



**Project:**  
Springbrook Wind Turbine

**Description:**  
This analysis has been based on background noise levels. More information on this report can be found in the specialist chapter of the Environmental Report.

**Printed/Page:**  
13/08/2013 13:07 / 1

**Licensed user:**  
**The Energy Workshop Limited**  
The Media Centre, 7 Northumberland Road, Huddersfield  
GB-WEST YORKSHIRE, HD1 1RL  
+441484 483108  
Matt Morgan / matt@theenergyworkshop.co.uk  
**Calculated:**  
13/08/2013 12:31/2.7.490

## DECIBEL - Main Result

**Calculation:** Enercon EWT Full Power - Warranted

### Noise propagation model:

ISO 9613-2 United Kingdom

### Wind speed:

4.0 m/s - 12.0 m/s, step 1.0 m/s

### Ground attenuation:

General, Ground factor: 0.5

### Type of demand in calculation:

WTG noise is compared to ambient noise plus 5dB margin with the option of a floor setting (e.g. 35dB)

### Noise values in calculation:

All noise values are 90% exceedence values (L90) designed to show compliance with ETSU-R-97 limits

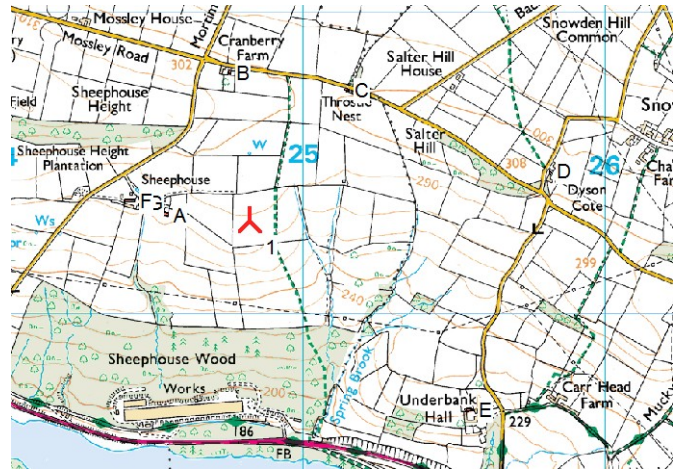
### Pure tones:

Pure and Impulse tone penalty are added to WTG source noise

### Calculation height above ground level:

4.0 m

### Octave band data required



New WTG

Noise sensitive area

## WTGs

BN (AIRY) (Normal)	BN (AIRY) (Normal)			Row data/Description	WTG type			Power, rated	Rotor diameter	Hub height	Noise data						
	East	North	Z		Valid	Manufact.	Type-generator				Creator	Name	First wind speed	Last wind speed	Pure tones	Octave data	
1	424,822	400,309	288.1	EWT DW54 900 54.0 IOI hub: 50.0 m... Yes EWT	Valid	Manufact.	DW54-900	[kW]	[m]	[m]	EMD	Level 0 - Guaranteed - DW52/DW54*900 - 07-2011	4.0	96.4	12.0	102.0	0 dB Generic *

\*Notice: One or more noise data for this WTG is generic or input by user

## Calculation Results

### Sound Level

Noise sensitive area No.	Name	BN (AIRY) (Normal)			Imission height	Demands	Sound Level			Demands fulfilled ?
		East	North	Z			Max Noise demand	Max From WTGs	Max exceedence	
				[m]	[m]	[dB(A)]	[dB(A)]	[dB(A)]		
A	Sheephouse Farm	424,553	400,336	280.9	4.0	56.3	40.4	0.0	Yes	
B	Cranberry	424,760	400,795	302.7	4.0	51.0	34.8	0.0	Yes	
C	Throstle Nest	425,136	400,742	299.0	4.0	53.6	33.9	0.0	Yes	
D	Dyson Cote 2	425,815	400,463	301.4	4.0	47.7	27.3	0.0	Yes	
E	Underbank	425,536	399,684	229.6	4.0	53.6	27.8	0.0	Yes	
F	Sheephouse C & D	424,441	400,371	281.9	4.0	56.3	37.1	0.0	Yes	
G	Sheephouse B	424,466	400,359	281.1	4.0	56.3	37.7	0.0	Yes	

### Distances (m)

WTG	
NSA	1
A	270
B	490
C	535
D	1005
E	949
F	386
G	360



Project:  
**Springbrook Wind Turbine**

Description:  
This analysis has been based on background noise levels. More information on this report can be found in the specialist chapter of the Environmental Report.

