

**BEFORE  
THE OHIO POWER SITING BOARD**

<b>In the Matter of the Power Siting Board's</b>	<b>)</b>	
<b>Review of Rule 4906-4-08 of the</b>	<b>)</b>	<b>Case No. 16-1109-GR-BRO</b>
<b>Ohio Administrative Code</b>	<b>)</b>	

---

**INITIAL COMMENTS OF UNION NEIGHBORS UNITED,  
JULIA F. JOHNSON, AND ROBERT AND DIANE McCONNELL**

---

On September 22, 2016, the Ohio Power Siting Board requested members of the public to submit comments on proposed rules 4906-4-08 and -09 pertaining to the siting and operation of wind utilities.<sup>1</sup> Union Neighbors United appreciates the opportunity to submit the following comments on the Staff's proposed rules.

**I.     ABOUT THE COMMENTERS**

Union Neighbors United ("UNU") is a nonprofit corporation formed for the purpose of promoting the safety and well-being of the Champaign County community by addressing issues relating to the siting of industrial wind turbines. UNU consists of ten trustees and officers, all of whom reside in the area that would be affected by the Buckeye Wind and Champaign Wind projects previously certificated by the Ohio Power Siting Board.

Robert and Diane McConnell reside at 4880 E. U.S. Route 36, Urbana, Ohio. Julia Johnson resides at 4891 E. U.S. Route 36, Urbana, Ohio. The McConnells and Ms. Johnson are trustees of UNU, but are also commenting in their individual capacities.

Since 2007, UNU, the McConnells, and Ms. Johnson have actively educated themselves and the community concerning the implications of wind development for Champaign County and

---

<sup>1</sup> The rules (and R.C. 4906.20) misleadingly refer to wind utilities as "wind farms," but they are not farms nor are they agricultural in any sense.

the State of Ohio. For example, Ms. Johnson and Ms. McConnell served as members of the Champaign County Wind Turbine Study Group convened by former Champaign County Prosecutor Nick Selvaggio. *Id.* Ms. Johnson also served as a stakeholder in the Ohio Wind Working Group, representing consumer interests. *Id.*

UNU, the McConnells, and Ms. Johnson participated in both stakeholder meetings preceding the issuance of these proposed rules, and previously submitted comments on the Power Siting Board's wind turbine siting rules, O.A.C. Chapter 4906-17. UNU, Ms. Johnson, and the McConnells also participated as intervenors in the Ohio Power Siting Board proceedings relating to the Buckeye Wind and Champaign Wind projects. *Application of Buckeye Wind, LLC for a Certificate to Construct a Wind Powered Electric Generating Facility in Champaign County, Ohio*, OPSB Nos. 08-666-EL-BGN, 13-360-EL-BGA; *Application of Champaign Wind, LLC for a Certificate to Construct a Wind Powered Electric Generating Facility in Champaign County, Ohio*, OPSB No. 12-160-EL-BGN.

Although the McConnells and Ms. Johnson join in these comments in their individual capacities, these comments will refer to them and to UNU collectively as “UNU” for simplicity.

## **II. COMMENTS**

The following comments are organized in the order that the issues are presented in proposed sections 4906-4-08 and -09.

### **A. The Board should adopt additional requirements to ensure that shadow flicker modeling is accurate and readily understood by the affected public. (O.A.C. § 4906-4-08(A)(9))**

Proposed § 4906-4-08(A)(9) requires the applicant to evaluate and describe potential cumulative impact from shadow flicker at habitable residences within a distance of ten rotor diameters or at least one-half mile of a turbine, whichever is greater, including its plans to minimize potential impacts.

Presumably, the purpose of the required evaluation is to enable the Staff and Board to confirm that the proposed facility will adequately protect the public and will comply with applicable regulatory standards. An evaluation limited to impact on “habitable residences,” however, will not meet that purpose. The shadow flicker standards set forth in proposed § 4906-4-09(H) currently apply to adjacent non-participating property lines, not habitable residences. In Comment D, below, UNU urges the Board to expand that standard to apply to all areas of nonparticipating properties. The point of compliance for the evaluation required by § 4906-4-08(A)(9) must be oriented toward the point of compliance of the standard in § 4906-4-09(H).

