide." *Id.* The source of the Governor's figure can be found in a scientific paper by Boyles et al. (2011), which estimated the economic loss to Ohio's agricultural industry at more than \$740 million per year should bats be extirpated. Smallwood Testimony, p. 17, lines 11-13. With about 300,000 acres of farmland between Huron and Erie Counties, the findings of Boyles et al. (2011) would predict that the loss of all bats would cost the agricultural industry in these counties \$22.2 million per year. *Id.*, lines 13-15.

Turbines kill bats. This occurs when bats and blades collide. Bats are known to be attracted to turbines and to actively forage within and close to the turbine's rotor-swept zone. Smallwood Testimony, p. 18, lines 10-15.

BSBO retained Dr. K. Shawn Smallwood to determine this Project's potential impacts on bats and to evaluate Firelands' bat surveys that were supposed to evaluate these risks. Dr. Smallwood has a masters degree and a doctorate in Ecology with more than 40 years of experience with field work on bats and other wildlife. Smallwood Testimony, p. 62, Curriculum

Vitae. He has 486 professional publications in this subject area, including 88 peer reviewed publications. *Id.* 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. Paul Rabie, who served as Firelands’ expert witness, Dr. Smallwood’s broad client base does not incentivize him to slant the results of mortality studies.

After comprehensively reviewing all of Firelands’ bat surveys, Dr. Smallwood concluded that they were flawed in many respects. He has identified enough errors in the techniques used in Firelands’ bat surveys to fill 12 pages of written testimony. Smallwood Testimony, pp. 4-15. Primarily, the only value of these studies is that they confirmed the simple fact that the Project

Area hosts bats that need to be protected against turbine collisions.

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 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.

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 1.⁶

⁶ 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.

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.

Firelands retained Dr. Paul Rabie to testify about bat impacts at the hearing. 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.

While Dr. Rabie's estimate reveals that the Project will cause substantial damage to the community's bat populations, it has every indication of being biased and low. The use of fatality counts at other wind projects, as he did in his testimony, 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.

Dr. 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.⁷ This mortality estimate, while lower than Dr. Smallwood's, is still alarming.

The estimate from another Firelands expert witness, Rhett Good, is even more concerning. He testified that bat mortality rates at Midwest wind projects have been documented

⁷ Wind turbines typically have a life expectancy of 20 to 25 years. Staff Exh. 1, Staff Report, p. 55.

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 bats 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 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.

According to guidance from the U.S. Fish and Wildlife Service (“USFWS”) for conducting bat surveys, the purposes of such surveys are to 1) determine anticipated take levels, 2) develop monitoring plans, 3) track take, and 4) develop appropriate adaptive management plans. Smallwood Testimony, p. 17, lines 16-20. Flawed surveys do not accomplish these objectives. Nor do they enable OPSB to satisfy its obligation under R.C. 4906.10(A)(2) to determine “[t]he nature of the probable environmental impact” from the Project. Although Firelands and USFWS agreed upon a Technical Assistance Letter (“TAL”) for the purported purpose of reducing turbine strikes of Indiana bats and northern long-eared bats, the adequacy of its conditions cannot be known without valid survey information on the bats in the area. Applic. Exh. 11, pdf p. 116. Moreover, neither this letter, the Application, nor the Stipulation contains any meaningful discussion about how to minimize the deaths of other bat species based on the results of Firelands’ surveys.

Although Firelands’ bat surveys failed to provide an accurate portrayal of the Project’s actual threat to bats, Dr. Smallwood has utilized his vast experience with other wind projects to compile a realistic estimate of the Project’s prospective damage to bat populations. Dr. Smallwood concluded that the Project will kill an estimated 14,620 bats per year. Smallwood Testimony, p. 36, lines 17-18. A higher estimate also would be defensible, since curtailment was used for part of the time at the other wind project on which these numbers are based and dogs were not used at the other wind project to find bat carcasses. *Id.*, p. 36, line 19 to p. 37, line 8. The TAL at the Project, if actually implemented to curtail turbine operation during bat migration, may reduce the expected bat mortalities. However, Firelands has provided no study to quantify

this benefit.

Dr. Smallwood examined the Project's turbine layout to ascertain whether the turbine locations were susceptible to bat collisions. He discovered that many of the selected turbine locations are near landscape features more likely to attract bats and thus more likely to result in bat mortalities. *Id.*, p. 40, lines 3-13 & pp. 40-44, Table 5. 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. The Project does not present the "minimum" adverse environmental impact under R.C. 4906.10(A)(3), since it can be designed more skillfully to kill fewer bats.

Not able to credibly downplay the Project's damage to bats, Firelands argues 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 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 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.

Dr. Smallwood reviewed the TAL to find out whether its proposed mitigation measures for bats are adequate. They are not. Smallwood Testimony, p. 47, line 12 to p. 49, line 14. The TAL is deficient in the following respects:

1. The curtailment period does not cover the periods in which Firelands’ acoustic bat surveys found the greatest bat activity. *Id.*, p. 47, line 22 to p. 48, line 4.

2. The use of a single cut-in speed is out of date and less effective than using real-time acoustic detection of bats with wind data. *Id.*, p. 48, lines 5-15.
3. The plan fails to require compensatory mitigation for the bats that curtailment fails to save. *Id.*, lines 16-23.
4. The monitoring techniques are based on outdated ODNR guidelines. In particular, post-construction monitoring should involve dogs and should upgrade carcass trials. *Id.*, p. 49, lines 1-9.
5. All turbines should be monitored for fatalities. *Id.*, line 10.
6. Mortality monitoring should last for at least three years. *Id.*, lines 10-11.
7. The fatality search radius is too small. *Id.*, lines 11-14.

Because OPSB has its own mandates under R.C. 4906.10(A)(3) and (6), the Board cannot sit by and let Firelands proceed with its Project under a deficient TAL. The Board should correct these deficiencies with additional conditions of its own.

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 Board erred in finding (at Page 54 of its Opinion) that Firelands adequately evaluated the Project's potential impacts on bats. The numerosity of bat studies is meaningless if they are all badly designed and poorly performed. Firelands' surveys were not just badly performed; they were consciously conducted to produce skewed results. A smaller number of accurate, well-designed surveys would have provided an accurate picture of the actual extent of risk to

bats. Nevertheless, not a single accurate study was conducted. The Board did not determine the nature of the Project's probable environmental impact to bats, because Firelands did not provide enough information to make that determination.

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.

The Board also erred in deferring to the U.S. Fish and Wildlife Service ("USFWS"), and the Ohio Department of Natural Resources ("ODNR") to determine whether Firelands' studies were adequate, instead of the Board making its own judgment based on expert testimony and evidence in a contested adjudication. The limited involvement of USFWS and ODNR in Firelands' inferior work product did not have the benefit of hearing the evidence that the Board received during this case about the deficiencies in these studies. The Board has had that benefit, and it should not ignore that evidence in implementing its mandate to determine whether the criteria of R.C. 4906.10(A) are met.

The Board also erred in depending solely on certificate conditions allowing the Staff, USFWS, and ODNR to determine post-certificate how bats will be protected against the hazards of the wind turbines, instead of judiciously exercising the Board's authority to govern the siting of the turbines. The Board's decision that the Project represents the minimum adverse environmental impact is erroneously based solely on the Board's assumption that the Staff and

other agencies will take the actions necessary to mitigate the harm that the Board's decision admits (at Page 54) will occur. The Board should not be placing USFW and ODNR in the unenviable position of being forced to deal with turbines placed in locations that will kill bats. The Board has the siting authority for the turbines, not USFWS and ODNR, and the Board should exercise this authority to protect these bats by denying certification for these turbines.

In sum, the Board has punted all of its responsibility to Staff, USFWS, and ODNR for studying and mitigating bat impacts. First, the Board has declined to independently evaluate the bat studies based on evidence in the record. And, second, the Board has failed to decide and implement its own siting decisions and operational requirements to protect the bats.

The Board should do the following with respect to the Project's threats to bats: (1) deny the certificate for lack of adequate bat survey information, including the lack of credible data on estimated bat deaths; (2) deny the certificate because the number of estimated bat mortalities, as calculated by Dr. Smallwood and Firelands' own witnesses, will damage the populations of bats needed for agriculture and other purposes; and (3) if the Project is approved, require additional conditions to compensate for the outdated, ineffective conditions in the TAL.

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

The Board erred in finding (at Page 54) that Firelands adequately evaluated the Project's potential impacts on birds. The numerosity of bird studies is meaningless if they are all badly designed and poorly performed. Firelands' surveys were not just badly performed; they were consciously conducted to produce skewed results. A smaller number of accurate, well-designed surveys would have provided an accurate picture of the actual extent of risk to bird life and the irreplaceable avian resources along Lake Erie. Not a single accurate study was conducted, with the most glaring, purposeful omission being the lack of nighttime radar studies to find out how

many birds the turbines will kill during migration to and from Lake Erie. The Board did not determine the nature of the Project's probable environmental impact to birds, because Firelands did not provide enough information to make that determination.

The Board also erred in deferring to the U.S. Fish and Wildlife Service ("USFWS"), and the Ohio Department of Natural Resources ("ODNR") to determine whether Firelands' studies were adequate, instead of the Board making its own judgment based on expert testimony and evidence in a contested adjudication. The limited involvement of USFWS and ODNR in Firelands' inferior work product did not have the benefit of hearing the evidence that the Board received during this case about the deficiencies in these studies. The Board has had that benefit, and it should not ignore that evidence in implementing its mandate to determine whether the criteria of R.C. 4906.10(A) are met.

The Board also erred in depending solely on certificate conditions allowing the Staff, USFWS, and ODNR to determine post-certificate how birds will be protected against the hazards of the wind turbines, instead of judiciously exercising the Board's authority to govern the siting of the turbines. The Board's decision that the Project represents the minimum adverse environmental impact is erroneously based solely on the Board's assumption that the Staff and other agencies will take the actions necessary to mitigate the harm that the Board's decision admits (at Page 54) will occur. The Board should not be placing USFW and ODNR in the unenviable position of being forced to deal with turbines placed in locations that will kill bald eagles and other birds, especially turbines sited near known eagle nests. The Board has the siting authority for the turbines, not USFWS and ODNR, and the Board should exercise this authority to protect these birds by denying certification for these turbines. This includes the establishment of a 2.5-mile setback between turbine sites and bald eagles nests, since bald eagles concentrate

their activities within 2.5 miles of the nest where they are vulnerable to collisions with whirling turbine blades.

In sum, the Board has punted all of its responsibility to Staff, USFWS, and ODNR for studying and mitigating bird impacts. First, the Board has declined to independently evaluate the bird studies based on evidence in the record. And, second,, the Board has failed to decide and implement its own siting decisions and operational requirements to protect the birds.

1. **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.**

A letter from the U.S. Fish and Wildlife Service to Firelands' predecessor on this Project emphasizes that a wind developer has an obligation to avoid the siting of wind projects in important avian migratory pathways:

The Service supports the development of wind power as an alternative energy source, however, wind farms can have negative impacts on wildlife and their habitats if not sited and designed with potential wildlife and habitat impacts in mind. Selection of the best sites for turbine placement is enhanced by ruling out sites with known, high concentrations of birds and/or bats passing within the rotor-swept area of the turbines or where the effects of habitat fragmentation will be detrimental. In support of wind power generation as a wildlife-friendly, renewable source of power, development sites with comparatively low bird, bat and other wildlife values, would be preferable and would have relatively lower impacts on wildlife.

Application Exh. K11, pdf pp. 3-4 (emphasis added). Unfortunately, Firelands ignored this advice in siting the Project.

The Project Area is in the midst of an area blessed with some of the greatest bird migration in North America. Shieldcastle Testimony, p. 31, lines 21-22. The Project Area lies directly south of one of the greatest bird concentration areas in the western hemisphere, designated by the National Audubon Society as a Globally Important Area. *Id.*, p. 14, lines 9-11. At the Magee Marsh Wildlife Area, the famous Magee Marsh Boardwalk nestled along the Lake

Erie coast is widely recognized as one of the continent's best birdwatching areas. *Id.*, p. 32, lines 10-11. The birds sought after and enjoyed at Magee Marsh have largely passed through the airspace of Seneca, Erie, and Huron Counties, including the Project Area, on their way from the tropics of South American to the north woods of Canada. *Id.*, lines 11-13. These birds will be threatened by the Emerson Creek wind project if constructed.

As these northbound birds approach Lake Erie in spring, the lake's large expanse of water poses a daunting barrier. *Id.*, p. 33, lines 18-19. Before crossing Lake Erie, small songbirds need to rest and feed to build their energy reserves. *Id.*, lines 19-20. As a result, large concentrations of these small birds converge on the remaining patches of wooded habitat along our lake shore in spring. *Id.*, lines 20-22. The wooded beachfront at Magee Marsh Wildlife Area provides prime habitat for migratory birds. *Id.*, p. 33, line 23 to p. 34, line 1. The position of a mile-long boardwalk in the heart of wooded, lakefront habitat makes these large concentrations of birds accessible for viewing in spectacular fashion. *Id.*, p. 34, lines 1-3.

The massive concentration of birds and birdwatchers in northwest Ohio each spring has attracted attention from the public and the news media. *Id.*, p. 34, line 23 to p. 35, line 2. Stories about this phenomenon have been featured in such news outlets as the national television program CBS Sunday Morning, Birds and Blooms Magazine, Audubon Magazine, and Spirit Magazine (the in-flight magazine of Southwest Airlines). *Id.*, p. 34, line 21 to p. 35, line 2. In November 2014, USA Today readers voted Magee Marsh the best birdwatching spot in the country. *Id.*, p. 35, lines 2-3.

Thus, the protection of these birds is vital to the natural environment and human recreation. Siting bird-killing machines in their migratory pathway would be irresponsible, not

to mention violative of the mandates in R.C. 4906.10(A)(3) and (A)(6) to protect the environment and to serve the public good.

Protecting these birds also is important to the economy of the State of Ohio and local communities. Birdwatching in this area is a multimillion dollar recreational activity. People come from every state in the United States and dozens of foreign countries to this region just to witness the spectacle of bird migration. Shieldcastle Testimony, p. 32, lines 3-5. The popularity of this birdwatching location led BSBO to launch a bird festival known as The Biggest Week In American Birding, which has become the largest birdwatching festival in the country. *Id.*, p. 32, lines 5-6; *id.*, p. 34, lines 15-18. This festival attracts nearly 100,000 people annually to enjoy these birds, with a conservative estimate of over 40 million dollars in economic benefit to the region (the actual estimated range of benefit is \$40 million to \$90 million). *Id.*, p. 32, lines 6-9. This includes income from the lodging, food, travel, and life expenditures while visiting. *Id.*, lines 9-10.

There is a direct connection between habitat conservation and the economic impact of birding tourism. *Id.*, p. 35, lines 4-5. To continue to provide the world-class birdwatching experience that attracts birders from all over the world, Ohio must be good a steward of the habitat that supports these birds. *Id.*, lines 5-7. Doing so is an investment in the health and wealth of Ohio's communities. *Id.*, line 8. The migratory airspace used by birds to reach Magee Marsh and Lake Erie is critical habitat that must be protected for the safety of these birds. The impairment of this habitat with bird-killing wind turbines does not serve this purpose.

2. **The Board's Rules Require Field Surveys For Birds, Because Generic Information On Avian Mortalities From Literature Are Unreliable And Unrepresentative Of Individual Project Sites.**

Firelands has asserted 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 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 that the anticipated avian mortality rate for the Project is not reasonably considered a biologically significant impact is not even supported by the Application. 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 Rhett 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 that the avian victims will be from many species and will be a small percentage of the migrating birds. Application Narrative, p. 159. Firelands argues 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.”⁸ *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.

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.

⁸ Eagles are species of raptors. Good, Tr. II 141:17.

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 field data necessary to determine the extent to which Firelands' turbines will kill these birds.

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

The bird expert for BSBO and the Residents, Mark Shieldcastle, has identified enough errors made in the techniques used in Firelands' bird surveys to fill 21 pages of written testimony. BSBO Exh.1, Shieldcastle Testimony, pp. 7-27. All of these errors are designed to reduce the sightings of birds or manipulate avian data in the Project Area in attempts to conceal the Project's harm to avian life.

Mr. Shieldcastle is a wildlife biologist with a Bachelor of Science degree in Wildlife Management from Ohio State University. *Id.*, p. 2, A.4, lines 4-5. After working as a wildlife research for Ohio State University for two years, he joined the Division of Wildlife of the Ohio Department of Natural Resources in 1976 at the Crane Creek Wildlife Research Unit. *Id.*, p. 2, lines 8-12. He was a wildlife official in the Ohio Division of Wildlife for 33 years from 1976 to 2009. *Id.*, p. 2, A.5; *Id.*, Exh. A (resume), pp. 1-2. From 1992 to the present, he has been the research director for the Black Swamp Bird Observatory. *Id.*, Exh. A, p. 1.

Mr. Shieldcastle's 43-year career has been devoted to the research and protection of birds and mammals, including field surveys to study and count them. *Id.*, Exh. A, pp. 1-2. He was the leader of Ohio's Bald Eagle recovery program for the Ohio Division of Wildlife, entailing the development of eagle recovery plans and nest monitoring. *Id.*, p. 2, Lines 13-15; *Id.*, Exh. A, p. 2; Shieldcastle, Tr. VII 977:14-19. This work included the Emerson Creek wind project area. *Id.*, Tr. VII 935:22 – 936:2. For the Ohio Division of Wildlife, he was engaged as a waterfowl biologist, as Ohio's technical representative to the Mississippi Flyway Council centering on migratory bird regulation development, and in the design of recovery plans for the Trumpeter

Swan, River Otter, Osprey, Common Tern, and Sandhill Crane. Shieldcastle Testimony, p. 2, A.5, Lines 14-18. He has authored and published numerous scientific papers on bird surveys and other bird-related topics. *Id.*, Exh. A, pp. 5-12. While with the Ohio Division of Wildlife, he developed the original Avian Concern Zones related to wind projects' risks to wildlife. *Id.*, p.2, lines 18-19. He is BSBO's technical lead on wind power issues related to wildlife. *Id.*, Exh. A, p. 1. He has banded or has been in charge of operations that have banded almost a million birds over 42 years. *Id.*, Exh. A, pp. 2-3.

For much of Mr. Shieldcastle's career, he has been stationed at and conducted his work in Northwest Ohio. This includes his employment at BSBO, headquartered in Oak Harbor, Ohio, and his positions with the Ohio Division of Wildlife at Crane Creek. *Id.*, Exh. A, pp. 1-2. This has provided him with comprehensive knowledge about bird life in the western basin of Lake Erie and Northwest Ohio. *Id.* He has conducted extensive research on birds in that area, including many field surveys of migrating and breeding passerines, raptors, shorebirds, waterfowl, and Bald Eagles. *Id.*

Mr. Shieldcastle's personal experience with bird surveys has informed his critique of Firelands' bird surveys. OAC 4906-4-08(B)(3) requires Firelands to "provide information regarding potential impacts to ecological resources during operation and maintenance of the facility." This information is necessary, not only to determine compliance with the statutory criteria of R.C. 4906.10(A)(3) and (6), but also to identify the "procedures to be utilized to avoid, minimize, and mitigate both the short- and long-term impacts of operation and maintenance" as required by OAC 4906-4-08(B)(3)(b) and to develop "plans for post-construction monitoring of wildlife impacts" as required by OAC 4906-4-08(B)(3)(c).

The inadequacy of Firelands' studies is revealed by the fact that people other than Firelands' consultants have reported the presence of listed bird species that Firelands' consultants have neglected to find. Other people have found 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. 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.

Firelands has not complied with these rules in a manner designed to minimize the Project's destruction of bird populations. As described in detail below, the company has intentionally designed its field surveys of birds so as to avoid detections of most birds using or flying over the Project Area. Because Firelands' bird surveys fail to accurately characterize the

bird populations in the Project Area, OPSB should direct Firelands to conduct new surveys that use techniques designed to actually find the birds.

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

The majority of avian casualties to turbines are nocturnal migrants. Good, Tr. II 178:3-9. Yet Firelands has not performed a single field survey of birds flying over the Project Area at night. Good, Tr. II 173:19-22. In particular, Firelands has not conducted any nighttime surveys for passerines. A passerine is a small bird generally considered to be a songbird. Good, Tr. II 161:24-25. Passerines include a wide variety of about 300 species in the eastern United States, including wood warblers. Good, Tr. II 161:25 – 162:4; Shieldcastle, Tr. VII 942:23 – 943:4. Some of the passerines expected to fly at night through the area are endangered species such as the Kirtland’s warbler, or special interest species such as the Canada warbler and the golden-winged warbler. Shieldcastle Testimony, p. 28, lines 15-18 & p. 29, lines 1-4. Without identifying and counting the passerines flying through the Project Area at night, it is not possible to accurately evaluate the risk from the birds’ collision with the Project’s wind turbines.

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.

Firelands presented three studies in Exhibit T of the Application that were labeled as “Passerine Migration Studies.” Application Exhs. T1, T2, T3. However, these studies were meaningless for evaluating turbine risk to migrating passerines, because none of the three studies looked for passerines flying through the Project Area at night. Shieldcastle Testimony, p. 8, line 23 to p. 9, line 1; p. 9, lines 17-19, 22; p.10, lines 6-7. The vast majority of most passerine species migrate at night. *Id.*, p. 6, lines 15-16; Good, Tr. II 173:16-19. Therefore, to address nocturnal migration risk, studies must be conducted at night when the birds are actively moving through the air column habitat. Shieldcastle Testimony, p. 7, lines 8-9. Radar can be used to count night migrants, it is the only method for doing so, and the USFWS uses radar for that purpose. *Id.*, p. 8, line 23 to p. 9, line 1; Shieldcastle, Tr. VII 944:2-15, 1005:4 – 1006:2, 1010:12-23. Nevertheless, Firelands limited its survey to the daytime counting of birds that had landed in the Project Area or were seen flying during daylight. Shieldcastle Testimony, p. 8, lines 7-9, 20-22; *Id.*, 9, lines 1-14.

Although these “migration” studies may have observed some flying birds, they missed the vast majority of passerines since they mostly migrate at night. *Id.*, p. 6, lines 15-16. Moreover, this daytime counting technique did a poor job of finding migrants even during daylight. A nocturnal migrant is unlikely to stop in the Project Area, unless it happens to be flying over the Project Area at the time the sun rises. Good, Tr. II 176:9 – 177:6. Moreover, the Project Area lacks the habitat necessary to attract migrants to stop in the Project Area. *Id.*, 207:8-17; Shieldcastle, Tr. VII 1008:16 – 1009:15. So counting migrants stopped in the Project Area did not identify the species of migrants flying through at night or quantify their numbers. The vast majority of nocturnally migrating birds cannot be counted during daylight in the Project Area, because they simply are not there. *Id.*, Tr. VII 1034:15-25. And trying to see migrants flying over the Project Area in daylight was ineffective, because the flying birds are high overhead or far away and difficult to see, especially the smaller passerines such as the warblers. Shieldcastle Testimony, p. 9, lines 1-14, 22; *Id.*, p. 10, lines 10-14. For example, a typical warbler is only six inches long, and it would look like an object of 0.025 inch at a distance of 200 meters. *Id.*, lines 3-4. A large percentage of the birds commonly victimized by turbines strikes are of species that cannot be detected using the observation strategies that Firelands employed. *Id.*, lines 7-9; *Id.*, p. 10, lines 14-16. Thus, looking for birds stopped during daylight does not representatively survey the birds that moved through during darkness. Shieldcastle, Tr. VII 963:17 – 964:6.

Instead of looking in a meaningful manner for the species that need the most protection from the turbines, Firelands’ method was biased towards finding common species that fly in highly visible flocks during daylight, such as blackbirds. Shieldcastle Testimony, p. 8, lines 19-20; *Id.*, p. 9, lines 10-14; *Id.*, p. 10, lines 13-14. The consequence of this deliberate design

failure was skewing the studies' results towards finding common, larger, flocking passerines, and missing the rarer birds that fly solo in daylight or darkness, fly at night, and are more susceptible to turbine collisions. Using the results of these deceptive techniques, Firelands submitted passerine "migration" reports cynically representing that the prevalence of common species indicate low risk of adverse impacts to sensitive avian species. Application Exh. T1, p. 7 & Exh. T2, p. 8.

The studies concluded that Firelands' turbines would pose little risk to migrating birds based on the bird surveys. This conclusion was the inevitable outcome of these studies, since they failed to look for passerines during the time they were most likely to be there, as they flew through the Project Area at night.

Therefore, Firelands has omitted to survey the category of birds most at risk of colliding with wind turbines – passerines -- during migration at night when they are the most vulnerable to flying into the turbines. Without this information, the Board cannot fulfill its duty under R.C. 4906.10(A)(2) to determine "[t]he nature of the probable environmental impact" from the Project. OPSB should not issue a certificate for this Project without requiring Firelands to first conduct nighttime radar monitoring to evaluate the turbines' threat to migrating birds in this important migratory area.

5. All Of Firelands' Bird Surveys Are Fatally Flawed And Need To Be Redone.

Mr. Shieldcastle's analysis revealed a myriad of ways in which Firelands' bird surveys were so flawed that they failed to accurately portray the bird species and populations that use or travel through the Project Area. Some of the many flaws include the following mistakes:

a. The daytime migrating bird studies were conducted for an inadequate period of time.

While Firelands did not survey migratory birds at night, it did survey migratory birds in daylight. WEST conducted all three studies -- one in 2012 and two from fall 2016 to fall 2017 -- and all of them were performed on different footprints, each of which included a segment of the present project but none of which was inclusive of the present documented footprint.

Shieldcastle Testimony, p. 7, lines 14-16. The 2012 survey was not even conducted in the Project Area. *Id.*, p. 8, lines 15-16. These studies did not take into account that migration is highly variable. *Id.*, p. 6, lines 7-18. No single year of observation can be assumed to be representative of migration in any given area. *Id.*, lines 7-8. At least three years of studies are necessary to begin quantifying average migratory patterns at any location. *Id.*, lines 8-9. Local research along Lake Erie demonstrates differences in bird volume as high as 50% from one year to the next. *Id.*, lines 9-10. Any shorter time frame for studies is insufficient and will not provide scientific validity or support for any conclusions. *Id.*, lines 10-11.

These surveys were conducted only weekly during the study period. Application Exh. T1, p. 4; Application Exh. T2, p. 3; Application Exh. T3, 2nd page. Weekly surveys do not produce representative results, since migration exhibits high variability on a daily basis. Shieldcastle Testimony, p. 7, lines 20-21. This sporadic surveying resulted in coverage of only a small percentage of the days of migration. For example, in the 2012 survey (Exh. T1), there were only 9 surveys for spring covering less than 10% of the time in the migration season, while in fall only 13 surveys were conducted covering only about 10% of the time in the migration season. *Id.*, p. 7, lines 21-23. Therefore, sampling volume was inadequate to address movement during migration within a year and in no way could address annual variability that can be extreme in avian migration. *Id.*, p. 7, line 23 to p. 8, line 2.

b. The studies did not encompass enough days, seasons, or weather conditions to provide complete and representative results.

The following are examples of these flaws:

- Firelands failed to record weather conditions during the passerine migration surveys, even though weather conditions greatly influence bird migration. Shieldcastle Testimony, p. 8, lines 4-14. Consequently, the studies fail to disclose whether the numbers of birds found to be migrating through or stopping inside the Project Area were suppressed by weather conditions and thus underestimate the risk of mortalities. *Id.*
- The 2012 daytime Passerine Migration Survey (Application Exh. T3) consisted of only 9 surveys for spring covering less than 10% of the time in the migration season, while in fall only 13 surveys were conducted covering only about 10% of the time in the migration season. Shieldcastle Testimony, p. 7, lines 20-23. The study was only conducted weekly for a life cycle phenomenon that exhibits high variability on a daily basis. *Id.*, lines 20-21; Good, Tr. II 166:13-16. Passerines generally migrate in pulses rather than in a steady stream, so an observer has to be in the Project Area during the pulses in order to find the birds. *Id.*, 164:4-16. During favorable weather, these pulses occur on 20-25% of the days and during inclement weather, all birds could pass through in a few pulses. *Id.*, 164:17 – 165:1. Therefore, by counting only once weekly, Firelands could easily miss most of the migrating passerines. Sampling volume was inadequate to address movement during migration within a year and in no way could address the variability from year-to-year that can be extreme in avian migration. Shieldcastle Testimony, p. 7, line 23 to p. 8, line 2. The other two passerine migration surveys and a raptor migration survey had the same defect. *Id.*, p. 9, lines 21-22; *id.*, p. 11, lines 5-6.
- The raptor nest survey in the Firelands Project Area did not cover time periods when nests of species other than Bald Eagles and Red-Tailed Hawks were likely to be found. *Id.*, p. 20, line 13 to p. 22, line 8. Its timing was wrong to find nests for other raptors such as

owls, Cooper's Hawks, Northern Harriers, and Red-Shouldered Hawks. *Id.*, p. 22, line 22 to p. 22, line 1. Nor was the survey likely to find the area's sensitive or listed raptor species that nest on the ground or in concealed areas. *Id.*, p. 22, lines 5-6.

- While Firelands surveyed the Project Area for large birds and eagles during the winter, Firelands made no effort to look for other birds during the winter when considerable winter bird populations of up to 75 species are present. Applic. Exh. 33, Farmer Testimony, Attachment CF-4; Shieldcastle Testimony, p. 16, line 14 to p.18, line 6; Shieldcastle, Tr. VII 981:10-25. And even Firelands' search for large birds was half-hearted. For example, Firelands found between 85 and 105 tundra swans per season, including winter, while the Residents saw thousands of tundra swans in the Project Area between November 2019 through February 2020. Farmer Testimony, Attachment CF-4, Appx. A1; LR Exh. 2, Beck Testimony, p. 9, A.15 & Exh. E. The swans use the Project Area for feeding from November to March. Shieldcastle Testimony, p. 17, lines 1-14. Tundra swans fly during low-light conditions and are prone to colliding with objects at flight height. *Id.*, p. 17, lines 7-11. Firelands also searched for three species of owls, but neglected to look for three other owl species that are winter residents (northern saw-whet, long-eared, and short-eared). *Id.*, p. 17, line 15 to p. 18, line 2; Good, Tr. II 151:22 - 152:14. Passerines from Canada over-winter in northern Ohio, such as finches. Good, Tr. II 153:16 – 154:7. Winter bird populations of birds include species that are routinely found in post-construction mortality studies, especially large numbers of horned larks. Shieldcastle Testimony, p. 16, lines 21-22. Firelands' failure to conduct comprehensive bird surveys during the winter leaves a considerable hole in the ability of the OPSB to assess minimum risk to the avian resource utilizing this region. *Id.*, p. 16, lines 19-20. No data has been supplied to support Firelands' claim that turbines pose a low risk to these vulnerable species. *Id.*, lines 22-23.

c. **The studies did not look for species diversity, but instead were biased towards finding common species.**

Firelands' studies were biased towards finding common species rather than detecting a wide variety of less common species. The following are examples of this bias:

- The daytime passerine migration study concentrated on blackbirds rather than sensitive bird species due to its low degree of effort (the rarer the species, the higher the sample effort required). *Id.*, p. 8, lines 18-20; *id.*, p. 9, lines 10-16.
- Much of the surveying depended on the observers' ability to see birds at long distances. *Id.*, p. 9, lines 1-10; *id.*, p. 16, lines 9-10. This means that large flocks of common birds such as blackbirds or large soaring raptors are more likely to be seen, while birds flying alone or small raptors are less likely to be noticed. *Id.*, p. 9, lines 11-14; p. 13, lines 14-21.
- Raptor surveys were conducted from 9 AM to 4 PM. *Id.*, p. 12, lines 5-6. This time window is reasonable for soaring raptors but fails to address important time of day movements of non-raptors and non-soaring raptors (primarily Accipiters). *Id.*, lines 6-8. This design flaw turned this study into exclusively a soaring raptor survey. *Id.*, lines 8-9. The fact that the Sharp-Shinned Hawk was not recorded (possibly the most common migrating raptor) raises considerable suspicion of the observers' level of expertise and the study design. *Id.*, p. 14, lines 4-6.
- Waterfowl are most likely observed in diurnal feeding flocks near dawn and dusk, but a diurnal bird/raptor study meant to find them was conducted from 9 AM to 4 PM. *Id.*, p. 14, lines 12-14. Another large bird study did not disclose the hours of the day in which waterfowl were surveyed. Farmer Testimony, Attachment CF-4.

d. **Firelands manipulated mathematical statistics to disguise the extent of risk to birds.**

The following are examples:

- making the assumption that a bird's elevation in the air can be identified to an accuracy of one meter at a distance of 800 meters away, when this is not possible; Shieldcastle Testimony, p. 15, lines 1-2.
 - using only the first observation of a bird to assess its elevation in the air, which under-calculates the number of birds that fly in the risk zone (the turbines' height); *Id.*, lines 3-5.
 - utilizing tricks to underestimate risk such as diluting bird counts by including hours of observation during which birds are unlikely to be seen due to season or hour of the day; *Id.*, lines 7-8.
 - averaging statistics to disguise risk. *Id.*, p. 13, lines 7-9; p. 15, lines 14-18; p. 15, line 22 to p. 16, line 2.
- e. **Some studies are too old to represent current conditions.**

For examples of these outdated studies, see Shieldcastle Testimony, p. 5, lines 8-9, p. 7, lines 19-20, p. 15, lines 14, 19, p. 20, line 19 to p. 21, line 2, and p. 12, lines 14-16. Also see Mr. Shieldcastle's list of Firelands' studies, showing 11 of them to be dated in 2013 or earlier years. *Id.*, pp. 3-4.

The foregoing deficiencies in Firelands' bird surveys demonstrate that they do not present an accurate portrayal of the birds living, passing through, or stopping in the Project Area. OPSB should require Firelands to conduct new studies using accurate survey methods as replacements for its studies that used faulty methodology. Without such accurate data, OPSB lacks the information necessary under R.C. 4906.10(A)(2) and will not be able to tell whether the Project

represents the minimum adverse environmental impact under R.C. 4906.10(A)(3) and serves the public interest, convenience, and necessity under R.C. § 4906.10(A)(6).

f. Firelands' Bald Eagle Surveys Employed Faulty Techniques That Underestimated The Presence Of Eagles In And Near The Project Area.

Most of Firelands' surveys for eagles and eagle nests are outdated and of no utility other than to demonstrate trends in eagle use of the Project Area. As explained in the next section below, the old surveys show that eagle usage is trending upward. That finding is the extent of their current utility.

Over the years, Firelands has conducted a number of surveys to look for active eagle nests. A table and a map in Attachment CF-2 of Christopher Farmer's direct testimony list and depict the locations of the eagle nests found in these studies. Applic. Exh. 33, Farmer Testimony, Attachment CF-2.

A 2020 drive-by inspection in and around the Project Area by Firelands' consultants Rhett Good and Christopher Farmer found seven active Bald Eagle nests within two miles of the Project Area. LR Exh. 15, fourth page; Farmer Testimony, Attachment CF-2; Farmer, Tr. II 287:4-9, 292:17 – 294:3. Their visit was not meant to be a comprehensive survey for eagle nests. Farmer, Tr. II 286:18-25. On the other hand, a subsequent 2020 aerial survey conducted for Firelands by Copperhead Environmental Consulting was meant to serve as a comprehensive eagle nest survey, but Copperhead found only four active eagle nests. Farmer Testimony, pp. 13-14, Answer 7.b. In contrast, Krista Beck, a resident biologist, found 11 active eagle nests within two miles of the Project Area in 2020. Beck Testimony, pp. 4-5, Answers 10, 11. Thus, Copperhead missed four of the active eagle nests known to Firelands' consultants, and missed seven active nests known to the Residents. One problem with Copperhead's survey was that it covered only the Project Area and territory within 1.2 miles of the project's borders (*id.*, p. 14,

Answer 7.b), even though USFWS protocol requires the evaluation of eagle nests for two miles outside the project's footprint (Applic. Exh. 46). However, Copperhead still missed four eagle nests inside or within 1.2 miles of the Project Area. *See* below for more details. Needless to say, Copperhead's survey methodology was unacceptably flawed. Shieldcastle Testimony, p. 27, lines 1-5. Firelands has not conducted a current, accurate survey of eagle nests in and around the Project Area.

Equally deficient are Firelands' surveys of Bald Eagle activity to determine where eagles forage, collect nesting materials, and fly in the Project Area. These surveys are essential for finding out whether the eagles are likely to fly in areas proposed for wind turbine sites. Nevertheless, Firelands' eagle activity surveys suffered from at least 12 flaws in design: (1) none of them were conducted in the entire footprint of the project; (2) the different surveys did not evaluate the same footprint from year-to-year, thus lacking value for comparing trends; (3) not all of the surveys were performed in the same manner; (4) the surveys were too short; (5) the surveys were too sporadic during the study period; (6) most of the survey minutes concentrated on spots within a mile of the nests and largely ignored other eagle activity centers; (7) most of the survey minutes occurred while eagle nestlings were in the nest, when the adult eagles stay close to the nests, leading to the inaccurate conclusion that most eagle activity was concentrated within a half mile of the nests; (8) the surveys' designers assumed all eagles were tied to active nests in June, and failed to look for eagles from failed nests that were traveling more freely around the Project Area; (9) the observers stopped recording the eagles' flights after they traveled a mile away, providing the false impression that most eagle activity occurred within a mile of the nest; (10) the nest surveys should have included weekly nest checks from January to June to determine whether the nest was active or inactive, while Firelands' less robust

protocol likely concluded nests were inactive and then failed to monitor them after they became active; (11) Firelands' overemphasis on June surveys, when deciduous trees had leaves, resulted in substantial missed eagle activity hidden by the leaves; and (12) Firelands manipulated the eagle activity data to underestimate the risk of turbine strikes by recording each eagle's flying elevation only at the time the bird was first seen, even though the bird had to breach the turbine rotor zone at least twice during every flight. Shieldcastle Testimony, p. 22, line 12 to p. 27, line 19.

In short, Firelands' eagle activity surveys are designed to provide the misleading appearance that Bald Eagles make little use of most of the Project Area. Because the eagle activity surveys, with some exceptions, watched only the eagle nests and adjacent territory without monitoring other areas of eagle use, Firelands inaccurately concluded that most eagle activity occurs within a half mile of the nest. Shieldcastle Testimony, p. 23, line 14 to p. 24, line 2. Firelands is exploiting the many flaws in its surveys to provide government agencies with underestimates of eagle activity in most of the Project Area.

6. Conclusion

The shortfalls in Firelands' bird surveys are widespread and serious. Without accurate information on the Project's threat to birds, the Board cannot fulfill its duty under R.C. 4906.10(A)(2) to determine "[t]he nature of the probable environmental impact" from the Project. Nor can OPSB find that the Project represents the minimum adverse impact under R. C. 4906.10(A)(3) or serves the public interest, convenience, and necessity under R. C. 4906.10(A)(6).

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

Firelands has argued 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 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.⁹ 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).¹⁰ 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. 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.

⁹ Section 1.2.1 is included in the “minimum” level of surveying effort, so it applies to all projects. *Id.*, p. 1, 2nd paragraph.

¹⁰ 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.

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 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.

L. The Evidentiary Record And The Certificate Must Contain Mitigation Plans For Reducing Bird And Bat Collisions With Turbines.

The applicant must identify the “procedures to be utilized to avoid, minimize, and mitigate both the short- and long-term impacts of operation and maintenance” to birds, bats, and other ecological resources as required by OAC 4906-4-08(B)(3)(b) and to include “plans for post-construction monitoring of wildlife impacts” as required by OAC 4906-4-08(B)(3)(c).

Instead of complying with these requirements, Firelands promises to provide OPSB with a turbine curtailment plan to reduce bird and bat mortalities at least 60 days prior to operating the turbines. Application Narrative, p. 237. This plan will describe Firelands’ procedures for maintaining the turbine blades in a stationary or nearly stationary stance during low wind speed conditions at night during bird and bat migratory seasons. *Id.*

Firelands should have included this plan, with respect to birds, in the record so that BSBO, the Residents, the public, and other stakeholders would be able to comment and testify on the plan. There is no practical reason to wait until turbine construction to submit the plan. After

all, Firelands was able to submit a curtailment protocol for bats in the form of the Technical Assistance Letter from USFWS. Applic. Exh. 11, pdf p. 116. OPSB should require Firelands to submit a curtailment plan to the record for birds, and reopen the hearing to consider testimony on the plan.

The certificate's conditions require Firelands to submit other mitigation plans after certification, when these plans should have been contained in the Application. These plans include the post-construction avian and bat monitoring plan in Condition 22 and the eagle conservation plan in Condition 31. Including these plans in the record as required would have allowed the Residents and other interested parties to adjudicate the sufficiency of these plans in this proceeding.

Absent such an action, the Board should add a condition to the certificate requiring the turbines to be feathered during the birds' spring and fall migratory seasons. 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. This information is necessary to comply with OAC 4906-4-08(B)(3)(b) and (c), and is necessary for the Board to determine compliance with the statutory criteria of R.C. 4906.10(A)(3) and (6).

The Residents appreciate the Board's directives that Firelands file on the public docket any notices of its encounters with listed species during construction under Condition 19, any mitigation plans for "significant mortality events" submitted under Condition 23, and the correspondence with USFWS about the eagle take permit under Condition 31. The Residents also appreciate the Board's directive (at Page 71, ¶ 183) that Firelands file all information it submits to the Staff to satisfy the certificate's conditions. Consistent with those directives, the

Staff should be directed to file on the public docket any notices of significant mortality events sent to Firelands pursuant to Condition 23 so that the public is kept informed about the Project's impacts. The Residents note, however, that filing these documents in the docket is not an adequate substitute from either a legal or factual perspective for including them in the record to enable the Residents to test their adequacy in an adjudicatory setting.

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

1. 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.

Even though Firelands' eagle surveys were designed to underestimate eagle activity, Firelands was well aware of the widespread Bald Eagle presence in and around the Project Area before filing its Application for a power siting certificate. Yet, despite knowing that eagles collide with and are killed by turbines, Firelands recklessly has plowed ahead with its plans to build turbines in this eagle-populated area.

Firelands' Application recounts that its 2018 eagle surveys found seven occupied and two unoccupied Bald Eagle nests in and within two miles of the northern and southern halves of the Project Area as configured at that time. Application Narrative, pp. 121-122. Firelands consultant Christopher Farmer testified that the actual number of active nests in and near the Project Area in 2018 was five. Farmer, Tr. II 291:5-20. Previous eagle and raptor surveys in 2009, 2010, 2011, 2012, 2013, 2015, 2016, and 2017 documented the widespread presence of eagle nests throughout and near the Project Area. Applic. Exh. 33, Farmer Testimony, pp. 6-12.

Even at the time of its Application, Firelands recognized the danger from siting turbines near eagle nests. In a rare instance of candor, Firelands acknowledged that, with respect to an

eagle nest found in the southern part of the Project Area, “[a]voiding siting turbines near the documented nest and point 41 may be appropriate to minimize risk.” Application Narrative, p. 131. The fatal strike of a Bald Eagle by a turbine near Bowling Green, Ohio in 2020 shows that the risk of collisions with turbines exists if turbines are within the activity centers of territorial pairs. Shieldcastle Testimony, p. 27, Lines 17-19.

Recent eagle surveys have confirmed the continued Bald Eagle use, and increase in use, of areas in and near the Project Area. Currently, Firelands’ consultants are aware of one active eagle nest inside the Project Area and six other active eagle nests within two miles, for a total of seven eagle nests. LR Exh. 15, fourth page; Farmer Testimony, Attachment CF-2; Farmer, Tr. II 287:4-9, 292:17 – 294:3. One of the nests, located on the boundary of the Project Area near the Bellevue Reservoir 5, was not detected until 2020.¹¹ LR Exh. 15, first page; Farmer, Tr. II 287:7-22. In 2020, Firelands commissioned an aerial survey by Copperhead Environmental Consulting to find and monitor eagle nests. Farmer Testimony, pp. 13-14, Answer 7.b. Copperhead limited its search to an area of 1.2 miles of the Project Area (*id.*, p. 14, Answer 7.b), even though USFWS protocol requires the evaluation of eagle nests for two miles outside the project’s footprint (Applic. Exh. 46). *Also see* the USFWS letter of March 1, 2010, advising Apex Clean Energy that USFWS required eagle nests within two miles to be monitored in accordance with ODNR protocols. Application Exh. K12, pdf p. 7. Copperhead found only four eagle nests in its aerial survey. Farmer Testimony, p. 14, Answer 7.b. Thus, Copperhead missed four of the active eagle nests known to Firelands’ consultants.

¹¹ Answer 7.b on Page 14 of Mr. Farmer’s testimony states that this nest (#25) is in the Project Area. Attachment CF-2 of his testimony and Answer 11 on Page 5 of Krista Beck’s direct testimony (LR Exh. 2) indicate that the nest is 0.1 mile outside of the Project Area boundary.

Resident Krista Beck, a wildlife biologist formerly employed by the Ohio Division of Wildlife and Erie MetroParks, also looked for and found eagle nests in and near the Project Area in 2020. LR Exh. 2, Beck Testimony, pp. 2, 4-5, Answers 6, 10, 11. Unlike Copperhead, she did not limit her search to 1.2 miles of the Project Area, but instead searched at least 2.5 miles outside of the Project Area. *Id.*, p. 5, Answer 12. Thus, her approach was more consistent with the directive of the USFWS to survey eagle nests within two miles of wind projects. Applic. Exh. 46. She saw all of the Bald Eagle nests observed by Firelands' consultants in 2020. Beck Testimony, pp. 4-5, Answers 10, 11. In addition, she found four more Bald Eagle nests within two miles of the Project Area that Firelands' consultants had missed in 2020. These nests and their distances from the Project Area boundary are:

Potter Road nest (0.946 mile)
Patten Tract Road nest (0.730 mile)
Huber Road nest (1.48 mile)
Daniels Road North nest (on the boundary).¹²

Id. These nests are not just within two miles of the Project Area, but three of them are also within 1.2 miles, so even Copperhead's restriction of search area to 1.2 miles provided it with no excuse for having missed these nests. In all, Ms. Beck found 11 active Bald Eagle nests within two miles of the Project, eight of which are located within 1.2 miles of the Project Area. *Id.*, pp.

¹² Firelands' counsel attempted to prove that the Daniels Road North nest had been shown by a prior Firelands survey to belong to a red-tailed hawk, but that red-tailed hawk nest was at a different location. Beck, Tr. VII 891:2-9; Shieldcastle, Tr. VII 1044:14 – 1045:4. Ms. Beck saw an adult Bald Eagle with a white head sitting in the Daniels Road North nest. Beck, Tr. VII 900:17 - 901:2. Questions from Firelands' counsel suggested that the bird could have been a baby red-tailed hawk. However, Ms. Beck saw the eagle on the nest on March 22, 2020 (*id.*, 892:25 – 893:14), and Mr. Good advised that red-tailed hawks are just "starting to occupy nests" by mid-March at which time they lay and incubate eggs (Good, Tr. II 142:7 – 143:5). So a red-tailed hawk egg could not have hatched by March 22, not to mention growing a bird large enough to poke its head above the crest of a large nest. Moreover, an adult Bald Eagle with a paper white head sitting high in a nest looks a lot different than a red-tailed hawk, including a much smaller nestling red-tailed hawk with a brownish, grayish tan head sitting low in a nest. Beck, 906:18-21, 908:1-12, 909:13-21. As a wildlife biologist with experience in banding and lecturing on Bald Eagles (Beck Testimony, p. 2, Answer 6) and having received formal training from the Ohio Division of Wildlife for identifying eagle and hawk nests (Beck, Tr. VII 898:15-19), Ms. Beck surely knows how to tell the difference between a Bald Eagle and a hawk, and the difference between an eagle nest and a hawk nest.

4-5, Answers 10, 11. As described above, Firelands’ ground and aerial surveys found only seven active eagle nests, confirming the shortcomings of Firelands’ eagle survey methods. Ms. Beck found that the Daniels CSX nest (referred to as nest # 23 on Mr. Farmer’s list in Attachment CF-2) and the Daniels Road North nest are inside the Project Area. *Id.*, p. 5, Answer 10.

In summary, Firelands and the Residents found the following active Bald Eagle nests within two miles of the Project Area in 2020. The distances between the nests and the Project Area, as measured by Ms. Beck and Mr. Farmer, are provided in parentheses.

<u>Beck ID</u>	<u>Farmer ID</u>
Billings Road (1 mi.)	11 (0.96 mi.)
Route 269 (1 mi.)	15 (0.91 mi.)
Ruffing (2 mi.)	19 (1.97 mi.)
Pontiac Section Line (0.859 mi.)	20 (0.63 mi.)
Daniels Road CSX (inside Project Area) ¹³	23 (inside Project Area)
Seneca-Huron Line Road (1.42 mi.)	24 (1.49 mi.)
Bellevue Reservoir 5 (0.119 mi.)	25 (0.10 mi.)
Patten Tract Road (0.730 mi.)	¹⁴
Potter Road (0.946 mi.)	
Huber Road (1.48 mi.)	
Daniels Road North Road (on boundary)	

An “initial” model run by Margaret Rheude of USFWS estimated that, based on the minutes of eagle sightings provided by Firelands prior to February 27, 2020, an average of 2.5 Bald Eagles will die annually while colliding with Firelands’ turbines. LR Exh. 16, 1st and 2nd pages. Ms. Rheude observed that “resident eagles fly through the proposed turbine fields” and that “large numbers” of Bald Eagles migrate along Lake Erie less than 10 miles from the Project Area. *Id.*, second page. Prophetically, however, Ms. Rheude noted that “we (the FWS) expect

¹³ Ms. Beck’s answer to Question 11 states that this nest is 0.153 mile from the boundary, but her answer to Question 10 clarifies that the nest is inside the Project Area. Mr. Farmer’s table of eagle nests also shows this nest (# 23) to be inside the Project Area. Farmer Testimony, Attachment CF-2.

¹⁴ Mr. Farmer’s table identifies this nest as # 12 with a distance of 0.73 mile from the Project Area, but states that the nest was not reported as occupied.

the eagle population in this area to increase, including the number and density of eagle nests.” LR Exh. 16, second page. True to her prediction, a comparison of eagle nest locations on a map in Ms. Rheude’s email reveals that she had not yet learned about the Potter Road nest, the Huber Road nest, the Bellevue Reservoir 5 nest, or the Daniels Road North nest at the time she estimated 2.5 eagle deaths per year. LR Exh. 16, fourth page (compare to eagle nest map in Beck Testimony, Exh. C). While Mr. Farmer testified that Ms. Rheude’s estimate of 2.5 eagle deaths per year is based on an 80% upper confidence rate (with 50% being the average) (Farmer, Tr. 303:3-17), her estimate was based on the number of eagle activity minutes (1) provided by Firelands using its flawed methodologies (*see* Section X. E above) and (2) compiled without regard to the four previously unknown eagle nests. Consequently, it is reasonable to believe that the expected eagle deaths will exceed 2.5 deaths per year.

The USFWS’ Eagle Conservation Plan (“ECP”) guidance provides additional evidence that Firelands’ project is not suitable for approval due to the presence of Bald Eagles in the Project Area. BSBO Exh. 1, Shieldcastle Testimony, Exh. D (“ECP Guidance”). The guidance refers to wind projects with the highest risk of eagle mortalities as Category 1 projects. *Id.*, p. 25. A Category 1 project is defined as a project with “[h]igh risk to eagles, potential to avoid or mitigate impacts is low.” *Id.* According to the ECP Guidance, “[c]onstruction of projects at sites in category 1 is not recommended because the project would likely not meet the regulatory requirements for permit issuance and may place the project developer or operator at risk of violating the BGEPA [the Bald and Golden Eagle Protection Act].” *Id.* The ECP recommends that any project meeting a Category 1 status must modify or abandon the project if it cannot reduce its status to at least Category 2. *Id.*

According to the ECP Guidance, “[a] project is in this category [1] if it ... has an important eagle-use area ... within the project footprint.” *Id.* (emphasis added). An “important eagle-use area” is defined as “an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding or sheltering and/or foraging area eagles.” *Id.*, p. 35 (emphasis added). Thus, the guidance automatically classifies a project with an eagle nest inside its footprint as a Category 1 project. *Id.* In addition, the guidance provides that a project within the half mean project area inter-nest distance of an eagle nest should be considered for Category 1 status if the eagles are likely to pass through the project’s footprint. *Id.*, p. 25. Firelands admits that an active Bald Eagle nest is within the Project Area. Farmer Testimony, Attachment CF-2 (referring to Nest # 23). Krista Beck found that eagle nest in the Project Area, as well as another one that Firelands missed. So the Emerson Creek Wind Project is a Category 1 project under the ECP Guidance.

As currently configured, the Emerson Creek Wind Project has placed at least 52 of its 87 prospective turbine sites within 2.5 miles of an existing Bald Eagle nest: Turbines 1, 2, 3, 6, 9, 10, 11, 12, 13, 15, 16, 24, 25, 26, 27, 30, 31, 32, 33, 35, 36, 39, 40, 41, 42, 43, 44, 45, 46, 61, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 80, 81, 82, 83, 84, 85, and 86. Beck Testimony, pp. 5-8, Answer 12, Exh. D. As explained in Section 2 below, Bald Eagles in the inland areas of Ohio routinely travel from their nests for a radius of 2.5 miles for foraging and other purposes. The eagle nests at Pontiac Section Line Road, Daniels Road North, Daniels Road CSX, Potter Road, and Bellevue Reservoir 5 are within 2.5 miles of 8, 11, 13, 13, and 16 turbine sites, respectively. *Id.* Some turbine sites threaten multiple eagle nests. *Id.* In all, 11 eagle nests are threatened by turbine sites within 2.5 miles. *Id.*

Of these turbine sites, 31 are within two miles of an eagle nest: Turbines 1, 11, 12, 35, 40, 41, 42, 43, 44, 45, 46, 61, 63, 64, 65, 67, 68, 69, 70, 71, 73, 74, 76, 77, 80, 81, 82, 83, 84, 85, and 86. Beck Testimony, pp. 5-8, Answer 12, Exh. D. Consequently, these turbine sites are within the two-mile zone of concern expressed by USFWS guidance. Applic. Exh. 46.

Moreover, an “important eagle-use area,” which makes a site a Category 1 project, also includes a “foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding or sheltering and/or foraging area eagles.” ECP Guidance, p. 35. Bald Eagle usage of the Project Area for these purposes is pervasive, as proven by numerous sightings inside and within two miles of the project boundary documented between December 2019 and June 2020 by Krista Beck and other area residents. Beck Testimony, pp. 3-4, Answers 8, 9, Exhs. A, B; Beck, Tr. II 887:22 – 888:2. Exhibits A and B of Ms. Beck’s direct testimony reveal widespread eagle use throughout the entire Project Area. Ms. Beck alone recorded approximately of these eagle 70 sightings in and near just the northern part of the Project Area. *Id.*, p. 3, Answer 8. The eagles’ use of the Project Area, like the presence of eagle nests there, make Firelands’ venture a Category 1 project under the ECP Guidance.

Firelands and the Staff may argue that the Board need do no more to protect eagles than require Firelands to implement an ECP and an Eagle Take Permit from the USFWS as proposed by Condition 31 of the Joint Stipulation and Recommendation. Condition 31 has serious shortcomings that impair its effectiveness for protecting eagles, as explained in Section XI. 2 below. Moreover, the USFWS can only decide whether or not to issue a Take Permit for the project authorizing Firelands to kill eagles with its turbines. Only OPSB, with its mandate to

scrutinize and act on power siting certificates, can decide whether Firelands will be allowed to erect turbines that kill eagles. The Board has the responsibility to deny a certificate to a project that does not represent the minimum adverse impact under R. C. 4906.10(A)(3) or does not serve the public interest, convenience, and necessity under R. C. 4906.10(A)(6). Killing eagles violates both of these criteria. The Board is not authorized to transfer its certification duties to the USFWS, and the USFWS has no authority to accept those duties. The Board should deny the requested certificate.

2. 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.

Condition 31 of the Joint Stipulation and Recommendation would require Firelands to prepare and implement an ECP and Eagle Take Permit. Jt. Exh. 1, p. 7. BSBO and the Residents support these requirements. However, Condition 31 falls well short of what is necessary to spare the area's Bald Eagles from collisions with wind turbines.

To a large extent, allowing Firelands to prepare its own ECP is an illusory mechanism for protecting the eagles. Mr. Farmer's testimony admits that the USFWS does not even approve ECPs. Farmer Testimony, p. 15, Answer 7.d. USFWS only uses ECPs to inform its analysis of Eagle Take Applications. *Id.* The drafters of proposed Condition 31 attempted, unsuccessfully, to disguise the condition's weakness by stating that the ECP will be developed "in coordination" with USFWS and according to USFWS guidance. Jt. Exh. 1, p. 7, Cond. 31. The condition also requires Firelands to apply for an Eagle Take Permit, but USFWS can take "several years" for USFWS to issue. Farmer Testimony, p. 15, Answer 7.d.

More importantly, an ECP and Eagle Take Permit do not actually prevent eagles from dying. By definition, a "take" permit is issued to give the applicant permission to kill or

otherwise harm the vulnerable species. This does not enable the Project to represent the minimum adverse environmental impact under R.C. 4906.10(A)(3) or to serve the public interest, convenience, and necessity under R.C. § 4906.10(A)(6). OPSB cannot abdicate its duty to achieve these statutory criteria by shuffling this responsibility to the USFWS.

Instead of abdicating its authority and responsibility to the USFWS, OPSB should protect the eagles by incorporating a condition into the certificate, if issued, that establishes a 2.5-mile buffer between Firelands' turbines and present and future Bald Eagle nests. The condition should prohibit the construction of turbines within 2.5 miles of existing eagle nests and should require constructed turbines to shut down operations if an eagle nest is built within 2.5 miles in the future. Otherwise, the turbines will kill the eagles moving into and near the Project Area.

Thirty years of research by the Ohio Division of Wildlife shows that nesting Bald Eagles in the inland (non-Lake Erie) areas of Ohio utilize a radius of 2.5 miles around the nest as their primary areas for feeding and other uses. Shieldcastle Testimony, p. 26, Lines 3-13. Mr. Shieldcastle is especially qualified to testify about this data, since he headed up the Division's Bald Eagle recovery project for 25 years. Shieldcastle, Tr. VII 977:14-19; Beck, Tr. VII 885:25 – 886:3. Mr. Shieldcastle's work on this project included work in the Project Area. Shieldcastle, Tr. VII 935:22 – 936:2, 9-14.

Firelands has raised a number of arguments in its post-hearing briefs about eagles, all of which are meritless. Firelands claims 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 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 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 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.

Because OPSB has a duty under R.C. 4906.10(A)(3) and R.C. 4906.10(A)(6) to protect the Bald Eagle population in the Project Area, the Board has a responsibility to do more than just abdicate its authority to USFWS under proposed Condition 31. If a certificate is issued, the certificate should require Firelands to conduct thorough surveys for eagle nests during the eagles’ nesting season of each year. Rather than allowing Firelands to kill eagles, the Board should prevent Firelands from constructing or operating turbines within a buffer zone of 2.5 miles of any eagle nest found during these surveys.

N. **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.

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

OAC 4906-4-08(A)(12) requires the applicant to evaluate and describe the potential for the facility to interfere with navigable airspace and to describe measures that will be taken to minimize interference. The record contains no such information about the effects of the wind turbines on flights and landings of aircraft for emergency medical services ("EMS").

Firelands argued that EMS helicopters can be safely operated inside and near the Project. Firelands, citing Francis Marcotte's testimony, represented 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 and evaluated.

The Board’s Opinion (at Page 61, ¶ 159) recognizes this issue, but it fails to do anything about the problem.¹⁵ Instead, the Opinion (at Page 61, ¶ 160) merely states that Firelands’ cooperation with the Federal Aviation Administration (“FAA”) and the Ohio Department of Transportation (“ODOT”) provides sufficient assurances that aviation will be safe despite the Project’s impact on flight routes. However, the FAA and ODOT have no jurisdiction over the emergency response issues described above. Nor has the Board made any findings of fact pertinent to those issues. The Board erred by finding that the Project will serve the public interest, convenience, and necessity under by R.C. 4906.10(A)(6) without requiring information on this issue in the record under OAC 4906-4-08(A)(12) and without addressing this issue in the Opinion.

P. The Negative Effects Of The Project On Neighboring Property Values Demonstrate That The Project Does Not Serve The Public Interest, Convenience, And Necessity As Required By R.C. 4906.10(A)(6).

¹⁵ The Board states (at Page 61, ¶ 159) that the Residents did not contest this issue during the hearing. However, the Residents did contest this issue by addressing it in their Post-Hearing Reply Brief and by cross-examining Firelands’ aviation witness Marcotte on this issue. Tr. V 653-656, 660-662.

The Board's Opinion (at Pages 27-28) summarizes the hearing testimony related to the impacts of wind projects on property values as part of the Board's discussion on the Project's economic impacts. Other than that description of evidence, the Board's Opinion does not discuss the property impacts issue, although the Opinion generally states (at Page 28) that the Project is economically beneficial. For the reasons described below, the Board should not use Mr. Marous' testimony or report as support for its finding that the Project "will serve the public interest, convenience, and necessity" as required by R.C. 4906.10(A)(6) with regard to economic impacts.

Firelands contends that the presence of wind turbines will not reduce the value of the neighbors' homes and land, based on the testimony and report 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 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 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 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.

IV. Because Firelands’ Evidence Fails To Identify, Consider, And Quantify The Economic Damage The Project Will Impose On Local Residents And Businesses, The Board Erred In Finding That The Probable Impact Of The Project Has Been Evaluated And Determined.

Firelands did not introduce evidence into the record complying 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.” Nor does the Board have support for its finding that the Project “will serve the public interest, convenience, and necessity” as required by R.C. 4906.10(A)(6) with regard to economic impacts. The Board erred in concluding (at Page 28) that these requirements were met.

Firelands touted 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 attempted 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). Nor has Firelands made any attempt to quantify or account for the consumer food costs and other societal losses related to the loss of productive farm land to this Project. Other sections of this Application for Rehearing describe the loss of property values and the economic benefits of bats to farmers and the general populace and the economic importance of birds, birdwatching, and bird-dependent tourism to the community, and this information is incorporated in this section by reference. 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, the evidentiary record does not contain any such analysis, it does not analyze or even mention any of the negative economic impacts on local commercial and industrial activities, and it does not include 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) and Ms. Tauzer’s hearing testimony, admitting that negative economic impacts were not evaluated. Consequently, Firelands did 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.” Nor does the Board have support for its finding that the Project “will serve the public interest, convenience, and necessity” as required by R.C. 4906.10(A)(6).

As explained in the prior section of this Application for Rehearing, the Board's Opinion also fails to take into account the loss in neighboring property values resulting from the Project. While Firelands' hired expert, Mr. Marous, opined that wind projects do not reduce property values, an extensive, impartial assessment sponsored by the Dutch Ministry of Economic Affairs and Climate Policy shows otherwise.

Intervenors Erf and Yingling contended 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.

Erf and Yingling also argued 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 stated 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 cited the testimony of four citizens at the public hearing in this case who believed that the Project would benefit the community financially. Similarly, Firelands stated 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. The Board should deny the certificate on the grounds that Firelands failed to conduct a complete economic analysis as required by R.C. 4906.10(A)(6) and OAC 4906-4-06(E)(4).

V. The Board Cannot Delegate Its Authority And Responsibility For Certification Decisions To The Staff Or Other Governmental Entities.

A decision of the Supreme Court of Ohio allowed the Board, in that case, to issue a certificate requiring the applicant to make six submittals for Staff approval after issuance of the certificate.¹⁶ *In re Application of Buckeye Wind, L.L.C.*, 2012-Ohio-878, ¶¶ 28-30, 131 Ohio St.3d 449, 456–57. The lead opinion in that case opined that it may not be practical to hold a hearing on every infinite detail of construction, such as "whether white or gray screws are used in the control room." *Id.* at ¶ 30. This opinion stated that, "[i]n this case, we conclude that the board reasonably drew the line regarding the issuance of the certificate and the imposition of its conditions." *Id.*

¹⁶ The certificate in that case required more than six post-certificate submittals, but only six were brought to the Ohio Supreme Court's attention, so the Court's lead opinion applied only to those six submittals.

Three justices joined in that portion of the decision, with another three justices dissenting. A fourth justice concurred only in the judgment. The dissent disagreed with the rationale and result of the lead opinion, on several grounds.

First, the dissent observed that the post-certificate conditions denied the appealing citizens of their only opportunity to be heard, and this violated the law:

The law requires otherwise. The legislature has required the board to settle issues like this up front on a public record, and it specifically guarantees affected citizens the right to participate in the review process and to have their voices heard. *See* R.C. 4906.07 (requiring that the board hold public hearings), 4906.08(A)(3) (neighboring citizens are entitled both to party status and to call and examine witnesses), 4906.09 (requiring the board to keep a record of its proceedings), 4906.10(A) (requiring the board to make all substantive determinations before authorizing construction), and 4906.11 (requiring the board to issue a written opinion stating the reasons for its decisions). Issues are not to be settled *after* construction is approved, much less by unaccountable staff members without public scrutiny or judicial review. Yet that is precisely what the board, and now the lead opinion, has allowed.

Id. at ¶ 53.