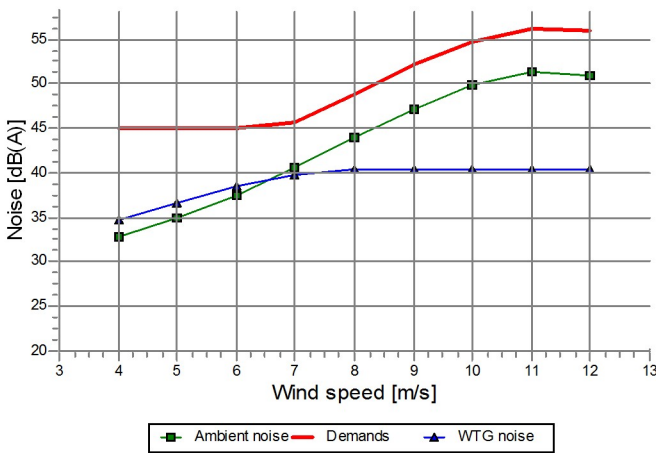
Printed/Page  
13/08/2013 13:07 / 2

Licensed user:  
**The Energy Workshop Limited**  
The Media Centre, 7 Northumberland Road, Huddersfield  
GB-WEST YORKSHIRE, HD1 1RL  
+441484 483108  
Matt Morgan / matt@theenergyworkshop.co.uk  
Calculated:  
13/08/2013 12:31/2.7.490

**DECIBEL - Detailed results**

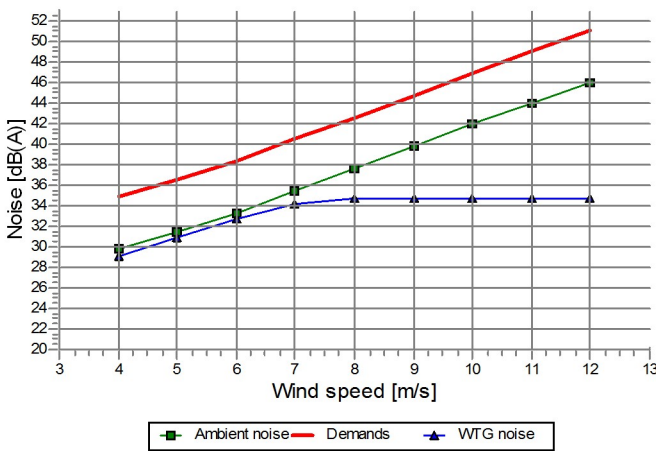
**Calculation: Enercon EWT Full Power - Warranted Noise calculation model: ISO 9613-2 United Kingdom**

**Sheephouse Farm (A)**



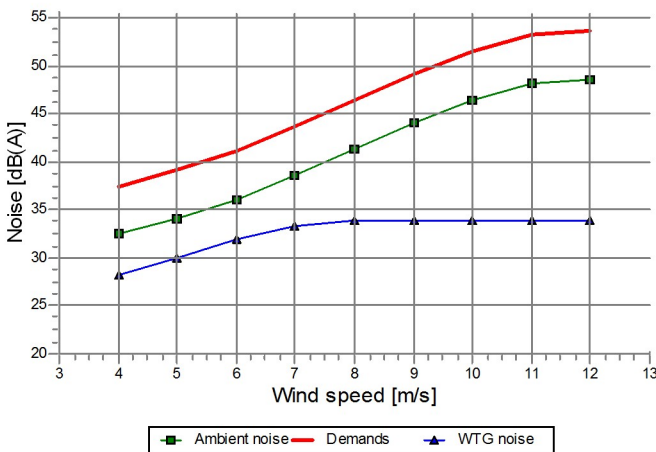
Wind speed [m/s]	Ambient noise [dB(A)]	Demands		Sound Level		Demands fulfilled ?
		Margin [dB(A)]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?	
4.0	32.9	5.0	45.0	34.8	Yes	
5.0	34.9	5.0	45.0	36.6	Yes	
6.0	37.5	5.0	45.0	38.4	Yes	
7.0	40.6	5.0	45.6	39.8	Yes	
8.0	43.9	5.0	48.9	40.4	Yes	
9.0	47.1	5.0	52.1	40.4	Yes	
10.0	49.8	5.0	54.8	40.4	Yes	
11.0	51.3	5.0	56.3	40.4	Yes	
12.0	50.9	5.0	55.9	40.4	Yes	

