Report VA4755.240110.NIA

301 Shenley Road, Borehamwood

Noise Impact Assessment

12 January 2024

BTS Group

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Contents

Attachments

Report Version	Author	Approved	Changes	Date
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1. Introduction

An application is to be submitted for the conversion of the ground floor at 301 Shenley Road, Borehamwood from commercial to residential use under Class MA of the General Permitted Development Order.

Venta Acoustics has been commissioned by BTS Group to undertake an assessment of the current environmental noise impact on the site and provide recommendations of acoustic mitigation where required in support of an application for planning permission.

An environmental noise survey has been undertaken to determine the noise levels incident on the site. These levels are then used to undertake an assessment of the likely impact in accordance with the National Planning Policy Framework with reference to relevant standards, guidance and the planning requirements of Hertsmere Borough Council.

Outline mitigation measures are considered and an appraisal of the requirements of external building fabric elements are provided where appropriate.

2. Guidance and Legislation

2.1 Hertsmere Council Requirements

Condition 4 of the consent, ref. 23/1324/PD56M, for the conversions states:

> *Prior to any above ground development, the applicant shall submit to, for approval in writing by the Local Planning Authority, details relating to a scheme to protect the proposed development from noise due to commercial/industrial sources which shall be implemented before any part of the accommodation hereby approved is occupied, unless the Local Planning Authority otherwise agrees in writing.*
>
> *The scheme shall ensure that indoor ambient noise levels in living rooms and bedrooms meet the standards within BS 8233:2014. Internal LAmax levels should not exceed 45dB more than ten times a night in bedrooms. Good acoustic design should be implemented throughout the development to reduce façade noise levels as much as possible.*
>
> *Where opening windows raises the internal noise levels above those within BS8233, other methods of ventilation/attenuation will have to be implemented. To assess overheating with windows closed, a CIBSE TM59 (Fixed Temperature method -CIBSE Guide A (2015a)) overheating assessment must be undertaken and submitted for review and approval.*
>
> *If mechanical ventilation is going to be installed, details of the system being installed must be provided such as the ventilation rates that the system can deliver. Ventilation rates for the development must comply with the latest building regulation requirements.*
>
> *Reason: To protect the occupants of the new development from noise disturbance.*

2.2 Permitted Development – Class MA

Class MA of the General Permitted Development Order provides the following requirements.

Conditions

MA.2. *(1) Development under Class MA is permitted subject to the conditions*

(2) Before beginning development under Class MA, the developer must apply to the local planning authority for a determination as to whether the prior approval of the authority will be required as to—

(a) transport impacts of the development, particularly to ensure safe site access;

(b) contamination risks in relation to the building;

(c) flooding risks in relation to the building;

(d) impacts of noise from commercial premises on the intended occupiers of the impacts of noise from commercial premises on the intended occupiers of the development)

(e)where—

(I)the building is located in a conservation area, and

(ii) the development involves a change of use of the whole or part of the ground floor,

the impact of that change of use on the character or sustainability of the conservation area;

(f) the provision of adequate natural light in all habitable rooms of the dwellinghouses;

(g) the impact on intended occupiers of the development of the introduction of residential use in an area the authority considers to be important for general or heavy industry, waste management, storage and distribution, or a mix of such uses; and

(h) where the development involves the loss of services provided by—

(i) a registered nursery, or

(ii)a health centre maintained under section 2 or 3 of the National Health Service Act 2006(4),the impact on the local provision of the type of services lost.

(3) An application for prior approval for development under Class MA may not be made before 1 August 2021.

(4) The provisions of paragraph W (prior approval) of this Part apply in relation to an application under this paragraph as if in the introductory words in sub-paragraph (5), for "and highways impacts of the development" there were substituted "impacts of the development, particularly to ensure safe site access".

(5) Development must be completed within a period of 3 years starting with the prior approval date.

(6) Any building permitted to be used as a dwellinghouse by virtue of Class MA is to remain in use as a dwellinghouse within the meaning of Class C3 of Schedule 1 to the Use Classes Order and for no other purpose, except to the extent that the other purpose is ancillary to the use as a dwellinghouse.".

Part 3, paragraph W(10)(b) of the GPDO states that the local planning authority must, when determining an application, have regard to the National Planning Policy Framework so far as relevant to the subject matter of the prior approval as if the application were a planning application.

2.3 The National Planning Policy Framework (2023)

The revised *National Planning Policy Framework* (NPPF), published in December 2023, sets out the Government's planning polices for England, superseding all previous planning policy statements and guidance.

