

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA**

**IN THE MATTER OF THE APPLICATION BY DAKOTA RANGE III, LLC
FOR A PERMIT OF A WIND ENERGY FACILITY AND A 345-KV TRANSMISSION
LINE IN GRANT AND ROBERTS COUNTIES, SOUTH DAKOTA**

SD PUC DOCKET EL18-046

**PRE-FILED SUPPLEMENTAL DIRECT TESTIMONY OF ROBERT O'NEAL
ON BEHALF OF DAKOTA RANGE III, LLC**

January 4, 2019

1 **I. INTRODUCTION**

2

3 **Q. Please state your name.**

4 A. My name is Robert O’Neal.

5

6 **Q. Did you provide Direct Testimony in this docket on October 26, 2018?**

7 A. Yes.

8

9 **Q. What is the purpose of your Supplemental Direct Testimony?**

10 A. The purpose of my Supplemental Direct Testimony is to provide an update on the
11 Sound Level Assessment Report and Shadow Flicker Analysis Report conducted for
12 the Dakota Range III Wind Farm (“Project”). I will also briefly address comments
13 regarding infrasound and low frequency noise filed in the docket by George and
14 Ruby Holborn.

15

16 **II. SOUND LEVEL ASSESSMENT REPORT UPDATE**

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18 **Q. Do you have any updates to your Direct Testimony?**

19 A. Yes. We have completed the reports for the sound level modeling analysis and
20 shadow flicker modeling analysis conducted for the Project. The Sound Level
21 Assessment Report (updated Appendix H to the Application) and Shadow Flicker
22 Analysis Report (updated Appendix I to the Application) are attached as Exhibit A6-1
23 and Exhibit A6-2.

24

25 **Q. Could you summarize the results of your Sound Level Assessment Report?**

26 A. Yes. The Roberts County zoning ordinance limits sound levels to 50 A-weighted
27 decibels (“dBA”) at the exterior wall of the closest principal and accessory structures.
28 The predicted worst-case L_{eq} sound levels from the Project are below the 50 dBA

29 limit at all modeled structures in Roberts County. The $L_{eq-one\ hour}$ sound levels
30 modeled at occupied receptors in Roberts County¹ are at or below 43 dBA.

31
32 The sound level limit in the current Grant County zoning ordinance is 50 dBA at the
33 perimeter of the principal and accessory structures of existing offsite residences,
34 businesses, and buildings owned and/or maintained by a governmental entity. The
35 predicted worst-case L_{eq} sound levels from the Project are below the 50 dBA limit at
36 all modeled structures in Grant County. The $L_{eq-one\ hour}$ sound levels modeled at
37 occupied receptors in Grant County² are at or below 43 dBA.

38
39 **Q. Are you aware of proposed changes to the sound level limit in Grant County?**

40 A. Yes. It is my understanding that Grant County is in the process of enacting changes
41 to its zoning ordinance, including a change to the sound level limit for wind energy
42 systems. My understanding is that the new provision would change the sound level
43 limit to 45 dBA including constructive interference effects measured twenty-five (25)
44 feet from the perimeter of existing non-participating residences, businesses, and
45 buildings owned and/or maintained by a governmental entity. The new sound
46 provision would also establish a limit of 50 dBA including constructive interference
47 effects measured twenty-five (25) feet from the perimeter of participating residences,
48 businesses, and buildings owned and/or maintained by a governmental entity. The
49 provision also specifies that measurements be conducted using the A-weighting
50 scale, in accordance with American National Standards Institute (“ANSI”) standards,
51 and that a L90 measurement be used with a measurement period of no less than ten
52 (10) minutes unless otherwise specified by the County’s Board of Adjustment.

53
54 As discussed in the Sound Level Assessment Report, the modeling conducted for
55 the Project demonstrates that the Project would comply with Grant County’s newly

¹ Modeled sound levels at accessory structures ranged from 27 to 43 dBA in Roberts County.

² Modeled sound levels at accessory structures ranged from 24 to 44 dBA in Grant County.

56 adopted sound provision. Constructive interference effects are accounted for by
57 assuming all wind turbines are running at the same time. Each wind turbine's
58 individual contribution to the total sound level at a residence is added together in
59 accordance with the international standard of sound propagation (ISO 9613-2). The
60 modeling predictions are at the side of the structure closest to a wind turbine.
61 Moving the point of compliance 25 feet away from a structure would increase sound
62 levels by no more than 0.2 decibels thus not changing compliance with the new
63 Grant County sound provision. A compliance L90 measurement is approximately 2
64 dBA less than the modeled Leq sound level as proven by real-world post-
65 construction measurement programs.³ Therefore, the modeling in the Sound Level
66 Assessment Report demonstrates compliance with the modeling specifications in the
67 new Grant County noise ordinance.

68

69 **Q. Have you analyzed the potential cumulative sound impacts on receptors in**
70 **proximity to both the Project and the Dakota Range I and II project?**

71 A. Yes. The closest point between the Project and the Dakota Range I and II project
72 ("DR I/II Project") is west of Interstate 29 along 149th Street in Grant County. This
73 road is at the southern end of the Project (turbines A03 and A04 are nearby), and
74 the northern perimeter of the DR I/II Project (turbines 1 and 2 are nearby). The
75 closest house to both projects is receptor ID #2243 east of the Project's A04 turbine.
76 Sound levels from the Project are conservatively modeled to be 34 dBA at this
77 receptor. This same receptor is also ID #2243 for the DR I/II Project, and has a
78 conservatively modeled sound level of 36 dBA from the DR I/II Project. The total
79 sound level from both projects would be 38 dBA Leq. This is still well below the
80 newly adopted Grant County sound level limit of 45 dBA L90. Cumulative impacts at
81 all other receptors will be even less.