**Cranberry (B)**



Wind speed [m/s]	Ambient noise [dB(A)]	Demands		Sound Level		Demands fulfilled ?
		Margin [dB(A)]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?	
4.0	29.8	5.0	34.8	29.2	Yes	
5.0	31.5	5.0	36.5	31.0	Yes	
6.0	33.3	5.0	38.3	32.8	Yes	
7.0	35.4	5.0	40.4	34.2	Yes	
8.0	37.5	5.0	42.5	34.8	Yes	
9.0	39.7	5.0	44.7	34.8	Yes	
10.0	41.9	5.0	46.9	34.8	Yes	
11.0	44.0	5.0	49.0	34.8	Yes	
12.0	46.0	5.0	51.0	34.8	Yes	

**Throstle Nest (C)**



Wind speed [m/s]	Ambient noise [dB(A)]	Demands		Sound Level		Demands fulfilled ?
		Margin [dB(A)]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?	
4.0	32.5	5.0	37.5	28.3	Yes	
5.0	34.1	5.0	39.1	30.1	Yes	
6.0	36.1	5.0	41.1	31.9	Yes	
7.0	38.6	5.0	43.6	33.3	Yes	
8.0	41.4	5.0	46.4	33.9	Yes	
9.0	44.1	5.0	49.1	33.9	Yes	
10.0	46.5	5.0	51.5	33.9	Yes	
11.0	48.2	5.0	53.2	33.9	Yes	
12.0	48.6	5.0	53.6	33.9	Yes	



**Project:**  
Springbrook Wind Turbine

**Description:**  
This analysis has been based on background noise levels. More information on this report can be found in the specialist chapter of the Environmental Report.

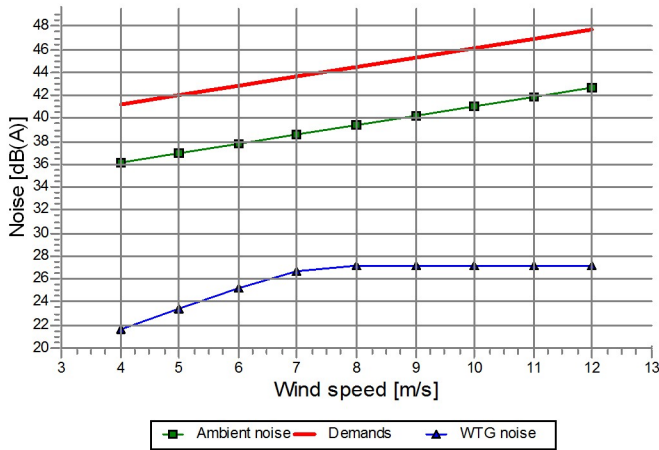
**Printed/Page:**  
13/08/2013 13:07 / 3

**Licensed user:**  
**The Energy Workshop Limited**  
The Media Centre, 7 Northumberland Road, Huddersfield  
GB-WEST YORKSHIRE, HD1 1RL  
+441484 483108  
Matt Morgan / matt@theenergyworkshop.co.uk  
**Calculated:**  
13/08/2013 12:31/2.7.490

**DECIBEL - Detailed results**

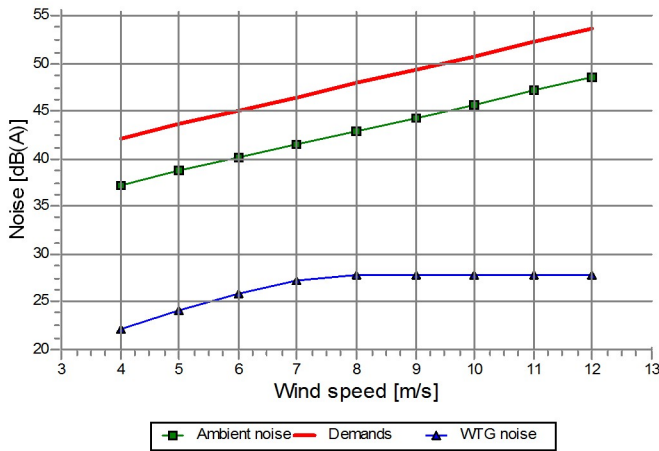
**Calculation:** Enercon EWT Full Power - Warranted Noise calculation model: ISO 9613-2 United Kingdom