In respect of noise, the NPPF states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing developments from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.

Hence, Paragraph 191 states that *planning policies and decisions should also ensure new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life
b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason

In regards to the term adverse impact, reference is made to the Noise Policy for England:

2.4 Noise Policy Statement for England (2010)

The Noise Policy Statement for England (NPSE) sets out the long term vision of Government noise policy: to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

This vision is supported by the following aims:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*

- *where possible, contribute to the improvement of health and quality of life.*

The terms “significant adverse” and “adverse” are related to the following concepts:

- No Observed Effect Level–(NOEL) - the level below which no effect on health and quality of life can be detected.
- Lowest Observed Adverse Effect Level –LOAEL) - the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level –SOAEL) - the level above which significant adverse effects on health and quality of life occur.

The guidance acknowledges that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations, but will be different for different noise sources, receptors and times.

In order to enable assessment of impacts in line with these requirements, reference should be made to other currently available guidance.

2.5 WHO Guidelines for Community Noise (1999)

The guidance in this document details suitable noise levels for various activities within residential and commercial buildings.

The relevant sections of this document are shown in Table 2.1.

Criterion	Environment	Design range $L_{Aeq,T}$ dB
Maintain speech intelligibility and avoid moderate annoyance, daytime and evening	Living Room	35 dB
Prevent sleep disturbance, night time	Bedrooms	30 dB

Table 2.1 – Excerpt from WHO **[dB ref. 20µPa]**

This guidance also states:

> *For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times a night (Vallet & Vernet 1991).*

For sleep disturbance, i.e. in bedrooms at night, the NOEL can, therefore, be taken as anything below 30dB(A), whilst the onset of the LOAEL occurs at 30dB(A) and above. The SOAEL cannot be inferred from this information.

2.6 BS8233:2014

BS8233 *Guidance on sound insulation and noise reduction for buildings* provides guidance as to desirable internal ambient noise levels for different areas within residential buildings.

The relevant section of the standard is shown below in Table 2.2.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq, 16\ hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16\ hour}$	30 dB $L_{Aeq, 8\ hour}$

Table 2.2 – Excerpt from BS82–3:2014 - Indoor ambient noise levels for dwellings [dB ref. 20µPa]

3. Site Description

As illustrated on attached site plan VA4755/SP1, the property is part of a semi-detached building, with a flat above and a convenience store at 303 Shenley Road, which is open between 07:00 and 21:30.

To the rear of the site is the parking for a children's nursery. To the north west of the building is a currently vacant commercial warehouse, which was previously associated with the ground floor commercial use at 301 Shenley Road.

The dominant noise source expected to affect the site is expected to be road traffic noise. There will be some noise associated with vehicles accessing the nursery to the rear, but these will be well screened by the boundary fence to the garden, which is understood to be a 1.8m high close board timber fence.

4. Environmental Noise Survey

4.1 Survey Procedure & Equipment

In order to establish the existing background noise levels at the site, a noise survey was carried out between Tuesday 2nd and Thursday 4th January 2024 at the locations shown in site plan VA4755/SP1. These locations were chosen to be representative of the noise levels at the proposed new noise sensitive receivers.

Continuous 5-minute samples of the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were undertaken at each of the measurement locations.

The weather during the survey period was generally dry with light winds, with the exception of Tuesday 2nd January, where windspeeds were higher than desirable. This data has been excluded from the analysis.

Works were carried out on the roof of the building on the Wednesday and Thursday during the working day, This data has been excluded from the analysis. However, this ensures that the daytime analysis includes both the morning and evening rush hour period, and so would result in a pessimistic and robust assessment of noise levels to ensure the protection of future residents from noise.

Measurements were made generally in accordance with ISO 1996 2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels*.

The following equipment was used in the course of the survey:

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
NTi Class 1 Integrating SLM	XL2	A2A-11586-E0	1502936-2	25/7/22
NTi Class 1 Integrating SLM	XL2	A2A-12202-E0	UCRT½1146	1/2/23
Larson Davis calibrator	CAL200	19816	1506037-1	28/7/23

Table 4.1 – Equipment used for the survey

The calibration of the sound level meters was verified before and after use with no significant calibration drift observed.

4.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA4755/TH1-2 for position 1 (front) and VA4755/TH3-4 for position 2 (rear).

The average noise levels for the Daytime and Night-time periods, as measured at the automated monitoring position were:

Monitoring Period	$L_{Aeq,T}$		Typical[1] $L_{A90,5min}$	
	Position 1	Position 2	Position 1	Position 2
07:00 – 23:00	68 dB	60 dB	50 dB	46 dB
23:00 – 07:00	60 dB	52 dB	35 dB	36 dB

Table 4.2 – Average ambient and typical background noise levels

[1] The typical L_{A90} value is taken as the 10th percentile of all L_{A90} values measured during the relevant period.

