

## **10. NOISE TECHNICAL APPENDIX**

### **10.1 INTRODUCTION**

This appendix contains information relating to the noise assessment of a technical nature that has not been included within Chapter 10 of the Environmental Statement. It contains the following:

- Consultation Correspondence
- Baseline Noise Survey Documentation – survey notes, rainfall record and equipment calibration certificates
- Manufacturer’s Noise Data for WinWind 1MW Wind Turbine
- Noise Model outputs

### **10.2 CONSULTATION CORRESPONDENCE**

The following pages contain copies of correspondence between Arcus Renewable Energy Consulting Ltd and Barnsley Metropolitan Borough Council Environmental health Department.



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Glasgow  
G3 7QL

T 0141 332 9949

W [arcusrenewables.co.uk](http://arcusrenewables.co.uk)

E [michael@arcusrenewables.co.uk](mailto:michael@arcusrenewables.co.uk)

Sarah Newman  
Environmental Health Officer  
Barnsley MBC  
By email: [sarahnewman@barnsley.gov.uk](mailto:sarahnewman@barnsley.gov.uk)

21 January 2008

Our Ref 064/MR-SN-20080121

Dear Ms Newman

**RE: Proposed Windfarm at Spicer Hill**

Arcus Renewable Energy Consulting is engaged by J.G. Pears Ltd to carry out an Environmental Impact Assessment for a proposed windfarm at Spicer Hill, near Penistone in South Yorkshire. A scoping report was issued in September 2007, to which a response has been received from Regulatory Services, stating that the baseline noise monitoring locations proposed were acceptable.

The proposed monitoring locations (Annat Royd, Brown's Edge, Eagle's Nest and Middle Cliff) were based on a preliminary turbine layout, which included turbines to the south of Whitley Road, which bisects the site. The layout has since been modified, and now comprises five 1.0MW turbines situated on the land to the north of the road.

A noise contour plot for the proposed five turbine layout has been produced, and is enclosed. This takes account of noise emissions from the proposed Spicer Hill turbines, together with theoretical emissions from the existing Royd Moor turbines.

ETSU-R-97 *The Assessment and Rating of Noise from Wind Turbines* specifies limits on wind turbine noise, the lowest of which is 35 dB(A),  $L_{A90,10min}$ . Higher limits may also be acceptable, depending on background noise levels. Therefore, it is intended to focus the assessment on properties which may receive noise levels at or above this minimum limit.

A baseline noise survey will be carried out in accordance with the methodology described in ETSU-R-97 for such measurements.

As can be seen from the enclosed noise contour plot, one of the initially proposed monitoring locations now lies outwith the 35 dB(A) contour, and would therefore not receive noise levels higher than 35 dB(A). It is therefore proposed to utilise an alternative location (Whitley House) rather than Middle Cliff. Please could you confirm that this will be acceptable.

During our telephone conversation today, you mentioned that you would be taking the view that the existing wind farm at Royd Moor should be considered a part of the prevailing background noise in the area. We would welcome this approach, and feel that it would be justified in this case. The planning consent for Royd Moor did not include any conditions relating to noise, and therefore to include the noise from this source in the limits imposed on Spicer Hill would be unreasonable on the new scheme. Royd Moor has also been in operation for a number of years now, and it may be assumed that the local residents have become accustomed to its presence. Therefore, it is likely that it would be the change to the current situation that would be of interest to them. In this regard, I would be interested in your thoughts regarding suitable criteria to be applied in the assessment.

My colleague has lodged an informal inquiry with the Council enquiring whether you have records of any noise complaints relating to Royd Moor. I would be grateful if you could advise whether there have been any such complaints and the outcome of any subsequent investigations.

Yours Sincerely,







Michael Reid AMIOA  
For Arcus Renewable Energy Consulting Ltd

**Key**

-  Proposed Turbine Locations
-  Proposed Monitoring Locations

**Predicted Noise Level**

LA90, 10min

-  30 dB(A)
-  35 dB(A)
-  40 dB(A)
-  45 dB(A)
-  50 dB(A)
-  55 dB(A)

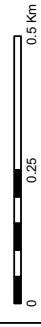
Noise contours calculated according to ISO-9613, assuming soft ground and omitting barrier attenuations. Calculation height 2.0m AGL, based on OS Landform Panorama contours.

Contributions from existing Royd Moor and proposed Spicer Hill turbines included.

Royd Moor turbines assumed to have sound power level of 98 dB(A), and typical wind turbine spectrum.

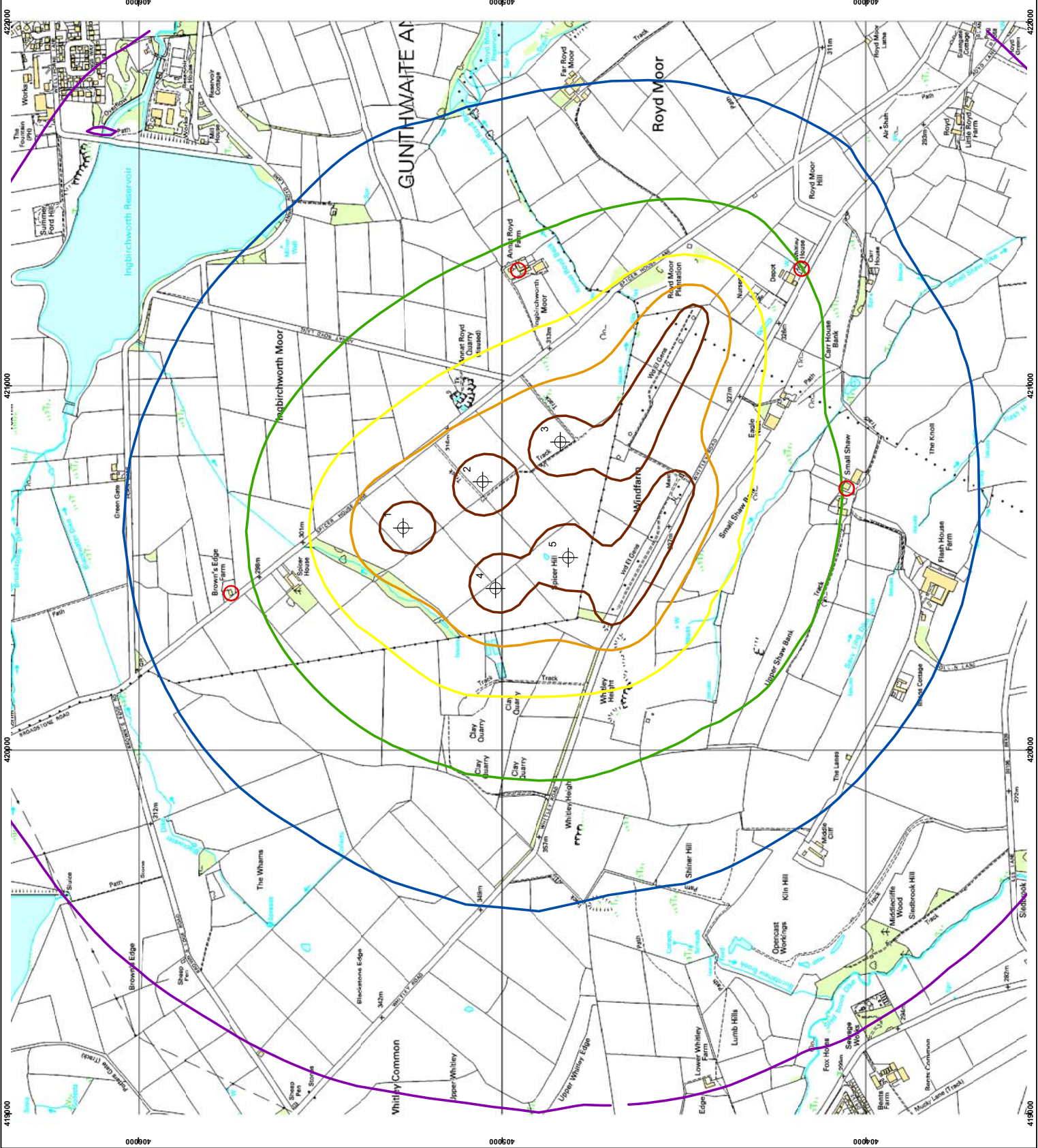
Spicer Hill turbines assumed to be WinWind 1.0MW turbines with maximum sound power level of 104 dB(A).

1:10,000 Scale @ A3



**Noise Contour Plot**  
Figure 1

**Spicer Hill Wind Farm**  
Noise Assessment



**Michael Reid**

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**From:** Newman , Sarah [SarahNewman@barnsley.gov.uk]  
**Sent:** 04 February 2008 17:21  
**To:** Michael Reid  
**Subject:** RE: proposed spicer hill wind farm

Dear Micheal,

- Whitely House is acceptable as an alternative monitoring location to Middle Cliff.
- Unfortunately I was not with the authority when Royd Moor was commissioned therefore I am not sure how far back to go in the records. We received complaints regarding noise and flashing from the turbines in 1994, however the computerized records only started in 1990 so I am not sure that they are complete. This service has received an Environmental Information query regarding this and will respond in due course.
- Not sure why you would consider the noise from a long-established land use as 'unreasonable' as part of the background noise or why this is difficult to include in the assessment criteria?.

Yours sincerely,

*Sarah Newman*

Senior Environmental Health Officer

Barnsley Metropolitan Borough Council  
Regulatory Services

Tel - 01226 77(2454)  
Mob - 07786 525 914  
Fax - 01226 775699

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**From:** Michael Reid [mailto:MichaelR@arcusrenewables.co.uk]  
**Sent:** 21 January 2008 14:41  
**To:** Newman , Sarah  
**Cc:** Victoria Ridyard  
**Subject:** proposed spicer hill wind farm

Hi Sarah,

Further to our earlier conversation, please find attached a consultation letter regarding the noise assessment for the proposed Spicer Hill wind farm.

I look forward to hearing from you.

