



Noise Assessment

Land off Stocking Lane, Shenington

For:
ELAN Homes Strategic Land Limited
MAN.1947.001.NO.R.001

'Experience and expertise working in union'



Contact Details:

Enzygo Ltd.
Samuel House,
5 Fox Valley Way
Stocksbridge
Sheffield
S36 2AA

tel: 0114 321 5151
email: acoustics@enzygo.com
www: enzygo.com

Noise Assessment

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For:	ELAN Homes Strategic Land Limited
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Author:	Edward Barnett BSc MIOA
Reviewer:	Darren Lafon-Anthony MSc MIOA FIQ

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Enzygo Limited Registered in England No. 6525159
Registered Office Stag House Chipping Wotton-Under-Edge Gloucestershire GL12 7AD

Contents

1 Introduction.....	4
2 Standards and Guidance	6
3 Baseline Noise Monitoring Survey	7
4 Noise Assessment.....	11
5 Conclusion	13
Glossary of Terminology	14

Tables & Figures

Figure 1-1: Site and Surrounding Area.....	5
Table 3-1: Noise Monitoring Location	7
Table 3-2: Survey Equipment.....	7
Figure 3-1: Noise Monitoring Location	8
Figure 3-2: Measured Survey Data	9
Table 3-3: Attended Noise Survey Results.....	10
Table 4-1: Measured Noise Level at the Assessment Location	11
Table 4-2: Indoor Noise Level Assessment	11

1 Introduction

1.1 Project Introduction

- 1.1.1 Enzygo Limited has been commissioned by ELAN Homes Strategic Land Limited to undertake an environmental noise impact assessment to support a planning application for a new residential development on land off Stocking Lane in Shenington, Banbury.
- 1.1.2 The assessment has been undertaken to assess the suitability of the site for residential occupation in accordance with the relevant standards and to provide outline mitigation advice where considered necessary.
- 1.1.3 Details of the assessment methodology employed, together with the results of the baseline survey, assessment and conclusions are presented within this report.

1.2 Site Description

- 1.2.1 The site is located on Stocking Lane in Shenington, Banbury and comprises an agricultural field.
- 1.2.2 Immediately to the north is Stocking Lane with residential properties beyond. Immediately to the east are further residential properties with the centre of the village of Shenington beyond. To the south-east is Rattlecombe Road with further residential properties beyond. To the south-west are fields and to the north-west is Shenington Church of England Primary School.
- 1.2.3 Shenington Kart Racing Club is approximately 710m to the west and Edgehill Gliding Centre, which is based at Shenington Airfield, is approximately 1.1km to the north-west. The site and surrounding area are shown in Figure 1-1.

1.3 Local Authority Consultation

- 1.3.1 Pre-application advice has been provided by the Local Authority (21/02693/PREAPP). The advice states that as the site is located near to an airfield and karting circuit, a noise assessment would be required to ensure the noise climate is acceptable for a new residential development.
- 1.3.2 Following the pre-app advice, a discussion has taken place with Neil Whitton at Cherwell District Council. It was agreed that a noise survey would be conducted for at least 2-hours during a period when the karting track and the airfield are operational. It was agreed that, as the karting track and airfield are understood to be operational during the daytime period only, the noise survey and assessment would consider the daytime period only.
- 1.3.3 It was also agreed that the measured noise levels would be compared to the recommended internal and external noise levels for residential dwellings specified in BS8233:2014 *Guidance on sound insulation and noise reduction for buildings*.

Figure 1-1: Site and Surrounding Area



1.4 Noise Assessment Methodology

- 1.4.1 The suitability of the site for residential occupation has been assessed in accordance with the guidance contained in British Standard 8233:2014 *Guidance on sound insulation and noise reduction for buildings* (BS8233).
- 1.4.2 The measured noise levels from the survey have been used to provide an indicative assessment of existing noise levels across the proposed development site in accordance with BS8233:2014 which recommends noise levels inside and outside dwellings.