The typical night time L_{Amax} events, not exceeded more than 10 times per night and generated by vehicle passbys, were recorded to be in the order of 76dB $L_{Amax,fast}$.

5. Commercial Noise Assessment

As previously highlighted, there is a nursery to the rear of the site, which has parking to the rear of 301 Shenley Road. There is also a vacant commercial building adjacent to the nursery. This is well screened from the ground floor of 301 Shenley Road by the rear extension of 303 Shenley Road, and would not be expected to affect the new dwelling.

The main noise source associated with the nursery would be vehicle movements from parents and staff entering and leaving the site, which is open between 07:30 and 18:00.

5.1 Carpark Noise

Noise from low speed vehicle movements in the carpark are not expected to be significant. Measurements of passenger cars moving at low speed on a tarmacked surface, undertaken on previous projects, indicate a typical level of L_{Aeq} 58dB at 1m. There is a 1.8m high boundary fence proposed to the rear garden, which will screen the view of the carpark to the ground floor flat.

At a distance of 10m, the distance to the rear living room window of the flat, this is reduced to approximately 38dB. An indicative assessment is as follows in relation to the recommended internal noise levels for BS8233:2014.

Indicative BS8233 Assessment of Car Movements	
Specific Noise Level at receiver	L_{Aeq} 38 dB
Time correction for 30 car movements of 20 seconds each, per hour	-8 dB
Line of sight loss for fence	-5 dB
Level Outside Window	25 dB(A)
Loss for a partially open window	-15 dB
Internal Noise Level	10 dB(A)
Recommended Internal Daytime Level from BS8233	35dB(A)

Table 5.1 - Vehicle movements in car park

As Table 5.1 shows, noise levels from low speed vehicle movements in the car park would be quieter than the recommended internal noise levels for the day-time, and hence would be considered unlikely to impact the future residents of the flat.

5.2 Context

The site is located in a mixed residential and commercial area, with existing houses and flats overlooking the nursery car park.

Within this context, the estimated impact of the sound sources is expected to remain valid or be slightly reduced.

5.3 Uncertainty

This section considers the variable in the assessment that may cause variations within the final results and describes how these have been addressed.

- Use of Class 1 sound level meters is considered to reduce instrument error to insignificant levels as compared with environmental variations. The calibration of the instrumentation was confirmed before and after the noise surveys.
- The measurements were undertaken under suitable weather conditions (with unsuitable periods excluded) over a period designed to include reasonable temporal variations in background noise levels. Two monitoring locations were selected to minimise local acoustic phenomenon that may affect a single measurement location, including the noise from the nearby road. These measurement locations were selected to be representative of the

background noise levels expected to be experienced by the proposed dwelling without being unduly influenced by extraneous noise sources.

- Where library data has been used, propagation calculations have been used to correct noise levels to the relevant distance at the receiver.

Overall, the uncertainty is considered to have been minimised to a suitable range so as not to risk significant variations in the impact assessment of typical operations.

6. Internal Noise Assessment

A review of the UPP drawings for the proposed scheme has been undertaken with the intent of achieving the internal noise levels from average and maximum noise levels stated in BS8233 and the WHO Guidelines.

6.1 Sound Reduction Performances of Building Elements

It has been assumed that all the non-glazed elements, i.e. walls and roof systems, will be capable of providing the following minimum sound insulation performance, when tested in accordance with BS EN ISO 10140-2:2021 *Acoustics - Laboratory measurement of sound insulation of building elements – Part 2: Measurement of airborne sound insulation*.

Building Element	Single figure weighted sound reduction index, dB
Masonry	R_w 51

Table 6.1 – Assumed sound reductions performances of non-glazed elements

6.2 Sound Reduction Performance of Windowsets and Vents

The monitoring data along with the architectural drawings have been used to calculate the required sound insulation performance for the windowsets (glazing and frame combination) and open ventilators for the building. These are summarised in Table 6.2 below.