UNU also requests that the Board clarify the requirement that the shadow flicker analysis include the applicant’s plans to “minimize potential impacts.” § 4906-4-08(A)(9). The term “minimize” should not be construed to mean “mitigate.” In other words, an applicant should not be allowed to demonstrate compliance with applicable shadow flicker standards by imposing mitigation measures on a neighbor. A neighbor should not be forced to accept changes to his or her property, such as additional shrubbery, venetian blinds, or window tinting, to mitigate unacceptable shadow flicker. If shadow flicker from a particular turbine is modeled to exceed the selected standard at a nearby residence, that turbine should not be built.

Furthermore, the Board should clarify the rule to minimize the risk of modeling errors. Computer shadow flicker modeling is complex and can harbor subtle and erroneous input assumptions that can drastically skew the modeling results. For example, in the Champaign Wind certificate proceedings, the shadow flicker analysis did not consider the actual size of the houses whose exposure was being modeled. Instead, Champaign Wind modeled shadow flicker exposure to “receptors” with a hypothetical dimension of one meter by one meter. By considering actual topography but modeling shadow flicker exposures to a tiny receptor, the

model overestimated the screening effect of any hills between a turbine and an actual residence. A hill that might screen shadows from a 1 meter by 1 meter receptor would not necessarily screen a two- or three-story home. This defect was present in the inputs for every single receptor modeled in the initial analysis. For more detail on the defects in the Champaign Wind shadow flicker modeling, *see* pp. 57-59 of UNU's post-hearing brief in that case. For the Board's convenience, those pages are attached to these comments as Appendix 1.<sup>2</sup>

The same erroneous methodology was employed in Champaign Wind's obstacle analysis, where the shadow flicker model was ostensibly refined by inputting additional potential screening features. Champaign Wind's consultants took photos of certain properties to document any obstacles that might block a hypothetical 1 x 1 meter receptor from receiving shadow flicker. They imported the information from the photos first onto an aerial photo, then into the WindPro modeling software. But again, that methodology was fundamentally flawed -- a 10' tall tree could conceivably screen a one-square-meter receptor, but may not screen a 40' wide two- or three-story structure. *See* Appendix 1. And if the tree was an ash tree, it is now gone.

Given the potential for these sorts of latent errors in modeling assumptions, UNU urges the Board to require the applicant to demonstrate shadow flicker compliance based on maximum astronomical flicker potential rather than based on "obstacle analyses" or other topography-based model refinements.

The rule also should provide for re-modeling and re-evaluation of a wind project's shadow flicker impacts if the applicant changes the size of the turbine or its blades after submitting the initial shadow flicker analysis its application. In the event that an applicant

---

<sup>2</sup> UNU's comments about potential pitfalls in the modeling methodology for measuring the impact of shadow flicker on residences should not be construed as an indication that UNU believes modeling need be conducted only for residences. As stated above, the modeling should be conducted at the property lines of non-participating properties.

changes the height of the turbine or the length of the turbine blades after modeling the anticipated shadow flicker, then the applicant must perform the modeling again. Changing the turbine's height or blade length (even if the turbine height does not change) can increase the amount of shadow flicker on non-participating properties. The rule should require the re-modeling and re-evaluation of shadow flicker whether the turbine changes are made before or after a certificate is issued. If the re-modeling and re-evaluation of shadow flicker reveals an increase in shadow flicker exposure to any non-participating neighbor that has signed a waiver of setbacks, the applicant should be required to obtain a new waiver from that neighbor after informing the neighbor that new information shows greater shadow flicker impacts.