2 Standards and Guidance

2.1 BS8233:2014 *Guidance on sound insulation and noise reduction for buildings*

2.1.1 BS8233:2014 provides guidance on noise control in and around buildings. The document includes recommended noise levels for external amenity areas, inside dwellings, and the typical noise reduction offered through a façade with a partially open window.

2.1.2 The Standard suggests suitable guidance values for residential dwellings shown in Table 2-1.

Table 2-1: BS8233 Indoor Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00 Hours	23:00 to 07:00 Hours
Resting	Living room	35dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$

2.1.3 The guidance suggests that the level of noise reduction provided by a façade with a partially open window for ventilation to be approximately 15dB.

2.1.4 The Standard also states that it is desirable for noise levels in external amenity areas, such as gardens, do not exceed 50dB $L_{Aeq,16hr}$, with an upper guideline value of 55dB $L_{Aeq,16hr}$.

3 Baseline Noise Monitoring Survey

3.1 Baseline Noise Survey

- 3.1.1 An attended baseline noise survey was undertaken between approximately 10:20 hours and 13:00 hours on Saturday 20th November 2021.
- 3.1.2 The noise survey was conducted during a period when Shenington Karting Track was hosting the IAME Cadet, ROTAX Libre and KZ Gearbox final rounds of the British Kart Championships 2021.
- 3.1.3 The measurement microphone was mounted on a tripod approximately 1.5m above local ground level with a windshield, in free-field conditions.
- 3.1.4 The monitoring location used for the survey is detailed in Table 3-1 and shown in Figure 3-1 below.

Table 3-1: Noise Monitoring Location

Location Reference	Attended/ Unattended	Grid Ref (NGR)
MP1	Attended	436835, 242754

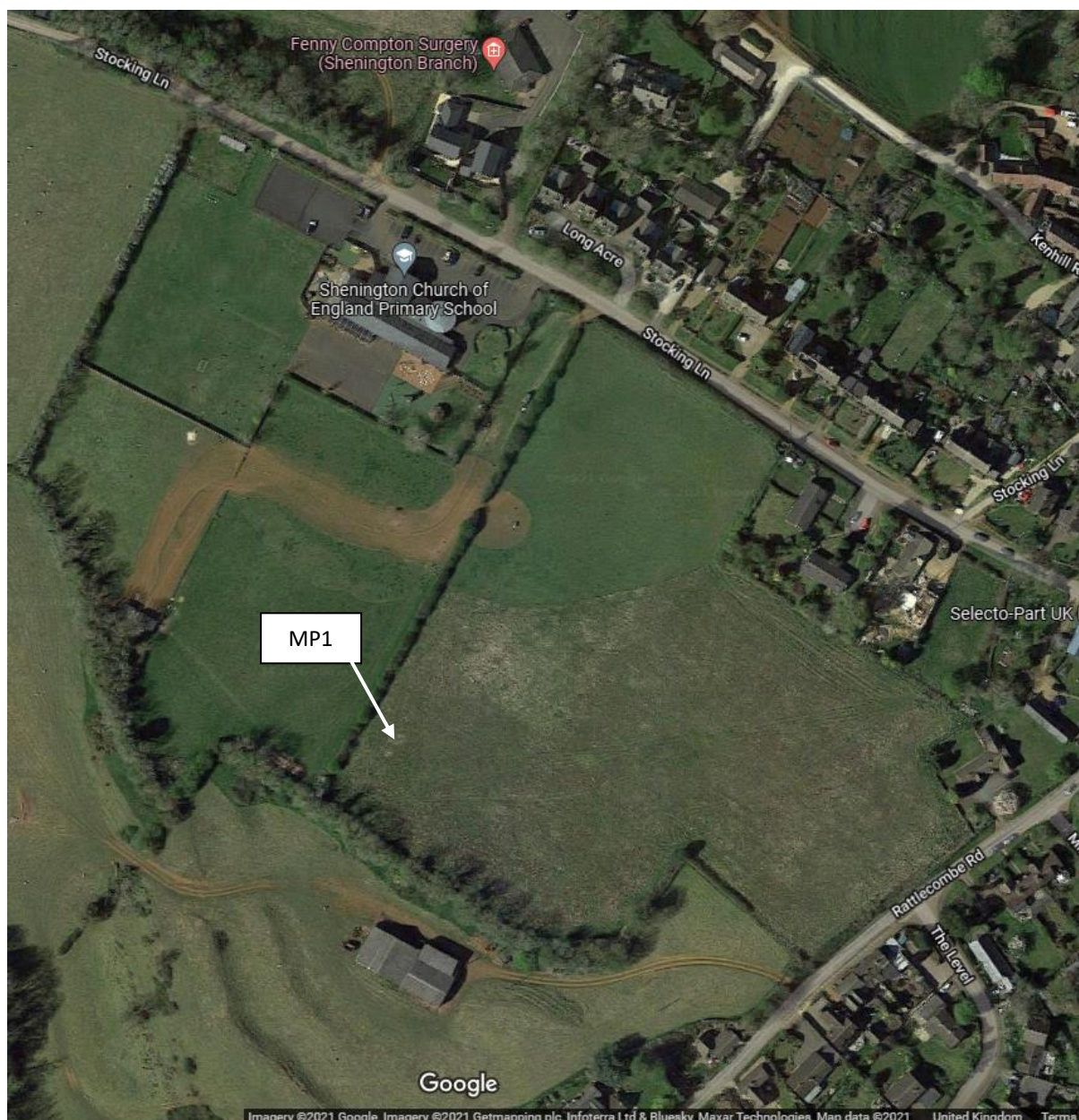
- 3.1.5 The noise monitoring equipment used during the survey is shown in Table 3-2, and was set to record a number of parameters including the $L_{Aeq,T}$, L_{A90} , L_{A10} and L_{Amax} parameters.