Regards,  
Michael Reid  
**Arcus Renewable Energy Consulting Ltd**  
27 Woodside Place  
Glasgow G3 7QL  
0141 332 9949  
07878 530174  
michael@arcusrenewables.co.uk  
www.arcusrenewables.co.uk

\*\*\* Barnsley MBC Disclaimer:

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15/04/2008

### **10.3 BASELINE NOISE SURVEY**

The following pages contain:

- Survey Notes
- Equipment Calibration Certificates

### Wind Farm Noise Survey Record Sheet

<b>Project No:</b>	064	<b>Project Name:</b>	Spicer Hill
<b>Client:</b>	JG Pears	<b>Survey By:</b>	MR/MB
<b>Location No (x/y):</b>	1/4	<b>Location Name:</b>	Annat Royd
<b>Monitoring Location (GPS Grid Reference):</b>			SE 21349,04973
<b>Monitoring Location Description:</b>	Edge of field NE of house. Yard area is reflective, so free-field location nearby selected.		
<b>Distance From Façade:</b>	5m from low wall, 7m from outbuilding, >10m from house		
<b>Noise Sources Present:</b>	Distant traffic, farm activities, partially screened from Royd Moor. Dairy.		
<b>Notes:</b>	Machinery active in dairy approx 0630-0830, 1630-1930		
<b>Start Date &amp; Time</b>	12/2/08 17.40	<b>End date &amp; Time</b>	5/3/08 16.50
<b>Equipment</b>			
<b>Item</b>	<b>Make</b>	<b>Model</b>	<b>Serial No.</b>
Microphone	Rion	NH-21	20328
Sound Level Meter	Rion	NL-31	1062690
Calibrator	Rion	NC-74	34372738
<b>Source of Equipment:</b>		Arcus	
<b>Calibration</b>			
	<b>Date &amp; Time</b>	<b>Calibration Level</b>	<b>Level before calibration</b>
<b>Initial</b>	12/2/08 17.30	93.9	n/a
<b>Mid-Survey Check 1</b>	21/2/08 AM	93.9	94.0
<b>Final Check</b>	5/3/08 1700	n/a	94.0

**Photo of Monitoring Location:**



## Wind Farm Noise Survey Record Sheet

<b>Project No:</b>	064	<b>Project Name:</b>	Spicer Hill
<b>Client:</b>	JG Pears	<b>Survey By:</b>	MR/MB
<b>Location No (x/y):</b>	2/4	<b>Location Name:</b>	Brown's Edge
<b>Monitoring Location (GPS Grid Reference):</b>			SE 20465,05769
<b>Monitoring Location Description:</b>	Corner of garden, NE of house.		
<b>Distance From Façade:</b>	> 10m		
<b>Noise Sources Present:</b>	Distant traffic, farm activities, Royd Moor.		
<b>Notes:</b>			
<b>Start Date &amp; Time</b>	13/2/08 10.40	<b>End date &amp; Time</b>	5/3/08 16.45
<b>Equipment</b>			
<b>Item</b>	<b>Make</b>	<b>Model</b>	<b>Serial No.</b>
<b>Microphone</b>	Rion	NH-21	310534/20327
<b>Sound Level Meter</b>	Rion	NL-31	1062689
<b>Calibrator</b>	Rion	NC-74	34372738
<b>Source of Equipment:</b>	Arcus		
<b>Calibration</b>			
	<b>Date &amp; Time</b>	<b>Calibration Level</b>	<b>Level before calibration</b>
<b>Initial</b>	12/2/08 10.40	93.9	n/a
<b>Mid-Survey Check 1</b>	21/2/08 AM	93.9	94.0
<b>Final Check</b>	5/3/08 16.45	n/a	93.9

### Photo of Monitoring Location:



### Wind Farm Noise Survey Record Sheet

<b>Project No:</b>	064	<b>Project Name:</b>	Spicer Hill
<b>Client:</b>	JG Pears	<b>Survey By:</b>	MR/MB
<b>Location No (x/y):</b>	3/4	<b>Location Name:</b>	Whitley House
<b>Monitoring Location (GPS Grid Reference):</b>			SE 21351,04169
<b>Monitoring Location Description:</b>	Garden east of house, narrow strip between low wall and fence.		
<b>Distance From Façade:</b>	> 10m, approx 5m to 1m high wall		
<b>Noise Sources Present:</b>	Dogs, traffic, wind, farm machinery, royd moor.		
<b>Notes:</b>			
<b>Start Date &amp; Time</b>	13/2/08 11.10	<b>End date &amp; Time</b>	5/3/08 16.30
<b>Equipment</b>			
<b>Item</b>	<b>Make</b>	<b>Model</b>	<b>Serial No.</b>
<b>Microphone</b>	Rion	NH-21	309605/20329
<b>Sound Level Meter</b>	Rion	NL-31	1062691
<b>Calibrator</b>	Rion	NC-74	34372738
<b>Source of Equipment:</b>		Arcus	
<b>Calibration</b>			
	<b>Date &amp; Time</b>	<b>Calibration Level</b>	<b>Level before calibration</b>
<b>Initial</b>	13/2/08 10.40	93.9	n/a
<b>Mid-Survey Check 1</b>	21/2/08	93.9	94.0
<b>Final Check</b>	5/3/08 16.45	n/a	94.0

**Photo of Monitoring Location:**



### Wind Farm Noise Survey Record Sheet

<b>Project No:</b>	064	<b>Project Name:</b>	Spicer Hill
<b>Client:</b>	JG Pears	<b>Survey By:</b>	MR/MB
<b>Location No (x/y):</b>	4/4	<b>Location Name:</b>	Eagle Nest
<b>Monitoring Location (GPS Grid Reference):</b>			SE 20979,04214
<b>Monitoring Location Description:</b>	Corner of garden, east of house, above wall off yard.		
<b>Distance From Façade:</b>	> 10m		
<b>Noise Sources Present:</b>	Farm traffic, wind, dogs.		
<b>Notes:</b>			
<b>Start Date &amp; Time</b>	21/2/08 0800	<b>End date &amp; Time</b>	5/3/08 1700
<b>Equipment</b>			
<b>Item</b>	<b>Make</b>	<b>Model</b>	<b>Serial No.</b>
Microphone	Rion	NH-21	20326
Sound Level Meter	Rion	NL-31	1062688
Calibrator	Rion	NC-74	34372738
<b>Source of Equipment:</b>		Arcus	
<b>Calibration</b>			
	<b>Date &amp; Time</b>	<b>Calibration Level</b>	<b>Level before calibration</b>
<b>Initial</b>	21/2/08	93.9	n/a
<b>Mid-Survey Check 1</b>	n/a	n/a	n/a
<b>Final Check</b>	5/3/08 16.45	n/a	94.0

**Photo of Monitoring Location:**





## CERTIFICATE OF CONFORMANCE

**Date of Issue** 26<sup>th</sup> April 2007  
**Customer** Bolsterstone PLC  
**Certificate Number** CONF040712

	<b>Manufacturer</b>	<b>Type</b>	<b>Serial Number</b>
<b>Acoustic Calibrator</b>	Rion	NC-74	34372738

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standard:

IEC 60942 2003 Class 1 (Electroacoustics – Sound Calibrators)

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

ANV Measurement Systems recommend that the instrument is calibrated at an interval of 12 months.

Signed.....

Position.....*DIRECTOR*

Date.....*26/4/07*

---

**BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL**

**☎ 01908 642846 ☎ 01908 642814**

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## CERTIFICATE OF CONFORMANCE

**Date of Issue** 26<sup>th</sup> April 2007  
**Customer** Bolsterstone PLC  
**Certificate Number** CONF040708

	<b>Manufacturer</b>	<b>Type</b>	<b>Serial Number</b>
<b>Sound Level Meter</b>	Rion	NL-31	01062688
<b>Preamplifier</b>	Rion	NH-21	20326
<b>Microphone</b>	Rion	UC-53A	310533

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 60651:1979 Type 1;  
IEC 60804:1985 Type 1; and  
IEC 61672-1:2002 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

ANV Measurement Systems recommend that the instrument is calibrated at an interval of 12 months.

Signed  Position DIRECTOR Date 26/4/07

---

**BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL**

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## CERTIFICATE OF CONFORMANCE

**Date of Issue** 26<sup>th</sup> April 2007  
**Customer** Bolsterstone PLC  
**Certificate Number** CONF040709

	<b>Manufacturer</b>	<b>Type</b>	<b>Serial Number</b>
<b>Sound Level Meter</b>	Rion	NL-31	01062689
<b>Preamplifier</b>	Rion	NH-21	20327
<b>Microphone</b>	Rion	UC-53A	310534

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 60651:1979 Type 1;  
IEC 60804:1985 Type 1; and  
IEC 61672-1:2002 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

ANV Measurement Systems recommend that the instrument is calibrated at an interval of 12 months.

Signed.....

Position.....*DIRECTOR*

Date.....*26/4/07*

---

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## CERTIFICATE OF CONFORMANCE

**Date of Issue** 26<sup>th</sup> April 2007  
**Customer** Bolsterstone PLC  
**Certificate Number** CONF040710

	<b>Manufacturer</b>	<b>Type</b>	<b>Serial Number</b>
<b>Sound Level Meter</b>	Rion	NL-31	01062690
<b>Preamplifier</b>	Rion	NH-21	20328
<b>Microphone</b>	Rion	UC-53A	311678

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 60651:1979 Type 1;  
IEC 60804:1985 Type 1; and  
IEC 61672-1:2002 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

ANV Measurement Systems recommend that the instrument is calibrated at an interval of 12 months.

Signed 

Position Director

Date 26/4/07

---

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#### **10.4 MANUFACTURER'S NOISE DATA**

The following pages contain extracts of manufacturer's noise data for the Enercon E70 2.3 MW wind turbine. Note that the data for a hub height of 64m (rather than 58m) has been used as a worse-case scenario, as that for a hub height of 60m is not available.

**Guaranteed Values of the Sound Power Level for the E-70 with 2.3 MW rated power**

$V_{Wind}$ in 10m Height \ Hub height	58 m	64 m	85 m	98/99 m	113 m
4 m/s	90.7 dB(A)	90.8 dB(A)	91.1 dB(A)	91.3 dB(A)	91.4 dB(A)
5 m/s	93.6 dB(A)	93.6 dB(A)	94.1 dB(A)	94.6 dB(A)	95.1 dB(A)
6 m/s	98.5 dB(A)	98.8 dB(A)	99.7 dB(A)	100.0 dB(A)	100.3 dB(A)
7 m/s	101.3 dB(A)	101.4 dB(A)	101.6 dB(A)	101.7 dB(A)	101.9 dB(A)
8 m/s	102.9 dB(A)	103.1 dB(A)	103.5 dB(A)	103.7 dB(A)	103.8 dB(A)
95% $P_{rated}$	104.5 dB(A)	104.5 dB(A)	104.5 dB(A)	104.5 dB(A)	104.5 dB(A)
10 m/s	104.5 dB(A)	104.5 dB(A)	104.5 dB(A)	104.5 dB(A)	104.5 dB(A)

Measured values				104,4 dB(A) (at 95% $P_{rated}$ ) WICO 314SEA05/01	
-----------------	--	--	--	--	--

1. A tonality value  $K_{TN}$  of 0-1 dB is guaranteed over the whole operational range (valid in the near vicinity of the turbine according to IEC).
2. An impulsivity value  $K_{IN}$  of 0 dB is guaranteed over the whole operational range (valid in the near vicinity of the turbine according to IEC).
3. The sound power values given in the table are valid for the **Operational Mode II** (defined through the rotational speed range of 6 – 21 rpm). The respective power curve is the Calculated Power Curve dated May 2005 (Rev. 1.x).
4. The guarantee is based on official and internal measurements of the sound power level. The official measured values are given in this document as a reference. The extracts of the official measurements are available and are valid in combination with this guarantee document. The measurements are being carried out according to the recommended national and international standards and norms (mentioned on the respective extracts).
5. In order to account for the uncertainties of measurement and sound prediction calculations, to increase the acceptance at the authorities and to avoid eventual verification measurements ENERCON recommends a safety factor of 1 dB(A) on the guaranteed values when carrying out sound propagation calculations. In countries where safety factors are already mandatory due to local regulations, the ENERCON recommendation is not applicable.  
  
Should this recommendation be neglected for any reasons, it is hereby explicitly referred to 6.
6. Due to the measurement uncertainties of sound measurements the verification of the guaranteed values is successful, if the measurement result of a measurement that has been carried out according to the accepted standards is in the range of +/- 1dB(A) of the guaranteed values [guarantee fulfilled when measurement result = guaranteed value +/- 1dB(A)].
7. For noise-sensitive sites it is possible to operate the E-70 with reduced rotational speed and reduced rated power during the night. The reduced sound power levels are given in a separate document.