Glazing Reference	Required Glazing SRI, dB	Ventilator Performance, dB
Living Rooms	R_w 27	$D_{n,e,w}$ 29
Bedroom	R_w 32	$D_{n,e,w}$ 33

Table 6.2 – Required minimum sound reduction indices for glazing and ventilators

In order that windows may remain closed to maintain the internal noise levels, it is expected that attenuated means of background ventilation will be required. If trickle vents are used the performance shown in Table 6.2 will be required. The figures stated are for a single vent per room. If multiple vents are required, then the performance requirement shown in Table 6.2 will increase by a value equal to +10log(*N*), with N being the total number of vents serving the room. It should be noted that there is no reason why windows could not be opened as a matter of personal preference or for purge ventilation.

6.3 Windowset Performances

It is important that the performance shown in Table 6.2 are achieved by the entire windowset including frames, ventilators, seals, etc. Glass performance alone would not be likely to show compliance with the specification as the other elements typically provide the weakest noise transmission path.

The ventilator performances provided would need to be achieved with the vents open. Should this performance not be achievable, a mechanical ventilation solution may be required.

Passive ventilators alone may not provide sufficient air flow for summer overheating, which should be evaluated by a suitably qualified thermal engineer.

With the above recommendations implemented, the noise levels within the proposed dwellings would be expected to be in line with recommendations given in the WHO 1999 and BS8233:2014 guidance. Internal noise levels can therefore be considered to be between the NOEL the LOAEL levels.

7. Conclusion

A baseline noise survey has been undertaken by Venta Acoustics to establish the prevailing noise climate in the locality of 301 Shenley Road, Borehamwood to address the planning condition attached to the approval for the development of new residential dwellings.

The measured levels have been assessed against the National Planning Policy Framework and currently available standards and guidance documents including World Health Organisation *Guidelines for Community Noise* (1999) and BS8233:2014 *Guidance on sound Insulation and noise*.

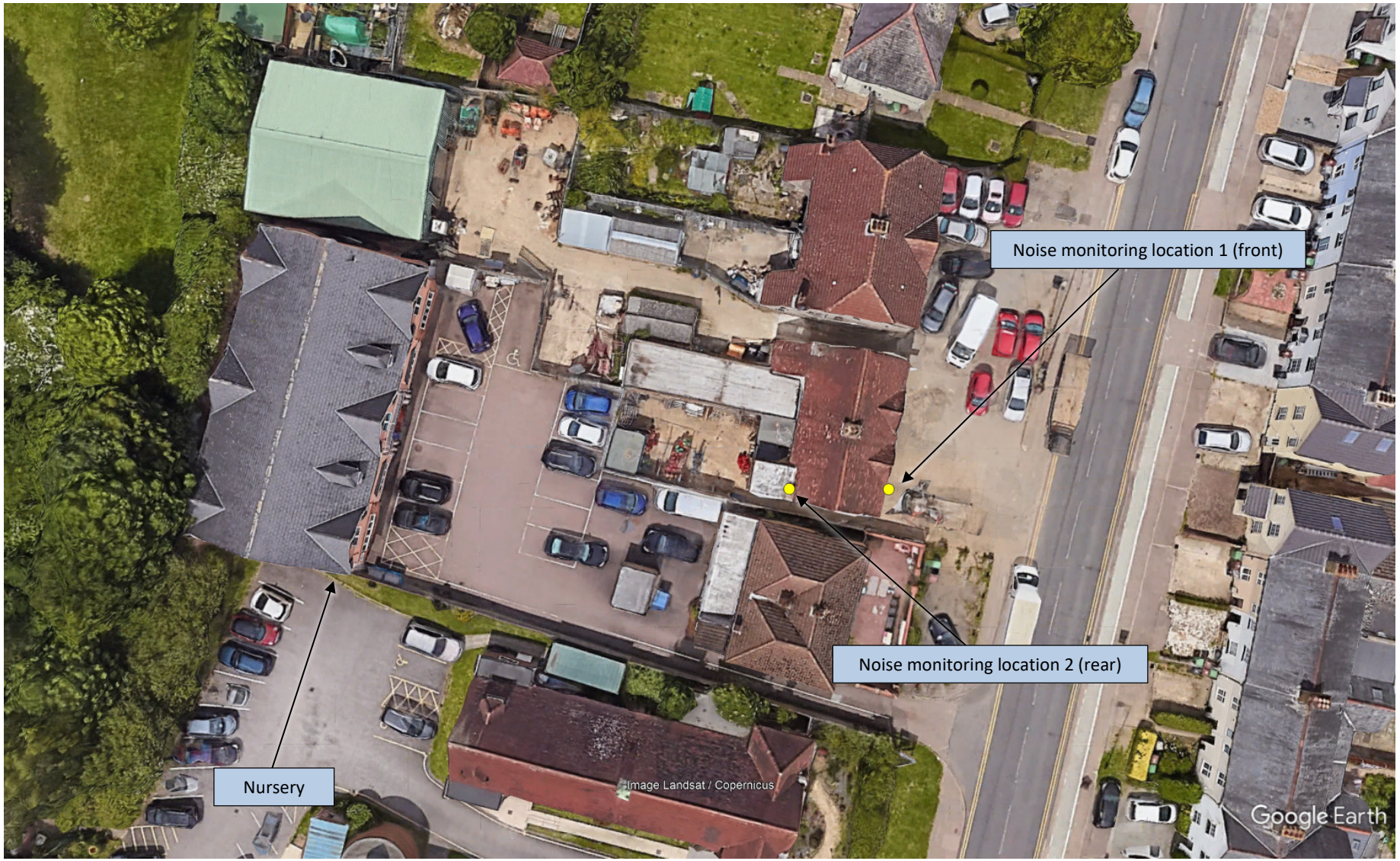
Commercial noise from the adjacent nursery carpark has been predicted to be at a low noise level at the new dwelling, such that it is not expected to impact the residents.