Finally, UNU urges the Board to require that applications express all parcel-specific information, such as modeling inputs and results, in a manner that can be readily interpreted by members of the public. In UNU's experience, the format of past applications for wind farm certificates has often made it difficult or impossible for members of the public to find key information that is important to their properties and their community. For example, modeling reports have sometimes referenced surrounding properties using unintelligible codes rather than by address, parcel number, or other means that can be readily interpreted by the public. In other cases, members of the public have not been able to decipher modeling conclusions concerning a particular parcel without the purchase of expensive proprietary software. Since this concern is not limited to shadow flicker modeling, UNU submits that the Board should enact a rule applicable to any parcel-specific information incorporated in an application or supporting models, evaluations, or exhibits.

**B. The application should include maps showing distances from each turbine to both nearby structures and property lines. (O.A.C. § 4906-4-08(C)(1)(b)(i)-(ii))**

Proposed § 4906-4-08(C)(1)(b)(i) and (ii) require that maps show the distance between “the structure or the property line.” Both rules should read, “the structure and the property line.” Because all statutory setbacks are now to be measured from the nearest adjacent property, R.C. 4906.20(B)(2)(a), the distance to nearby property lines should be mandatory. The current language would allow applicants to continue to provide distances only to residences and omit the property line distances needed to evaluate setback compliance.

**C. The noise standards in O.A.C. 4906-4-09(F)(2) need improvement.**

UNU, in consultation with an acoustical engineer, has reviewed the new noise standard proposed by the Board in OAC 4906-4-09(F)(2). This standard has some deficiencies that the Board should address.

First, the use of the Leq metric is appropriate for measuring wind turbine sound to determine whether it complies with the Board’s noise standard. However, to accurately quantify background sound, acoustical engineers universally use the L90 metric. L90 is the sound level exceeded during 90% of the measurement period. The L90 measures the quietest 10% of an interval to identify the amount of background sound normally available to mask turbine noise that otherwise would awaken a person. This filters out the sporadic noise from brief noise events, such as occasionally passing cars, that would only briefly mask the new sound. Accordingly, the standard should provide that the Leq level for wind turbine noise must not exceed the L90 level of background sound by more than five A-weighted decibels.

Second, the rule contains no standard for low frequency noise. The Board should adopt a standard that provides that the Leq level for wind turbine noise must not exceed the L90 level of background sound by more than five C-weighted decibels.

Third, the results of sound measurements can be substantially skewed by improper measurement techniques. UNU recommends that the Board require sound measurements to be conducted in compliance with the standards issued by the American National Standards Institute, Inc. (ANSI) and Acoustical Society of America (ASA).

Fourth, the proposed rule would measure compliance with the noise standards by comparing the noise levels at a neighbor's property to the greater of (1) the measured ambient Leq at the location of the neighbor's property or (2) the project area ambient nighttime Leq. However, ambient sound levels can vary substantially throughout an area, where some properties might be exposed to road traffic and other sound sources but other homes may not be exposed to these sounds. Using an areawide ambient level to measure compliance in the quieter portions of the area will allow the facility to impose noise on the quieter areas that could be substantially higher than five decibels above the actual ambient sound level in those quieter areas. This could create intolerable noise conditions in the quieter areas. Consequently, we urge the Board to use only the ambient sound level at the location of the neighbor's property to measure compliance.

**D. Shadow flicker exposures should be limited to 8 hours/year (O.A.C. § 4906-4-09(H))**

Proposed Rule 4906-4-09(H) provides as follows:

- (1) The facility shall be designed to avoid unreasonable adverse shadow flicker effect at any adjacent non-participating property boundary. At a minimum, the facility shall be operated so that the shadow flicker levels do not exceed thirty hours per year at any non-participating property boundary.
- (2) After commencement of commercial operation, the applicant shall conduct further review of the impact and possible mitigation of all project-related shadow flicker complaints through its complaint resolution process.