<b>Document information:</b>		<b>ENERCON reserves the right to technical modifications</b>	
Author/ date:	MK / 19.10.05	Translator / date:	MK / 19.10.05
Department:	SA	Revisor / date:	
Approved / date:		Reference:	SA-04-SPL Guarantee E-70 2,3MW-Rev1_1-ger-eng.doc
Revision / date:	1.1 / 17.02.06		



One third octave sound power level at reference point $v_{10} = 8 \text{ m/s}$ [dB(A)]												
Frequency	50	63	80	100	125	160	200	250	315	400	500	630
L <sub>WA</sub>	76.0	80.4	84.0	87.6	90.0	90.5	89.7	93.2	93.7	91.7	91.0	91.6
L <sub>WA</sub>	86.0			94.3			97.3			96.2		
Frequency	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
L <sub>WA</sub>	89.5	89.4	88.0	86.4	85.4	83.1	80.1	78.0	75.7	73.3	71.3	70.3
L <sub>WA</sub>	93.8			89.9			83.1			76.6		

One third octave sound power level at reference point $v_{10} = 9 \text{ m/s}$ [dB(A)]												
Frequency	50	63	80	100	125	160	200	250	315	400	500	630
L <sub>WA</sub>	77.5	80.6	83.3	86.7	89.6	92.1	91.0	94.6	95.7	94.4	93.8	93.9
L <sub>WA</sub>	85.9			94.8			99.0			98.8		
Frequency	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
L <sub>WA</sub>	91.0	89.3	87.4	86.0	84.8	82.9	81.0	80.6	79.8	78.6	76.8	74.9
L <sub>WA</sub>	94.2			89.5			85.3			81.8		

One third octave sound power level at reference point $v_{10} = 10 \text{ m/s}$ [dB(A)]												
Frequency	50	63	80	100	125	160	200	250	315	400	500	630
L <sub>WA</sub>	78.3	82.6	86.2	89.6	91.9	93.6	92.1	95.3	95.5	93.3	92.5	93.4
L <sub>WA</sub>	88.2			96.8			99.3			97.9		
Frequency	800	1000	1250	1600	2000	2500	3150	4000	5000	6300	8000	10000
L <sub>WA</sub>	91.6	92.0	91.1	89.8	88.2	86.1	83.1	81.3	78.7	75.5	73.3	72.1
L <sub>WA</sub>	96.4			93.1			86.2			78.6		

1) Data basis is a measurement at a hub height of 99 m.

This extract of test report is valid only in connection with the enclosed „Manufacturer's certificate“ from 2005-11-07.

This declaration does not replace above-mentioned report.

measured by: WIND-consult GmbH  
Reuterstraße 9  
D-18211 Bargeshagen



- PDF document was signed electronically -

date: 2006-03-16

Dipl.-Ing. A. Petersen

Dipl.-Ing. J. Schwabe



DAP-PL-2756.00

According to DIN EN ISO 17025 by the DAP German Accreditation System for Testing Ltd. accredited testing laboratory.  
The accreditation is valid for test methods listed in the document.

## 10.5 NOISE MODEL OUTPUTS

The following pages contain noise model outputs, detailing the following for the proposed Spicer Hill wind turbines, the existing Royd Moor Turbines and the consented Hazelhead and Blackstone Edge turbines:

- Modelling parameters
- Predicted noise levels for each receptor for reference sound power
- Source details
- Propagation Summary for each receptor

Note that the following assumptions have been made throughout:

- Mixed ground ( $G=0.5$ )
- Air pressure, temperature and humidity setting were chosen to provide the minimum level of atmospheric absorption, i.e. 1013.25 mBar, 70% RH and 10 °C
- Receiver height of 4.0m
- $L_{A90,10min}$  2 dB(A) lower than  $L_{Aeq,10min}$  which is assumed to be equal to the model output
- Receiver levels were calculated for a single reference sound power level, then adjusted to provide predictions for other wind speeds according to the variation in sound power level with wind speed for the assessment envelope.
- Relative contributions of each 1/3-octave band to broadband sound power level assumed to be consistent throughout wind speed range.

## Project description

Project title: Spicer Hill Wind Farm  
Engineer: Michael Reid  
Customer: JG Pears Ltd

Description:

## Run description

Calculation type: Single Point Sound  
Title: point layout E70 mode II 102.9 dB(A) 4.0m mixed ground 20090320  
Run file: calcs.runx  
Result number: 22  
Calculation start: 15/04/2009 13:25:34  
Calculation end: 15/04/2009 13:25:45  
Calculation time: 00:00:187 [m:s:ms]  
No. of points: 14  
No. of calculated points: 14  
Kernel version: 14/04/2009

## Run parameters

Angle increment: 1.00 deg  
Reflection depth: 0  
Number of reflections: 3  
Maximal search radius: 10000  
Weighting: dB(A)  
Source side reflection precalculation enabled

### Standards:

Industry: ISO 9613-2 : 1996  
Air absorption: ISO 9613  
Limitation of screening loss:

single/multiple 0 dB /0 dB

### Environment:

Air pressure 1013.25 mbar  
rel. Humidity 70 %  
Temperature 10 °C

Meteo. Corr. C0(7-19h)[dB]=0.0; C0(19-23h)[dB]=0.0; C0(23-7h)[dB]=0.0;

### VDI-Parameters for diffraction

C1=3 C2=20

### Dissection parameters:

Distance to diameter factor 2  
Minimal Distance [m] 1 m  
Max. Difference GND+Diffraction 1 dB  
Max. No. of Iterations 4

Assessment: ESTU-R-97

Reflection of "own" facade is suppressed

Geometry data

RDGM9999.dgm	26/11/2007 14:58:02	
layout E70 mode II 2,3MW 102,9 dB(A) 20090203.geo		17/02/2009 12:27:50
mixed ground.geo	14/04/2009 10:04:08	
receivers 4 m 20090320.geo	15/04/2009 13:24:56	

Individual Receiver Predictions  
 Spicer Hill  
 Reference Sound Power Level 102.9 dB(A)

Name	X m	Y m	Z m	TH m	LA90 dB(A)	
Annat Royd	421319.000	404955.000	300.62	296.62	36.4	
Brown's Edge	420431.000	405746.000	302.49	298.49	36.7	
Carr House	421318.000	403988.000	287.57	283.57	30.6	
Eagle Nest	420948.000	404239.000	318.24	314.24	35.8	
Far Royd Moor	421786.000	404783.000	275.25	271.25	31.4	
Flash House Farm 1	420517.000	403855.000	278.32	274.32	32.5	
Flash House Farm 2	420366.000	403847.000	286.69	282.69	32.4	
Green Gate	420742.000	406043.000	282.87	278.87	33.3	
Illian's Cottage	420170.000	403920.000	294.46	290.46	32.6	
Sledbrook House	418562.000	404629.000	310.92	306.92	26.0	
Small Shaw	420679.000	404074.000	294.16	290.16	34.7	
Spicer House	420481.000	405587.000	305.75	301.75	39.3	
The Lanes	419980.000	404049.000	304.00	300.00	32.8	
Whitley House	421332.000	404172.000	324.00	320.00	32.6	

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Source Details  
 Spicer Hill  
 Reference Sound Power Level of 102.9 dB(A)

Source	X	Y	Z	Lw	KI	KT	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1,25 kHz	1,6 kHz	2 kHz	2,5 kHz	3,15 kHz	4 kHz	5 kHz	6,3 kHz	8 kHz	10 kHz
1	420632.00	404826.00	404.00	102.9	0	0	76.8	81.2	84.8	88.4	90.8	91.3	90.5	94.0	94.5	92.5	91.8	92.4	90.3	90.2	88.8	87.2	86.2	83.9	80.9	78.8	76.5	74.1	72.1	72.1
2	420648.00	405187.00	387.84	102.9	0	0	76.8	81.2	84.8	88.4	90.8	91.3	90.5	94.0	94.5	92.5	91.8	92.4	90.3	90.2	88.8	87.2	86.2	83.9	80.9	78.8	76.5	74.1	72.1	72.1
3	420389.00	404938.00	401.41	102.9	0	0	76.8	81.2	84.8	88.4	90.8	91.3	90.5	94.0	94.5	92.5	91.8	92.4	90.3	90.2	88.8	87.2	86.2	83.9	80.9	78.8	76.5	74.1	72.1	72.1

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Source Details  
 Spicer Hill  
 Reference Sound Power Level of 102.9 dB(A)

Legend

Source		Source name
X	m	X-Coordinate
Y	m	Y-Coordinate
Z	m	Z-Coordinate
Lw	dB(A)	Sound power per unit
KI	dB	Correction for impulsiveness
KT	dB	Correction for tonality
50 Hz	dB(A)	Sound power level 50 Hz
63 Hz	dB(A)	Sound power level 63 Hz
80 Hz	dB(A)	Sound power level 80 Hz
100 Hz	dB(A)	Sound power level 100 Hz
125 Hz	dB(A)	Sound power level 125 Hz
160 Hz	dB(A)	Sound power level 160 Hz
200 Hz	dB(A)	Sound power level 200 Hz
250 Hz	dB(A)	Sound power level 250 Hz
315 Hz	dB(A)	Sound power level 315 Hz
400 Hz	dB(A)	Sound power level 400 Hz
500 Hz	dB(A)	Sound power level 500 Hz
630 Hz	dB(A)	Sound power level 630 Hz
800 Hz	dB(A)	Sound power level 800 Hz
1 kHz	dB(A)	Sound power level 1000 Hz
1,25 kHz	dB(A)	Sound power level 1250 Hz
1,6 kHz	dB(A)	Sound power level 1600 Hz
2 kHz	dB(A)	Sound power level 2000 Hz
2,5 kHz	dB(A)	Sound power level 2500 Hz
3,15 kHz	dB(A)	Sound power level 3150 Hz
4 kHz	dB(A)	Sound power level 4000 Hz
5 kHz	dB(A)	Sound power level 5000 Hz
6,3 kHz	dB(A)	Sound power level 6300 Hz
8 kHz	dB(A)	Sound power level 8000 Hz
10 kHz	dB(A)	Sound power level 10000 Hz

Propagation Calculation -  
Spicer Hill  
Reference Sound Power Level of 102.9 dB(A)