Table 3-2: Survey Equipment

Location Reference	Equipment Description	Serial Number	Calibration Date
MP1	01dB Black Solo Class 1 sound level meter	65396	05/02/20
	Cirrus CR:515 Acoustic calibrator	59522	05/02/21

- 3.1.6 The sound level meters were field calibrated, using an electronic calibrator, prior to commencement and upon completion of each survey period, no significant drift in calibration was observed. The external calibration documentation for the equipment used is available upon request.

Figure 3-1: Noise Monitoring Location



3.2 Weather

3.2.1 The weather conditions throughout the noise survey were dry with a slight breeze.

3.3 Survey Results

3.3.1 Figure 3-2 presents the 1-second L_{Aeq} results from the attended measurement position (MP1). The summary L_{AeqT} , L_{A90T} , L_{A10T} and L_{Amax} results from position MP1 are presented in Table 3-3, with the 5-minute L_{AeqT} , L_{A90T} , L_{A10T} and L_{Amax} results tabulated in Appendix A.



Figure 3-2: Measured Survey Data

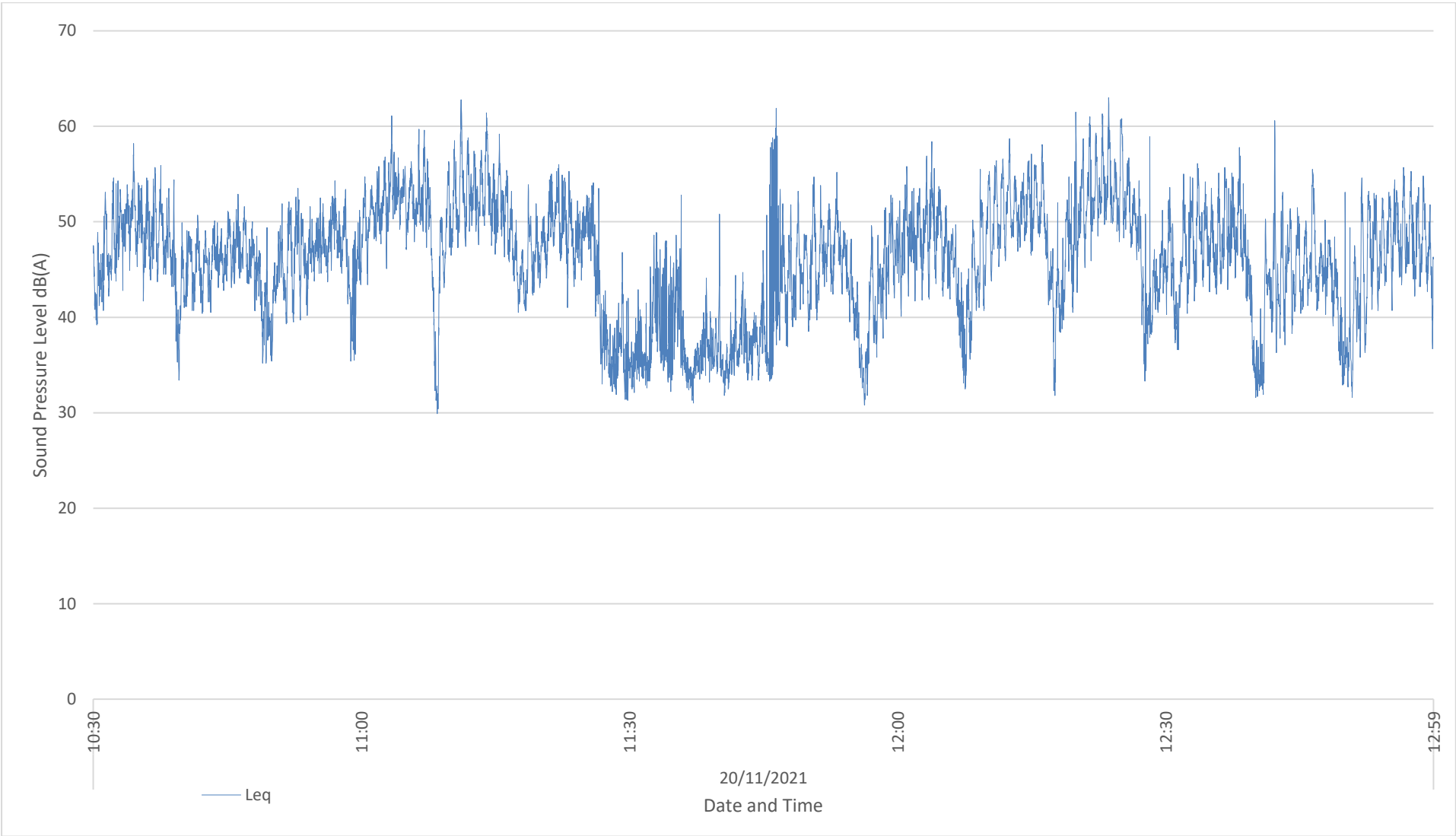


Table 3-3: Attended Noise Survey Results

Position	Time (hh:mm)	Duration	Measured Sound Pressure Level, dB			
			L _{Aeq,T}	L _{Amax}	L _{A90,T}	L _{A10,T}
MP1	10:30	2.5-hours	49.3	63.0	36.3	52.9

3.4 Subjective Field Monitoring Notes

- 3.4.1 The noise climate throughout the survey was predominantly controlled by noise from Shenington Karting Track, including noise from go-karts and amplified voices. In addition, overhead aircraft, birdsong and noise from a bird scarer occasionally affected the measured levels. A single glider was noted, though this did not affect the measured noise levels.

4 Noise Assessment

4.1 Introduction

- 4.1.1 This section of the report outlines the assessment of the measured noise levels on the proposed residential development.
- 4.1.2 The assessment has been conducted based on the measured survey data outlined in Section 3, and the assessment methodology in Section 1.4. The noise levels measured at the proposed site have been compared with the recommended internal and external levels outlined and BS8233:2014.

