BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET EL24-023

IN THE MATTER OF THE APPLICATION BY DEUEL HARVEST WIND ENERGY SOUTH LLC FOR ENERGY FACILITY PERMITS OF A WIND ENERGY FACILITY AND A 345 KV TRANSMISSION FACILITY IN DEUEL COUNTY, SOUTH DAKOTA FOR THE SOUTH DEUEL WIND PROJECT

Direct Testimony of David M Hessler
On Behalf of the Staff of the South Dakota Public Utilities Commission
November 13, 2024

Q. Please state your name and business address.

A. My name is David M. Hessler. The address of my company's administrative offices is 38329 Old Mill Way, Ocean View, Delaware 19970, and my personal office is located at 5096 N Silver Cloud Dr., St. George, Utah 84770.

Q. Mr. Hessler, by whom are you employed and in what capacity?

A. I have been employed for over 33 years by Hessler Associates, Inc., as Vice President and a Principal Consultant. Hessler Associates, Inc. is a family run engineering consulting firm that specializes in the acoustical design and analysis of power generation facilities of all kinds, including wind energy projects.

Q. Please describe your educational background and your professional experience?

A. I received a Bachelor of Science degree in Mechanical Engineering in 1997, Summa cum Laude, from the A. James Clark School of Engineering, University of Maryland, College Park, Maryland, and a Bachelor of Arts degree, 1982, from the University of Hartford, Hartford, Connecticut. I am a registered Professional Engineer (P.E.) in the Commonwealth of Virginia. My professional specialization is the measurement, analysis, control and prediction of noise from both fossil fueled and renewable power generation facilities. I have been the principal acoustical designer and/or test engineer on hundreds of power station projects all over the world and on roughly 70 industrial scale wind energy projects. I wrote the chapter on measuring and analyzing wind turbine noise in the book "Wind

Turbine Noise"[1], which was published in 2011. I also drafted a set of best practices guidelines[2] for siting new wind turbine projects and testing them once completed for the National Association of Regulatory Utility Commissioners (NARUC). My resume, which contains a list of the cases where I have testified as an expert witness, is also attached for reference as **Exhibit DMH-1**.

Q. What is the purpose of your testimony in this case?

A. I have been asked by the Staff of the South Dakota Public Utilities Commission to review and independently evaluate the adequacy of the sound study prepared for the South Deuel Wind Project and the validity of its conclusions.

Q. What materials have you reviewed in this matter?

A. I have reviewed Section 11.3 of the Application and also Appendix M, which is the original (June 20, 2024) sound study for the Project prepared by Hankard Environmental, along with the Applicant's responses to noise-related issues in Data Requests 1 and 4. I have also reviewed the direct testimony of Michael Hankard, who was the author of the sound study.

Q. Can you please summarize your overall opinion of the sound study submitted on behalf of the project?

[1] Bowdler, D., and Leventhall, G., Editors, "Wind Turbine Noise", Multi-Science Publishing Company, Brentwood, Essex, UK, 2011.

[2] Hessler, D., "Assessing Potential Impacts from Proposed Wind Farms & Measuring the Performance of Completed Projects", National Association of Regulatory Utility Commissioners, U.S. Department of Energy, October 2011.

A. In general, the quality of the work and noise modeling is perfectly satisfactory and consistent with good industry practice. I agree with the modeling methodology and believe that the predictions are realistic, if not somewhat conservative because a highly reflective ground absorption coefficient, per ISO 9613-2, of 0 was used. This approach essentially neglects sound propagation losses from ground absorption, which can be significant in areas that primarily consist of open farm fields like those within the planned project area, leading to higher predicted sound levels than might actually occur.

Q. Do you agree with the report's overall conclusion that the regulatory limit of 45 dBA can be met at all of the non-participating residences within and near the project area when the South Deuel Project is considered in isolation?

A. Yes, on a long-term average basis. Wind turbine noise is variable with atmospheric conditions and will at times be louder and quieter than the predicted level at any given location. So, as is normal for any wind project, I would expect the project sound level to be above the predicted level a small percentage of the time. The degree to which that might happen here is minimized to a certain extent by the conservativism in the modeling. The discussion on page 6 of the report of Hankard's experience comparing modeled and measured sound level indicates, I think credibly, that the model predictions are likely to be about 1 or 2 dBA high.