**Dyson Cote 2 (D)**



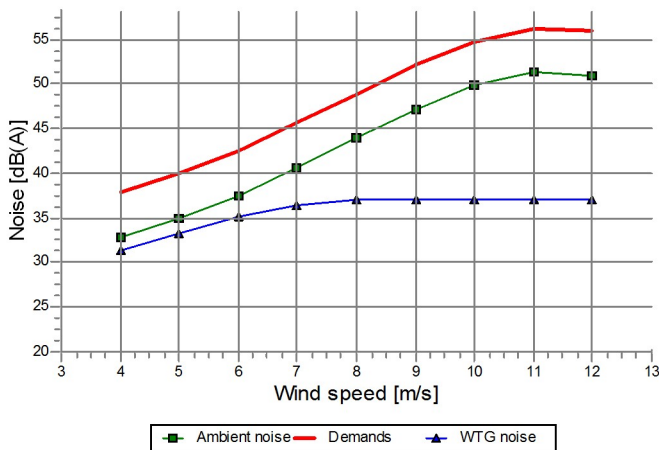
Wind speed [m/s]	Ambient noise [dB(A)]	Demands		Sound Level		Demands fulfilled ?
		Margin [dB(A)]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?	
4.0	36.2	5.0	41.2	21.7	Yes	
5.0	37.0	5.0	42.0	23.5	Yes	
6.0	37.8	5.0	42.8	25.3	Yes	
7.0	38.6	5.0	43.6	26.7	Yes	
8.0	39.4	5.0	44.4	27.3	Yes	
9.0	40.3	5.0	45.3	27.3	Yes	
10.0	41.1	5.0	46.1	27.3	Yes	
11.0	41.9	5.0	46.9	27.3	Yes	
12.0	42.7	5.0	47.7	27.3	Yes	

**Underbank (E)**



Wind speed [m/s]	Ambient noise [dB(A)]	Demands		Sound Level		Demands fulfilled ?
		Margin [dB(A)]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?	
4.0	37.2	5.0	42.2	22.2	Yes	
5.0	38.7	5.0	43.7	24.0	Yes	
6.0	40.1	5.0	45.1	25.8	Yes	
7.0	41.5	5.0	46.5	27.2	Yes	
8.0	42.9	5.0	47.9	27.8	Yes	
9.0	44.3	5.0	49.3	27.8	Yes	
10.0	45.7	5.0	50.7	27.8	Yes	
11.0	47.2	5.0	52.2	27.8	Yes	
12.0	48.6	5.0	53.6	27.8	Yes	

**Sheephouse C & D (F)**



Wind speed [m/s]	Ambient noise [dB(A)]	Demands		Sound Level		Demands fulfilled ?
		Margin [dB(A)]	Demands [dB(A)]	WTG noise [dB(A)]	Demands fulfilled ?	
4.0	32.9	5.0	37.9	31.5	Yes	
5.0	34.9	5.0	39.9	33.3	Yes	
6.0	37.5	5.0	42.5	35.1	Yes	
7.0	40.6	5.0	45.6	36.5	Yes	
8.0	43.9	5.0	48.9	37.1	Yes	
9.0	47.1	5.0	52.1	37.1	Yes	
10.0	49.8	5.0	54.8	37.1	Yes	
11.0	51.3	5.0	56.3	37.1	Yes	
12.0	50.9	5.0	55.9	37.1	Yes	

Project:  
**Springbrook Wind Turbine**

Description:  
This analysis has been based on background noise levels. More information on this report can be found in the specialist chapter of the Environmental Report.

Printed/Page  
13/08/2013 13:07 / 4

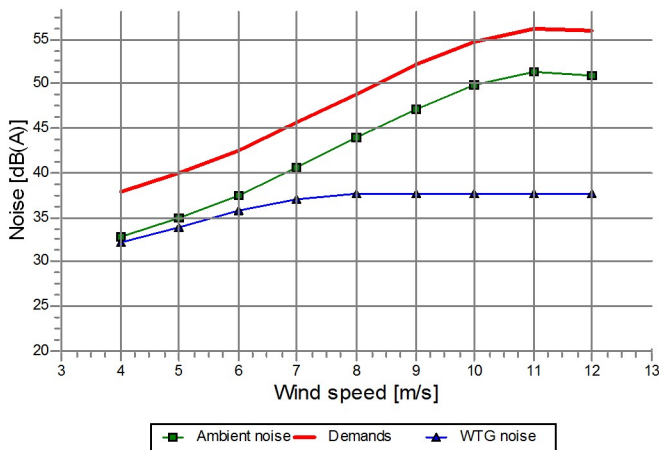
Licensed user:  
**The Energy Workshop Limited**  
The Media Centre, 7 Northumberland Road, Huddersfield  
GB-WEST YORKSHIRE, HD1 1RL  
+441484 483108  
Matt Morgan / matt@theenergyworkshop.co.uk  
Calculated:  
13/08/2013 12:31/2.7.490



