

11-12 Ingestre Road London



Noise Impact Assessment Report Report 26887.NIA.01

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26887.TH1-2	Environmental Noise Time Histories
26887.Daytime L90.TH1-2	Statistical analysis for representative daytime L_{A90}
26887.Night-time L90.TH1-2	Statistical analysis for representative night-time L_{A90}
Appendix A	Glossary of Acoustics Terminology

SUMMARY

KP Acoustics Ltd has been commissioned to assess the suitability of the site at 11 -12 Ingestre Road, London NW5 1UX for a residential development in accordance with the provisions of the National Planning Policy Framework and the Noise Policy Statement for England (NPSE).

An environmental noise survey has been undertaken on site in order to establish the current ambient noise levels, as shown in Table 3.1.

Sound reduction performance calculations have been undertaken in order to specify the minimum performance required from glazed elements in order to meet the requirements of BS8233:2014, taking into consideration the non-glazed external building fabric elements. The results of these calculations and the sound reduction performance requirements for the glazed elements are shown in Table 5.2.

Further advice can be provided with regards to the overheating strategy to assess the noise implications once thermal modelling calculations have been undertaken.

Noise levels within external amenity areas would be expected to meet the recommended levels provided within BS8233:2014.

No further mitigation measures should be required in order to protect the proposed habitable spaces from external noise intrusion.

The environmental noise survey has also been undertaken to determine daytime and night-time noise emission criteria for the future proposed plant, in agreement with the planning requirements of The London Borough of Camden.

1.0 INTRODUCTION

KP Acoustics Ltd has been commissioned by Four Quarters Developments Limited, 12 Conqueror Court, Sittingbourne, Kent, ME10 5BH, to assess the suitability of the site at 11-12 Ingestre Road, London NW5 1UX for a residential development in accordance with the provisions of the National Planning Policy Framework and the Noise Policy Statement for England (NPSE).

This report presents the results of the environmental survey undertaken in order to measure prevailing background noise levels and outlines any necessary mitigation measures.

2.0 SITE SURVEYS

2.1 Site Description

The site is bounded by Ingestre Road and a railway to the north, Ingestre Road to the west and east, and residential properties to the south. Entrance to the site is located to the south. At the time of the survey, the background noise climate was dominated by road and rail traffic noise from the surrounded sources.

2.2 Environmental Noise Survey Procedure


A noise survey was undertaken on the proposed site as shown in Figure 2.1. The location was chosen in order to collect data representative of the worst-case levels expected on the site due to all nearby sources.

Continuous automated monitoring was undertaken for the duration of the survey between 11:20 on 20/11/2023 and 11:10 on 22/11/2023.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2017 Acoustics '*Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels*'.

2.3 Measurement Positions

Measurement positions are as described within Table 2.1 and shown within Figure 2.1.

Icon	Descriptor	Location Description
	Noise Measurement Position 1	<p>The microphone was installed on a tripod on the rooftop level of the south façade, as shown in Figure 2.2.</p> <p>The microphone was positioned within free-field conditions at least approx. 1.5 metres from the nearest surface.</p>

Icon	Descriptor	Location Description
2	Noise Measurement Position 2	<p>The microphone was installed on a pole sticking out of the window on the first floor of the north façade, as shown in Figure 2.2.</p> <p>The microphone was positioned within free-field conditions at least approx. 1.5 metres from the nearest surface.</p>

Table 2.1 Measurement positions and descriptions



Figure 2.1 Site measurement positions (Image Source: Google Maps)

2.4 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed. The equipment used is described within Table 2.2.

Measurement instrumentation		Serial no.	Date	Cert no.
Noise Kit 37	NTI Audio XL2 Class 1 Sound Level Meter	A2A-21302-E0	12/09/2023	UK-23-103
	Free-field microphone NTI Acoustics MC230A	A23082		
	Preamplifier NTI Acoustics MA220	13798		
	NTI Audio External Weatherproof Shroud	-	-	-
Noise Kit 38	NTI Audio XL2 Class 1 Sound Level Meter	A2A-23182-E1	12/09/2023	UK-23-104
	Free-field microphone NTI Acoustics MC230A	A25833		
	Preamplifier NTI Acoustics MA220	13818		
	NTI Audio External Weatherproof Shroud	-	-	-
B&K Type 4231 Class 1 Calibrator		2147411	05/06/2023	UCRT23/1739

Table 2.2 Measurement instrumentation

3.0 RESULTS

The $L_{Aeq, 5min}$, $L_{Amax, 5min}$, $L_{A10, 5min}$ and $L_{A90, 5min}$ acoustic parameters were measured throughout the duration of the survey. Measured levels are shown as a time history in Figure 26887.TH1-2.