4.2 Measured External Noise Levels

- 4.2.1 The summary $L_{Aeq,T}$ noise level measured at the position MP1 is presented in Table 4-1.

Table 4-1: Measured Noise Level at the Assessment Location

Area	Assessment Period	Assessment Location	Assessment Period	External Noise Level dB $L_{Aeq,T}$
Proposed Development Site	Daytime	Proposed Dwelling External Facade	$L_{Aeq,T}$	49
		Proposed Dwelling External Amenity Area (Rear Garden)	$L_{Aeq,T}$	

4.3 Indoor Noise Level Assessment

- 4.3.1 An assessment of the predicted noise levels inside the proposed residential properties has been made against the recommended daytime internal ambient noise levels outlined in the BS8233 guidance.
- 4.3.2 Table 4-2 details the predicted internal ambient noise levels, when considering a 15dB reduction through a façade with a partially open window for ventilation, based on the dwelling façade noise levels presented in Table 4-1.

Table 4-2: Indoor Noise Level Assessment

Location	Assessment Period	Measured External Noise Level dB $L_{Aeq,T}$	Reduction Through Open Window dB $L_{Aeq,T}$	Predicted Internal Noise Level dB $L_{Aeq,T}$
Area A	Daytime $L_{Aeq,T}$	49	15	34

- 4.3.3 Table 4-2 shows that, when considering a 15dB reduction through a façade with a partially open window for ventilation, go-kart and aircraft noise levels within the proposed properties would be below the recommended daytime internal ambient noise levels of 35dB $L_{Aeq,16hr}$ specified in BS8233.

- 4.3.4 The noise assessment has been conducted in the west corner of the proposed development site, at the closest point to Shenington Kart Track and Edge Hill Gliding Centre. It should be noted that once the properties have been constructed, dwellings in the centre and east of the site would be screened by the intervening properties, and noise emanating from Shenington Kart Track would be lower.

4.4 External Amenity Noise Level Assessment

- 4.4.1 Table 4-1 shows that, in gardens and public amenity spaces, noise emanating from Shenington Karting Track and Edge Hill Gliding Centre would be below the BS8233 desirable noise level of 50dB $L_{Aeq,16hr}$ for external amenity areas.
- 4.4.2 It should be noted that once the properties have been constructed, gardens and other outdoor amenity spaces would be screened by garden fences, walls and intervening properties, and noise emanating from Shenington Kart Track would be lower.

5 Conclusion

5.1 Background

- 5.1.1 Enzygo Limited has been commissioned by ELAN Homes Strategic Land Limited to undertake an environmental noise impact assessment to support a planning application for a new residential development on land off Stocking Lane in Shenington, Banbury.
- 5.1.2 The assessment has been undertaken to assess the suitability of the proposed development site for residential occupation, when considering noise from Shenington Karting Track and Edge Hill Gliding Centre, in accordance with the relevant standards and to provide outline mitigation advice where considered necessary.
- 5.1.3 Details of the assessment methodology which have been agreed with the Local Authority, together with the results of the baseline survey, assessment and conclusions are presented within this report.

5.2 Noise Assessment

- 5.2.1 The assessment has found that it would be possible to meet the BS8233 recommended daytime internal ambient noise levels in dwellings across the proposed development site with windows open.
- 5.2.2 In addition, in both private and public external amenity areas, noise from Shenington Kart Track and Edge Hill Gliding Centre would be below the desirable noise level in external amenity areas of 50dB $L_{Aeq,16hr}$ specified in BS8233.
- 5.2.3 It should be noted that once the properties have been constructed, properties and external amenity spaces in the centre and east of the site would be screened by garden fences, walls and intervening buildings, and noise emanating from Shenington Kart Track would be lower both internally and externally.

Glossary of Terminology

Noise is defined as unwanted sound. The range of audible sound is known to be from 0dB (threshold of hearing) to 140dB (threshold of pain). Examples of typical noise levels relating to 'everyday' occurrences are given in Table G-1 below.