Source	Lw dB(A)	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Lr dB(A)	LA90 dB(A)
<b>Name Annat Royd LAeq 38.4 dB(A) LA90 36.4 dB(A)</b>													
1	102.9	0	0	0.0	706.61	68.0	-1.0		0.0	1.4	0.0	34.5	32.5
2	102.9	0	0	0.0	715.31	68.1	-1.0		0.0	1.4	0.0	34.4	32.4
3	102.9	0	0	0.0	935.60	70.4	-1.0		0.0	1.8	0.0	31.6	29.6
<b>Name Brown's Edge LAeq 38.7 dB(A) LA90 36.7 dB(A)</b>													
1	102.9	0	0	0.0	947.16	70.5	-1.0		0.0	1.8	0.0	31.5	29.5
2	102.9	0	0	0.0	605.69	66.6	-1.0		0.0	1.3	0.0	36.0	34.0
3	102.9	0	0	0.0	815.12	69.2	-1.0		0.0	1.6	0.0	33.0	31.0
<b>Name Carr House LAeq 32.6 dB(A) LA90 30.6 dB(A)</b>													
1	102.9	0	0	0.0	1089.22	71.7	-0.9		1.0	1.9	0.0	29.2	27.2
2	102.9	0	0	0.0	1377.15	73.8	-0.9		1.0	2.3	0.0	26.7	24.7
3	102.9	0	0	0.0	1333.60	73.5	-0.9		1.0	2.3	0.0	27.1	25.1
<b>Name Eagle Nest LAeq 37.8 dB(A) LA90 35.8 dB(A)</b>													
1	102.9	0	0	0.0	672.15	67.5	-1.0		0.0	1.4	0.0	35.0	33.0
2	102.9	0	0	0.0	996.77	71.0	-0.9		0.0	1.9	0.0	31.0	29.0
3	102.9	0	0	0.0	898.89	70.1	-1.0		0.0	1.8	0.0	32.1	30.1
<b>Name Far Royd Moor LAeq 33.4 dB(A) LA90 31.4 dB(A)</b>													
1	102.9	0	0	0.0	1161.96	72.3	-0.9		0.0	2.2	0.0	29.4	27.4
2	102.9	0	0	0.0	1212.82	72.7	-0.9		0.0	2.2	0.0	29.0	27.0
3	102.9	0	0	0.0	1411.22	74.0	-0.9		0.0	2.5	0.0	27.3	25.3
<b>Name Flash House Farm 1 LAeq 34.5 dB(A) LA90 32.5 dB(A)</b>													
1	102.9	0	0	0.0	985.83	70.9	-0.9		0.0	1.9	0.0	31.1	29.1
2	102.9	0	0	0.0	1342.90	73.6	-0.9		1.0	2.3	0.0	27.0	25.0
3	102.9	0	0	0.0	1097.46	71.8	-0.9		0.0	2.1	0.0	30.0	28.0
<b>Name Flash House Farm 2 LAeq 34.4 dB(A) LA90 32.4 dB(A)</b>													
1	102.9	0	0	0.0	1021.25	71.2	-0.9		0.0	1.9	0.0	30.7	28.7
2	102.9	0	0	0.0	1373.08	73.7	-0.9		0.0	2.5	0.0	27.6	25.6
3	102.9	0	0	0.0	1097.26	71.8	-0.9		0.0	2.1	0.0	30.0	28.0
<b>Name Green Gate LAeq 35.3 dB(A) LA90 33.3 dB(A)</b>													
1	102.9	0	0	0.0	1227.95	72.8	-0.9		0.0	2.3	0.0	28.8	26.8
2	102.9	0	0	0.0	867.52	69.8	-1.0		0.0	1.7	0.0	32.4	30.4
3	102.9	0	0	0.0	1166.06	72.3	-0.9		0.0	2.2	0.0	29.4	27.4
<b>Name Illian's Cottage LAeq 34.6 dB(A) LA90 32.6 dB(A)</b>													
1	102.9	0	0	0.0	1022.88	71.2	-0.9		0.0	1.9	0.0	30.7	28.7
2	102.9	0	0	0.0	1357.38	73.6	-0.9		0.0	2.4	0.0	27.8	25.8
3	102.9	0	0	0.0	1046.77	71.4	-0.9		0.0	2.0	0.0	30.5	28.5
<b>Name Sledbrook House LAeq 28.0 dB(A) LA90 26.0 dB(A)</b>													
1	102.9	0	0	0.0	2081.44	77.4	-1.0		0.0	3.4	0.0	23.1	21.1
2	102.9	0	0	0.0	2160.71	77.7	-1.0		1.1	3.3	0.0	21.8	19.8
3	102.9	0	0	0.0	1855.16	76.4	-0.9		0.0	3.1	0.0	24.4	22.4
<b>Name Small Shaw LAeq 36.7 dB(A) LA90 34.7 dB(A)</b>													
1	102.9	0	0	0.0	761.43	68.6	-1.0		0.0	1.5	0.0	33.7	31.7
2	102.9	0	0	0.0	1117.37	72.0	-0.9		1.0	2.0	0.0	28.9	26.9
3	102.9	0	0	0.0	917.66	70.2	-1.0		0.0	1.8	0.0	31.8	29.8

Propagation Calculation -  
Spicer Hill  
Reference Sound Power Level of 102.9 dB(A)

Source	Lw dB(A)	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Lr dB(A)	LA90 dB(A)
Name Spicer House		LAeq 41.3 dB(A)		LA90 39.3 dB(A)									
1	102.9	0	0	0.0	782.03	68.9	-1.0		0.0	1.6	0.0	33.5	31.5
2	102.9	0	0	0.0	441.17	63.9	-1.0		0.0	1.0	0.0	39.1	37.1
3	102.9	0	0	0.0	662.43	67.4	-1.0		0.0	1.4	0.0	35.1	33.1
Name The Lanes		LAeq 34.8 dB(A)		LA90 32.8 dB(A)									
1	102.9	0	0	0.0	1019.23	71.2	-0.9		0.0	1.9	0.0	30.8	28.8
2	102.9	0	0	0.0	1322.23	73.4	-0.9		1.0	2.3	0.0	27.2	25.2
3	102.9	0	0	0.0	983.41	70.8	-0.9		0.0	1.9	0.0	31.1	29.1
Name Whitley House		LAeq 34.6 dB(A)		LA90 32.6 dB(A)									
1	102.9	0	0	0.0	961.31	70.6	-0.9		0.0	1.9	0.0	31.4	29.4
2	102.9	0	0	0.0	1225.63	72.8	-0.9		0.0	2.3	0.0	28.8	26.8
3	102.9	0	0	0.0	1217.37	72.7	-0.9		0.0	2.2	0.0	28.9	26.9

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Propagation Calculation -  
 Spicer Hill  
 Reference Sound Power Level of 102.9 dB(A)

**Legend**

Source		Source name
Lw	dB(A)	Sound power per unit
KI	dB	Correction for impulsiveness
KT	dB	Correction for tonality
Ko	dB	Correction for non spherical emission
s	m	Distance source - receiver
Adiv	dB	Mean spreading loss
Agr	dB	Mean ground effect
Amisc	dB	Miscellaneous losses (mitigation, ...)
Abar	dB	Mean barrier loss
Aatm	dB	Mean air absorption loss
DI	dB	Directivity correction
Lr	dB(A)	Leq
LA90	dB(A)	LA90

### Project description

Project title: Spicer Hill Wind Farm  
Engineer: Michael Reid  
Customer: JG Pears Ltd

Description:

### Run description

Calculation type: Single Point Sound  
Title: point royd moor 4m mixed ground 20090320  
Run file: calcs.runx  
Result number: 21  
Calculation start: 15/04/2009 13:25:22  
Calculation end: 15/04/2009 13:25:32  
Calculation time: 00:00:422 [m:s:ms]  
No. of points: 14  
No. of calculated points: 14  
Kernel version: 14/04/2009

### Run parameters

Angle increment: 1.00 deg  
Reflection depth: 0  
Number of reflections: 3  
Maximal search radius: 5000  
Weighting: dB(A)  
Source side reflection precalculation enabled

#### Standards:

Industry: ISO 9613-2 : 1996  
Air absorption: ISO 9613  
Limitation of screening loss:

single/multiple                      0 dB /0 dB

#### Environment:

Air pressure                              1013.25 mbar  
rel. Humidity                              70 %  
Temperature                                10 °C

Meteo. Corr. C0(7-19h)[dB]=0.0; C0(19-23h)[dB]=0.0; C0(23-7h)[dB]=0.0;

#### VDI-Parameters for diffraction

C1=3 C2=20

#### Dissection parameters:

Distance to diameter factor    2  
Minimal Distance [m]            1 m  
Max. Difference GND+Diffraction                              1 dB  
Max. No. of Iterations            4

Assessment: ESTU-R-97

Reflection of "own" facade is suppressed

**Geometry data**

RDGM9999.dgm	26/11/2007 14:58:02
royd moor 20080306.geo	06/03/2008 15:32:18
mixed ground.geo	14/04/2009 10:04:08
receivers 4 m 20090320.geo	15/04/2009 13:24:56

Individual Receiver Predictions  
 Royd Moor  
 Reference Sound Power Level 98 dB(A)

Name	X m	Y m	Z m	TH m	LA90 dB(A)	
Annat Royd	421319.000	404955.000	300.62	296.62	39.3	
Brown's Edge	420431.000	405746.000	302.49	298.49	31.9	
Carr House	421318.000	403988.000	287.57	283.57	36.0	
Eagle Nest	420948.000	404239.000	318.24	314.24	43.4	
Far Royd Moor	421786.000	404783.000	275.25	271.25	34.7	
Flash House Farm 1	420517.000	403855.000	278.32	274.32	36.1	
Flash House Farm 2	420366.000	403847.000	286.69	282.69	35.4	
Green Gate	420742.000	406043.000	282.87	278.87	29.9	
Illian's Cottage	420170.000	403920.000	294.46	290.46	35.0	
Sledbrook House	418562.000	404629.000	310.92	306.92	24.5	
Small Shaw	420679.000	404074.000	294.16	290.16	39.8	
Spicer House	420481.000	405587.000	305.75	301.75	33.4	
The Lanes	419980.000	404049.000	304.00	300.00	34.6	
Whitley House	421332.000	404172.000	324.00	320.00	39.9	

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Source Details  
 Royd Moor  
 Reference Sound Power Level 98 dB(A)

Source	X	Y	Z	Lw	KI	KT	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1,25 kHz	1,6 kHz	2 kHz	2,5 kHz	3,15 kHz	4 kHz	5 kHz	6,3 kHz	8 kHz	10 kHz
1	420387.00	404695.00	375.00	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
2	420453.00	404659.00	375.00	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
3	420518.00	404623.00	373.31	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
4	420586.00	404588.00	366.00	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
5	420652.00	404551.00	365.00	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
6	420724.00	404513.00	365.00	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
7	420804.00	404679.00	359.87	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
8	420868.00	404644.00	355.00	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
9	420933.00	404611.00	355.00	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
10	420996.00	404575.00	355.00	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
11	421060.00	404542.00	353.26	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
12	421123.00	404507.00	352.66	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9
13	421187.00	404473.00	352.93	98.0	0	0	67.9	69.9	73.0	74.8	78.0	81.3	83.2	86.0	87.5	86.3	87.8	87.4	87.5	86.8	86.1	86.0	84.9	85.3	85.6	84.1	80.4	75.7	67.5	56.9

Propagation Calculation -  
Royd Moor  
Reference Sound Power Level 98 dB(A)

Source	Lw dB(A)	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Lr dB(A)	LA90 dB(A)
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Name	Annat Royd		LAeq 41.3 dB(A)		LA90 39.3 dB(A)								
1	98.0	0	0	0.0	970.44	70.7	-1.3		0.0	3.4	0.0	25.1	23.1
2	98.0	0	0	0.0	918.21	70.3	-1.3		0.0	3.3	0.0	25.7	23.7
3	98.0	0	0	0.0	870.12	69.8	-1.3		0.0	3.2	0.0	26.3	24.3
4	98.0	0	0	0.0	822.35	69.3	-1.3		0.0	3.1	0.0	26.9	24.9
5	98.0	0	0	0.0	782.46	68.9	-1.3		0.0	3.0	0.0	27.5	25.5
6	98.0	0	0	0.0	744.00	68.4	-1.3		0.0	2.9	0.0	28.0	26.0
7	98.0	0	0	0.0	587.29	66.4	-1.3		0.0	2.4	0.0	30.5	28.5
8	98.0	0	0	0.0	550.53	65.8	-1.3		0.0	2.3	0.0	31.2	29.2
9	98.0	0	0	0.0	519.89	65.3	-1.3		0.0	2.2	0.0	31.7	29.7
10	98.0	0	0	0.0	501.68	65.0	-1.3		0.0	2.2	0.0	32.1	30.1
11	98.0	0	0	0.0	490.33	64.8	-1.3		0.0	2.2	0.0	32.3	30.3
12	98.0	0	0	0.0	491.76	64.8	-1.3		0.0	2.2	0.0	32.3	30.3
13	98.0	0	0	0.0	502.48	65.0	-1.3		0.0	2.2	0.0	32.1	30.1

