

**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**

1 **Q. Please state your name and business address.**

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

5  
6 **Q. Mr. Hessler, by whom are you employed and in what capacity?**

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

11

12 **Q. Please describe your educational background and your professional  
13 experience?**

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

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

6  
7 **Q. What is the purpose of your testimony in this case?**

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

11  
12 **Q. What materials have you reviewed in this matter?**

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

18  
19 **Q. Can you please summarize your overall opinion of the sound study**  
20 **submitted on behalf of the project?**

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<sup>1</sup> Bowdler, D., and Leventhall, G., Editors, “Wind Turbine Noise”, Multi-Science Publishing Company, Brentwood, Essex, UK, 2011.

<sup>2</sup> 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.

1 A. In general, the quality of the work and noise modeling is perfectly satisfactory  
2 and consistent with good industry practice. I agree with the modeling  
3 methodology and believe that the predictions are realistic, if not somewhat  
4 conservative because a highly reflective ground absorption coefficient, per ISO  
5 9613-2, of 0 was used. This approach essentially neglects sound propagation  
6 losses from ground absorption, which can be significant in areas that primarily  
7 consist of open farm fields like those within the planned project area, leading to  
8 higher predicted sound levels than might actually occur.

9  
10 **Q. Do you agree with the report's overall conclusion that the regulatory limit**  
11 **of 45 dBA can be met at all of the non-participating residences within and**  
12 **near the project area when the South Deuel Project is considered in**  
13 **isolation?**

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

23

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

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

14  
15 **Q. The proposed South Deuel Project abuts the existing Tatanka Ridge Wind**  
16 **Project, which lies immediately to its southwest. Do you believe the**  
17 **discussion of cumulative noise in the report from this adjacent project is**  
18 **adequate and acceptable?**

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

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**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

1 turbine sites analyzed in the noise model “only 68 turbines will be constructed.”  
2 This was later clarified in the Applicant’s response to Staff Data Request 1-19  
3 that a maximum of 68 GE turbines would actually be installed and far fewer units  
4 if one of the other manufacturers were used. Consequently, there are a  
5 minimum of 5 spare sites that were modeled but where turbines will not actually  
6 be erected. The most significant cumulative noise overages, ranging from 0.3 to  
7 1.0 dBA if GE units were used, are being caused by three turbines at sites 39, 89  
8 and H. If these three sites were designated as no-build sites, then it looks like all  
9 the overages at non-participating houses will be either totally eliminated or made  
10 negligible. By ‘negligible’ I mean that the calculated cumulative level is over 45  
11 dBA by 0.2 dBA or less. Such a small and meaningless overage is well within  
12 the possible accuracy of this kind of modeling analysis and more of a  
13 mathematical construct than any kind of actual adverse noise impact, especially  
14 given the conservatism inherent in the modeling.

15  
16 **Q. Can you expand on this idea of designating certain turbine locations as no-**  
17 **build sites with more specifics?**

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

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

3  
4 Figure D-5 shows how Turbine 39 is affecting receptors R-205 (+0.5 dBA) and R-  
5 171 (+0.3 dBA), again assuming GE turbines. It appears that these cumulative  
6 increases would likely decrease or go away entirely without unit 39.

7  
8 **Q. Are any other residences affected by cumulative noise, in the sense that**  
9 **the total level is expected to be above 45 dBA?**

10 A. Yes. Residence R-212 in the lower left of Figure D-5 is predicted to have an  
11 overage of +0.2 dBA with GE units and +0.1 dBA with Vestas turbines. I would  
12 consider these small overages intangible, negligible and probably unlikely to  
13 actually occur given the conservatism in the modeling. Consequently, the  
14 potential elimination of the cause, Turbine 33, cannot be rigorously justified, but  
15 its omission would lower sound levels, probably noticeably, at non-participants R-  
16 204, R-327, R-212 and R-209.

17  
18 A somewhat similar situation exists near Turbine 56 in the upper right of Figure  
19 D-7. The slight cumulative overages of 0.2 dBA at R-089 and 0.1 dBA at R087  
20 appear to be reversible without Turbine 56 - in the event that the elimination of  
21 Turbines 89 and H, as discussed above, doesn't already make that happen.



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

4  
5 **Q. Have you reviewed the permit conditions on noise proposed by Staff in**  
6 **Data Request 1-60(b)?**

7 A. Yes.

8  
9 **Q. What is your opinion of the conditions in general?**

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

14  
15 **Q. What is your opinion of the Applicant's proposed edits to the conditions?**

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

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

3 A. No, that concludes my testimony.

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