Appropriate internal noise criteria have been considered to minimise adverse impacts on health and quality of life as a result of the new development. Appropriate mitigation measures have been outlined including proprietary thermal double-glazing and trickle vents.

With these measures in place the indoor ambient noise levels in living rooms and bedrooms are expected to meet the standards within BS 8233:2014 and internal L_{Amax} levels are not expected to exceed 45dB more than ten times a night in bedrooms.

The proposed scheme is not expected to experience a significant adverse noise impact and the planning requirements are considered to be met.

Jamie Duncan MIOA



Indicative Site Plan

301 Shenley Road, Borehamwood

Environmental Noise Time History: 1

Front

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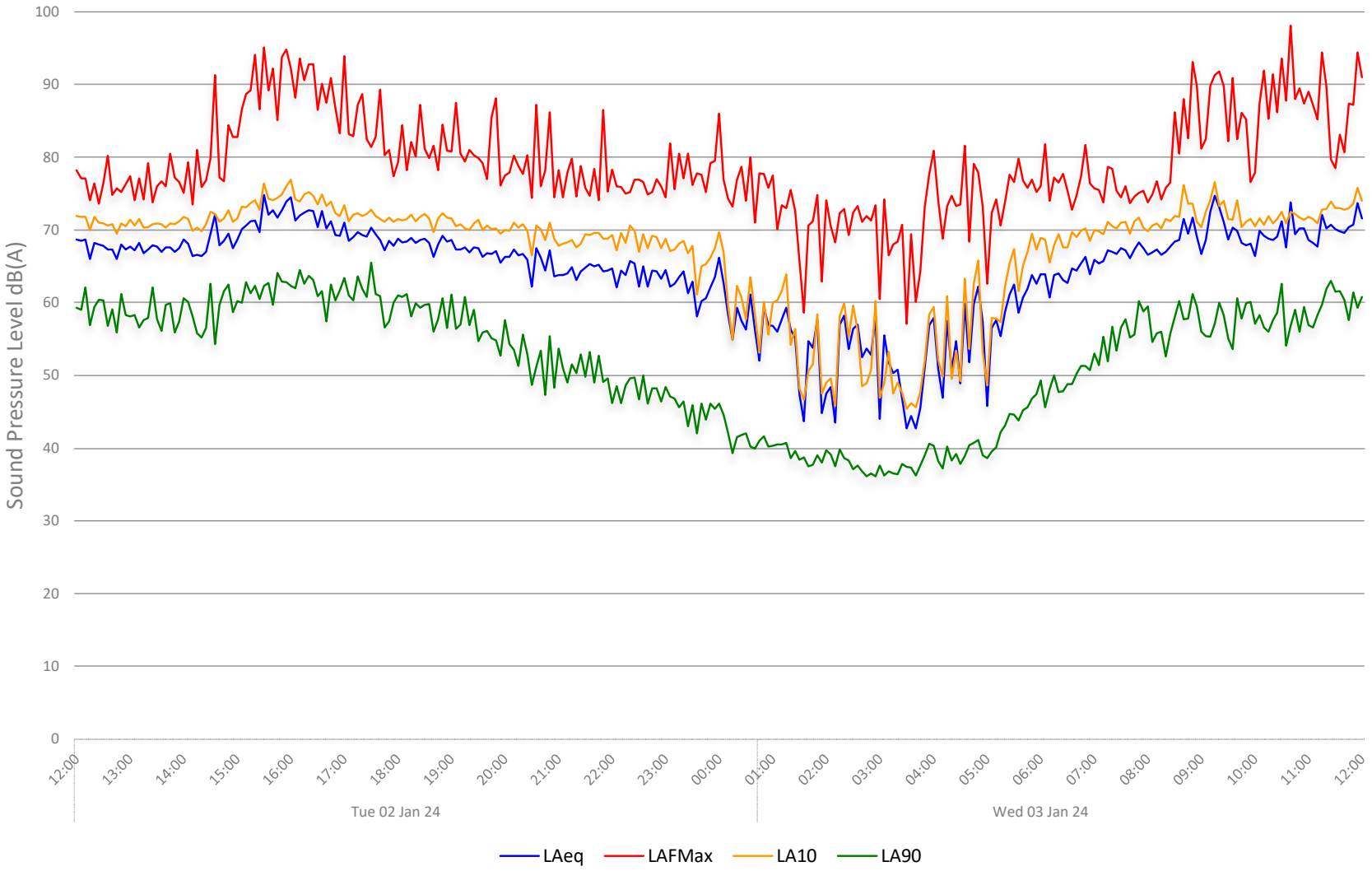
Figure VA4755/TH1