Table G-1: Typical Noise Levels

Source	Sound Pressure Level in dB(A)	Subjective Level
Gun shot	160	Perforation of eardrum
Military Jet take-off	140	Threshold of pain
Jet Aircraft at 100m	120	Very Loud
Rock Concert, front seats	110	Threshold of Sensation
Pneumatic Drill at 5m	100	Very Loud
Heavy goods vehicle from pavement	90	
Traffic at kerb edge	70 – 85	Loud
Vacuum Cleaner, Hair Dryer	70	
Normal conversation at 1m	60	Moderate
Typical Office	50 – 60	
Residential area at night	40	Quiet
Rural area at night, still air	30	
Leaves Rustling	20	
Rubbing together of fingertips	10	
	0	Threshold of hearing

The frequency response of the human ear to noise is usually taken to be around 18Hz (number of oscillations per second) to 18,000Hz. However, the human ear does not respond equally to different frequencies at the same level; it is more sensitive in the mid-frequency range than lower and higher frequencies and, because of this, when undertaking the measurement of noise the low and high frequency components of any given sound are reduced in importance by applying a filtering (weighting) circuit to the noise measuring instrument. The weighting which is widely accepted to correlate best with the subjective nature of human response to noise and is most widely used to quantify this is the A-weighted filter set. This is an internationally accepted standard for noise measurement.

For variable noise sources within an area an increase of 3dB(A) would be the minimum perceptible to the human ear under normal conditions. It is generally accepted that an increase/decrease of 10dB(A) corresponds to a doubling or halving in perceived loudness. The 'loudness' of a noise is a purely subjective parameter, dependant not only upon the sound pressure of the event but also on the dynamics of the listener's ear, the time of the day and the general mood of the person.

With regard to environmental noise levels (in the open air), these are rarely steady but rise and fall according to the activities being undertaken within the surrounding area at any given time. In an attempt to produce a figure that relates this variable nature of noise to human subjective response, a number of statistical noise metrics have been developed. These and other useful terminology and descriptors are presented in Table G-2 below.

Table G-2: Terminology

Term	Definition
Sound	Pressure fluctuations in a fluid medium within the audible range of amplitudes and frequencies which stimulate the organs of hearing.
Noise	Unwanted sound emitted from a source and received by the sensitive receptor.
Decibel (dB)	Unit most often used to describe the sound pressure level. A logarithmic number, it correlates closely to the way in which humans perceive sound. Its wide range of values helps quantify sound pressures from a large variety of magnitudes.
A-Weighting (dB(A))	Human perception of sound is frequency dependant. A-weighting applies a range of corrections at each frequency to provide a 'human-averaged'. Can be frequency band or broadband values.
Frequency (Hz)	The number of cycles per second, for sound this is closely related (and often mistaken for) pitch.
Frequency Spectrum	A more detailed analysis of the frequency components that comprise a sound source.
L_{A10,T}	The 10 th statistical percentile of a measurement period, i.e. the level that is exceeded for 10% of the measurement duration. Closely correlates with traffic sources, A-weighted.
L_{A90,T}	The 90 th statistical percentile of a measurement period, i.e. the level that is exceeded for 90% of the measurement duration. Used to describe background sound levels, as this value is affected less by short, transient sound sources, A-weighted.
L_{Amax}	The root mean square (RMS) maximum sound pressure level within a measurement period, A-weighted.
Ambient Sound	The total sound climate of all sources incident at one location, both in the near- and far-field (<i>The ambient sound comprises the residual sound and the specific sound when present</i>).
Ambient Sound Level L_a = L_{Aeq,T}	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
Background Sound Level L_{A90,T}	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.

