Our ref: NIA/5910/15/5627/v1/Mossley House Farm

2nd April 2015

Mr Charles Ashton
DC21 Limited
Dene House
North Road
Kirkburton
Huddersfield
HD8 0RW

Dear Sirs,

NOISE ASSESSMENT FOR PROPOSED ENDURANCE E-4660 (85 KW) WIND TURBINE MOSSLEY HOUSE FARM, MOSSLEY ROAD, PENISTONE, SHEFFIELD, S36 9FH

1.00 INTRODUCTION

1.01 Environmental Noise Solutions Limited (ENS) has been commissioned to undertake a noise assessment for a proposed Endurance E-4660 (85 kW) wind turbine at land at Mossley House Farm, Mossley Road, Penistone, Sheffield, S36 9FH.

1.02 This report has been prepared for DC21 Limited 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 and DC21 Limited 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 Limit dB L_{A90}	Relative Limit dB L_{A90}
Daytime (07:00–23:00)	35 – 40	5 dB(A) above background noise
Night time (23:00–07:00)	43	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 emissions 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).

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3.00 PROPOSED DEVELOPMENT

3.01 The proposed development consists of the erection of an Endurance E-4660 (85 kW) wind turbine at Mossley House Farm, Mossley Road, Penistone, Sheffield, S36 9FH. The proposed wind turbine has a 24.8 metre hub height, 23.5 metre rotor diameter and a 36.6 metre tip height.

3.02 The proposed wind turbine is to be located at grid reference **E424268 N400840**. The nearest noise sensitive receptors are understood to be:

- NSR1 Mossley House Farm (financially involved) located circa 117 metres to the north of the proposed wind turbine
- NSR2 Judd Field House (non-associated) located circa 385 metres to the south west of the proposed wind turbine



3.03 The noise emission data for an Endurance E-4660 (85 kW) wind turbine has been provided by the manufacturer.

3.04 The noise emission data illustrates that the apparent sound power level (L_{WA}) of the wind turbine varies from 86.1 dB(A) at 4 metres per second wind speed at 10 metres height to 89.3 dB(A) at 10 metres per second wind speed at 10 metres height. Measurement uncertainty is 0.9 dB(A). The noise emissions associated with the turbine are not tonal.

3.05 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.

3.06 An extract of the Endurance E-4660 Noise Performance Assessment is contained in Appendix 1 for reference.

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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 data has been modelled:

- The adoption of 89.3 dB L_{WA} sound power level for the Endurance E-4660 (85 kW) wind turbine at a 10 metres per second wind speed at 10 metres height
- The addition of a further 1.5 decibels uncertainty (0.9 dB x 1.645)
- Intervening semi-porous ground (G=0.5)
- 4 metre receptor height
- 70 percent relative humidity
- 10 degrees Celsius temperature

4.03 The noise emissions associated with the proposed Endurance E-4660 (85 kW) wind turbine (rounded to the nearest decibel) at the nearest noise sensitive receptors are set out in the following table.

Table 4.1 – Predicted Noise Emission Levels

Wind Speed 10m height	Modelled Sound Power Level	NSR1 (FI) MOSSLEY HOUSE FARM	NSR2 (NON-FI) JUDD FIELD HOUSE
4 m/s	87.6 dB L_{WA} (86.1 dB L_{WA} + 1.5 dB)	34 dB L_{A90}	23 dB L_{A90}
5 m/s	88.1 dB L_{WA} (86.6 dB L_{WA} + 1.5 dB)	34 dB L_{A90}	23 dB L_{A90}
6 m/s	88.5 dB L_{WA} (87.0 dB L_{WA} + 1.5 dB)	35 dB L_{A90}	24 dB L_{A90}
7 m/s	88.7 dB L_{WA} (87.2 dB L_{WA} + 1.5 dB)	35 dB L_{A90}	24 dB L_{A90}
8 m/s	89.4 dB L_{WA} (87.9 dB L_{WA} + 1.5 dB)	36 dB L_{A90}	25 dB L_{A90}
9 m/s	90.6 dB L_{WA} (89.1 dB L_{WA} + 1.5 dB)	37 dB L_{A90}	26 dB L_{A90}
10 m/s	90.8 dB L_{WA} (89.3 dB L_{WA} + 1.5 dB)	37 dB L_{A90}	26 dB L_{A90}
ETSU-R-97 Lower Absolute Fixed Limits		**45 dB L_{A90}**	**35–40 dB L_{A90} daytime 43 dB L_{A90} night time**

4.04 The noise emissions at the nearest financially involved noise sensitive receptor associated with the proposed Endurance E-4660 (85 kW) wind turbine do not exceed 45 dB L_{A90} at a wind speed of 10 metres per second at 10 metres height. In accordance with the simplified '45 dB rule' set out in ETSU-R-97, this condition alone is deemed satisfactory with respect to noise.

4.05 The noise emissions at the nearest non-associated noise sensitive receptor associated with the proposed Endurance E-4660 (85 kW) wind turbine do not exceed 35 dB L_{A90} at a wind speed of 10 metres per second at 10 metres height. In accordance with the simplified '35 dB rule' set out in ETSU-R-97, this condition alone is deemed satisfactory with respect to noise.

4.06 In conclusion, the noise emissions associated with the proposed Endurance E-4660 (85 kW) wind turbine should not cause any unacceptable loss of amenity to the occupants of the nearest noise sensitive receptors.

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

Yours sincerely,



Daniel Bailey
Environmental Noise Solutions Limited
MIOA, Diploma Acoustics & Noise Control, BSc (Hons)

cc File

APPENDIX 1
ENDURANCE 4660 (85 kW) WIND TURBINE
NOISE EMISSION DATA

Table 5.2
Calculation of 10m Reference Height Apparent Emission Sound Power Levels, dB(A)

Wind Speed, m/s, at 10m Reference Height	4	5	6	7	8	9	10	11
Apparent Sound Power Level, dB(A) L_{WA}	86.1	86.6	87.0	87.2	87.9	89.1	89.3	90.7

Table 5.4
Combined Uncertainty (U_{com}) Uncertainty of Apparent Emission Sound Power Levels, dB

Wind Speed, m/s, at Hub Height	4	5	6	7	8	9	10	11	12
Apparent Sound Power Level Uncertainty, dB	0.7	0.8	0.7	0.7	0.8	0.8	0.9	0.9	0.7