

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

**IN THE MATTER OF THE APPLICATION BY ENGIE NORTH AMERICA, INC. FOR
A PERMIT FOR A WIND ENERGY FACILITY IN HYDE COUNTY, SOUTH
DAKOTA, FOR MERIDIAN WIND PROJECT**

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**PRE-FILED DIRECT TESTIMONY OF TRICIA PELLERIN, SOUND AND ACOUSTICS,
ON BEHALF OF ENGIE NORTH AMERICA, INC.**

April 8, 2020

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

2 A. My name is Tricia Pellerin and I am a Senior Acoustic Engineer with Tetra Tech at 10
3 Post Office Square, 11th Floor, Boston MA, 02109.

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

5 A. I have both Bachelor and Master of Engineering Science degrees from the University of
6 Western Ontario in London, Ontario.

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

8 A. I have approximately 15 years of environmental consulting experience, focusing on
9 acoustic analysis. I have supported the permitting of more than 50 wind energy facilities, both
10 onshore and offshore, in more than 20 states, including South Dakota. My work includes
11 conducting acoustic studies required to adhere to the applicable noise requirements, such as
12 completing baseline sound surveys, acoustic modeling analysis, and post-construction sound
13 surveys.

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

15 A. Yes, my resume is attached.

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

18 A. No, I have not submitted testimony in this proceeding, but I have provided it for the
19 Triple H Wind Project.

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

21 A. My testimony is to discuss the acoustic modeling used to design the project, discuss
22 anticipated impacts on residents in the project area, and discuss mitigation efforts made in
23 design.

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

25 A. 11.3, Acoustics.

26 **Q. Did the project model its expected acoustic impacts and if so, what were the results?**

27 A. A pre-construction wind turbine Acoustic Assessment was conducted for the Project in
28 March 2020 and is included in Appendix D. The pre-construction Acoustic Assessment
29 analyzed the Project implementing the GE 2.72-116 wind turbine model with and without the
30 addition of Low Noise Trailing Edge (LNTE) technology, which modifies the wind turbine
31 blades resulting in reduced sound emissions.

32 The results of the acoustic assessment show that, when using the GE 2.72-116 without
33 LNTE technology, the Project will comply with the Hyde County 45-A-weighted decibel (dBA)
34 limit at all receptors, except for ten participating landowner properties and one non-participating
35 landowner property, which may periodically experience sound levels above the noise threshold
36 criteria. When using the GE 2.72-116 with LNTE technology, the Project will comply with the
37 Hyde County 45-A-weighted dBA limit at all receptors, except for five participating landowner
38 properties, which may periodically experience sound levels above the noise threshold criteria.

39 **Q. What are the Hyde County Ordinances?**

40 A. Hyde County proposed regulations for wind energy facilities under Zoning Ordinance
41 Section 9-104-A-18 limiting sounds levels to 45 dBA at the perimeter of occupied residences
42 existing at the time the permit application unless a signed waiver is obtained from the landowner
43 or the land is leased. The noise level may be exceeded during short-term events such as utility
44 outages or wind storms.

45 Sound levels resulting from the Project at all identified receptors located in the vicinity of
46 the Project were assessed against the 45 dBA limit to determine whether compliance was

47 achieved. The Hyde County Zoning Ordinance noise limit is absolute and independent of the
48 existing acoustic environment; therefore, a baseline sound survey was not required to assess
49 conformity.

50 **Q. Are there acoustical impacts from construction?**

51 A. Potential noise associated with construction and decommissioning of the Project includes
52 site clearing, grading, foundation work and wind turbine generator installation. While most
53 heavy construction work is anticipated to occur during daylight hours, some construction
54 operations may be conducted outside of normal working hours. In these cases, the necessary
55 construction efforts generally require activities that must be completed in their entirety once
56 initiated (i.e., pouring concrete). The list of construction equipment that may be used on the
57 Project and estimates of near and far sound source levels are presented in Table 11-1.

58 **Q. Will the project undertake efforts to mitigate impacts from construction activity?**

59 A. All reasonable efforts will be made to minimize the impact of noise resulting from
60 construction activities. Sounds generated by construction activities are typically exempt from
61 state and local noise oversight if they occur within weekday, daytime periods. All construction
62 and decommissioning related noise producing activities will be undertaken as to comply with
63 applicable permit requirements and applicable ordinances.

64 **Q. What about impacts from operation of the wind farm?**

65 A. When in motion, the wind turbines generate sound primarily from aerodynamic flow
66 across and around the blades. Secondary contributors to turbine noise are associated with the
67 mechanical and electrical equipment within the nacelle including gearboxes, motors, cooling
68 systems and pumps. Sound level is strongly dependent on the speed of the tip of the blade, the
69 design of the blade and on atmospheric conditions such as the degree of turbulence. Blade noise

70 increases with wind speed until full rated electrical power is achieved. However, it is also
71 important to recognize that, as wind speed increases, the ambient sound level will generally
72 increase, which will aid in masking sound produced by wind turbines.

73 **Q. How did you model the project acoustics?**

74 A. Sound propagation modeling was conducted using the CadnaA (Computer-Aided Noise
75 Abatement) program (version 2020 MR1), a comprehensive 3-dimensional acoustic modeling
76 computer simulation software, with calculations made in accordance with the International
77 Organization for Standardization (ISO) Standard 9613-2 “Attenuation of Sound during
78 Propagation Outdoors.” Further information is found in Section 11.3.2.3 of the application.

79 **Q. What were the results?**

80 A. Two sets of results were presented in the pre-construction wind turbine Acoustic
81 Assessment; one set of results corresponds to the Project using the GE 2.72-116 wind turbine
82 model with standard equipment settings. The other set of results corresponds to the Project using
83 the GE 2.72-116 wind turbine model equipped with LNTE technology.

84 When analyzing the Project using the GE 2.72-116 wind turbine with standard equipment
85 settings, the maximum calculated noise level, based on assumptions incorporated into the Cadna-
86 A model and the turbine layout, resulted in a received sound level of 50 dBA at one noise
87 sensitive receptor (NSR) under maximum rotational wind turbine operation during both
88 moderate downwind and anomalous meteorological conditions. Including that NSR, there are a
89 total of eleven NSRs that have the potential to exceed the 45 dBA noise limit threshold as
90 mandated under the Hyde County Zoning Ordinance (Table 5 in Appendix D). Nine NSRs are
91 expected to exceed the 45 dBA noise limit under maximum rotational wind turbine operation
92 during both moderate downwind and anomalous meteorological conditions, while two NSRs are

93 expected to only exceed the limit under anomalous meteorological conditions. Of all eleven
94 NSRs with predicted exceedances, only one involves a landowner not participating in the
95 Project; therefore, just one written waiver is required. All other NSRs were shown to comply
96 with the 45 dBA limit. Lastly, modeling results also showed that all NSRs were anticipated to
97 remain below the 45 dBA limit at cut-in wind speeds.

98 The Project using the GE 2.72-116 wind turbine equipped with LNTE technology, the
99 maximum calculated noise level, based on assumptions incorporated into the Cadna-A model
100 and the turbine layout, resulted in a received sound level of 48 dBA at one NSR under
101 maximum rotational wind turbine operation during both moderate downwind and anomalous
102 meteorological conditions. Including that NSR, there are a total of five NSRs that have the
103 potential to exceed the 45 dBA noise limit threshold as mandated under the Hyde County Zoning
104 Ordinance (Table 5 in Appendix D). Four NSRs are expected to exceed the 45 dBA noise limit
105 under maximum rotational wind turbine operation during both moderate downwind and
106 anomalous meteorological conditions, while one NSR is expected to only exceed the limit under
107 anomalous meteorological conditions. As all five NSRs involve landowners participating in the
108 project, no written waivers are required. All other NSRs were shown to comply with the 45 dBA
109 limit. Lastly, modeling results also showed that all NSRs were anticipated to remain below the
110 45 dBA limit at cut-in wind speeds.

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

113 A. Meridian Wind does not anticipate that noise mitigation will be necessary. [We will be
114 using the low noise trailing edge option that GE offers. I would state that here] However,
115 Meridian will establish a process for documenting, investigating and resolving Project-related

116 noise complaints. With respect to the short-term construction-related noise, mitigation measures
117 will include maintaining all equipment in good working order in accordance with manufacturer
118 specifications (e.g., suitable mufflers and/or air-inlet silencers should be installed on all internal
119 combustion engines and certain compressor components); and enforcing speed limits for all
120 vehicles and construction equipment traveling within and around the Project Area.

121

122

123 Dated this 8th day of April, 2020.

124 */s/ Tricia Pellerin*

125 Tricia Pellerin, Acoustics – Tetra Tech