Name	Brown's Edge		LAeq 33.9 dB(A)		LA90 31.9 dB(A)								
1	98.0	0	0	0.0	1054.42	71.5	-1.3		0.0	3.6	0.0	24.2	22.2
2	98.0	0	0	0.0	1089.64	71.7	-1.3		0.0	3.7	0.0	23.9	21.9
3	98.0	0	0	0.0	1128.59	72.0	-1.3		0.0	3.8	0.0	23.5	21.5
4	98.0	0	0	0.0	1170.05	72.4	-1.3		0.0	3.9	0.0	23.1	21.1
5	98.0	0	0	0.0	1216.87	72.7	-1.3		0.0	4.0	0.0	22.7	20.7
6	98.0	0	0	0.0	1268.88	73.1	-1.4		0.0	4.1	0.0	22.3	20.3
7	98.0	0	0	0.0	1131.77	72.1	-1.3		0.0	3.8	0.0	23.4	21.4
8	98.0	0	0	0.0	1186.65	72.5	-1.3		0.0	3.9	0.0	22.9	20.9
9	98.0	0	0	0.0	1242.17	72.9	-1.4		0.0	4.0	0.0	22.5	20.5
10	98.0	0	0	0.0	1301.24	73.3	-1.4		0.0	4.1	0.0	22.0	20.0
11	98.0	0	0	0.0	1359.35	73.7	-1.5		0.0	4.3	0.0	21.6	19.6
12	98.0	0	0	0.0	1420.04	74.0	-1.6		0.0	4.4	0.0	21.1	19.1
13	98.0	0	0	0.0	1481.42	74.4	-1.6		0.0	4.5	0.0	20.7	18.7

Name	Carr House		LAeq 38.0 dB(A)		LA90 36.0 dB(A)								
1	98.0	0	0	0.0	1172.29	72.4	-1.3		1.3	3.7	0.0	21.9	19.9
2	98.0	0	0	0.0	1098.23	71.8	-1.3		1.3	3.6	0.0	22.6	20.6
3	98.0	0	0	0.0	1024.98	71.2	-1.3		1.3	3.4	0.0	23.4	21.4
4	98.0	0	0	0.0	949.72	70.5	-1.3		1.3	3.2	0.0	24.2	22.2
5	98.0	0	0	0.0	875.51	69.8	-1.3		1.3	3.1	0.0	25.1	23.1
6	98.0	0	0	0.0	796.53	69.0	-1.3		1.3	2.9	0.0	26.1	24.1
7	98.0	0	0	0.0	864.24	69.7	-1.3		1.3	3.0	0.0	25.2	23.2
8	98.0	0	0	0.0	798.36	69.0	-1.3		1.3	2.9	0.0	26.1	24.1
9	98.0	0	0	0.0	735.46	68.3	-1.3		1.3	2.7	0.0	26.9	24.9
10	98.0	0	0	0.0	672.90	67.6	-1.3		1.3	2.6	0.0	27.9	25.9
11	98.0	0	0	0.0	614.65	66.8	-1.3		1.3	2.4	0.0	28.8	26.8
12	98.0	0	0	0.0	558.23	65.9	-1.3		1.3	2.3	0.0	29.8	27.8
13	98.0	0	0	0.0	506.61	65.1	-1.3		1.3	2.1	0.0	30.8	28.8

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Propagation Calculation -  
Royd Moor  
Reference Sound Power Level 98 dB(A)

Source	Lw dB(A)	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Lr dB(A)	LA90 dB(A)
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Name	Eagle Nest	LAeq 45.4 dB(A)		LA90 43.4 dB(A)									
1	98.0	0	0	0.0	725.17	68.2	-1.3		0.0	2.8	0.0	28.3	26.3
2	98.0	0	0	0.0	651.65	67.3	-1.3		0.0	2.6	0.0	29.4	27.4
3	98.0	0	0	0.0	579.13	66.2	-1.3		0.0	2.4	0.0	30.6	28.6
4	98.0	0	0	0.0	505.10	65.1	-1.3		0.0	2.2	0.0	32.0	30.0
5	98.0	0	0	0.0	432.60	63.7	-1.3		0.0	2.0	0.0	33.6	31.6
6	98.0	0	0	0.0	356.99	62.0	-1.3		0.0	1.7	0.0	35.5	33.5
7	98.0	0	0	0.0	464.83	64.3	-1.3		0.0	2.1	0.0	32.9	30.9
8	98.0	0	0	0.0	414.46	63.3	-1.3		0.0	1.9	0.0	34.0	32.0
9	98.0	0	0	0.0	374.11	62.5	-1.3		0.0	1.8	0.0	35.1	33.1
10	98.0	0	0	0.0	341.40	61.7	-1.3		0.0	1.7	0.0	36.0	34.0
11	98.0	0	0	0.0	324.93	61.2	-1.3		0.0	1.6	0.0	36.5	34.5
12	98.0	0	0	0.0	321.92	61.1	-1.3		0.0	1.6	0.0	36.6	34.6
13	98.0	0	0	0.0	336.27	61.5	-1.3		0.0	1.6	0.0	36.1	34.1

Name	Far Royd Moor	LAeq 36.7 dB(A)		LA90 34.7 dB(A)									
1	98.0	0	0	0.0	1405.31	73.9	-1.5		0.0	4.4	0.0	21.2	19.2
2	98.0	0	0	0.0	1342.47	73.6	-1.5		0.0	4.2	0.0	21.7	19.7
3	98.0	0	0	0.0	1281.81	73.1	-1.4		0.0	4.1	0.0	22.2	20.2
4	98.0	0	0	0.0	1219.12	72.7	-1.3		1.4	3.8	0.0	21.5	19.5
5	98.0	0	0	0.0	1160.96	72.3	-1.3		1.3	3.7	0.0	22.0	20.0
6	98.0	0	0	0.0	1099.45	71.8	-1.3		0.0	3.7	0.0	23.8	21.8
7	98.0	0	0	0.0	991.11	70.9	-1.3		0.0	3.5	0.0	24.9	22.9
8	98.0	0	0	0.0	931.88	70.4	-1.3		0.0	3.3	0.0	25.6	23.6
9	98.0	0	0	0.0	873.81	69.8	-1.3		0.0	3.2	0.0	26.3	24.3
10	98.0	0	0	0.0	820.81	69.3	-1.3		0.0	3.1	0.0	27.0	25.0
11	98.0	0	0	0.0	768.92	68.7	-1.3		0.0	2.9	0.0	27.7	25.7
12	98.0	0	0	0.0	722.31	68.2	-1.3		0.0	2.8	0.0	28.3	26.3
13	98.0	0	0	0.0	678.92	67.6	-1.3		0.0	2.7	0.0	29.0	27.0

Name	Flash House Farm 1	LAeq 38.1 dB(A)		LA90 36.1 dB(A)									
1	98.0	0	0	0.0	855.48	69.6	-1.3		0.0	3.1	0.0	26.5	24.5
2	98.0	0	0	0.0	812.32	69.2	-1.3		0.0	3.0	0.0	27.1	25.1
3	98.0	0	0	0.0	773.85	68.8	-1.3		0.0	2.9	0.0	27.6	25.6
4	98.0	0	0	0.0	741.44	68.4	-1.3		0.0	2.9	0.0	28.0	26.0
5	98.0	0	0	0.0	714.25	68.1	-1.3		0.0	2.8	0.0	28.4	26.4
6	98.0	0	0	0.0	695.22	67.8	-1.3		0.0	2.7	0.0	28.7	26.7
7	98.0	0	0	0.0	876.35	69.8	-1.3		0.0	3.2	0.0	26.3	24.3
8	98.0	0	0	0.0	866.95	69.8	-1.3		0.0	3.2	0.0	26.4	24.4
9	98.0	0	0	0.0	866.30	69.7	-1.3		0.0	3.2	0.0	26.4	24.4
10	98.0	0	0	0.0	868.17	69.8	-1.3		0.0	3.2	0.0	26.4	24.4
11	98.0	0	0	0.0	878.88	69.9	-1.3		0.0	3.2	0.0	26.2	24.2
12	98.0	0	0	0.0	893.23	70.0	-1.3		0.0	3.2	0.0	26.0	24.0
13	98.0	0	0	0.0	914.54	70.2	-1.3		0.0	3.3	0.0	25.8	23.8

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Propagation Calculation -  
Royd Moor  
Reference Sound Power Level 98 dB(A)

Source	Lw dB(A)	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Lr dB(A)	LA90 dB(A)
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Name Flash House Farm 2 LAeq 37.4 dB(A) LA90 35.4 dB(A)													
1	98.0	0	0	0.0	852.84	69.6	-1.3		0.0	3.1	0.0	26.5	24.5
2	98.0	0	0	0.0	821.41	69.3	-1.3		0.0	3.1	0.0	26.9	24.9
3	98.0	0	0	0.0	795.48	69.0	-1.3		0.0	3.0	0.0	27.3	25.3
4	98.0	0	0	0.0	777.03	68.8	-1.3		0.0	2.9	0.0	27.5	25.5
5	98.0	0	0	0.0	763.90	68.7	-1.3		0.0	2.9	0.0	27.7	25.7
6	98.0	0	0	0.0	760.17	68.6	-1.3		0.0	2.9	0.0	27.8	25.8
7	98.0	0	0	0.0	943.09	70.5	-1.3		0.0	3.3	0.0	25.5	23.5
8	98.0	0	0	0.0	944.39	70.5	-1.3		0.0	3.4	0.0	25.4	23.4
9	98.0	0	0	0.0	953.86	70.6	-1.3		0.0	3.4	0.0	25.3	23.3
10	98.0	0	0	0.0	965.17	70.7	-1.3		0.0	3.4	0.0	25.2	23.2
11	98.0	0	0	0.0	984.42	70.9	-1.3		0.0	3.4	0.0	25.0	23.0
12	98.0	0	0	0.0	1006.48	71.0	-1.3		0.0	3.5	0.0	24.7	22.7
13	98.0	0	0	0.0	1034.55	71.3	-1.3		0.0	3.6	0.0	24.4	22.4