## DECIBEL - Detailed results

Calculation: Enercon EWT Full Power - Warranted Noise calculation model: ISO 9613-2 United Kingdom

Sheephouse B (G)



Wind speed [m/s]	Ambient noise [dB(A)]	Demands		Sound Level		Demands fulfilled ?
		Margin [dB(A)]	Demands [dB(A)]	WTG noise [dB(A)]	WTG noise [dB(A)]	
4.0	32.9	5.0	37.9	32.1	Yes	
5.0	34.9	5.0	39.9	33.9	Yes	
6.0	37.5	5.0	42.5	35.7	Yes	
7.0	40.6	5.0	45.6	37.1	Yes	
8.0	43.9	5.0	48.9	37.7	Yes	
9.0	47.1	5.0	52.1	37.7	Yes	
10.0	49.8	5.0	54.8	37.7	Yes	
11.0	51.3	5.0	56.3	37.7	Yes	
12.0	50.9	5.0	55.9	37.7	Yes	

**Project:**  
Springbrook Wind Turbine

**Description:**  
This analysis has been based on background noise levels. More information on this report can be found in the specialist chapter of the Environmental Report.

**Printed/Page:**  
13/08/2013 13:07 / 5  
**Licensed user:**  
**The Energy Workshop Limited**  
The Media Centre, 7 Northumberland Road, Huddersfield  
GB-WEST YORKSHIRE, HD1 1RL  
+441484 483108  
Matt Morgan / matt@theenergyworkshop.co.uk  
**Calculated:**  
13/08/2013 12:31/2.7.490



**DECIBEL - Assumptions for noise calculation**

**Calculation:** Enercon EWT Full Power - Warranted **Noise calculation model:** ISO 9613-2 United Kingdom

**Noise calculation model:**  
ISO 9613-2 United Kingdom

**Wind speed:**  
4.0 m/s - 12.0 m/s, step 1.0 m/s

**Ground attenuation:**  
General, Ground factor: 0.5

**Meteorological coefficient, C0:**  
0.0 dB

**Type of demand in calculation:**  
3: WTG noise is compared to ambient noise plus margin (UK, AT etc.)

**Noise values in calculation:**  
All noise values are 90% exceedance values (L90)

**Pure tones:**  
Pure and Impulse tone penalty are added to WTG source noise

**Height above ground level, when no value in NSA object:**  
4.0 m Don't allow override of model height with height from NSA object

**Deviation from "official" noise demands. Negative is more restrictive, positive is less restrictive.:**  
0.0 dB(A)

**Octave data required**  
Air absorption

63	125	250	500	1,000	2,000	4,000	8,000
[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]	[dB/km]
0.1	0.4	1.0	1.9	3.7	9.7	32.8	117.0

**WTG:** EWT DW54 900 54.0 !O!  
**Noise:** Level 0 - Guaranteed - DW52/DW54\*900 - 07-2011

Source Source/Date Creator Edited  
Manufacturer 18/07/2011 EMD 17/08/2012 14:43  
Based on EWT Specification S-1005010-R01.

The warranted sound power levels are based on actual measurements executed by an independent noise measurement institute according to the preferred methods set out in IEC-61400-11.

Uncertainty levels are included in the warranted sound power levels.

EWT declares that the tonal noise will not exceed warranted sound power levels when calculated according ETSU-R-97.

The values given in the table are valid for normal operational mode (rotation speed 0-26 RPM)

The calculation of the standardized wind speed at 10m height according to IEC 61400-11 is based on a terrain roughness length Z0=0,05m.

