

Our ref: NIA/6305/15/6092/v1/Westfield Farm

28th September 2015

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Dear Sirs

**NOISE ASSESSMENT FOR PROPOSED ENDURANCE E-3120 (50 KW) WIND TURBINE,
LAND AT WESTFIELD FARM, ROYD MOOR ROAD, THURLSTONE, SHEFFIELD, S36 7RD**

1.00 INTRODUCTION

- 1.01 Environmental Noise Solutions Limited (ENS) has been commissioned to undertake a noise assessment for an Endurance E-3120 50 kW wind turbine on a 24.6 metre tower on land at Westfield Farm, Royd Moor Road, Thurlstone, Sheffield, S36 7RD.
- 1.02 This report has been prepared for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult ENS as to the extent to which the findings may be appropriate for their use.

2.00 ETSU-R-97

- 2.01 Principles and guidelines for the environmental assessment of wind turbine related noise are given in the report entitled ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms', based on the findings of the Working Group on Noise from Wind Turbines.
- 2.02 ETSU-R-97 recommends the imposition of noise limits set relative to the existing background noise (except in low noise environments, where lower absolute noise limits apply) at the nearest noise sensitive receptors, taking into consideration the variation in both turbine source noise and background noise with wind speed.

Table 2.1 – ETSU-R-97 Noise Limits for Wind Turbine Related Noise

Period	Lower Absolute Noise Limit	Relative Noise Limit
Daytime (07:00–23:00)	35–40 dB L _{A90}	5 dB(A) above background noise
Night time (23:00–07:00)	43 dB L _{A90}	5 dB(A) above background noise

Note: At low wind speeds (where background noise is expected to be quieter), the lower absolute noise limits apply, until the background noise has risen to within 5 dB of this level (as wind speed increases) wherein the relative noise limits come into force.

- 2.03 ETSU-R-97 recommends a simplified assessment method for situations where it can be demonstrated that noise limits will be met until quite high wind speeds even if there is no increase in the background noise levels. It is considered that if noise immissions from the wind turbine are limited to 35 dB L_{A90} up to a wind speed of 10 metres per second (at 10 metres height), then this condition alone is deemed sufficient to provide an adequate level of protection against noise. It is considered that this type of condition may be suitable for single wind turbine developments (as is the case here).
- 2.04 ETSU-R-97 also recommends that for financially involved properties, relatively higher noise limits may be appropriate. It is recommended that both the daytime and night time lower fixed limits may be relaxed to 45 dB(A) and that consideration should also be given to increasing the permissible margin above background noise levels (at higher wind speeds).

3.00 PROPOSED DEVELOPMENT

- 3.01 The proposed development consists of the erection of an Endurance E-3120 50 kW wind turbine on a 24.6 metre tower on land at Westfield Farm, Royd Moor Road, Thurlstone, Sheffield, S36 7RD.
- 3.02 The proposed wind turbine is to be located at grid reference **E422650 N403855**. The nearest noise sensitive receptors are:
- NSR1 Westfield Farm (financially involved) located circa 335 metres to the east
 - NSR2 Westfield Avenue (non-associated) located circa 365 metres to the east south east



- 3.03 The noise emission data for an Endurance E-3120 50 kW wind turbine has been provided by the manufacturer of the wind turbine in the form of Hayes McKenzie report HM2300/R1 (an extract is reproduced in Appendix 1 for reference). The noise emission data illustrates that the apparent sound power level (L_{WA}) of the wind turbine is 94.3 dB(A) under a wind speed of 10 metres per second at a reference height of 10 metres. The noise emissions associated with the turbine are not tonal.
- 3.04 The information reported herein has been based on the wind turbine manufacturer's noise emission data and has been accepted in good faith as being accurate and valid.

4.00 PREDICTED NOISE EMISSIONS

- 4.01 Of particular importance is the way noise propagation from wind turbines is modelled since this is not covered by the ETSU-R-97 guidance which only deals with assessment of any such predicted noise levels. This issue is covered by the Institute of Acoustics 'Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' (IOAGPG) published on 20th May 2013.
- 4.02 In accordance with the methodology set out in the IOAGPG, the following inputs have been adopted in the ISO 9613-2 model:
- Sound power level of 94.3 dB L_{WA} at 10m/s wind speed at a reference height of 10m
 - 2 dB uncertainty allowance
 - Intervening semi porous ground ($G = 0.5$)
 - 4 metre receptor height
 - Atmospheric conditions of 10°C and 70 percent relative humidity
 - – 2 dB correction from L_{Aeq} to L_{A90}

- 4.03 The predicted wind turbine noise emission levels at the nearest noise sensitive receptors are set out in the following table (rounded to the nearest decibel).

Table 4.1 – Predicted Wind Turbine Noise Emission Levels (dB L_{A90})

Wind Speed 10m Height	IOA GPG Modelled Level (including uncertainty)	NSR1 (FI) Westfield Farm	NSR2 (Non-FI) Westfield Avenue
10	96.3 dB L_{WA}	32 dB L_{A90}	31 dB L_{A90}
ETSU-R-97 Lower Absolute Limits		45 dB L_{A90}	35–40 dB L_{A90} daytime 43 dB L_{A90} night time

- 4.04 It is evident that noise emissions do not exceed 45 dB L_{A90} at a wind speed of 10m/s at 10m height at the nearest financially involved receptors. In accordance with the simplified '45 dB rule' for financially involved receptors set out in ETSU-R-97, this condition alone is deemed satisfactory with respect to noise.
- 4.05 It is evident that noise emissions do not exceed 35 dB L_{A90} at a wind speed of 10 m/s at 10m height at the nearest non-associated noise sensitive receptors. In accordance with the simplified '35 dB rule' for non-associated noise sensitive receptors set out in ETSU-R-97, this condition alone is deemed satisfactory with respect to noise.
- 4.06 It is therefore concluded that the noise emissions associated with the proposed Endurance E-3120 (50 kW) wind turbine at Westfield Farm, Royd Moor Road, Thurlstone, Sheffield, S36 7RD should not cause any unacceptable loss of amenity to the occupants of any of the nearby noise sensitive receptors.

I trust the foregoing is to your satisfaction. If you have any queries please do not hesitate to contact me.

Yours sincerely,

Jonathan Rigg
Environmental Noise Solutions Limited
MIOA, Diploma in Acoustics & Noise Control, MEng (Hons)

cc File

APPENDIX 1
ENDURANCE E-3120 (50 kW)
NOISE EMISSION DATA

Table 5 - Calculation of Sound Power Level using 4th Order Regression Line

10m-height wind speed (m/s)	3	4	5	6	7	8	9	10	11	12
Total Measured Operational Noise Levels (dB L_{Aeq})	49.8	50.1	50.3	50.8	51.8	53.4	55.4	57.3	58.6	58.6
Background Noise Level (dB L_{Aeq})	35.9	35.8	36.6	38.2	40.3	42.9	45.8	48.6	51.4	53.8
Difference Between Total and Background Noise (dB)	13.9	14.3	13.7	12.6	11.5	10.5	9.6	8.7	7.3	4.8
Background Corrected Sound Pressure Level, L_{Aeq,c,k} (dB L_{Aeq})	49.6	49.9	50.1	50.5	51.5	53.0	54.9	56.7	57.7	57.3
Secondary Wind Shield Correction	0.4	0.3	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.5
Apparent Sound Power Level, L_{WA,k} (dB L_{WA})	87.1	87.3	87.6	88.1	89.0	90.6	92.4	94.3	95.4	94.9*

Client:
Endurance Wind Power, Inc.

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Issued by:
Hayes McKenzie Partnership Ltd