82

³ RSG et al, "Massachusetts Study on Wind Turbine Acoustics," Massachusetts Clean Energy Center and Massachusetts Department of Environmental Protection, 2016.

83 **Q. Comments prepared by Richard James regarding infrasound and low**
84 **frequency noise impacts from wind projects were filed in the docket by**
85 **George and Ruby Holborn. Do you have a response to the comments?**

86 A. Yes. There is no disagreement that wind turbines produce low frequency sound and
87 infrasound. This is not unlike any mechanical piece of equipment. However, the
88 fact that the Project's wind turbines may be 4.2 MW in electrical output does not
89 mean that the low frequency sound and infrasound energy will create a unique
90 condition compared to the over 50,000 existing wind turbines already operating in
91 the U.S. The letter from Mr. James does not mention that in December 2015, the
92 Brown County, Wisconsin health officer declared that there is insufficient scientific
93 evidence to support the relationship between wind turbines and health concerns.⁴
94 This finding still stands today.

95

96 **III. SHADOW FLICKER ANALYSIS REPORT UPDATE**

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98 **Q. Could you summarize the results of your Shadow Flicker Analysis Report?**

99 A. Yes. In Roberts County, the maximum expected annual flicker at a sensitive
100 receptor resulting from the operation of the proposed and alternate wind turbines is
101 27 hours, 13 minutes. This occurs at a participating receptor. The maximum
102 expected annual flicker at a non-participating receptor in Roberts County is 25
103 hours, 00 minutes.

104

105 In Grant County, the maximum expected annual duration of shadow flicker at a
106 sensitive receptor resulting from the operation of the proposed and alternate wind
107 turbines is 39 hours, 20 minutes. This receptor is a participating receptor. The
108 maximum expected annual flicker at a non-participating receptor in Grant County is
109 23 hours, 32 minutes.

⁴ Proceedings of the Board of Health Special Meeting, UW Extension, Green Bay, Wisconsin, December 15, 2015, available at: http://www.co.brown.wi.us/j_brown/minutes/895edb5ae8ce/boh_minutes_12-15-15_draft_2.pdf.

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Q. Based on the modeling, will the Project comply with the applicable shadow flicker requirements?

A. Per the Roberts County zoning ordinance, shadow flicker is to be modeled from sunrise to sunset over the course of a year at all schools, churches, businesses and occupied dwellings within a one mile radius of each turbine within a project. The analysis may account for topography, but not for obstacles such as accessory structures and trees. Flicker at any specified receptor is not to exceed thirty (30) hours per year, unless a waiver agreement is executed by the landowner. I understand that Grant County recently adopted the same shadow flicker requirements as part of an amendment to its zoning ordinance. See also Supplemental Testimony of Brenna Gunderson.

For both counties, the methodology we employed in conducting modeling for the Project complies with the applicable requirements. The modeling utilized the topography of the area, and evaluated all receptors within 1.25 miles of a wind turbine. The results are conservative in that the surrounding area was assumed to be without vegetation or obstacles (“bare earth”). In Roberts County, shadow flicker at specified receptors does not exceed thirty (30) hours per year. In Grant County, two participating receptors may experience shadow flicker levels above thirty (30) hours per year; however, it is our understanding that Dakota Range III has obtained waiver agreements from these participating landowners. See also the Supplemental Direct Testimony of Brenna Gunderson. Thus, the Project would also comply with the newly adopted shadow flicker requirement in Grant County.

Q. Thirty (30) hours per year (absent a waiver agreement) is the standard set in Roberts and Grant Counties. Is this a common standard in the industry and, if so, why?

A. Typically there are no regulations for shadow flicker. As more areas see wind energy projects, some jurisdictions are trying to implement a guideline or limit on the amount of shadow flicker from wind turbines. The most common limit is 30 hours

141 per year. This number arose from a German court case which deemed 30 hours per
142 year of flicker acceptable.

143

144 **Q. Have you analyzed the potential cumulative shadow flicker impacts on**
145 **receptors in proximity to both the Project and the DR I/II Project?**

146 A. Yes. As discussed above, the closest house to both projects is receptor ID #2243
147 east of the Project's A04 turbine. Shadow flicker levels from the Project are
148 conservatively predicted to be 5 hours 48 minutes at this receptor. This same
149 receptor is also ID #2243 for the DR I/II Project, and has a conservative predicted
150 shadow flicker level of 4 hours 13 minutes from the DR I/II Project. The total shadow
151 flicker level from both projects would be 10 hours 1 minute. This is still well below
152 the newly adopted Grant County shadow flicker limit of 30 hours/year. Cumulative
153 impacts at all other receptors will be even less.

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155 **IV. CONCLUSION**

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157 **Q. Does this conclude your Supplemental Direct Testimony?**

158 A. Yes.

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160 Dated this 4th day of January, 2019.

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165 Robert O'Neal

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