Status	Hub height [m]	Wind speed [m/s]	LwA,ref [dB(A)]	Pure tones	Octave data								
					63 [dB]	125 [dB]	250 [dB]	500 [dB]	1000 [dB]	2000 [dB]	4000 [dB]	8000 [dB]	
ExtraPolated	50.0	4.0	96.4	No	Generic data	76.0	83.0	86.4	89.0	88.8	85.9	81.1	71.6
From Windcat		5.0	98.2	No	Generic data	77.8	84.8	88.2	90.8	90.6	87.7	82.9	73.4
From Windcat		6.0	100.0	No	Generic data	79.6	86.6	90.0	92.6	92.4	89.5	84.7	75.2
From Windcat		7.0	101.4	No	Generic data	81.0	88.0	91.4	94.0	93.8	90.9	86.1	76.6
From Windcat		8.0	102.0	No	Generic data	81.6	88.6	92.0	94.6	94.4	91.5	86.7	77.2
From Windcat		9.0	102.0	No	Generic data	81.6	88.6	92.0	94.6	94.4	91.5	86.7	77.2
From Windcat		10.0	102.0	No	Generic data	81.6	88.6	92.0	94.6	94.4	91.5	86.7	77.2
ExtraPolated		11.0	102.0	No	Generic data	81.6	88.6	92.0	94.6	94.4	91.5	86.7	77.2
ExtraPolated		12.0	102.0	No	Generic data	81.6	88.6	92.0	94.6	94.4	91.5	86.7	77.2

**NSA:** Sheephouse Farm-A  
**Predefined calculation standard:** British  
**Imission height(a.g.l.):** Use standard value from calculation model

**Ambient noise:**

4.0 [m/s]	5.0 [m/s]	6.0 [m/s]	7.0 [m/s]	8.0 [m/s]	9.0 [m/s]	10.0 [m/s]	11.0 [m/s]	12.0 [m/s]
32.9 dB(A)	34.9 dB(A)	37.5 dB(A)	40.6 dB(A)	43.9 dB(A)	47.1 dB(A)	49.8 dB(A)	51.3 dB(A)	50.9 dB(A)

**Margin or Allowed additional exposure:** 5.0 dB(A)

**Sound level always accepted:** 45.0 dB(A)

**Distance demand:** 0.0 m



## Project:

Springbrook Wind Turbine

## Description:

This analysis has been based on background noise levels. More information on this report can be found in the specialist chapter of the Environmental Report.

## Printed/Page

13/08/2013 13:07 / 6

## Licensed user:

**The Energy Workshop Limited**

The Media Centre, 7 Northumberland Road, Huddersfield  
GB-WEST YORKSHIRE, HD1 1RL  
+441484 483108

Matt Morgan / matt@theenergyworkshop.co.uk

## Calculated:

13/08/2013 12:31/2.7.490

**DECIBEL - Assumptions for noise calculation****Calculation:** Enercon EWT Full Power - Warranted **Noise calculation model:** ISO 9613-2 United Kingdom**NSA:** Cranberry-B**Predefined calculation standard:** British**Imission height(a.g.l.):** Use standard value from calculation model**Ambient noise:**

4.0 [m/s]	5.0 [m/s]	6.0 [m/s]	7.0 [m/s]	8.0 [m/s]	9.0 [m/s]	10.0 [m/s]	11.0 [m/s]	12.0 [m/s]
29.8 dB(A)	31.5 dB(A)	33.3 dB(A)	35.4 dB(A)	37.5 dB(A)	39.7 dB(A)	41.9 dB(A)	44.0 dB(A)	46.0 dB(A)

**Margin or Allowed additional exposure:** 5.0 dB(A)**Sound level always accepted:** 0.0 dB(A)**Distance demand:** 0.0 m**NSA:** Throstle Nest-C**Predefined calculation standard:** British**Imission height(a.g.l.):** Use standard value from calculation model**Ambient noise:**

4.0 [m/s]	5.0 [m/s]	6.0 [m/s]	7.0 [m/s]	8.0 [m/s]	9.0 [m/s]	10.0 [m/s]	11.0 [m/s]	12.0 [m/s]
32.5 dB(A)	34.1 dB(A)	36.1 dB(A)	38.6 dB(A)	41.4 dB(A)	44.1 dB(A)	46.5 dB(A)	48.2 dB(A)	48.6 dB(A)

**Margin or Allowed additional exposure:** 5.0 dB(A)**Sound level always accepted:** 0.0 dB(A)**Distance demand:** 0.0 m**NSA:** Dyson Cote 2-D**Predefined calculation standard:** British**Imission height(a.g.l.):** Use standard value from calculation model**Ambient noise:**

4.0 [m/s]	5.0 [m/s]	6.0 [m/s]	7.0 [m/s]	8.0 [m/s]	9.0 [m/s]	10.0 [m/s]	11.0 [m/s]	12.0 [m/s]
36.2 dB(A)	37.0 dB(A)	37.8 dB(A)	38.6 dB(A)	39.4 dB(A)	40.3 dB(A)	41.1 dB(A)	41.9 dB(A)	42.7 dB(A)

**Margin or Allowed additional exposure:** 5.0 dB(A)**Sound level always accepted:** 0.0 dB(A)**Distance demand:** 0.0 m**NSA:** Underbank-E**Predefined calculation standard:** British**Imission height(a.g.l.):** Use standard value from calculation model**Ambient noise:**

4.0 [m/s]	5.0 [m/s]	6.0 [m/s]	7.0 [m/s]	8.0 [m/s]	9.0 [m/s]	10.0 [m/s]	11.0 [m/s]	12.0 [m/s]
37.2 dB(A)	38.7 dB(A)	40.1 dB(A)	41.5 dB(A)	42.9 dB(A)	44.3 dB(A)	45.7 dB(A)	47.2 dB(A)	48.6 dB(A)

**Margin or Allowed additional exposure:** 5.0 dB(A)**Sound level always accepted:** 0.0 dB(A)**Distance demand:** 0.0 m**NSA:** Sheephouse C & D-F**Predefined calculation standard:** British**Imission height(a.g.l.):** Use standard value from calculation model**Ambient noise:**

4.0 [m/s]	5.0 [m/s]	6.0 [m/s]	7.0 [m/s]	8.0 [m/s]	9.0 [m/s]	10.0 [m/s]	11.0 [m/s]	12.0 [m/s]
32.9 dB(A)	34.9 dB(A)	37.5 dB(A)	40.6 dB(A)	43.9 dB(A)	47.1 dB(A)	49.8 dB(A)	51.3 dB(A)	50.9 dB(A)

**Margin or Allowed additional exposure:** 5.0 dB(A)**Sound level always accepted:** 0.0 dB(A)**Distance demand:** 0.0 m

Project:

**Springbrook Wind Turbine**

Description:

This analysis has been based on background noise levels. More information on this report can be found in the specialist chapter of the Environmental Report.

Printed/Page

13/08/2013 13:07 / 7

Licensed user:

**The Energy Workshop Limited**

The Media Centre, 7 Northumberland Road, Huddersfield  
GB-WEST YORKSHIRE, HD1 1RL  
+441484 483108

Matt Morgan / matt@theenergyworkshop.co.uk

Calculated:

13/08/2013 12:31/2.7.490



## DECIBEL - Assumptions for noise calculation

**Calculation:** Enercon EWT Full Power - Warranted **Noise calculation model:** ISO 9613-2 United Kingdom

**NSA:** Sheephouse B-G

**Predefined calculation standard:** British

**mission height(a.g.l.):** Use standard value from calculation model

### Ambient noise:

4.0 [m/s]	5.0 [m/s]	6.0 [m/s]	7.0 [m/s]	8.0 [m/s]	9.0 [m/s]	10.0 [m/s]	11.0 [m/s]	12.0 [m/s]
32.9 dB(A)	34.9 dB(A)	37.5 dB(A)	40.6 dB(A)	43.9 dB(A)	47.1 dB(A)	49.8 dB(A)	51.3 dB(A)	50.9 dB(A)

**Margin or Allowed additional exposure:** 5.0 dB(A)

**Sound level always accepted:** 0.0 dB(A)

**Distance demand:** 0.0 m

**Project:**  
Springbrook Wind Turbine

**Description:**  
This analysis has been based on background noise levels. More information on this report can be found in the specialist chapter of the Environmental Report.