Measured noise levels are representative of noise exposure levels expected to be experienced by all facades of the proposed development, and are shown in Table 3.1.

Time Period	Noise Measurement Position 1 (Measured Noise level – dBA)	Noise Measurement Position 2 (Measured Noise level – dBA)
Daytime $L_{Aeq, 16hour}$	60	53
Night-time $L_{Aeq, 8hour}$	55	47

Table 3.1 Site average noise levels for daytime and night time

Representative background noise levels are shown in Table 3.1 for daytime and night-time.

It should be noted that the representative background noise level has been derived from the most commonly occurring $L_{A90, 5min}$ levels measured during the environmental noise survey

undertaken on site, as shown in time history graphs 26887.DaytimeL90.TH1-2 and 26887.Night-timeL90.TH1 -2 attached.

Time Period	Representative background noise level Position 1 L _{A90} dB(A)	Representative background noise level Position 2 L _{A90} dB(A)
Daytime (07:00-23:00)	44	42
Night-time (23:00-07:00)	41	36

Table 3.2 Representative background noise levels

4.0 NOISE ASSESSMENT GUIDANCE

4.1 Planning conditions 17 and 18

The London Borough of Camden has issued the following conditions regarding the Building Envelope Sound Insulation and Fixed Plant Noise within the application 2018/4449/P:

“Condition 17: Building Envelope Sound Insulation

Internal noise levels in habitable rooms shall comply with BS8233:2014 guidance criteria for indoor ambient noise levels in residential dwellings when they are unoccupied and Table B, Appendix 3: Noise Thresholds of the Local Plan.”

Table B, Appendix 3: Noise Thresholds of the Local Plan refers to NPPF which is detailed in Section 4.2 below.

“Condition 18: Fixed Plant Noise

Prior to the installation of any items of fixed plant associated with the operation of the development, a noise report shall be submitted to and approved in writing by the local planning authority.

The noise report shall demonstrate that cumulative sound levels from external building services and fixed plant are 10dB or more below the lowest background sound level (15dB if tonal components are present) at the nearest sensitive receptor at any time. The report should reference the proposed noise limits included in the planning application noise report, Table 11: Plant Noise Limits at the Nearest Noise Sensitive Premises.”

4.2 Noise Policy Statement for England 2023

The National Planning Policy Framework (NPPF) has superseded and replaces Planning Policy Guidance Note 24 (PPG24), which previously covered issues relating to noise and planning in

England. Paragraph 174 of NPPF 2023 states that planning policies and decisions should aim to:

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans

In addition, Paragraph 185 of the NPPF states that *'Planning policies and decisions should also ensure that 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':*

- 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
- Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason

The Noise Policy Statement for England (NPSE) was developed by DEFRA and published in March 2010 with the aim to 'Promote good health and good quality of life through the effective management of noise within the context of Government policy on sustainable development.'

Noise Policy Statement England (NPSE) noise policy aims are as follows:

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

- *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 Noise Policy Statement England (NPSE) outlines observed effect levels relating to the above, as follows:

- NOEL – No Observed Effect Level

- This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level
 - This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level
 - This is the level above which significant adverse effects on health and quality of life occur.

As stated in The Noise Policy Statement England (NPSE), it is not currently possible to have a single objective based measure that defines SOAEL that is applicable to all sources of noise in all situations. Specific noise levels are not stated within the guidance for this reason, and allow flexibility in the policy until further guidance is available.

4.3 Planning Practice Guidance – Noise (PPG-N)

Planning Practice Guidance – Noise (PPG) was introduced by the Ministry of Housing, Communities & Local Government in March 2014 and revised in July 2019. It is an online digital resource that “advises on how planning can manage potential noise impacts in new development”. It gives guidance on establishing whether noise will likely cause a concern, factors of influence on noise impact and methods by which planning can address adverse effects of noise sources.

A noise exposure hierarchy table is provided within the guidance that follows the same observed effect descriptors given within the NPSE guidance, i.e. NOEL, NOAEL and LOAEL and SOAEL.

For a NOAEL descriptor: “A noise has no adverse effect so long as the exposure does not cause any change in behaviour, attitude or other physiological responses of those affected by it. The noise may slightly affect the acoustic character of an area but not to the extent there is a change in quality of life”

4.4 ProPG: Planning and Noise

As outlined above, the National Planning Policy Framework encourages improved standards of design, although it provides no specific noise levels which should be achieved on site for

varying standards of acoustic acceptability, or a prescriptive method for the assessment of noise.

ProPG: Planning and Noise was published in May 2017 in order to encourage better acoustic design for new residential schemes in order to protect future residents from the harmful effects of noise. This guidance can be seen as the missing link between the current NPPF and its predecessor, PPG24 (Planning Policy Guidance 24: Planning and Noise), which provided a prescriptive method for assessing sites for residential development, but without the nuance of 'good acoustic design' as outlined in ProPG.