Q. In Table 4-1 of the report the sound power level of the Siemens turbine is about 1 dBA higher than the Vestas unit, yet in the sound contours for these two turbines, Figures D-1 through D-4, the 45 dBA sound contour is considerably further out for the ostensibly quieter Vestas turbine. Does that seem right?

A. It doesn't seem right, but I did my own sound propagation calculations for the two sound power level spectra at an arbitrary distance of 500 m and the apparently louder Siemens turbine produces a lower far field sound pressure level. The difference in the shape of each spectrum is the reason. The Siemens spectrum peaks around 1000 and 2000 Hz while the Vestas unit peaks at a somewhat lower point around 500 Hz. The higher frequencies of the Siemens turbine fade out more rapidly with distance. So, although counterintuitive, Figures D-1 through D-4 appear to be correct.

Q. The proposed South Deuel Project abuts the existing Tatanka Ridge Wind Project, which lies immediately to its southwest. Do you believe the discussion of cumulative noise in the report from this adjacent project is adequate and acceptable?

A. No, not at all. There is no actual discussion of cumulative noise, and the entire topic has been relegated essentially without comment to a long table of numbers in Appendix E where the implications for sound levels at houses between the two projects are difficult to discern. The cumulative sound contours are not plotted in a graphic format where it would be easier to visualize any problem areas.

Q. What do the numbers in the Appendix E table say about cumulative impacts?

A. After careful review it becomes clear that the combined sound emissions from the two projects will result in predicted sound levels above the 45 dBA regulatory limit at a number of non-participating homes, depending on the turbine model. More specifically, there are 7 non-participants above 45 dBA using the GE model, 3 over 45 dBA using the Vestas turbine and 1 over using the Siemens model. Admittedly, the overages are small, up to a maximum of only 1 dBA, but they are overages none the less.

Q. Would such small increases make any real difference in how noise is subjectively perceived at the affected homes?

A. Quite frankly, no. A sound level of 45 dBA is indistinguishable from a sound level of 46 dBA, but I believe it would set an undesirable precedent to allow predicted sound levels above the regulatory limit to be explicitly allowed in the operating permit. A hypothetical East Deuel wind project could then potentially build in another 1 or 2 dBA increase the next time.

Q. Do you see any kind of practical action that could be taken by the Applicant to avert these cumulative noise increases above 45 dBA?

A. Yes. Although not mentioned in the actual sound study, there is a statement in Section 11.3.2 “Acoustical Model Inputs” of the Application that despite the 73

turbine sites analyzed in the noise model "only 68 turbines will be constructed." This was later clarified in the Applicant's response to Staff Data Request 1-19 that a maximum of 68 GE turbines would actually be installed and far fewer units if one of the other manufacturers were used. Consequently, there are a minimum of 5 spare sites that were modeled but where turbines will not actually be erected. The most significant cumulative noise overages, ranging from 0.3 to 1.0 dBA if GE units were used, are being caused by three turbines at sites 39, 89 and H. If these three sites were designated as no-build sites, then it looks like all the overages at non-participating houses will be either totally eliminated or made negligible. By 'negligible' I mean that the calculated cumulative level is over 45 dBA by 0.2 dBA or less. Such a small and meaningless overage is well within the possible accuracy of this kind of modeling analysis and more of a mathematical construct than any kind of actual adverse noise impact, especially given the conservatism inherent in the modeling.

Q. Can you expand on this idea of designating certain turbine locations as no-build sites with more specifics?

A. Yes. In Figure D-7 it is clear even without a cumulative sound contour map that Turbines 89 and H are responsible for the maximum cumulative overages of +0.9 dBA at non-participating residence R-322 and +1.0 dBA at R-306 assuming GE units, with lesser overages associated with the other turbine makes. Eliminating those two units would, I would estimate, keep the total sound level at 45 dBA or less at those two worst-affected receptors and perhaps eliminate smaller, largely

theoretical, overages at R-089 and R-087, while also generally reducing noise levels at the numerous other non-participating houses in that local area.