301 Shenley Road, Borehamwood

Environmental Noise Time History: 2

Front

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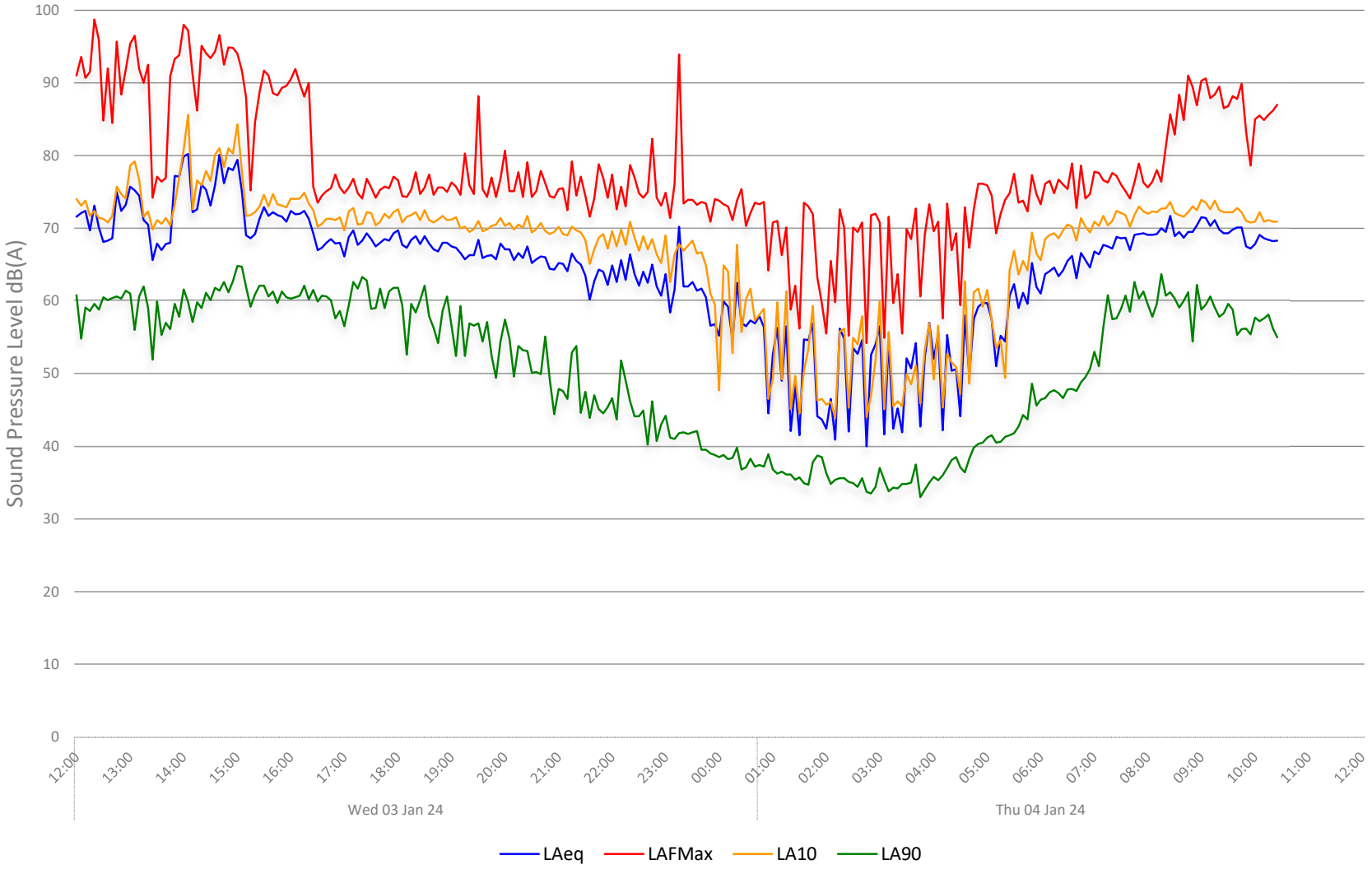
Figure VA4755/TH2