UNU commends the Board and Staff for recommending a shadow flicker standard measured from non-participating property boundaries. However, the point of compliance for the proposed standard should not be limited to adjacent non-participating boundaries. As discussed

at Comment A, above, topography or other landscape features may result in variable shadow flicker effects on neighboring non-participating properties. For example, if a hill is situated between a turbine and an adjacent non-participating property boundary, the boundary may be sheltered from flicker effects—but a house located on another hill located on that property (or another non-participating property) may be subjected to far greater shadow flicker. Therefore, it is important that the proposed standard be applicable anywhere on any non-participating property, whether or not it is adjacent to the property hosting the turbine. Furthermore, the standard should apply both to design and operation of wind energy facilities. For purposes of enforcement, the standard should also be expressed on a calendar-year basis to avoid disputes over when measurement of compliance should begin.

In addition, the recommended 30-hour standard is unduly lax compared to current U.S. and European standards. According to a comparative study of international standards for wind energy siting prepared by the State of Minnesota in 2011, Germany's shadow flicker limits are widely referenced in government and wind energy association documents worldwide. Haugen, *International Review of Policies and Recommendations for Wind Turbine Setbacks from Residences: Setbacks, Noise, Shadow Flicker, and Other Concerns* at 6 (Minnesota Dep't of Commerce 2011), [http://mn.gov/commerce/energyfacilities/documents/International\\_Review\\_of\\_Wind\\_Policies\\_and\\_Recommendations.pdf](http://mn.gov/commerce/energyfacilities/documents/International_Review_of_Wind_Policies_and_Recommendations.pdf). The Minnesota study notes that there is widespread confusion about Germany's limits. *Id.* Many sources reference Germany's worst-case exposure limit of 30 hours/year. The German 30-hour standard is a siting standard that takes into account maximum astronomical flicker duration on a given property. However, according to the Minnesota study (which included personal interviews with German contacts), the same German law limits actual shadow flicker exposure at residences, schools,



workplaces, and health care facilities to 8 hours/year. *Id.* If setback distances are not sufficient to reduce shadow flicker to 8 hours/year, the law directs that turbines be turned off during periods when shadow flicker is an issue. *Id.* New Hampshire has also adopted a shadow flicker standard incorporating the 8-hour limit. New Hampshire Siting Comm’n Rule 301.13(f)(2) (2015), [http://www.gencourt.state.nh.us/rules/state\\_agencies/site100-300.html](http://www.gencourt.state.nh.us/rules/state_agencies/site100-300.html). Denmark, which in 2011 had the highest wind energy capacity per capita and per land area in the world, *id.* at 18, applies a shadow flicker exposure guideline of 10 hours/year and includes a provision similar to Germany’s requiring operation of non-compliant turbines to be curtailed. Haughen, *International Review of Policies* at 6.

Following the lead of Germany, if the Board wishes to adopt a 30-hour shadow flicker standard, UNU recommends that standard be applied to the applicant’s pre-certificate modeling to limit maximum astronomical flicker duration. (*See* Comment A, above.) For purposes of limitations on actual shadow flicker impacts, UNU urges the Board to revised Rule 4906-4-09(H)(1) as follows:

The facility shall be designed and operated to avoid unreasonable adverse shadow flicker effect at any location on any adjacent non-participating property boundary. At a minimum, the facility shall be designed and operated so that the shadow flicker levels do not exceed eight ~~thirty~~ hours per calendar year at any location on any any non-participating property boundary. The applicant shall curtail operation of any wind turbine that causes shadow flicker exceeding eight hours per calendar year at any location on any non-participating property boundary.

Finally, with respect to subsection (2) of § 4906-4-08, the applicant should be required to submit to the Staff any post-certificate evaluation of shadow flicker impacts, including all supporting documentation and data. Furthermore, such information should be deemed public records and should not be subject to trade secret protection. With regard to the term “mitigate” in subsection (2), as discussed in Comment A, above, a neighboring property should not be

required to accept mitigation measures on his or her property to address excessive shadow flicker. If a wind turbine cannot comply with applicable standards, operation should be curtailed.