Name Green Gate LAeq 31.9 dB(A) LA90 29.9 dB(A)													
1	98.0	0	0	0.0	1397.00	73.9	-1.5		0.0	4.3	0.0	21.3	19.3
2	98.0	0	0	0.0	1416.85	74.0	-1.5		0.0	4.4	0.0	21.2	19.2
3	98.0	0	0	0.0	1440.40	74.2	-1.6		0.0	4.4	0.0	21.0	19.0
4	98.0	0	0	0.0	1465.70	74.3	-1.6		0.0	4.5	0.0	20.8	18.8
5	98.0	0	0	0.0	1496.97	74.5	-1.6		0.0	4.5	0.0	20.6	18.6
6	98.0	0	0	0.0	1532.31	74.7	-1.6		0.0	4.6	0.0	20.3	18.3
7	98.0	0	0	0.0	1367.58	73.7	-1.5		0.0	4.3	0.0	21.5	19.5
8	98.0	0	0	0.0	1406.51	74.0	-1.5		0.0	4.4	0.0	21.2	19.2
9	98.0	0	0	0.0	1446.48	74.2	-1.6		0.0	4.4	0.0	20.9	18.9
10	98.0	0	0	0.0	1491.56	74.5	-1.6		0.0	4.5	0.0	20.6	18.6
11	98.0	0	0	0.0	1535.93	74.7	-1.6		0.0	4.6	0.0	20.3	18.3
12	98.0	0	0	0.0	1584.09	75.0	-1.7		0.0	4.7	0.0	20.0	18.0
13	98.0	0	0	0.0	1633.35	75.3	-1.7		0.0	4.8	0.0	19.7	17.7

Name Illian's Cottage LAeq 37.0 dB(A) LA90 35.0 dB(A)													
1	98.0	0	0	0.0	808.83	69.1	-1.3		0.0	3.0	0.0	27.1	25.1
2	98.0	0	0	0.0	795.42	69.0	-1.3		0.0	3.0	0.0	27.3	25.3
3	98.0	0	0	0.0	788.37	68.9	-1.3		0.0	3.0	0.0	27.4	25.4
4	98.0	0	0	0.0	790.19	68.9	-1.3		0.0	3.0	0.0	27.4	25.4
5	98.0	0	0	0.0	797.16	69.0	-1.3		0.0	3.0	0.0	27.3	25.3
6	98.0	0	0	0.0	814.58	69.2	-1.3		0.0	3.0	0.0	27.0	25.0
7	98.0	0	0	0.0	991.12	70.9	-1.3		0.0	3.5	0.0	24.9	22.9
8	98.0	0	0	0.0	1007.49	71.1	-1.3		0.0	3.5	0.0	24.7	22.7
9	98.0	0	0	0.0	1031.17	71.3	-1.3		0.0	3.6	0.0	24.5	22.5
10	98.0	0	0	0.0	1055.92	71.5	-1.3		0.0	3.6	0.0	24.2	22.2
11	98.0	0	0	0.0	1087.40	71.7	-1.3		0.0	3.7	0.0	23.9	21.9
12	98.0	0	0	0.0	1120.79	72.0	-1.3		0.0	3.8	0.0	23.5	21.5
13	98.0	0	0	0.0	1159.10	72.3	-1.3		0.0	3.8	0.0	23.2	21.2

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Propagation Calculation -  
Royd Moor  
Reference Sound Power Level 98 dB(A)

Source	Lw dB(A)	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Lr dB(A)	LA90 dB(A)
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Name	Sledbrook House	LAeq 26.5 dB(A)		LA90 24.5 dB(A)									
1	98.0	0	0	0.0	1827.32	76.2	-1.8		0.0	5.2	0.0	18.4	16.4
2	98.0	0	0	0.0	1892.32	76.5	-1.9		0.0	5.3	0.0	18.1	16.1
3	98.0	0	0	0.0	1957.00	76.8	-1.9		0.0	5.4	0.0	17.7	15.7
4	98.0	0	0	0.0	2025.17	77.1	-1.9		1.9	5.3	0.0	15.6	13.6
5	98.0	0	0	0.0	2092.15	77.4	-2.0		2.0	5.4	0.0	15.2	13.2
6	98.0	0	0	0.0	2165.79	77.7	-2.0		2.0	5.5	0.0	14.8	12.8
7	98.0	0	0	0.0	2243.09	78.0	-2.0		2.0	5.7	0.0	14.3	12.3
8	98.0	0	0	0.0	2306.47	78.3	-2.0		2.0	5.8	0.0	14.0	12.0
9	98.0	0	0	0.0	2371.48	78.5	-2.1		2.1	5.9	0.0	13.6	11.6
10	98.0	0	0	0.0	2435.00	78.7	-2.1		2.1	6.0	0.0	13.3	11.3
11	98.0	0	0	0.0	2499.87	79.0	-2.1		2.1	6.1	0.0	13.0	11.0
12	98.0	0	0	0.0	2564.24	79.2	-2.1		2.1	6.2	0.0	12.7	10.7
13	98.0	0	0	0.0	2629.97	79.4	-2.1		2.1	6.3	0.0	12.3	10.3

Name	Small Shaw	LAeq 41.8 dB(A)		LA90 39.8 dB(A)									
1	98.0	0	0	0.0	690.97	67.8	-1.3		0.0	2.7	0.0	28.8	26.8
2	98.0	0	0	0.0	632.33	67.0	-1.3		0.0	2.6	0.0	29.7	27.7
3	98.0	0	0	0.0	577.57	66.2	-1.3		0.0	2.4	0.0	30.7	28.7
4	98.0	0	0	0.0	527.26	65.4	-1.3		0.0	2.3	0.0	31.6	29.6
5	98.0	0	0	0.0	482.99	64.7	-1.3		0.0	2.1	0.0	32.5	30.5
6	98.0	0	0	0.0	446.95	64.0	-1.3		0.0	2.0	0.0	33.3	31.3
7	98.0	0	0	0.0	621.26	66.9	-1.3		0.0	2.5	0.0	29.9	27.9
8	98.0	0	0	0.0	603.59	66.6	-1.3		0.0	2.5	0.0	30.2	28.2
9	98.0	0	0	0.0	597.15	66.5	-1.3		0.0	2.5	0.0	30.3	28.3
10	98.0	0	0	0.0	595.98	66.5	-1.3		0.0	2.5	0.0	30.3	28.3
11	98.0	0	0	0.0	606.36	66.6	-1.3		0.0	2.5	0.0	30.2	28.2
12	98.0	0	0	0.0	622.93	66.9	-1.3		0.0	2.5	0.0	29.9	27.9
13	98.0	0	0	0.0	648.63	67.2	-1.3		0.0	2.6	0.0	29.5	27.5

Name	Spicer House	LAeq 35.4 dB(A)		LA90 33.4 dB(A)									
1	98.0	0	0	0.0	899.61	70.1	-1.3		0.0	3.2	0.0	26.0	24.0
2	98.0	0	0	0.0	931.00	70.4	-1.3		0.0	3.3	0.0	25.6	23.6
3	98.0	0	0	0.0	967.07	70.7	-1.3		0.0	3.4	0.0	25.2	23.2
4	98.0	0	0	0.0	1006.31	71.0	-1.3		0.0	3.5	0.0	24.7	22.7
5	98.0	0	0	0.0	1051.69	71.4	-1.3		0.0	3.6	0.0	24.3	22.3
6	98.0	0	0	0.0	1102.74	71.8	-1.3		0.0	3.7	0.0	23.7	21.7
7	98.0	0	0	0.0	965.26	70.7	-1.3		0.0	3.4	0.0	25.2	23.2
8	98.0	0	0	0.0	1020.51	71.2	-1.3		0.0	3.5	0.0	24.6	22.6
9	98.0	0	0	0.0	1076.71	71.6	-1.3		0.0	3.7	0.0	24.0	22.0
10	98.0	0	0	0.0	1136.57	72.1	-1.3		0.0	3.8	0.0	23.4	21.4
11	98.0	0	0	0.0	1195.63	72.5	-1.3		0.0	3.9	0.0	22.9	20.9
12	98.0	0	0	0.0	1257.28	73.0	-1.4		0.0	4.0	0.0	22.4	20.4
13	98.0	0	0	0.0	1319.72	73.4	-1.5		0.0	4.2	0.0	21.9	19.9

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Propagation Calculation -  
 Royd Moor  
 Reference Sound Power Level 98 dB(A)

Source	Lw dB(A)	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Lr dB(A)	LA90 dB(A)
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Name	The Lanes	LAeq 36.6 dB(A)		LA90 34.6 dB(A)									
1	98.0	0	0	0.0	766.82	68.7	-1.3		0.0	2.9	0.0	27.7	25.7
2	98.0	0	0	0.0	775.16	68.8	-1.3		0.0	2.9	0.0	27.6	25.6
3	98.0	0	0	0.0	789.76	68.9	-1.3		0.0	3.0	0.0	27.4	25.4
4	98.0	0	0	0.0	813.39	69.2	-1.3		0.0	3.0	0.0	27.1	25.1
5	98.0	0	0	0.0	841.02	69.5	-1.3		0.0	3.1	0.0	26.7	24.7
6	98.0	0	0	0.0	878.95	69.9	-1.3		0.0	3.2	0.0	26.2	24.2
7	98.0	0	0	0.0	1038.75	71.3	-1.3		0.0	3.6	0.0	24.4	22.4
8	98.0	0	0	0.0	1070.13	71.6	-1.3		0.0	3.6	0.0	24.1	22.1
9	98.0	0	0	0.0	1107.54	71.9	-1.3		0.0	3.7	0.0	23.7	21.7
10	98.0	0	0	0.0	1145.22	72.2	-1.3		0.0	3.8	0.0	23.3	21.3
11	98.0	0	0	0.0	1188.22	72.5	-1.3		0.0	3.9	0.0	22.9	20.9
12	98.0	0	0	0.0	1232.31	72.8	-1.4		0.0	4.0	0.0	22.6	20.6
13	98.0	0	0	0.0	1280.24	73.1	-1.4		0.0	4.1	0.0	22.2	20.2

Name	Whitley House	LAeq 41.9 dB(A)		LA90 39.9 dB(A)									
1	98.0	0	0	0.0	1081.28	71.7	-1.3		0.0	3.7	0.0	23.9	21.9
2	98.0	0	0	0.0	1006.19	71.0	-1.3		0.0	3.5	0.0	24.7	22.7
3	98.0	0	0	0.0	931.90	70.4	-1.3		0.0	3.3	0.0	25.6	23.6
4	98.0	0	0	0.0	855.18	69.6	-1.3		0.0	3.1	0.0	26.5	24.5
5	98.0	0	0	0.0	779.57	68.8	-1.3		0.0	2.9	0.0	27.5	25.5
6	98.0	0	0	0.0	698.30	67.9	-1.3		0.0	2.7	0.0	28.7	26.7
7	98.0	0	0	0.0	732.88	68.3	-1.3		0.0	2.8	0.0	28.2	26.2
8	98.0	0	0	0.0	662.60	67.4	-1.3		0.0	2.6	0.0	29.2	27.2
9	98.0	0	0	0.0	594.04	66.5	-1.3		0.0	2.5	0.0	30.4	28.4
10	98.0	0	0	0.0	525.61	65.4	-1.3		0.0	2.3	0.0	31.6	29.6
11	98.0	0	0	0.0	460.15	64.3	-1.3		0.0	2.1	0.0	33.0	31.0
12	98.0	0	0	0.0	395.89	62.9	-1.3		0.0	1.9	0.0	34.5	32.5
13	98.0	0	0	0.0	335.35	61.5	-1.3		0.0	1.6	0.0	36.2	34.2

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**Project description**

Project title: Spicer Hill Wind Farm  
Engineer: Michael Reid  
Customer: JG Pears Ltd

Description:

**Run description**

Calculation type: Single Point Sound  
Title: point hazelhead 4.0m mixed ground  
Run file: calcs.runx  
Result number: 23  
Calculation start: 15/04/2009 13:25:47  
Calculation end: 15/04/2009 13:25:58  
Calculation time: 00:00:078 [m:s:ms]  
No. of points: 14  
No. of calculated points: 14  
Kernel version: 14/04/2009

**Run parameters**

Angle increment: 1.00 deg  
Reflection depth: 0  
Number of reflections: 3  
Maximal search radius: 10000  
Weighting: dB(A)  
Source side reflection precalculation enabled

Standards:

Industry: ISO 9613-2 : 1996  
Air absorption: ISO 9613  
Limitation of screening loss:

single/multiple 0 dB /0 dB

Environment:

Air pressure 1013.25 mbar  
rel. Humidity 70 %  
Temperature 10 °C

Meteo. Corr. C0(7-19h)[dB]=0.0; C0(19-23h)[dB]=0.0; C0(23-7h)[dB]=0.0;

VDI-Parameters for diffraction

C1=3 C2=20

Dissection parameters:

Distance to diameter factor 2  
Minimal Distance [m] 1 m  
Max. Difference GND+Diffraction 1 dB  
Max. No. of Iterations 4

Model Settings  
Hazelhead

Assessment: ESTU-R-97

Reflection of "own" facade is suppressed

Geometry data

RDGM9999.dgm	26/11/2007 14:58:02
hazelhead.geo	26/03/2008 17:17:04
mixed ground.geo	14/04/2009 10:04:08
receivers 4 m 20090320.geo	15/04/2009 13:24:56

Receiver Predictions  
Hazelhead  
Reference Sound Power Level 105.3 dB(A)

Name	X m	Y m	Z m	TH m	LA90 dB(A)	
Annat Royd	421319.000	404955.000	300.62	296.62	19.4	
Brown's Edge	420431.000	405746.000	302.49	298.49	21.6	
Carr House	421318.000	403988.000	287.57	283.57	21.4	
Eagle Nest	420948.000	404239.000	318.24	314.24	22.9	
Far Royd Moor	421786.000	404783.000	275.25	271.25	17.8	
Flash House Farm 1	420517.000	403855.000	278.32	274.32	24.0	
Flash House Farm 2	420366.000	403847.000	286.69	282.69	25.4	
Green Gate	420742.000	406043.000	282.87	278.87	19.8	
Illian's Cottage	420170.000	403920.000	294.46	290.46	26.4	
Sledbrook House	418562.000	404629.000	310.92	306.92	38.8	
Small Shaw	420679.000	404074.000	294.16	290.16	23.3	
Spicer House	420481.000	405587.000	305.75	301.75	21.8	
The Lanes	419980.000	404049.000	304.00	300.00	27.6	
Whitley House	421332.000	404172.000	324.00	320.00	20.5	

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Source Details  
Hazelhead  
Reference Sound Power Level 105.3 dB(A)

Sourc	X	Y	Z	Lw	KI	KT	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1,25 kHz	1,6 kHz	2 kHz	2,5 kHz	3,15 kHz	4 kHz	5 kHz	6,3 kHz	8 kHz	10 kHz
1	418310.00	404080.00	381.55	105.3	0	0	75.6	77.7	81.0	83.8	86.5	88.2	91.0	93.5	94.6	95.6	95.7	95.4	94.4	93.2	94.7	93.2	93.2	92.1	90.4	87.2	82.2	74.6	67.3	62.4
2	417942.00	404270.00	380.00	105.3	0	0	75.6	77.7	81.0	83.8	86.5	88.2	91.0	93.5	94.6	95.6	95.7	95.4	94.4	93.2	94.7	93.2	93.2	92.1	90.4	87.2	82.2	74.6	67.3	62.4
3	417604.00	404390.00	388.99	105.3	0	0	75.6	77.7	81.0	83.8	86.5	88.2	91.0	93.5	94.6	95.6	95.7	95.4	94.4	93.2	94.7	93.2	93.2	92.1	90.4	87.2	82.2	74.6	67.3	62.4

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Propagation Calculation -  
Hazelhead  
Reference Sound Power Level 105.3 dB(A)

Source	Lw dB(A)	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Lr dB(A)	LA90 dB(A)
<b>Name Annat Royd</b> LAeq 21.4 dB(A) LA90 19.4 dB(A)													
1	105.3	0	0	0.0	3134.69	80.9	-1.9		1.9	6.7	0.0	17.8	15.8
2	105.3	0	0	0.0	3446.69	81.7	-1.9		1.9	7.1	0.0	16.5	14.5
3	105.3	0	0	0.0	3758.76	82.5	-2.0		2.0	7.5	0.0	15.3	13.3
<b>Name Brown's Edge</b> LAeq 23.6 dB(A) LA90 21.6 dB(A)													
1	105.3	0	0	0.0	2698.23	79.6	-1.7		1.7	6.0	0.0	19.7	17.7
2	105.3	0	0	0.0	2894.77	80.2	-1.8		1.8	6.3	0.0	18.8	16.8
3	105.3	0	0	0.0	3136.58	80.9	-1.9		1.9	6.7	0.0	17.8	15.8
<b>Name Carr House</b> LAeq 23.4 dB(A) LA90 21.4 dB(A)													
1	105.3	0	0	0.0	3010.87	80.6	-1.8		0.0	6.8	0.0	19.9	17.9
2	105.3	0	0	0.0	3389.02	81.6	-1.9		0.0	7.3	0.0	18.4	16.4
3	105.3	0	0	0.0	3737.07	82.4	-2.0		0.0	7.8	0.0	17.1	15.1
<b>Name Eagle Nest</b> LAeq 24.9 dB(A) LA90 22.9 dB(A)													
1	105.3	0	0	0.0	2643.55	79.4	-1.7		0.0	6.2	0.0	21.4	19.4
2	105.3	0	0	0.0	3006.80	80.6	-1.8		0.0	6.7	0.0	19.9	17.9
3	105.3	0	0	0.0	3348.16	81.5	-1.9		0.0	7.3	0.0	18.5	16.5
<b>Name Far Royd Moor</b> LAeq 19.8 dB(A) LA90 17.8 dB(A)													
1	105.3	0	0	0.0	3547.97	82.0	-2.0		2.0	7.2	0.0	16.1	14.1
2	105.3	0	0	0.0	3879.49	82.8	-2.0		2.0	7.7	0.0	14.9	12.9
3	105.3	0	0	0.0	4201.96	83.5	-2.1		2.1	8.1	0.0	13.8	11.8
<b>Name Flash House Farm 1</b> LAeq 26.0 dB(A) LA90 24.0 dB(A)													
1	105.3	0	0	0.0	2220.84	77.9	-1.5		0.0	5.5	0.0	23.4	21.4
2	105.3	0	0	0.0	2610.21	79.3	-1.7		1.7	5.9	0.0	20.1	18.1
3	105.3	0	0	0.0	2963.79	80.4	-1.8		1.8	6.4	0.0	18.5	16.5
<b>Name Flash House Farm 2</b> LAeq 27.4 dB(A) LA90 25.4 dB(A)													
1	105.3	0	0	0.0	2071.33	77.3	-1.4		0.0	5.2	0.0	24.2	22.2
2	105.3	0	0	0.0	2462.40	78.8	-1.6		0.0	5.9	0.0	22.3	20.3
3	105.3	0	0	0.0	2816.73	80.0	-1.8		0.0	6.4	0.0	20.7	18.7
<b>Name Green Gate</b> LAeq 21.8 dB(A) LA90 19.8 dB(A)													
1	105.3	0	0	0.0	3126.94	80.9	-1.9		1.9	6.6	0.0	17.8	15.8
2	105.3	0	0	0.0	3315.56	81.4	-1.9		1.9	6.9	0.0	17.0	15.0
3	105.3	0	0	0.0	3548.34	82.0	-2.0		2.0	7.2	0.0	16.1	14.1
<b>Name Illian's Cottage</b> LAeq 28.4 dB(A) LA90 26.4 dB(A)													
1	105.3	0	0	0.0	1868.90	76.4	-1.3		0.0	4.8	0.0	25.3	23.3
2	105.3	0	0	0.0	2256.94	78.1	-1.5		0.0	5.5	0.0	23.2	21.2
3	105.3	0	0	0.0	2610.40	79.3	-1.7		0.0	6.1	0.0	21.6	19.6
<b>Name Sledbrook House</b> LAeq 40.8 dB(A) LA90 38.8 dB(A)													
1	105.3	0	0	0.0	608.19	66.7	-1.3		0.0	2.1	0.0	37.8	35.8
2	105.3	0	0	0.0	719.76	68.1	-1.3		0.0	2.4	0.0	36.1	34.1
3	105.3	0	0	0.0	990.44	70.9	-1.3		0.0	3.1	0.0	32.6	30.6
<b>Name Small Shaw</b> LAeq 25.3 dB(A) LA90 23.3 dB(A)													
1	105.3	0	0	0.0	2370.62	78.5	-1.6		0.0	5.7	0.0	22.7	20.7
2	105.3	0	0	0.0	2745.35	79.8	-1.7		1.7	6.1	0.0	19.5	17.5
3	105.3	0	0	0.0	3092.65	80.8	-1.8		1.8	6.6	0.0	18.0	16.0

Propagation Calculation -  
Hazelhead  
Reference Sound Power Level 105.3 dB(A)

Source	Lw dB(A)	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Lr dB(A)	LA90 dB(A)
<b>Name Spicer House</b> LAeq 23.8 dB(A) LA90 21.8 dB(A)													
1	105.3	0	0	0.0	2643.87	79.4	-1.7		1.7	5.9	0.0	20.0	18.0
2	105.3	0	0	0.0	2861.21	80.1	-1.8		1.8	6.2	0.0	19.0	17.0
3	105.3	0	0	0.0	3117.19	80.9	-1.9		1.9	6.6	0.0	17.9	15.9
<b>Name The Lanes</b> LAeq 29.6 dB(A) LA90 27.6 dB(A)													
1	105.3	0	0	0.0	1672.09	75.5	-1.3		0.0	4.5	0.0	26.7	24.7
2	105.3	0	0	0.0	2051.36	77.2	-1.4		0.0	5.2	0.0	24.3	22.3
3	105.3	0	0	0.0	2401.85	78.6	-1.6		0.0	5.8	0.0	22.5	20.5
<b>Name Whitley House</b> LAeq 22.5 dB(A) LA90 20.5 dB(A)													
1	105.3	0	0	0.0	3023.95	80.6	-1.8		0.0	6.8	0.0	19.8	17.8
2	105.3	0	0	0.0	3391.88	81.6	-1.9		1.9	7.0	0.0	16.7	14.7
3	105.3	0	0	0.0	3734.93	82.4	-2.0		2.0	7.5	0.0	15.4	13.4

### Project description

Project title: Spicer Hill Wind Farm  
Engineer: Michael Reid  
Customer: JG Pears Ltd

Description:

### Run description

Calculation type: Single Point Sound  
Title: point blackstone 4.0m mixed ground 20090320  
Run file: calcs.runx  
Result number: 24  
Calculation start: 15/04/2009 15:34:55  
Calculation end: 15/04/2009 15:35:05  
Calculation time: 00:00:297 [m:s:ms]  
No. of points: 14  
No. of calculated points: 14  
Kernel version: 14/04/2009

### Run parameters

Angle increment: 1.00 deg  
Reflection depth: 0  
Number of reflections: 3  
Maximal search radius: 5000  
Weighting: dB(A)  
Source side reflection precalculation enabled

#### Standards:

Industry: ISO 9613-2 : 1996  
Air absorption: ISO 9613  
Limitation of screening loss:

single/multiple                      0 dB /0 dB

#### Environment:

Air pressure                              1013.25 mbar  
rel. Humidity                              70 %  
Temperature                                10 °C

Meteo. Corr. C0(7-19h)[dB]=0.0; C0(19-23h)[dB]=0.0; C0(23-7h)[dB]=0.0;

#### VDI-Parameters for diffraction

C1=3 C2=20

#### Dissection parameters:

Distance to diameter factor    2  
Minimal Distance [m]            1 m  
Max. Difference GND+Diffraction                              1 dB  
Max. No. of Iterations            4

Model Settings  
Blackstone Edge

Assessment: ESTU-R-97

Reflection of "own" facade is suppressed

Geometry data

RDGM9999.dgm	26/11/2007 14:58:02
BLACKSTONE.geo	26/03/2008 16:43:08
mixed ground.geo	14/04/2009 10:04:08
receivers 4 m 20090320.geo	15/04/2009 13:24:56

Receiver Predictions  
 Blackstone Edge  
 Reference Sound Power Level 106.2 dB(A)

Name	X m	Y m	Z m	TH m	LA90 dB(A)	
Annat Royd	421319.000	404955.000	300.62	296.62	31.5	
Brown's Edge	420431.000	405746.000	302.49	298.49	38.1	
Carr House	421318.000	403988.000	287.57	283.57	28.2	
Eagle Nest	420948.000	404239.000	318.24	314.24	31.7	
Far Royd Moor	421786.000	404783.000	275.25	271.25	28.6	
Flash House Farm 1	420517.000	403855.000	278.32	274.32	31.0	
Flash House Farm 2	420366.000	403847.000	286.69	282.69	31.8	
Green Gate	420742.000	406043.000	282.87	278.87	34.2	
Illian's Cottage	420170.000	403920.000	294.46	290.46	32.8	
Sledbrook House	418562.000	404629.000	310.92	306.92	34.0	
Small Shaw	420679.000	404074.000	294.16	290.16	32.0	
Spicer House	420481.000	405587.000	305.75	301.75	38.5	
The Lanes	419980.000	404049.000	304.00	300.00	34.2	
Whitley House	421332.000	404172.000	324.00	320.00	29.6	

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Source Details  
 Blackstone Edge  
 Reference Sound Power Level 106.2 dB(A)

Source	X	Y	Z	Lw	KI	KT	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1,25 kHz	1,6 kHz	2 kHz	2,5 kHz	3,15 kHz	4 kHz	5 kHz	6,3 kHz	8 kHz	10 kHz
1	419565.00	405226.00	418.10	106.2	0	0	78.8	83.0	87.1	90.7	93.6	95.1	97.2	97.1	96.6	96.5	94.7	93.7	92.9	92.1	91.8	92.3	90.7	88.5	85.5	83.2	78.5	74.3	67.4	60.7
2	419555.00	405538.00	402.87	106.2	0	0	78.8	83.0	87.1	90.7	93.6	95.1	97.2	97.1	96.6	96.5	94.7	93.7	92.9	92.1	91.8	92.3	90.7	88.5	85.5	83.2	78.5	74.3	67.4	60.7
3	419868.00	405197.00	420.00	106.2	0	0	78.8	83.0	87.1	90.7	93.6	95.1	97.2	97.1	96.6	96.5	94.7	93.7	92.9	92.1	91.8	92.3	90.7	88.5	85.5	83.2	78.5	74.3	67.4	60.7

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Propagation Calculation -  
Blackstone Edge  
Reference Sound Power Level 106.2 dB(A)

Source	Lw dB(A)	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Lr dB(A)	LA90 dB(A)
<b>Name Annat Royd LAeq 33.5 dB(A) LA90 31.5 dB(A)</b>													
1	106.2	0	0	0.0	1778.70	76.0	-0.9		0.0	3.0	0.0	28.1	26.1
2	106.2	0	0	0.0	1860.66	76.4	-0.9		0.0	3.1	0.0	27.6	25.6
3	106.2	0	0	0.0	1475.88	74.4	-0.9		0.0	2.6	0.0	30.1	28.1
<b>Name Brown's Edge LAeq 40.1 dB(A) LA90 38.1 dB(A)</b>													
1	106.2	0	0	0.0	1016.72	71.1	-0.9		0.0	2.0	0.0	34.0	32.0
2	106.2	0	0	0.0	905.93	70.1	-0.9		0.0	1.8	0.0	35.2	33.2
3	106.2	0	0	0.0	795.10	69.0	-0.9		0.0	1.6	0.0	36.5	34.5
<b>Name Carr House LAeq 30.2 dB(A) LA90 28.2 dB(A)</b>													
1	106.2	0	0	0.0	2150.04	77.6	-0.9		1.0	3.3	0.0	25.2	23.2
2	106.2	0	0	0.0	2350.31	78.4	-0.9		1.0	3.5	0.0	24.2	22.2
3	106.2	0	0	0.0	1892.54	76.5	-0.9		1.0	3.0	0.0	26.6	24.6
<b>Name Eagle Nest LAeq 33.7 dB(A) LA90 31.7 dB(A)</b>													
1	106.2	0	0	0.0	1702.01	75.6	-0.9		0.0	2.9	0.0	28.6	26.6
2	106.2	0	0	0.0	1906.57	76.6	-0.9		0.0	3.2	0.0	27.3	25.3
3	106.2	0	0	0.0	1447.25	74.2	-0.9		0.0	2.6	0.0	30.3	28.3
<b>Name Far Royd Moor LAeq 30.6 dB(A) LA90 28.6 dB(A)</b>													
1	106.2	0	0	0.0	2269.25	78.1	-0.9		0.0	3.6	0.0	25.4	23.4
2	106.2	0	0	0.0	2358.74	78.4	-0.9		0.0	3.7	0.0	24.9	22.9
3	106.2	0	0	0.0	1967.50	76.9	-0.9		0.0	3.2	0.0	27.0	25.0
<b>Name Flash House Farm 1 LAeq 33.0 dB(A) LA90 31.0 dB(A)</b>													
1	106.2	0	0	0.0	1674.96	75.5	-0.9		0.0	2.9	0.0	28.8	26.8
2	106.2	0	0	0.0	1942.54	76.8	-0.9		1.0	3.0	0.0	26.3	24.3
3	106.2	0	0	0.0	1497.41	74.5	-0.9		1.0	2.5	0.0	29.2	27.2
<b>Name Flash House Farm 2 LAeq 33.8 dB(A) LA90 31.8 dB(A)</b>													
1	106.2	0	0	0.0	1600.16	75.1	-0.9		0.0	2.8	0.0	29.3	27.3
2	106.2	0	0	0.0	1879.01	76.5	-0.9		1.0	2.9	0.0	26.7	24.7
3	106.2	0	0	0.0	1445.09	74.2	-0.9		0.0	2.6	0.0	30.4	28.4
<b>Name Green Gate LAeq 36.2 dB(A) LA90 34.2 dB(A)</b>													
1	106.2	0	0	0.0	1439.13	74.2	-0.9		0.0	2.6	0.0	30.4	28.4
2	106.2	0	0	0.0	1295.53	73.2	-0.9		0.0	2.4	0.0	31.5	29.5
3	106.2	0	0	0.0	1224.09	72.7	-0.9		0.0	2.3	0.0	32.1	30.1
<b>Name Illian's Cottage LAeq 34.8 dB(A) LA90 32.8 dB(A)</b>													
1	106.2	0	0	0.0	1444.63	74.2	-0.9		0.0	2.6	0.0	30.4	28.4
2	106.2	0	0	0.0	1734.33	75.8	-0.9		1.0	2.8	0.0	27.6	25.6
3	106.2	0	0	0.0	1318.22	73.4	-0.9		0.0	2.4	0.0	31.3	29.3
<b>Name Sledbrook House LAeq 36.0 dB(A) LA90 34.0 dB(A)</b>													
1	106.2	0	0	0.0	1172.14	72.4	-0.9		0.0	2.2	0.0	32.6	30.6
2	106.2	0	0	0.0	1349.36	73.6	-0.9		0.0	2.4	0.0	31.1	29.1
3	106.2	0	0	0.0	1428.34	74.1	-0.9		1.0	2.4	0.0	29.7	27.7
<b>Name Small Shaw LAeq 34.0 dB(A) LA90 32.0 dB(A)</b>													
1	106.2	0	0	0.0	1607.32	75.1	-0.9		0.0	2.8	0.0	29.2	27.2
2	106.2	0	0	0.0	1848.92	76.3	-0.9		1.0	2.9	0.0	26.9	24.9
3	106.2	0	0	0.0	1390.93	73.9	-0.9		0.0	2.5	0.0	30.8	28.8

Propagation Calculation -  
Blackstone Edge  
Reference Sound Power Level 106.2 dB(A)

Source	Lw dB(A)	KI dB	KT dB	Ko dB	s m	Adiv dB	Agr dB	Amisc dB	Abar dB	Aatm dB	DI dB	Lr dB(A)	LA90 dB(A)
Name Spicer House		LAeq 40.5 dB(A)		LA90 38.5 dB(A)									
1	106.2	0	0	0.0	990.96	70.9	-0.9		0.0	1.9	0.0	34.3	32.3
2	106.2	0	0	0.0	932.37	70.4	-0.9		0.0	1.8	0.0	34.9	32.9
3	106.2	0	0	0.0	735.47	68.3	-0.9		0.0	1.5	0.0	37.3	35.3
Name The Lanes		LAeq 36.2 dB(A)		LA90 34.2 dB(A)									
1	106.2	0	0	0.0	1253.23	73.0	-0.9		0.0	2.3	0.0	31.9	29.9
2	106.2	0	0	0.0	1551.62	74.8	-0.9		1.0	2.5	0.0	28.8	26.8
3	106.2	0	0	0.0	1159.27	72.3	-0.9		0.0	2.2	0.0	32.7	30.7
Name Whitley House		LAeq 31.6 dB(A)		LA90 29.6 dB(A)									
1	106.2	0	0	0.0	2059.63	77.3	-0.9		0.0	3.4	0.0	26.5	24.5
2	106.2	0	0	0.0	2242.75	78.0	-0.9		0.0	3.6	0.0	25.5	23.5
3	106.2	0	0	0.0	1789.73	76.0	-0.9		0.0	3.0	0.0	28.0	26.0

Propagation Calculation -  
Blackstone Edge  
Reference Sound Power Level 106.2 dB(A)

**Legend**

Source		Source name
Lw	dB(A)	Sound power per unit
KI	dB	Correction for impulsiveness
KT	dB	Correction for tonality
Ko	dB	Correction for non spherical emission
s	m	Distance source - receiver
Adiv	dB	Mean spreading loss
Agr	dB	Mean ground effect
Amisc	dB	Miscellaneous losses (mitigation, ...)
Abar	dB	Mean barrier loss
Aatm	dB	Mean air absorption loss
DI	dB	Directivity correction
Lr	dB(A)	Leq
LA90	dB(A)	LA90