

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

**IN THE MATTER OF THE APPLICATION BY TATANKA RIDGE WIND, LLC, FOR
A PERMIT FOR A WIND ENERGY FACILITY IN DEUEL COUNTY, SOUTH
DAKOTA, FOR TATANKA RIDGE WIND PROJECT**

SD PUC DOCKET EL _____

**PREFILED DIRECT TESTIMONY OF MARK BASTASCH,
JACOBS
ON BEHALF OF TATANKA RIDGE WIND, LLC**

June 17, 2019

TABLE OF CONTENTS

I.	Witness Introduction.....	3
II.	Shadow Flicker	4
III.	Sound	5

1 **I. Witness Introduction**

2 **Please state your name, employer, and business address for the record.**

3 A. Mark Bastasch, Jacobs Engineering Group, Inc., 2020 SW 4th Avenue, Portland, Oregon,
4 97201

5 **Q. Briefly describe your educational background.**

6 A. I received my Bachelor's of Science degree (Cum Laude) in Environmental Engineering
7 from California Polytechnic State University, San Luis Obispo, and my Master's of Science
8 degree in Environmental Engineering from Rice University.

9 **Q. Briefly describe your professional experience.**

10 A. I routinely work with multidisciplinary teams that design, permit, and build infrastructure
11 projects. My wind energy permitting experience dates back to the early 2000s when the first
12 utility-scale wind projects were being developed, including the Stateline Wind Project, which at
13 the time of permitting was among the largest wind projects in world. I am a registered
14 Professional Engineer (P.E.) in the State of Oregon, having passed the Acoustical, Civil, and
15 Environmental exams. Oregon is the only state to offer a P.E. in Acoustics.

16 **Q. Have you attached a resume or CV.**

17 A. Yes, my resume is attached.

18 **Q. Have you previously submitted or prepared testimony in this proceeding in South
19 Dakota?**

20 A. No, I have not.

21 **Q. What is the purpose of your direct testimony?**

22 A. The purpose of my direct testimony is to discuss the modeling the Tatanka Ridge Wind
23 Project (Project) used to predict the duration of shadow flicker as well as the level of sound

24 during Project construction and operation.

25 **Q. Which sections of the application are you responsible for?**

26 A. I am responsible for Section 11.5, Acoustics and Appendix N, Acoustical Analysis, as
27 well as Section 11.6, Shadow Flicker, and Appendix O, Shadow Flicker Modeling.

28 II. Shadow Flicker

29 **What is shadow flicker?**

30 A. When wind turbine blades rotate, the sun can cast moving shadows. These moving
31 shadows are called shadow flicker.

32 **Q. Is shadow flicker regulated at the local level?**

33 A. Yes. Deuel County's Zoning Ordinance Section 1215.03(13)(b) states that the "Limit for
34 allowable shadow flicker at existing residences to no more than 30 hours annually."

35 **Q. Will the project meet Deuel County's shadow flicker ordinance?**

36 A. Yes. The duration of shadow flicker from the Project was predicted using the WindPro
37 software package. The analysis was based on 62 wind turbine locations while only 56 locations
38 will be constructed. The model calculated the annual hours of shadow flicker for the realistic
39 expected case that considers sunshine and wind statistics. The results are presented in Appendix
40 O, Shadow Flicker Modeling, and summarized in Table 11-8. The results demonstrate
41 compliance with the local ordinance.

42 **Q. If necessary, what mitigation measures will the project implement for project area
43 residents?**

44 A. While not expected to be necessary, multiple options are available to Tatanka Ridge
45 Wind, including but not limited to investigating the nature of the concern, potentially providing
46 the affected homeowner with technical and financial assistance to install awnings or window

47 coverings for windows on the sides of their residences that would be exposed to flicker; and
48 providing residents with technical and financial assistance to install trees or shrubs that are
49 strategically located to reduce shadow flickering around their residences. In cases where there is
50 potential for shadow flicker effects to exceed adopted standards and where window coverings
51 and landscape plantings would not be sufficient to reduce the shadow flicker effects to levels that
52 are consistent with the standards, consideration can be given to programming specific turbines to
53 modify their operation during sunny and windy conditions during the days and times turbines
54 would be expected to create higher levels of shadow flicker.

55 **III. Sound**

56 **Is sound regulated at the local level?**

57 A. Yes. Deuel County's Zoning Ordinance Section 1215.03(13)(a) states, "Noise level
58 shall not exceed 45 dBA average A-Weighted Sound pressure at the perimeter of existing
59 residences, for non-participating residences."

60 **Q. Will the project meet Deuel County's noise ordinance?**

61 A. Yes. Acoustical modeling of the Project was conducted and is summarized in Section
62 11.5 and included in Appendix N, Acoustical Analysis, of the application. The acoustical model
63 was developed based on International Organization for Standardization (ISO) Standard 9613-2
64 "Attenuation of Sound during Propagation Outdoors" as implemented in the Cadna/A software.
65 The highest predicted sound level at a nonparticipating parcel is 44 dBA while 49 dBA is
66 predicted at a participating parcel. These results comply with the Deuel County requirements,
67 which establish a limit of 45 dBA at nonparticipant parcels. When less conservative modeling
68 techniques are utilized, 41 dBA is the highest level predicted at a nonparticipant parcel while 47
69 dBA is predicted at a participant parcel.

70 **Q. Are there acoustical emissions from construction?**

71 A. Construction activities do result in the generation of sound or noise. Construction is a
72 dynamic activity that moves from one area to another as construction progresses. The level of
73 sound will depend on the nature of the activities and the distance from which they are observed.
74 Estimated sound levels from construction are presented in Section 11.5 and Appendix N of the
75 application. It is anticipated that noisy construction activities will primarily occur during daytime
76 hours, though some limited critical activities may periodically carry over into the nighttime hours
77 (for example, critical continuous concrete pours or critical lifts that require calm wind
78 conditions).

79 **Q. Will the project undertake efforts to mitigate concerns from construction sound?**

80 A. While sound from construction activities is not regulated, the Project anticipates
81 investigating construction noise complaints and working with the Project construction liaison in
82 the event a specific issue arises.

83 **Q. Are there mitigation measures to implement in either the construction or operation
84 of the project?**

85 A. Tatanka Ridge Wind does not anticipate needing sound mitigation. Tatanka Ridge Wind
86 will require contractors to implement best management practices such as maintaining equipment
87 in good working order in accordance with manufacturer specifications (for example,
88 manufacturers recommend mufflers and silencers are functioning); enforcing speed limits for
89 vehicles and construction equipment traveling within and around the Project area; and working
90 with the Project liaison to address specific concerns that may arise.

91 /s/

92 Dated this 17 day of June 2019.

93 /s/

94 Mark Bastasch