**E. Leases, options for leases, and setback waivers should be included in the applications for public review.**

Important information pertinent to a wind project application may be included in an applicant's leases with participating landowners for turbine sites and associated facilities, an applicant's options for such leases, and agreements from participating landowners and non-participating neighbors to waive setbacks. The public should be allowed to review these documents to identify potential threats to humans, neighboring properties, and the environment. In addition, agreements with non-participating neighbors to waive setbacks must be subject to public review to ensure that the applicant has secured waivers that comply with applicable requirements in the proposed new language for Rule 4906-4-08(C)(3). Secrecy for leases, options, and waiver agreements leads to the public's distrust of a project; genuine transparency benefits the public and everyone else involved in the application process. This purpose can be served by including these documents in the applications, even if pricing and other proprietary information not pertinent to the application or the project's potential impacts on the public are redacted from the documents to protect an applicant's trade secrets. The rules should require these documents to be included in the application. These documents also should be recorded in the county recorder's office prior to the filing of the application, so that prospect purchasers or tenants of the affected properties (including the land hosting the wind utility, the land subject to setback waivers, and other parcels near the wind facilities) will have fair warning about the impacts on land before they purchase the land.

**F. The rules should allow an applicant to extend the construction deadline for a certificated project by no more than three years.**

OPSB's decisions explain that it is "the long-standing policy of the Board" to include in each certificate a condition requiring the applicant to begin a continuous course of construction within a specified time period. *In re Lima Energy Company*, Ohio Power Siting Bd. No. 00-513-EL-BGN at 7, ¶ 8, 2012 WL 3252845 (July 30, 2012); *In re Norton Energy Storage, LLC*, Ohio Power Siting Bd. No. 99-1626-EL-BGN at 2, ¶ 9, 2013 WL 5570311 at \*1 (Sept. 30, 2013). The Board's decisions explain that the purpose of this provision is (1) to ensure that the information upon which the Board initially relied in granting the certificate is still valid and accurate and (2) to prevent an applicant from indefinitely encumbering property development rights without actually developing a project, so as to encourage the efficient use of the land. *Lima Energy*, at 7, ¶ 8; *Norton Energy*, at 2, ¶ 9. Consequently, this condition is an important component of the certificate. These important purposes are defeated if an applicant obtains lengthy extensions for a certificated project.

These considerations are especially pertinent to wind projects. The designs of wind turbine models have undergone substantial changes over the years. For example, the currently marketed turbine models are significantly taller and have a much greater rated capacity than the models contemplated by the approved applications for the Buckeye I and Buckeye II wind projects. These developments call into question the continued validity of the certificates for these projects. Lengthy extensions of the construction deadlines in these certificates will result in the construction of projects that were not properly vetted in the application process.

Moreover, the existence of a certificate for an unbuilt project discourages neighboring landowners in a community from beneficially developing their own properties for uses that would be impaired by the certificated project once it is operational. Families in such a project

area find it difficult to sell their homes or use the equity in their homes for funding such needs as medical care, retirement, college, and elder care, because prospective home buyers or financial institutions will not invest in homes that may be impacted in the future by nearby wind turbines. Lengthy extensions of the construction deadlines for an unbuilt project are injurious and unfair to the community.

Therefore, the Board should add a provision to its rules that prohibits the Board's five-year certificates from being extended by more than an additional three years. An extension of any length should not be automatic, but should still be subject to the rules' existing requirements that an applicant duly apply for and justify the extension. Eight years to start construction is more than ample time for an applicant to start construction. Eight years of uncertainty about a facility's construction plans is already harmful to a community. A longer extension should not be allowed in any situation.

**G. R.C. 4906.20 requires the Board to prescribe standards to protect recreational land use, but the rules provide no such standards.**

Ohio Revised Code Section 4906.20 provides that "the rules shall prescribe reasonable regulations regarding any wind turbines and associated facilities of an economically significant wind farm, including, but not limited to . . . recreational land use. . . ." Although proposed Rule 4906-4-08(D)(3) requires an applicant to submit information about nearby recreational areas, the rules provide no setbacks or other standards to protect the recreational areas. Merely knowing about the existence of recreational areas does nothing to protect them.

Outdoor recreation areas and facilities, whether they be public or private, are local amenities and oftentimes important contributors to the rural economy as well as a source of jobs. Proximity to a wind facility diminishes the amenity and threatens the economic viability of the enterprise. The Board has previous experience with a lack of a standard when it failed to protect

Indian Lake in the Scioto Ridge project until public outcry forced a negotiated settlement and the removal of numerous turbines near the lake. Local residents should not have to go to these lengths to protect outdoor recreation areas. The Board should promulgate meaningful standards to protect these important resources, including a setback of at least three miles so that the public can enjoy their use of the recreational areas.

### **III. CONCLUSION**

For the foregoing reasons, Union Neighbors United recommends that the above comments and changes be considered and adopted by the Board as it finalizes Rules 4906-4-08 and -09.

Respectfully submitted,

/s/ Jack A. Van Kley

Christopher A. Walker (0040696)  
Van Kley & Walker, LLC  
137 N. Main St., Suite 316  
Dayton, OH 45419  
(937) 226-9000  
(937) 226-9002 fax  
[cwalker@vankleywalker.com](mailto:cwalker@vankleywalker.com)

Jack A. Van Kley (0016961)  
Van Kley & Walker, LLC  
132 Northwoods Blvd., Suite C-1  
Columbus, OH 43235  
Telephone: (614) 431-8900  
Email: [jvankley@vankleywalker.com](mailto:jvankley@vankleywalker.com)

Counsel for Union Neighbors United,  
Julia F. Johnson, and Robert and Diane  
McConnell

**CERTIFICATE OF SERVICE**

I hereby certify that, on October 24, 2016, a copy of the foregoing comments was filed with the docketing division's e-filing system, which will electronically serve notice of the filing of this document on the following parties:

Matt Butler  
Public Utilities Commission of Ohio  
180 E. Broad St.  
Columbus OH 43215

Teresa Orahood  
Bricker & Eckler LLP  
100 South Third Street  
Columbus OH 43215-4291  
Attorney for 6011 Greenwich Windpark, LLC

Amy M. Milam  
Ohio Farm Bureau Federation  
280 N. High Street, P.O. Box 182383  
Columbus OH 43218-2383

Sandra Coffey  
Public Utilities Commission of Ohio  
180 E. Broad St.  
Columbus OH 43215

Donielle Hunter  
PUCO  
180 East Broad Street 11th Floor  
Columbus OH 43215

Samuel C. Randazzo  
McNees Wallace & Nurick LLC  
21 E. State Street, 17th Floor  
Columbus OH 43215  
Attorney for Greenwich Neighbors United

/s/ Jack A. Van Kley  
Jack A. Van Kley

# APPENDIX 1

## BEFORE THE OHIO POWER SITING BOARD

In the Matter of the Application of )  
Champaign Wind LLC for a Certificate )  
to Construct a Wind Powered Electric ) Case No. 12-160-EL-BGN  
Generating Facility in Champaign )  
County, Ohio )

---

### OPENING POST-HEARING BRIEF OF INTERVENORS UNION NEIGHBORS UNITED, INC., ROBERT AND DIANE MCCONNELL, AND JULIA F. JOHNSON

---

Jack A. Van Kley (0016961)  
Van Kley & Walker, LLC  
132 Northwoods Blvd., Suite C-1  
Columbus, Ohio 43235  
Telephone: (614) 431-8900  
Facsimile: (614) 431-8905  
Email: [jvankley@vankleywalker.com](mailto:jvankley@vankleywalker.com)