Term	Definition
Equivalent Continuous A-weighted Sound Pressure Level $L_{Aeq,T}$	<p>Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:</p> $L_{Aeq,T} = 10 \lg_{10} \left\{ \left(\frac{1}{T} \right) \int_{t_1}^{t_2} \left[p_A \frac{(t)^2}{p_0^2} \right] dt \right\}$ <p>Where p_0 is the reference sound pressure (20μPA); and $P_A(t)$ is the instantaneous A-weighted sound pressure level at time t.</p>
Measurement Time Interval T_m	Total time over which measurements are taken (<i>This may consist of the sum of a number of non-contiguous, short-term measurement time intervals</i>)
Rating level $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound, over a period of time, T .
Reference Time Interval, T_r	Specified interval over which the specific sound level is determined (This is 1hr during the day from 07:00 to 23:00 hours and a shorter period of 15-min at night from 23:00 to 07:00 hours).
Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level $L_r = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound in a given situation at the assessment location over a given time interval, T .
Sound Pressure Level	The level of fluctuation in air pressure, caused by airborne sound sources. Measured in Pascals (Pa).
Sound Power Level	The rate at which sound is radiated by a source. This parameter is useful as it describes sound energy before environmental or decay factors. Quantified in dB and notated usually as L_w or SWL.
Specific sound level $L_s = L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T .
Specific Sound Source	Sound source being assessed.

Appendix A – Survey Results

Table A-1: MP1 Measured Noise Levels

Time and Date	L _{Aeq,T}	L _{Amax}	L _{A90,T}	L _{A10,T}
20/11/2021 10:30	49.4	58.2	42.8	52.4
20/11/2021 10:35	49.2	55.9	40.3	52.5
20/11/2021 10:40	46.0	50.7	42.1	48.3
20/11/2021 10:45	46.4	52.9	38.8	49.4
20/11/2021 10:50	47.0	53.5	41.5	50.0
20/11/2021 10:55	48.0	54.3	41.8	50.9
20/11/2021 11:00	52.8	61.1	48.6	55.1
20/11/2021 11:05	51.6	59.7	38.4	55.0
20/11/2021 11:10	54.4	62.8	48.8	57.4
20/11/2021 11:15	49.6	59.2	42.6	53.2
20/11/2021 11:20	50.1	56.0	45.5	53.0
20/11/2021 11:25	45.2	54.1	33.6	50.1
20/11/2021 11:30	40.2	48.9	34.0	44.4
20/11/2021 11:35	38.9	52.8	33.8	42.2
20/11/2021 11:40	38.1	50.8	33.8	40.4
20/11/2021 11:45	48.3	61.9	35.4	50.9
20/11/2021 11:50	47.7	55.2	41.9	51.0
20/11/2021 11:55	44.7	52.8	34.6	49.1
20/11/2021 12:00	50.1	58.4	44.2	53.0
20/11/2021 12:05	45.8	55.5	37.5	49.4
20/11/2021 12:10	52.2	58.7	47.2	54.8
20/11/2021 12:15	50.0	61.5	40.4	54.0
20/11/2021 12:20	54.6	63.0	49.0	58.5
20/11/2021 12:25	50.7	60.8	39.1	54.2
20/11/2021 12:30	48.4	56.1	40.9	51.8
20/11/2021 12:35	49.4	57.8	42.3	53.4
20/11/2021 12:40	46.3	60.6	33.3	49.7
20/11/2021 12:45	46.1	55.5	37.9	48.6
20/11/2021 12:50	47.1	54.6	35.7	51.3
20/11/2021 12:55	49.6	55.7	44.1	52.6



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BRISTOL OFFICE

The Byre
Woodend Lane
Cromhall
Gloucestershire GL12 8AA
Tel: 01454 269 237

SHEFFIELD OFFICE

Samuel House
5 Fox Valley Way
Stocksbridge
Sheffield S36 2AA
Tel: 0114 321 5151

MANCHESTER OFFICE

First Floor
3 Hardman Square
Spinningfields
Manchester M3 3EB
Tel: 0161 413 6444

Please visit our website for more information.

enzygo.com