Second, the dissent found that the lead opinion did not offer any workable response to the denial of the citizens' right to a public hearing. The dissent found this situation objectionable, for several reasons. It noted that the Staff's post-certificate decisions are made in secret without input from the public and without subsequent review by the Board or the Ohio Supreme Court. *Id.* at ¶¶ 55-56. The affected citizens have no process or opportunity to provide input into the Staff's post-certificate approvals. *Id.* at ¶¶ 57-63. Even if they did have a mechanism to challenge the Staff's decisions, such a remedy would not justify disregarding their right to a hearing. *Id.* at ¶ 61. R.C. 4906.10(A) prohibits the Board from issuing a certificate unless the Board makes the required findings and determinations to resolve the issues. *Id.* at ¶ 64. The Board cannot delegate these issues to its Staff. *Id.* at ¶¶ 64-65.

Third, the dissent noted that the lead decision rendered ineffectual the laws designed to protect the interests of citizens living near proposed utility projects:

The outcome of this decision is unfortunate for anyone living near the site of a proposed high-voltage transmission line, electric substation, high-pressure gas pipeline, or generation plant. If the board runs into an issue that for whatever reason it does not want to deal with—or if it simply prefers to resolve an issue without the discomfort of public participation and judicial review—it now has a broad off-ramp. Approve the project now; work out the details with the company later. The public retains a formal right to participate, but it is up to the board whether that right amounts to anything more than a formality.

This is not alarmist but precisely what happened in this case. If, as it did in this case, the power siting board can delegate the very *siting* of facilities—its core duty, the duty from which the power siting board derives its name—it can delegate anything and everything. The lead opinion identifies no enforceable limits on the board's power to delegate but apparently trusts that the board will exercise its new discretion wisely. One can hope that the lead opinion's trust proves well founded, but in my view, the public's business should not be left to the unreviewable discretion of appointed staff members who are not accountable to the public. The board's decisions should have to see and bear the light of day.

Id. at ¶¶ 66-67 (emphasis in original). The Citizens incorporate by reference the statements of the dissent in *Buckeye Wind*.

In Firelands' case, the parties signing the Stipulation were trying to fill some large information gaps in the record with a multitude of post-certificate studies to be evaluated only by the Staff without public involvement and without the Board members' participation. This is not the process envisioned by the General Assembly when it enacted R.C. Chapter 4906.

The Stipulation would allow Firelands to submit six or more major plans and studies, which are identified in Sections II and III above, to provide for mitigation of the Project's impacts on the public. *Jt. Exh. 1*, pp. 6-11. Rather than merely identifying the color of the screws in the control room as allowed in *Buckeye Wind*, these plans and studies provide for

design and operational procedures that go to the core of how the Project will be constructed and operated. This goes well beyond the activities that the lead opinion in *Buckeye Wind* let pass.

The Board is not issuing a certificate that merely calls upon the Staff to monitor compliance with post-certificate conditions. The certificate entrusts the Staff with the post-certification responsibility to obtain and evaluate plans and other information that the Board's rules require the Board to consider in determining whether the Project complies with the criteria in R.C. 4906.10(A) and then allows the Staff to make those determinations.

The scarcity of the Firelands' analysis of the hazards and damage threatened by the Project has deprived the Citizens thus far of their right to comment on and test the Project's impacts and the proposed certificate conditions. For the same reason, the Staff and the Board have not had the information necessary to make informed decisions about issuing a certificate for this project. The Stipulation does not seek to correct this situation. The Board should not issue a certificate based on this inadequate record, but instead should reopen the record with instructions to supply the missing information to allow the Board to make an informed decision.

Any attempt to introduce new details for facility design after certification, instead of including them in the record, deprives intervenors of their right to test these details through discovery and other steps of an orderly adjudicatory proceeding, and deprives other members of the public of their right to comment on these details in the public hearing.

The required plans and studies should be added to the record before the Board decides whether to issue a certificate, not afterwards. Otherwise, the Board will abdicate its duty to make the required findings and determinations to resolve the issues as required by R.C. 4906.10(A), and unlawfully delegate its responsibility to the Staff. This practice would deprive the Residents of their statutory right to call and examine witnesses at the hearing under R.C.

4906.08 and otherwise participate in the adjudicatory process as noted in Paragraph 53 of the dissent in *Buckeye Wind*. And it would deprive the Residents of their right to procedural due process under the Fourteenth Amendment of the Ohio State Constitution and Section 16, Article I of the Ohio Constitution, which require that administrative proceedings comport with due process. *Mathews v. Eldridge* (1976), 424 U.S. 319; *LTV Steel Co. v. Indus. Comm'n* (2000), 140 Ohio App.3d 680; *Egbert v. Ohio Dep't of Agriculture* (2008), 2008-Ohio-5309. At its core, “due process insists upon fundamental fairness, and the requirement to conduct a hearing implies that a fair hearing must occur.” *Lassiter v. Dep't of Social Serv.* (1981), 452 U.S. 18, 24; *Clayman v. State Med. Bd.* (1999), 133 Ohio App.3d 122, 127, citing *State ex rel. Ormet v. Ind. Comm'n* (1990), 54 Ohio St.3d 102, 104. Also see *Seitz v. All Creatures Animal Hosp.* (Nov. 15, 1985), Ashtabula App. No. 1192, 1985 WL 3679.

The Board should reconsider the certificate and deny it due to the applicant's failure to follow the procedures required by statute, rule, and constitution.

VI. The Stipulation Violates Important Regulatory Principles And Is Contrary To The Public Interest, Because The Evidentiary Record Lacks The Information Required By The Board's Rules, The Stipulation Delegates The Board's Authority And Responsibility For Certification Decisions To The Staff, The Firelands Project Does Not Constitute The Minimum Environmental Impact, And The Project Does Not Serve The Public Interest, Convenience, And Necessity.

Firelands must show that the Stipulation does not violate important regulatory principles and practices and is not contrary to the public interest. Firelands cannot sustain this burden, due to the incomplete record and the violations of the laws and rules as described in Section III above and the Stipulation's unlawful delegation of the Board's authority and duties to the Staff as described in Section II and V. In addition, Firelands cannot sustain this burden, because the Project will not represent the minimum environmental impact as required by R.C. 4906.10(A)(3) and will not serve the public interest, convenience, and necessity as required by R.C.

4906.10(A)(6). Firelands has the burden to prove the Project's compliance with these criteria, but the Application and evidentiary record do not contain that evidence. For these reasons, the Stipulation violates important regulatory principles and practices and is contrary to the public interest. Accordingly, OPSB should deny Fireland's request for a certificate.

The Stipulation would provide for an unlawful and unconstitutional delegation of power to the Staff for the reasons explained in Section V above. Some of the Stipulation's supposed accomplishments touted by Firelands and the Staff are future submittals of plans and studies that should have been submitted into the record, but which now are proposed to be delivered after certification by Firelands and approved by the Staff. The Stipulation as accepted by the Board's Opinion just postpones, until after certification, Fireland's evaluations of the Project's potential threats to the public and the Fireland's identification of mitigation measures work that should have been included in the record. The Board is not issuing a certificate that merely calls upon the Staff to monitor compliance with post-certificate conditions. The certificate entrusts the Staff with the post-certification responsibility to obtain and evaluate plans and other information that the Board's rules require the Board to consider in determining whether the Project complies with the criteria in R.C. 4906.10(A) and then allows the Staff to make those determinations.

The lack of Firelands's analysis of the hazards and damage threatened by the Project has deprived the Residents of their right to comment on and test the Project's impacts and the proposed certificate conditions. For the same reason, the Staff and the Board have not required Firelands to provide the information necessary to make informed decisions about issuing a certificate for this Project. The Stipulation did not correct this situation. The Board should not issue a certificate based on this inadequate record, but instead should deny the certificate or

reopen the record with instructions to supply the missing information to allow the Board to make an informed decision.

Although Firelands and Staff have told the Board that it should defer to the Stipulation and approve the Project with the Stipulation's conditions, a stipulation signed by allied parties over the objections of other parties is not entitled to deference. If it were, any two or more aligned parties (*e.g.*, two Resident intervenors) could sign a stipulation over other parties' objection and obtain the Board's blessing for it. Therefore, the Stipulation is not entitled to deference or substantial weight. A stipulation of parties is merely a recommendation and is in no sense legally binding upon the Board. *Duff v. Pub. Utilities Comm'n*, 56 Ohio St. 2d 367, 379 (1978) (applying this standard to the PUCO). The Board may take the stipulation into consideration, but must determine what is just and reasonable from the evidence presented at the hearing. *Id.* Moreover, the parties signing the Stipulation do not have to live next door to the Project's hazards, so they do not represent the Residents' interests and that fact is reflected in the Stipulation's failure to address these hazards. The Board has the statutory responsibility to make sure Firelands has provided a complete and honest assessment of the Project's hazards and has designed the Project to reduce those hazards to a minimum. Deferring to the Stipulation and adopting it does not fulfill this responsibility.

XIV. Conclusion

The Stipulation accepted by the Board's Opinion grants a certificate for the Project based on a record that lacks the information required by the Board's rules as described herein. The Board cannot circumvent its own rules by issuing a certificate that violates those rules. Nor can it accept a Stipulation that (1) is based on an evidentiary record 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. Based on the entire evidentiary record, the Board erred by approving a Project that does not meet the statutory criteria under R.C. 4906.10(A) 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 Board should rehear this case and deny the certificate.

Respectfully submitted,

/s/ Jack A. Van Kley

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CERTIFICATE OF SERVICE

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Summary: App for Rehearing electronically filed by Mr. Jack A Van Kley on behalf of Local Resident Intervenors