Christopher A. Walker (0040696)  
Van Kley & Walker, LLC  
137 North Main Street, Suite 316  
Dayton, OH 45402-1772  
Telephone: (937) 226-9000  
Facsimile: (937) 226-9002  
E-Mail: [cwalker@vankleywalker.com](mailto:cwalker@vankleywalker.com)

## APPENDIX 1

Moreover, the ALJs have blocked UNU's attempt to obtain any meaningful information about whether CW's proposed 30 hour per year shadow flicker limit is effective to prevent problems at Ohio's operating wind farms, granting motions by CW and those wind developers to quash UNU's subpoenas for neighbors' shadow flicker complaints and other records pertinent to the wind farms' shadow flicker. Entry of Oct. 22, 2012, pp. 10-11, ¶¶ 22-23. Even Mr. Speerschneider admitted that information about shadow flicker at other wind farms is relevant to this application, even if it is produced by turbine models other than the six being considered in CW's application. Speerschneider, Tr. II 316:21 - 317:2. Mr. Speerschneider acknowledged that shadow flicker complaints at other wind projects are pertinent, because other turbine models are similar and because shadow flicker standards imposed on the other wind farms are similar to those requested for BW II. *Id.* at 341:8 - 342:21. The Board should not rely on the so-called "precedent" of this 30-hour limit without a meaningful evaluation of its effectiveness.

For all of these reasons, UNU requests that the Board (a) grant the motions of UNU and Champaign County to strike the hearsay evidence set forth in the Application and in the testimony of Michael Speerschneider and Robert Poore and (b) deny the Certificate due to the Applicant's failure to carry its burden of proof with regard to R.C. § 4906.10(A)(2), (3), and (6). In the alternative, the Board should reopen the evidentiary hearing for the consideration of evidence proffered by UNU but excluded or stricken by the ALJs on the basis of hearsay.

**2. The Shadow Flicker Model Is Fundamentally Flawed Because It Failed To Consider the Actual Size of Houses Whose Flicker Exposure Was Being Modeled.**

In its rulings on UNU's motions to strike the testimony of Mr. Speerschneider and Mr. Poore, the ALJs stated that the parties would have the benefit of cross-examining those witnesses to test the reliability of their testimony. Tr. I 32:7-10; Tr. III 937:8-12. Yet ironically, on cross-exam, neither witness had knowledge of the specific methodologies used by EDR in connection with its obstacle analysis. Nonetheless, a basic review of the Shadow Flicker Report shows that the obstacle analysis -- and, for that matter, the entire modeling analysis--is fatally flawed for the simple reason that it did not consider the actual size of the houses whose exposure was being modeled. Company Exh. 1, Exh. P at 4. Instead, CW modeled shadow flicker exposure to "receptors" with a hypothetical dimension of one meter by one meter. *Id.*



## APPENDIX 1

Understanding this fundamental flaw is a matter of simple geometry. While the initial analysis used an artificially small receptor size, it also considered actual site topography. According to the Application, one of the inputs to the initial analysis was U.S. Geological Survey (USGS) topographical mapping and digital elevation model. *Applic.*, p. 85. By considering actual topography but modeling shadow flicker exposures to a tiny receptor, the model overestimates the screening effect of any hills between a turbine and an actual residence. A hill that might screen shadows from a 1 meter by 1 meter receptor would not necessarily screen a two- or three-story home. This defect is present in the inputs for every single receptor modeled in the initial analysis. *Applic.*, Exh. P, Attachments C, F (*see* inputs for width, height, and height above ground level starting at p. 3, graphical calendars, and shadow calendars).

The same sleight of hand was employed in the obstacle analysis, where EDR professed to incorporate refinements to the models by inputting additional potential screening features into the model. First, EDR did “reconnaissance” at each of the non-participating properties modeled to exceed 30 hours. During the reconnaissance, they took photos to document any obstacles that might block a receptor from receiving shadow flicker. They imported the information from the photos onto an aerial photo, then imported that into the WindPro modeling software. EDR then drew rectangles on the aerial photo in WindPro to represent the obstacles:

Each rectangle was assigned a width, length and height to reflect the dimensions of the obstacle. The width and length of obstacles were determined from the orthoimagery [i.e., the aerial photo], while the heights were determined by direct measurements in the field or from the photographs taken on site. . . .”