**Printed/Page:**  
13/08/2013 13:07 / 8

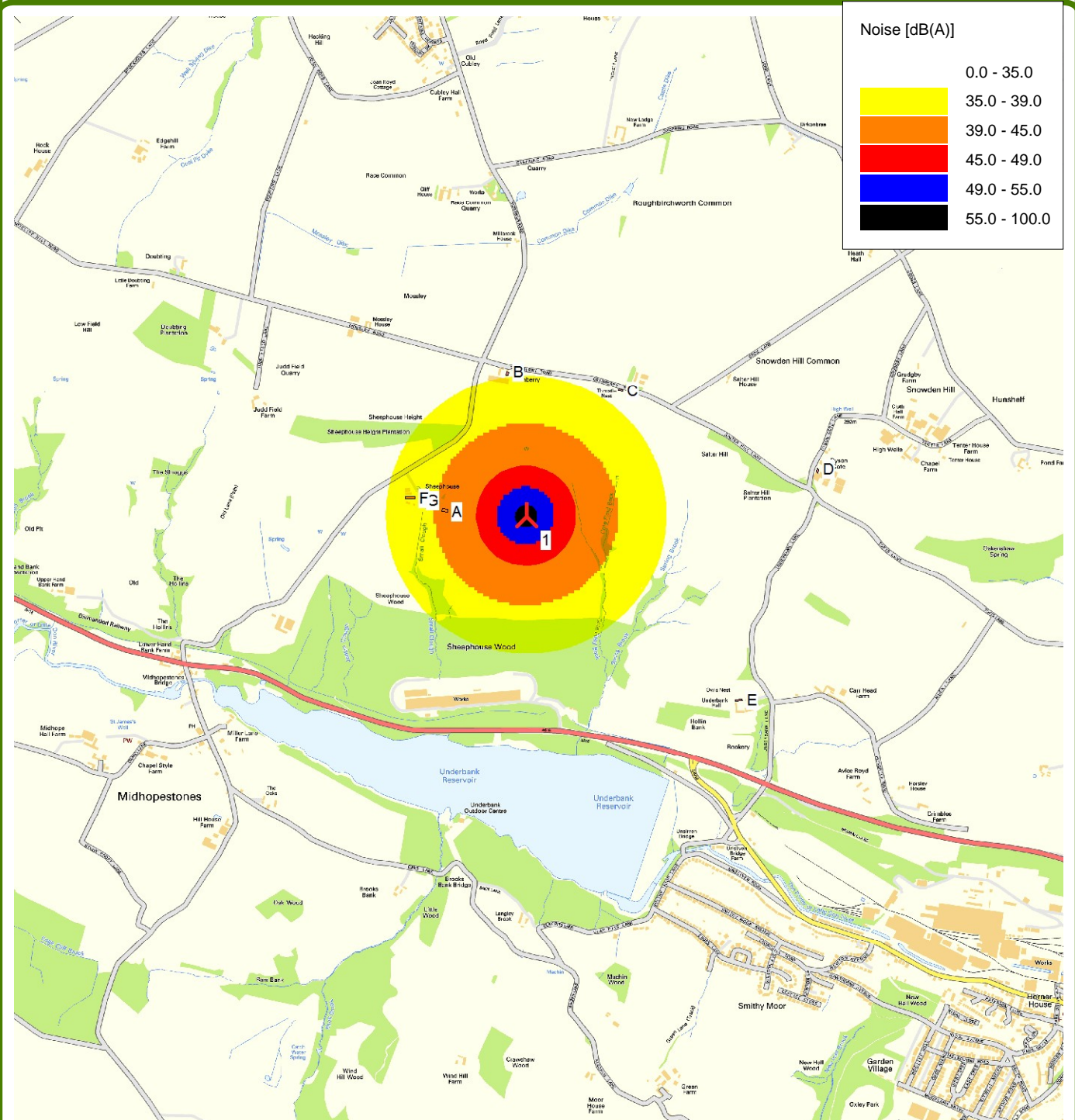
**Licensed user:**  
**The Energy Workshop Limited**  
The Media Centre, 7 Northumberland Road, Huddersfield  
GB-WEST YORKSHIRE, HD1 1RL  
+441484 483108  
Matt Morgan / matt@theenergyworkshop.co.uk

**Calculated:**  
13/08/2013 12:31/2.7.490



**DECIBEL - Map 10.0 m/s**

**Calculation:** Enercon EWT Full Power - Warranted Noise calculation model: ISO 9613-2 United Kingdom



Map: , Print scale 1:20,000, Map center British National Grid (AIRY) East: 424,932 North: 400,083  
Noise calculation model: ISO 9613-2 United Kingdom. Wind speed: 10.0 m/s

**New WTG** **Noise sensitive area**

**Height above sea level from active line object**

35.0 dB(A)    40.0 dB(A)    45.0 dB(A)    50.0 dB(A)    55.0 dB(A)