301 Shenley Road, Borehamwood

Environmental Noise Time History: 3

Rear

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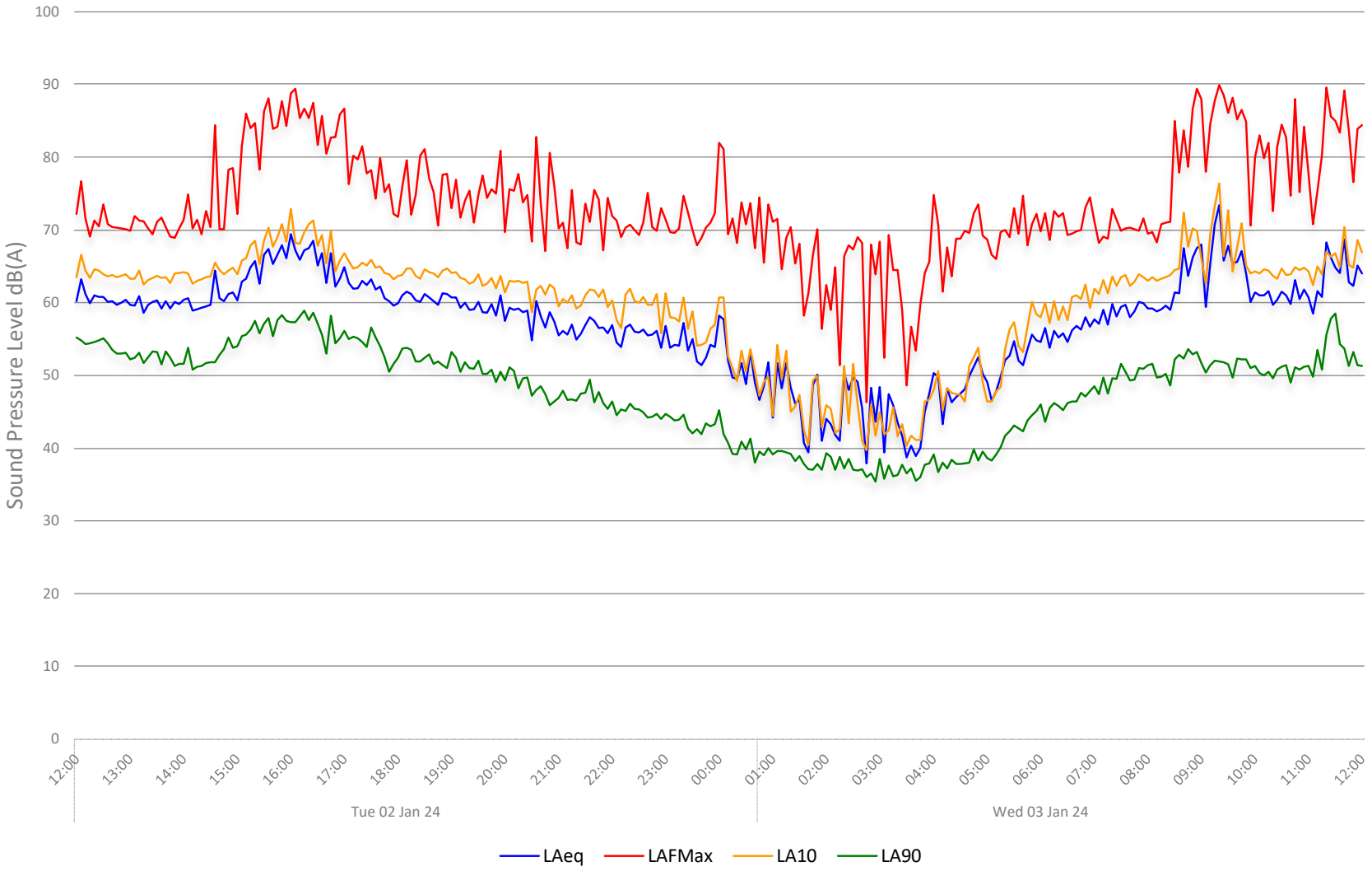
Figure VA4755/TH3