*Applic.* at 86; *Id.*, Exh. P at 7 (emphasis added). Again, because a 10’ tall tree could conceivably screen a one-square-meter receptor but would not completely screen a 40’ wide two- or three-story structure, the obstacle analysis is fundamentally flawed.<sup>8</sup> As was the case with the initial analysis, this flaw is present in the inputs for every single “receptor” modeled in the obstacle analysis. *Applic.*, Exh. P, Attachment E, G (*see* inputs for width, height, and height above ground level starting at p. 3, graphical calendars, and shadow calendars).

This error in the model is basic and indisputable. Amazingly, however, it was not detected (or acknowledged) by either Mr. Speerschneider, Mr. Poore, or Mr. Strom -- which

---

<sup>8</sup> In addition, the Shadow Flicker Report does not specify the actual dimensions of the site-specific obstacles input in the obstacle analysis. Neither Mr. Speerschneider nor Mr. Poore was able to explain how those obstacles were input into the model. Speerschneider, Tr. II 289:19-290:17; Poore, Tr. III 561:13-562:3.

## APPENDIX 1

further calls into question their qualification to offer expert opinions on this topic. For all of the above reasons, the predictions of annual shadow flicker set forth in the Shadow Flicker Model are inherently unreliable and should be disregarded. Without reliable projections of shadow flicker on affected residences, CW has not met its burden of proof and the Board has no basis in the record to determine compliance with the certification criteria set forth in R.C. § 4906.10(A)(2), (3), and (6) as they pertain to shadow flicker. Therefore, the Application should be denied.

3. **The Board Should Not Approve The Siting Of Wind Turbines That Will Cast Excessive Shadow Flicker On Neighboring Land And Residences.**

Even assuming the Shadow Flicker Report is admissible, accurate, and credible -- which, for the above reasons, it is not -- the report predicts that as many as 50 neighboring residences, 11 of whom are nonparticipating properties, will experience shadow flicker at levels beyond the proposed 30 hour/year standard. A shadow flicker standard that is not applied uniformly to all nonparticipating properties is no standard at all. The Board should establish a shadow flicker standard that is uniformly applied to screen out inappropriate locations for turbines. Because shadow flicker affects a neighbor's entire property, not just the residence, modeling for compliance with the shadow flicker standard should evaluate the duration of flicker over the entire property.

The Staff Report recommends that CW provide additional modeling--after the certificate is issued--to show that shadow flicker impacts have been reduced to 30 hours/year or less for each affected receptor. Staff Report at 59, Cond. 50. The proposed condition continues:

This analysis may incorporate shadow flicker reductions for trees, vegetation, buildings, obstructions, turbine line of sight, operational hours, wind direction, sunshine probabilities, and other mitigation confirmed by Staff to be in compliance with this condition.

*Id.* UNU strongly objects to this proposed condition because it defers consideration of important siting considerations and mitigation measures until after the evidentiary hearing has concluded and the Certificate is issued. This is particularly objectionable when neither CW nor the Staff were able to identify a fundamental flaw in the original Shadow Flicker Study presented in the Application. Any shadow flicker modeling supporting the BW II project must be presented in the context of the evidentiary hearing, where the intervenors have a right to scrutinize it and offer

**This foregoing document was electronically filed with the Public Utilities**

**Commission of Ohio Docketing Information System on**

**10/24/2016 4:05:45 PM**

**in**

**Case No(s). 16-1109-GE-BRO**

Summary: Comments Initial Comments of Union Neighbors United, Julia F. Johnson, and Robert and Diane McConnell electronically filed by Mr. Jack A Van Kley on behalf of Union Neighbors United and Johnson, Julia Ms. and McConnell, Robert Mr. and McConnell, Diane Ms.