Figure D-5 shows how Turbine 39 is affecting receptors R-205 (+0.5 dBA) and R-171 (+0.3 dBA), again assuming GE turbines. It appears that these cumulative increases would likely decrease or go away entirely without unit 39.

Q. Are any other residences affected by cumulative noise, in the sense that the total level is expected to be above 45 dBA?

A. Yes. Residence R-212 in the lower left of Figure D-5 is predicted to have an overage of +0.2 dBA with GE units and +0.1 dBA with Vestas turbines. I would consider these small overages intangible, negligible and probably unlikely to actually occur given the conservativism in the modeling. Consequently, the potential elimination of the cause, Turbine 33, cannot be rigorously justified, but its omission would lower sound levels, probably noticeably, at non-participants R-204, R-327, R-212 and R-209.

A somewhat similar situation exists near Turbine 56 in the upper right of Figure D-7. The slight cumulative overages of 0.2 dBA at R-089 and 0.1 dBA at R087 appear to be reversable without Turbine 56 - in the event that the elimination of Turbines 89 and H, as discussed above, doesn't already make that happen.

In any case, Turbines 33 and 56 would be good candidates for a no-build designation as long as at least 5 sites, or more, will need to be eliminated anyway.

Q. Have you reviewed the permit conditions on noise proposed by Staff in Data Request 1-60(b)?

A. Yes.

Q. What is your opinion of the conditions in general?

A. I agree with the proposed requirements, including the provision that noise from an adjacent, existing wind project is not to be considered background noise, but rather must be counted against the total permissible sound level of 45 dBA during any field testing.

Q. What is your opinion of the Applicant's proposed edits to the conditions?

A. I believe they are reasonable and fair and should be accepted. I would agree with the assertion that only the four closest turbines to any given test location are relevant to the sound level. I also agree with the clarification that the four closest *Project* turbines must be operating during a test because the Applicant has no control over turbines that may be nearby but owned by a different project. Unless some kind of maintenance work is going on, it is likely that potentially relevant turbines in an adjacent project will be operating anyway under the moderately windy conditions necessary for testing.

Q. Do you have any other comments on the sound study?

A. No, that concludes my testimony.

CURRICULUM VITAE

DAVID M. HESSLER

Title:	Principal Consultant, Vice-President Hessler Associates, Inc.
Professional Affiliations:	Professional Engineer (P.E.), Commonwealth of Virginia
Education:	Bachelor of Science in Mechanical Engineering (B.S.), 1997 *Summa cum Laude* A. James Clark School of Engineering University of Maryland, College Park, MD Bachelor of Arts (B.A.), 1982 University of Hartford, Hartford, CT
Employer:	Hessler Associates, Inc. 38329 Old Mill Way, Unit 8 Ocean View, DE 19970
Office Location:	St. George, UT Years in present position: 33
Current Job Description:	Acoustical engineer specializing in the prediction, assessment and mitigation of environmental noise from new and existing power generation and industrial facilities. Typical tasks include: • Field measurement studies of existing ambient sound levels in the vicinity of proposed project sites • Computer noise modeling of new facilities prior to construction • Environmental impact assessments for new projects • Noise mitigation design studies of new facilities • Verification measurements of completed facilities • Diagnostic studies of facilities with existing noise problems • Design and specification of noise mitigation measures • Expert witness testimony
General Experience:	As an outside consultant to nearly all the major power industry EPC contractors, developers and OEM's, Mr. Hessler has been the principal acoustical designer of over 400 power plants and industrial facilities worldwide ranging from a 3900 MW power station in Saudi Arabia to numerous combustion turbine combined cycle plants, data centers, diesel generator installations, refineries, battery storage, solar and wind turbine projects. Typically, the focus of the work on these projects was to anticipate/model potential noise impacts at sensitive receptors near the project and recommend practical noise abatement measures to avoid them. In addition, extensive verification measurements in and around completed power plants, industrial facilities and wind farms have been performed to confirm that the design recommendations have been successfully executed.

Representative Papers and Publications:

"Wind Turbine Noise", Chapter 7 *Measuring and Analyzing Wind Turbine Sound Levels*, Multi-Science Publishing Co., Brentwood, Essex, UK, Jan. 2012. Comprehensive book on all aspects of wind turbine noise. Each chapter written by a recognized expert in that subject.

Teleseminar "Wind Turbine Siting and Best Practices", National Regulatory Research Institute (NRRI), Invited speaker, Jan. 2012.

"Best Practices Guidelines for Assessing Sound Emissions from Proposed Wind Farms and Measuring the Performance of Completed Projects", Prepared for the Minnesota Public Utilities Commission under the auspices of the National Association of Regulatory Utility Commissioners (NARUC), Oct. 2011.

"Accounting for Background Noise when Measuring Operational Noise from Wind Turbines", Fourth International Meeting on Wind Turbine Noise, Rome, Italy, Apr. 2011.

"Recommended noise level design goals and limits at residential receptors for wind turbine developments in the United States", *Noise Control Engineering Journal*, J.59 (1), January-February 2011.

"Wind tunnel testing of microphone windscreen performance applied to field measurements of wind turbines", Third International Meeting on Wind Turbine Noise, Aalborg, Denmark, June 2009.

"Experimental study to determine wind-induced noise and windscreen attenuation effects on microphone response for environmental wind turbine and other applications", *Noise Control Engineering Journal*, J.56, July-August 2008.

Expert Witness Cases:

Before the Washington State Energy Facilities Siting Board (EFSEC) on behalf of Bechtel and the Cherry Point Cogeneration Project, Bellingham, WA, 2003. Permitting support for a proposed combined cycle power plant facility.

Before the Public Service Commission of West Virginia on behalf of the Longview Power Project near Morgantown, WV, 2006. Permitting support for a proposed coal-fired power plant facility.

Before the Pennsylvania Department of Environmental Protection on behalf of Waste Management and the Alliance Sanitary Landfill in Taylor, PA, 2006. Support in defending against a Class Action Lawsuit brought by neighbors of the landfill.

Before the Office of the Attorney General of New York on behalf of the Hudson Valley Community College Cogeneration (Diesel) Plant. Support in defending against a Class Action Lawsuit brought by neighbors.

Before the Hanover County (VA) Board of Supervisors on behalf of Martin Marietta Materials and the Doswell Quarry, 2008. Permitting support for a proposed quarry expansion.

Before the New Hampshire Site Evaluation Committee on behalf of Granite Reliable Power, LLC, 2008. Permitting support for a proposed wind turbine project in Northern New Hampshire.

Before the Public Utilities Commission of Ohio, Ohio Power Siting Board on behalf of EverPower Renewables and the Buckeye Wind Project, 2008. Permitting support for a proposed wind turbine project in Ohio.

Before the Wisconsin Public Service Commission on behalf of Clean Wisconsin with regard to the proposed Highland Wind Farm in Forest, WI. Docket No. 2535-CE-100. Engaged as an independent expert to evaluate the Applicant's sound studies and the testimony of opposition groups.

Before the Public Utilities Commission of Ohio, Ohio Power Siting Board on behalf of EverPower Renewables and the Buckeye II Wind Project, 2012. Permitting support for a proposed wind turbine project in Ohio.

Before the Maine State Government Energy, Utilities and Technology Committee on behalf of Patriot Renewables and the Beaver Ridge Wind Project, 2014. Peer review of operational sound testing by others.

Before the South Dakota Public Utilities Commission on behalf of the Commission Staff to review the noise aspects of the application for the Crocker Wind Farm Project. Docket EL17-055. April 2018.

Before the South Dakota Public Utilities Commission on behalf of the Commission Staff to review the noise aspects of the application for the Dakota Range Wind Project. Docket EL18-003. April 2018.

Before the Rhode Island Energy Facility Siting Board, serving as an outside expert to the Town of Burrillville, RI reviewing the noise aspects of the Clear River Energy Center permit application, Docket SB-2015-06, December 2018.

Before the South Dakota Public Utilities Commission, serving as an outside expert to the PUC Staff reviewing the noise aspects of the Deuel Harvest Wind Project permit application, Docket EL18-053, April 2019.

Before the Kentucky Public Service Commission on behalf of Unbridled Solar, April 2021.

Before the Kentucky Public Service Commission on behalf of Caldwell Solar, February 2022.