301 Shenley Road, Borehamwood

Environmental Noise Time History: 4

Rear

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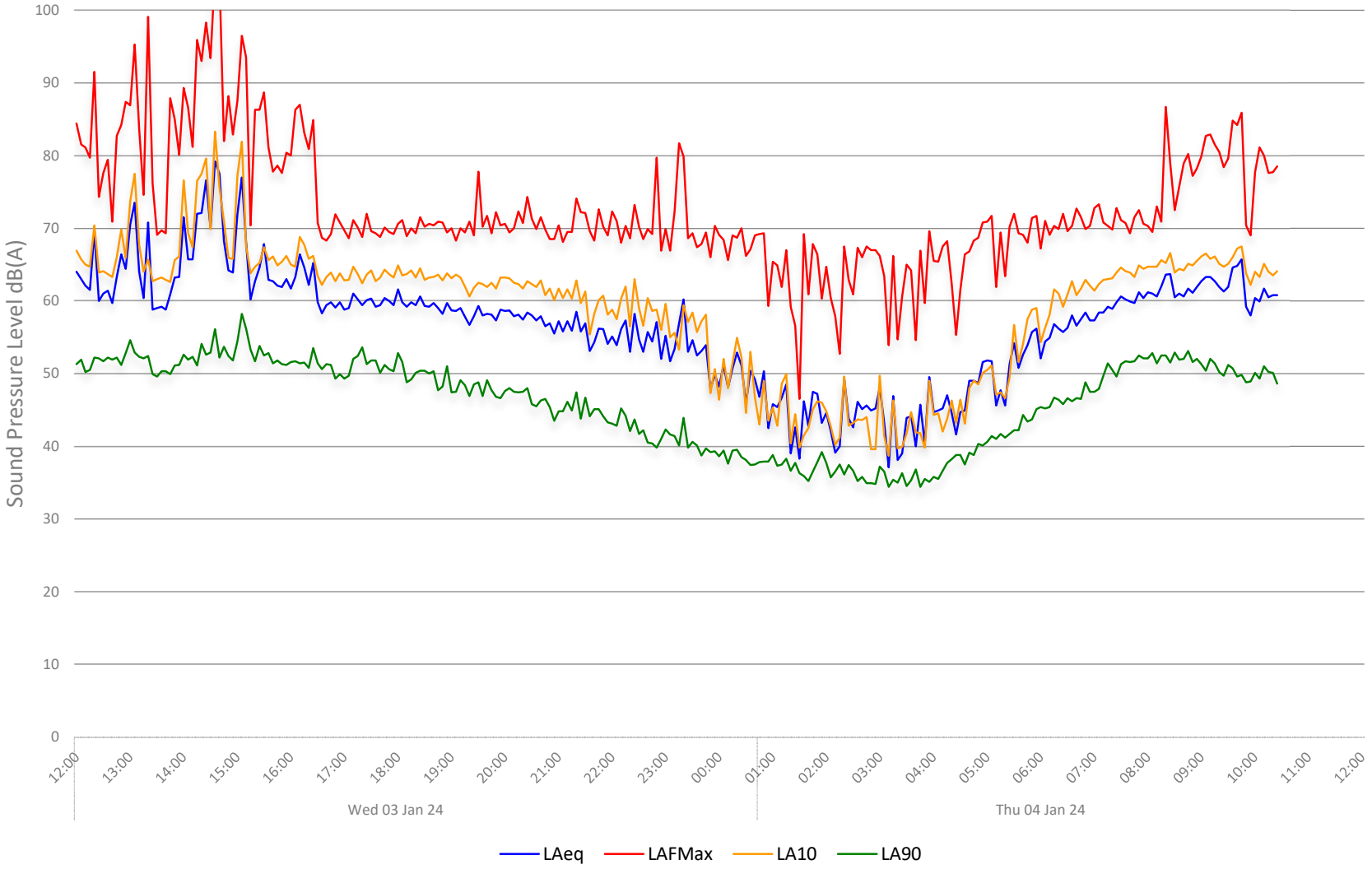
Figure VA4755/TH4



APPENDIX A

1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

Sound	Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.
Noise	Sound that is unwanted by or disturbing to the perceiver.
Frequency	The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.
dB(A):	Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A.
L_{eq} :	A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc). The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.
L_{10} & L_{90} :	Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise. It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.
L_{max} :	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000

APPENDIX A

1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial