SD WIND ENERGY

23rd January 2024

FAO: Carol Anderton

Sea End
Benington
Boston
PE22 0DN

Noise Assessment

The Noise assessment carried out in this report follows the guidance set out in the Microgeneration Installation Standard: MIS 3003. This standard identifies the evaluation and assessment practices to be undertaken for the supply, design, installation, set to work, commissioning and handover of micro and small wind turbine systems to customers. The MIS 3003 standard is widely considered best practice when evaluating the viability and suitability of small wind turbine installations. The methodologies set out the industry standard and should be considered a reliable guide for evaluating Noise for proposed small wind turbine installations.

The slant distance (the straight line distance between the turbine rotor and neighbouring properties at ground level) at the site is IRO 20-50m. As such, both 20m and 50m slant distances have been considered in this report.

This report calculates a site specific noise assessment for an SD3 small wind turbine, at a 15m hub height. The SD3 has a rotor diameter of 3.9m, and blade area of 11.9m2 with a rated power of 3kW. At 0m, the power level, L_{Wd}, of the SD3 is 105.2 dB(A) re 10^{-12} W.

IEC 61400-11:2012 NOISE EMISSION LEVELS												
Wind Speed (m/s) at Wind Turbine Hub Height	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
Apparent Sound Power Level, L_{WA}, dB(A) re 10^{-12}W	79.9	82.8	84.2	84.6	85.8	87.4	90.1	93.6	96.4	99.4	101.7	103.7
Combined Uncertainty, U_c, dB	0.93	0.63	0.58	0.66	0.68	0.65	0.70	0.75	0.80	0.68	0.74	0.93
Declared Sound Power Level, L_{Wd}, dB(A) re 10^{-12}W	**81.4**	**83.8**	**85.2**	**85.7**	**86.9**	**88.4**	**91.2**	**94.8**	**97.8**	**100.5**	**102.9**	**105.2**

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1.0 Acoustic Estimate

The Acoustic Estimate for the proposed wind turbine was conducted following the methodology set out in section 4.3.2 of the MIS 3003 standard. The Annual Energy Performance calculation is used to derive the acoustic estimate and is detailed in the Desktop Survey appended (Appendix 1). Wind Speed data was accessed via NASA wind databases, using the longitude and latitude coordinates of the proposed turbine location.

The energy performance estimate is generated via a standardised method using publicly available wind resource data and SD Wind Energy turbine Energy Performance data. They are given as guidance only and should not be considered to be a guarantee. The energy performance of wind turbine systems is impossible to predict with a high degree of certainty due to the variability in wind from year to year. For the purposes of the Noise Assessment calculation however, this should be considered a reliable estimate given the ratified methodology and historic wind data.

1.1 Acoustic Estimate Calculation

The Vavg,10 at 10m hub height for the SD3 Wind Turbine is calculated to be:

5.3 m/s

The Vavg,10 at 15m hub height for the SD3 Wind Turbine is calculated to be:

5.7 m/s

At a Slant Distance of 20m, this would correspond to:

45-50 dB(A)

At a Slant Distance of 50m, this would correspond to:

35-40 dB(A)

The Vavg,10 wind speed value is then plotted on the Emission Noise Map in the BWEA Noise Label (per BWEA Small Wind Turbine Safety and Performance Standard). The distance for the acoustic dB(A) values or interest has been recorded at between 20m and 50m per discussions with the

property owner. The Estimated Acoustic Noise Level is plotted in the Noise Map appended (Appendix 2).

The acoustic estimate calculated is given as a guide and is calculated using the average annual wind speeds. The acoustic level of the turbine will differ as the wind speed varies. Due to the absence of a generator, the only audible noise from the SD3 turbine is the blades cutting through the air. At times of higher winds, the noise of the turbine blades turning is obscured by the environmental noise of high winds. Noise data in the BWEA Noise Map was taken at a location with little or no audible background noise. In a residential setting, there will be noise pollution associated with daily life which will obscure the noise of the SD3 turbine blades cutting through the air.

3.0 Summary

To summarise, SD Wind Energy have calculated site specific noise assessment for the proposed SD3 wind turbine at Sea End, Benington, Boston, PE22 0DN for Carol Anderton. The acoustic estimate calculation states that at the average wind speeds the noise falls within acceptable levels. At the estimated maximum, $V_{avg,10}$ Wind Speeds the wind itself will mask the majority of noise emissions from the turbine.

Kind Regards,

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Appendix 1 – Annual Energy Performance Estimate

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Power for the Planet

Wind Survey - Carol Anderton, Sea End, Benington, Boston, PE22 0DN

(52.990852, 0.096924)

Wind speed at 10m Hub height = **5.3 m/s** Correction Factor = **1.08**
(No obstructions) *(To 15m Tower with Category 2 obstructions)*
Wind speed with Correction Factor = **5.7 m/s**

Your highest wind month is: **February**
Your lowest wind month is: **July**

SD12 Annual Yield up to **31,177 kWh**
SD6 Annual Yield up to **12,402 kWh**
SD3 Annual Yield up to **7,543 kWh**

Category	Definition	Correction Factor at Hub Height			
		6m	9m	15m	20m
Category 1	Flat grassland, parkland, or bare soil, without hedges and only a few isolated obstructions.	1.03	1.09	1.18	1.23
Category 2	Gently undulating countryside, fields and crops, fences or low boundary hedges and few trees.	0.91	0.99	1.08	1.13
Category 3	Farmland with high boundary hedges, occasional small farm structures, houses, and trees etc.	0.77	0.84	0.94	1.00
Category 4	Woodland or low ride urban/suburban areas (e.g., Domestic housing) with a plan area density of up to about 20%.	0.61	0.69	0.80	0.86
Category 5	Dense urban areas and city centres (e.g., buildings of four-stories or higher) with a plan area density of greater than about 20%.	0.44	0.53	0.65	0.71

Location: Latitude 52.9909 Longitude 0.0969
Elevation from MERRA-2: Average for 0.5 x 0.625 degree lat/lon region = 13.83 meters
The value for missing source data that cannot be computed or is outside of the sources availability range: -999
Parameter(s):
WS10M MERRA-2 Wind Speed at 10 Meters (m/s)
-END HEADER-

PARAMETE	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	
WS10M	2015	6.99	5.66	6.2	4.47	5.59	4.85	4.66	4.84	4.41	4.58	6.97	7.84	5.59	
WS10M	2016	6.58	6.48	5.24	4.86	4.98	3.62	4.38	4.95	4.96	4.68	5.23	4.84	5.06	
WS10M	2017	4.88	6.12	5.59	4.75	4.84	5.38	4.66	4.62	5.22	6.51	5.77	6.09	5.37	
WS10M	2018	6.66	5.8	5.8	5.38	4.53	3.8	3.66	4.19	5.36	5.68	5.91	5.38	5.17	
WS10M	2019	5.41	5.59	6.7	4.9	3.97	4.82	4.13	5.41	5.15	5.47	4.96	6.07	5.21	
WS10M	2020	6.19	8.87	6.38	4.65	4.52	5.02	4.97	5.61	5.31	5.93	5.79	5.52	5.72	
WS10M	2021	5.55	6.27	5.58	4.29	4.96	3.94	3.68	4.71	4.4	6.07	5.56	5.45	5.03	
WS10M	2022	5.37	8.26	4.88	5.3	4.39	4.29	4.2	3.91	4.37	5.65	5.53	5.24	5.09	
		5.95	6.63	5.80	4.83	4.72	4.47	4.29	4.78	4.90	5.57	5.72	5.80	**5.28**	

The energy performance estimate is generated via a standardised method using publicly available wind resource data and SD Wind Energy turbine Energy Performance data. They are given as guidance only and should not be considered to be a guarantee. Energy performance of wind turbine systems is impossibe to predict with a high degree of certainty due to the variability in wind from year to year.

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Appendix 2 – SD3 Estimated Acoustic Noise Map for Sea End, Benington, Boston, PE22 0DN