ProPG allows the assessor to take a holistic approach to consider the site's suitability, taking into consideration numerous design factors which previously may not have been considered alongside the noise level measured on site, for example the orientation of the building in relation to the main source of noise incident upon it.

It should be noted this document is not an official government code of practice, and neither replaces nor provides an authoritative interpretation of the law or government policy, and therefore should be seen as a good practice document only.

4.5 The London Plan: Policy D12 Agent of Change

The London Plan states the following with regards to existing noise generating sources and new residential developments:

- A. *The Agent of Change principle places the responsibility for mitigating impacts from existing noise-generating activities or uses on the proposed new noise-sensitive development.*
- B. *Boroughs should ensure that planning decisions reflect the Agent of Change principle and take account of existing noise-generating uses in a sensitive manner when new development, particularly residential, is proposed nearby.*
- C. *Development proposals should manage noise and other potential nuisances by:*
 - *Ensuring good acoustic design to mitigate and minimise existing and potential impacts of noise generated by existing uses located in the area*
 - *Exploring mitigation measures early in the design stage, with necessary and appropriate provisions secured through planning obligations*

- *Separating new noise-sensitive development where possible from existing noise-generating businesses through distance, screening, internal layout, soundproofing and insulation, and other acoustic design measures.*
- D. *Development should be designed to ensure that established noise-generating venues remain viable and can continue or grow without unreasonable restrictions being placed on them.*
- E. *New noise-generating development, such as industrial uses, music venues, pubs, rail infrastructure, schools and sporting venues proposed close to residential and other noise-sensitive development should put in place measures such as soundproofing to mitigate and manage any noise impacts for neighbouring residents and businesses.*
- F. *Boroughs should refuse development proposals that have not clearly demonstrated how noise impacts will be mitigated and managed.'*

4.6 BS8233:2014

BS8233:2014 'Sound insulation and noise reduction for buildings' describes recommended internal noise levels for residential spaces. These levels are shown in Table 4.1.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Rooms	35 dB(A)	-
Dining	Dining Room/area	40 dB(A)	-
Sleeping (daytime resting)	Bedrooms	35 dB(A)	30 dB(A)

Table 4.1 BS8233 recommended internal background noise levels

It should be noted that the recommended internal noise levels outlined above are not applicable under "purge ventilation" conditions as defined by Approved Document F of the Building Regulations, as this should only occur occasionally (e.g. to remove odour from painting or burnt food). However, the levels above should be achieved whilst providing sufficient background ventilation, either via passive or mechanical methods.

The external building fabric would need to be carefully designed to achieve these recommended internal levels.

In addition to guidance on internal levels, BS8233:2014 also states the following with regards to noise within external amenity spaces:

'For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline

value of 55 dB $L_{Aeq,T}$, which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.'

As outlined above, the resulting noise levels in external amenity areas should not be a reason for refusal, providing that the noise levels are designed to be as low as practically possible within external amenity areas.

Expected levels within the proposed external amenity areas are outlined in Section X.X in more detail.

4.7 WHO Guidelines for Community Noise (1999)

WHO Guidelines for Community Noise (1999) recommends that internal noise levels for individual events should not exceed 45dB L_{Amax} more than 10-15 times per night.

It should be noted that this impact is increasingly being regarded as 'LOAEL' for this number of exceedances, as described in Section 4.1.

The external building fabric would need to be carefully designed to ensure that the above guidance is achieved.

4.8 Approved Document O (ed. 2021)

Approved Document O (ADO) supports Part O of Schedule 1 to the Building Regulations 2010. ADO introduces requirements for residential premises in order to prevent overheating from occurring. There are two specific requirements from ADO:

Requirement O1 (1):

To limit unwanted solar gains in summer and to provide adequate means to remove heat from the indoor environment.

Requirement O1 (2):

- (a) Account must be taken of the safety of the occupant, and their reasonable enjoyment of the residence.

(b) Mechanical cooling may only be used where sufficient heat cannot be removed from the indoor environment without it.

The statutory guidance to support Requirement O1(2)(a) contains requirements relating to noise at night.

4.8.1 Application

The guidance within ADO applies to new residential buildings only and are defined within the following table:

Title	Purpose for which the building is intended to be used.
Residential (dwellings)	Dwellings, which includes both dwellinghouses and flats.
Residential (institutions)	Home, school or other similar establishment, where people sleep on the premises. The building may be living accommodation for the care or maintenance of any of the following. <ul style="list-style-type: none"> A. Older and disabled people, due to illness or other physical or mental condition. B. People under the age of 5 years.
Residential (other)	Residential college, hall of residence and other student accommodation, and living accommodation for children ages 5 years or older.

Table 4.2 Residential buildings within the scope of ADO (ref. Table 0.1 of Approved Document O)

Paragraphs 3.2 and 3.3 of ADO specifically refer to noise within bedrooms at night. Whilst any habitable room could be used as a bedroom, it is proposed that the scope is confined to those rooms specifically designated as bedrooms.

4.8.2 Internal Noise Level Targets

ADO sets internal noise level targets within Paragraph 3.3 of the document:

“Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

a. 40dB $L_{Aeq,T}$ averaged over 8 hours (between 11pm and 7am)

b. 55dB L_{AFmax} more than 10 times a night (between 11pm and 7am).”

Where an openable window for the removal of excess heat is predicted to result in the above internal noise levels to be exceeded, then the overheating mitigation strategy must adopt one of the alternative means listed within Paragraph 2.10 of ADO (presented within Section 4.7.3 of this report). This constraint applies regardless of which method is used to demonstrate compliance with Requirement O1 (1).

4.8.3 Methods to Remove Excess Heat

Paragraph 2.10 of ADO lists the means for removing excess heat from dwellings according to the following:

- Openable windows
- Ventilation louvres in external walls
- A mechanical ventilation system
- A mechanical cooling system

4.9 BS4142: 2014 '*Methods for rating and assessing industrial and commercial sound*'

British Standard BS4142:2014 '*Methods for rating and assessing industrial and commercial sound*' describes a method for rating and assessing sound of an industrial and/or commercial nature, which includes:

- Sound from industrial and manufacturing processes
- Sound from fixed installations which comprise mechanical and electrical plant and equipment
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises, and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes.

This Standard compares the Rating Level due to the noise source/s under assessment for a one-hour period during the daytime (07:00 – 23:00 hours) and a fifteen-minute period during the night-time (23:00 – 07:00 hours) with the existing background noise level in terms of an L_{A90} when the noise source is not operating.

It should be noted that the Rating Level is the Specific Sound Level in question ($L_{Aeq, Tr}$), including any relevant acoustic feature corrections, as follows:

- **Tonality** – '*For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0dB and +6dB for tonality. Subjectively, this can be converted to a penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible, and 6dB where it is highly perceptible*'
- **Impulsivity** – '*A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3dB for*

impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible'

- **Intermittency** – *'If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied'*
- **Other sound characteristics** – *'Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied'*

Once the Rating Level has been obtained, the representative background sound level is subtracted from the Rating Level to obtain an initial estimate of the impact, as follows:

- Typically, the greater this difference, the greater the magnitude of the impact
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context
- A difference of around +5 dB could be an indication of an adverse impact, depending on the context
- The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context

NOTE: Adverse impacts may include but not be limited to annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.

The initial estimate of the impact may then be modified by taking consideration of the context in which the sound occurs.

5.0 EXTERNAL BUILDING FABRIC SPECIFICATION

Sound reduction performance calculations have been undertaken in order to specify the minimum performance required from glazed and non-glazed elements in order to achieve the recommended internal noise levels shown in Table 4.1, taking into account average and maximum noise levels monitored during the environmental noise survey.

Typical sized bedrooms with a high ratio of glazing to masonry have been used for all calculations in order to specify glazing:

- A-G.01 north facing Bedroom –14.8sqm floor area - 8sqm glazing area
- B-5.02 south facing Kitchen Living Room Dining Room - 29.6sqm floor area – 6sqm glazing area

As a more robust assessment, L_{Amax} spectrum values of night-time peaks have also been considered and incorporated into the glazing calculation in order to cater for the interior limit of 45 dB L_{Amax} for individual events, as recommended in WHO Guidelines.

Please note that the glazed and non-glazed element calculations would need to be finalised once all design proposals are finalised.

5.1 Non-Glazed Elements

It is currently understood that there are three proposed external wall types which are composed of Brick/Metal stud, Brick/Blockwork and Brick/concrete construction build up. The non-glazed building façade are comprised of the elements as shown within Table 5.1 based on the construction detail provided. The anticipated sound reduction index has been calculated, and would be expected to provide the minimum figures shown in the following table when tested in accordance with the BS EN ISO 10140 series of standards.

Element	Octave band centre frequency SRI, dB					
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
Brick/Metal stud 102.5mm - Brickwork 50mm - Cavity 120mm - Isover Poltherm Max Plus 12.5mm - Siniat Weather Defence Board 100mm - SFS fully filled with Isover Steel Frame Infill Batt 15mm - GTEC Fire Board	29	42	55	60	65	60
Brick/Blockwork 102.5mm - Brickwork 182.5mm - Isover CWS 32 - Staifix ST1 Wall Ties 100mm - Medium Dense Blockwork 15mm - GTEC Standard Board on Dabs*	35	30	44	55	55	55

Element	Octave band centre frequency SRI, dB					
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz
Brick/concrete						
102.5mm - Brickwork						
182.5mm - Isover CWS 32 - Staifix ST1 Wall Ties	45	46	54	59	59	59
200mm - Concrete						
15mm - GTEC Standard Board on Dabs*						

Table 5.1 Assumed sound reduction performance for non-glazed elements

5.2 Glazed Elements

Minimum octave band sound reduction index (SRI) values required for all glazed elements to be installed are shown in Table 5.2. The performance is specified for the whole window unit, including the frame, seals, etc. as appropriate. Sole glass performance data would not demonstrate compliance with this specification.

Glazing performance calculations have been based both on average measured night-time noise levels as well as verified against the L_{Amax} spectrum of individual events in order to comply with a maximum internal noise level of 45dB(A) in bedrooms as recommended by World Health Organisation Guidelines. The combined most robust results of these calculations are shown in Table 5.2.

Elevation	Octave band centre frequency SRI, dB						$R_w(C;C_{tr})$, dB
	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	
North, East, West Elevations	29	27	35	37	36	45	36 (-1;-3)
South Elevations	24	22	29	39	33	38	32 (-1;-3)

Table 5.2 Required glazing performance

The nominated glazing supplier should verify that their proposed window system meets the attenuation figures shown at each centre frequency band as shown in Table 5.2.

Example glazing types that would be expected achieve the above spectral values are shown in Table 5.3.

Elevation	Example glazing type
North, East, West Elevations	8/12/10 mm
South Elevations	6/12/6 mm

Table 5.3 Example glazing types

All major building elements should be tested in accordance with the BS EN ISO 10140 series of standards.

Independent testing at a UKAS accredited laboratory will be required in order to confirm the performance of the chosen system for an ‘actual’ configuration.

6.0 VENTILATION AND OVERHEATING

6.1 Ventilation Strategy

Based on the noise levels measured on site, appropriate ventilation systems are outlined in Table 6.1 below in order to ensure the internal noise environment is not compromised.

Ventilation System	Whole Dwelling Ventilation North, East, West Elevations	Whole Dwelling Ventilation South Elevations	Extract Ventilation
ADF System 1	Trickle vents providing a minimum performance of 38dB $D_{n,e,w}$	Trickle vents providing a minimum performance of 27dB $D_{n,e,w}$	Intermittent extract fans
ADF System 3	Continuous mechanical extract (low rate) and trickle vents for supply providing a minimum performance of 2 38dB $D_{n,e,w}$	Continuous mechanical extract (low rate) and trickle vents for supply providing a minimum performance of 27dB $D_{n,e,w}$	Continuous mechanical extract (high rate) with trickle vents providing inlet air
ADF System 4	Continuous mechanical supply and extract (low rate)	Continuous mechanical supply and extract (low rate)	Continuous mechanical supply and extract (high rate)

Table 6.1 Ventilation systems

Where trickle vents are proposed, a typical number has been assumed based on the room size and number of windows. As trickle vents introduce a weak point in the building façade, it should be noted that increasing the number of trickle vents will reduce the composite performance of the facade. If more trickle vents are required, the required insulation should be increased by ‘+10*LOG(N)’ where N is the number of vents proposed. If trickle vents are

proposed, the total number of trickle vents for each sensitive space should be confirmed so that calculations can be accurately revised.

In the case of mechanical ventilation, systems should be designed to meet the internal noise levels as defined in CIBSE Guide A (2015), as shown in Table 6.2.

Room Type	L_{Aeq} , dB	NR
Bedrooms	30	25
Living Rooms	35	30
Kitchen	45-50	40-45

Table 6.2 CIBSE Guide A 2015 guidance levels for mechanical building services

In all cases, purge ventilation would be provided by openable windows. As outlined in Section 4.5, the internal noise level requirement would not be applicable during purge conditions as this would only occur occasionally.

6.2 Openable Windows

Approved Document O (ADO) only applies to Bedrooms during night. The advice within this section would therefore only apply to Bedrooms during night-time hours (23:00-07:00) to ensure that the internal noise level targets of 40dB(A) $L_{eq,T}$ and 55dB(A) L_{max} are not exceeded.

Table 6.3 presents the open area of the window as a % of the floor area which would need to be achieved to ensure that sufficient attenuation is provided from outside to inside.

Elevation	Sound Reduction Required to Achieve ADO Target Internal L_{Aeq} Noise Levels	Sound Reduction Required to Achieve ADO Target Internal L_{Amax} Noise Levels	Maximum Open Area of the Window as a Percentage of the Floor Area to Achieve ADO Target Internal Noise Levels
North, East, West	15 dB	21 dB	0 %
South	7 dB	10 dB	2 %

Table 6.3 Window open areas

The overheating model should inform the design team whether the % open areas above would be sufficient to remove excess heat. In the event they are insufficient, other options to limit solar gains into the building should be investigated (such as those outlined in Section 2.7 of

Approved Document O), or other means of removing excess heat should be explored (as outlined in Section 2.10 of the Approved Document).

Note: Acoustic open area is the measurable, cross-sectional, geometric area of an opening. For a partially open window, this is considered to be the lesser of either the size of the hole in the window frame that is left by the opening light, or the combined cross-sectional area around the opening light through which air must pass to move from outside to inside. The area around a hinged opening light includes the triangular areas on the sides adjacent to the hinge, and the rectangular area on the side opposite the hinge. This should not be used for comparing the air-flow performance of elements because this will also be dependent on factors such as depth (length of air-path), surface roughness and tortuosity.

6.3 Overheating Control Strategies

Where the open areas specified above are not sufficient for controlling overheating, then one or more of the following strategies will need to be adhered to:

- Fixed shading devices comprising any of the following:
 - Shutters
 - External blinds
 - Overhangs
 - Awnings
- Glazing design, involving any of the following solutions
 - Size
 - Orientation
 - G-value
- Building design, e.g. the placement of balconies
- Shading provided by adjacent buildings structures or landscaping.
- Ventilation louvres in external walls
- A mechanical ventilation system
- A mechanical cooling system

KP Acoustics would be happy to review any proposals to ensure that they adhere to the internal noise levels targeted within ADO.

7.0 EXTERNAL AMENITY AREA ASSESSMENT

External amenity areas are proposed with private balconies for all units from Level 1 to Level 5 and with a large resident communal external amenity space proposed to the ground floor facing south. It is understood there is no private residential balconies facing the railways to the north.

Figure 7.1 and 7.2 show the ground and first floor plan respectively and amenity spaces.

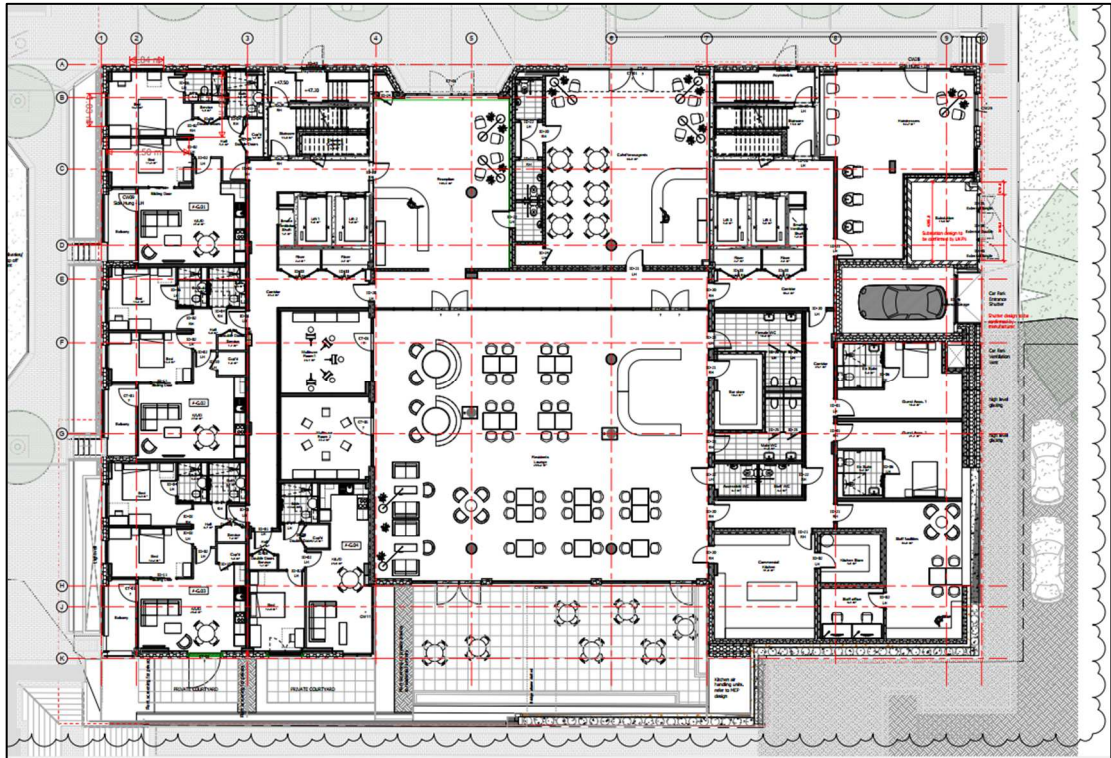


Figure 7.1 Amenity spaces on Ground Floor

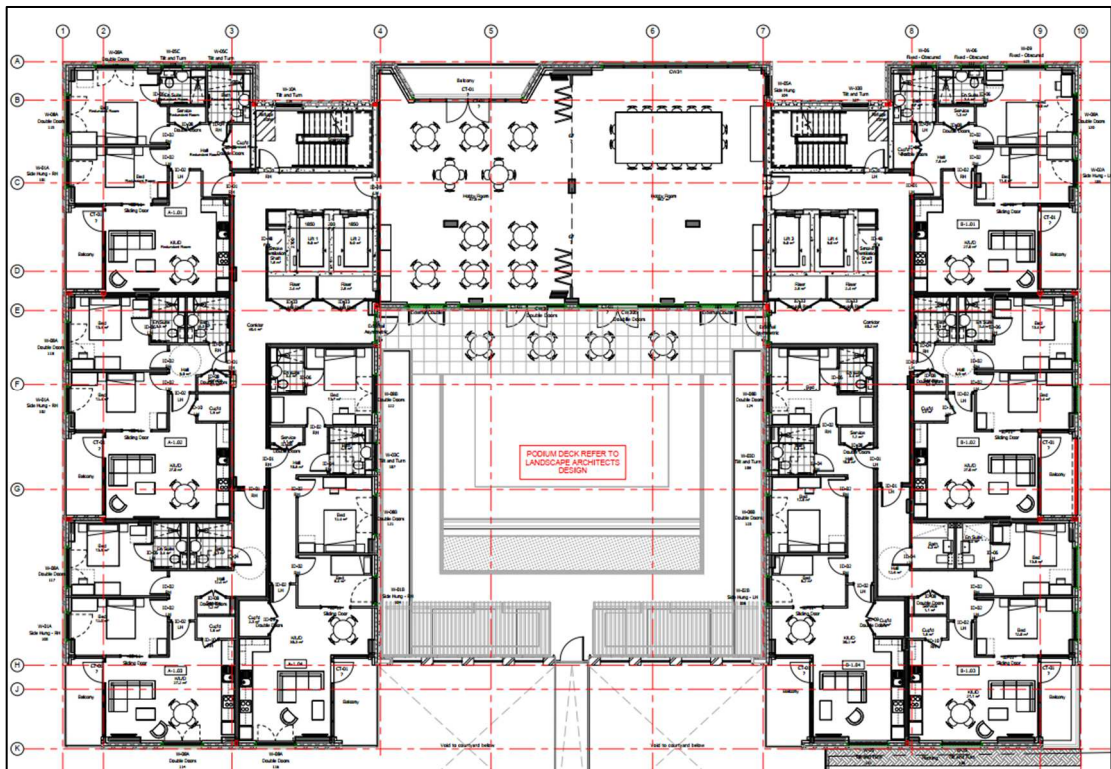


Figure 7.2 Amenity spaces on First Floor

Providing all east and west balconies facing the railway are recessed, the building envelope of the balconies would provide an attenuation of 5 to 8dB. As noise levels on the northern boundary of the site are currently in the region of 60dB(A), this would ensure that anyone seated within the east and west amenity areas would be exposed to noise level no higher than the BS8233 upper guideline value of 55dB(A).

Balconies on the south facing elevation would have noise levels in the region of 47 to 53dB(A), therefore being commensurate with the ideal situation noted in the guidance.

8.0 PLANT NOISE ASSESSMENT

8.1 Noise Emissions Criterion

The proposed future units could be used at any time of the day or night, and therefore the criterion has been set as shown in Table 8.1 in order to comply with the London Borough of Camden requirements.

Time Period	Noise Criterion at Nearest Residential Receiver – North, East, West Elevations	Noise Criterion at Nearest Residential Receiver – South Elevations
Night-time (23:00 to 07:00)	31 dB(A)	26 dB(A)

Table 8.1 Proposed noise emissions criterion

8.2 Proposed Plant Installations

Currently, the exact details of the proposed units are unknown. Once all M&E proposals have been finalised, this report will be revised to include calculations which demonstrate compliance to the criterion set in Table 8.1.

9.0 CONCLUSION

An environmental noise survey has been undertaken at 11 - 12 Ingestre Road, London NW5 1UX allowing the assessment of daytime and night-time levels likely to be experienced by the proposed development.

Measured noise levels allowed a robust glazing specification to be proposed which would provide internal noise levels for all residential environments of the development commensurate to the design range of BS8233:2014.

No further mitigation measures should be required in order to protect the proposed habitable spaces from external noise intrusion.

The maximum openable area for bedroom windows with the development has been presented based upon the requirements of Approved Document O.

An assessment of the external amenity areas with the development has been undertaken. The noise levels within the external amenity areas are in line with the guidance presented within BS8233:2014.

The results of the survey have also enabled a maximum noise emissions criterion for the proposed plant unit installations to be established, based on the requirements of the Local Authority.

Further calculations would need to be undertaken once all M&E proposals are finalised in order to demonstrate compliance.

Ingestre Road, London - Position 1
Environmental Time History
20/11/2023 to 22/11/2023

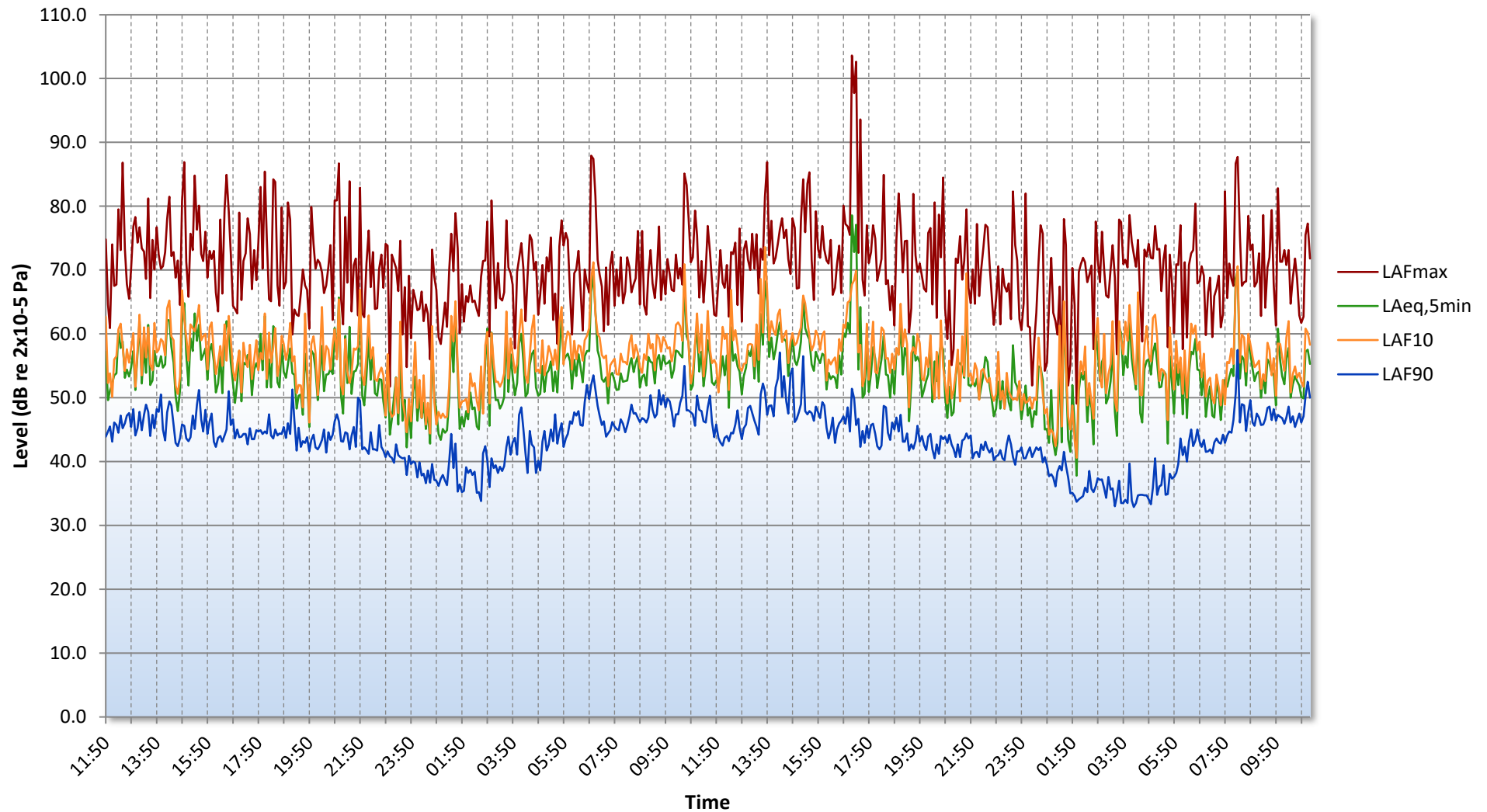


Figure 26887.TH1

Ingestre Road, London - Position 1
Representative Daytime Background Noise Level
20/11/2023 to 22/11/2023

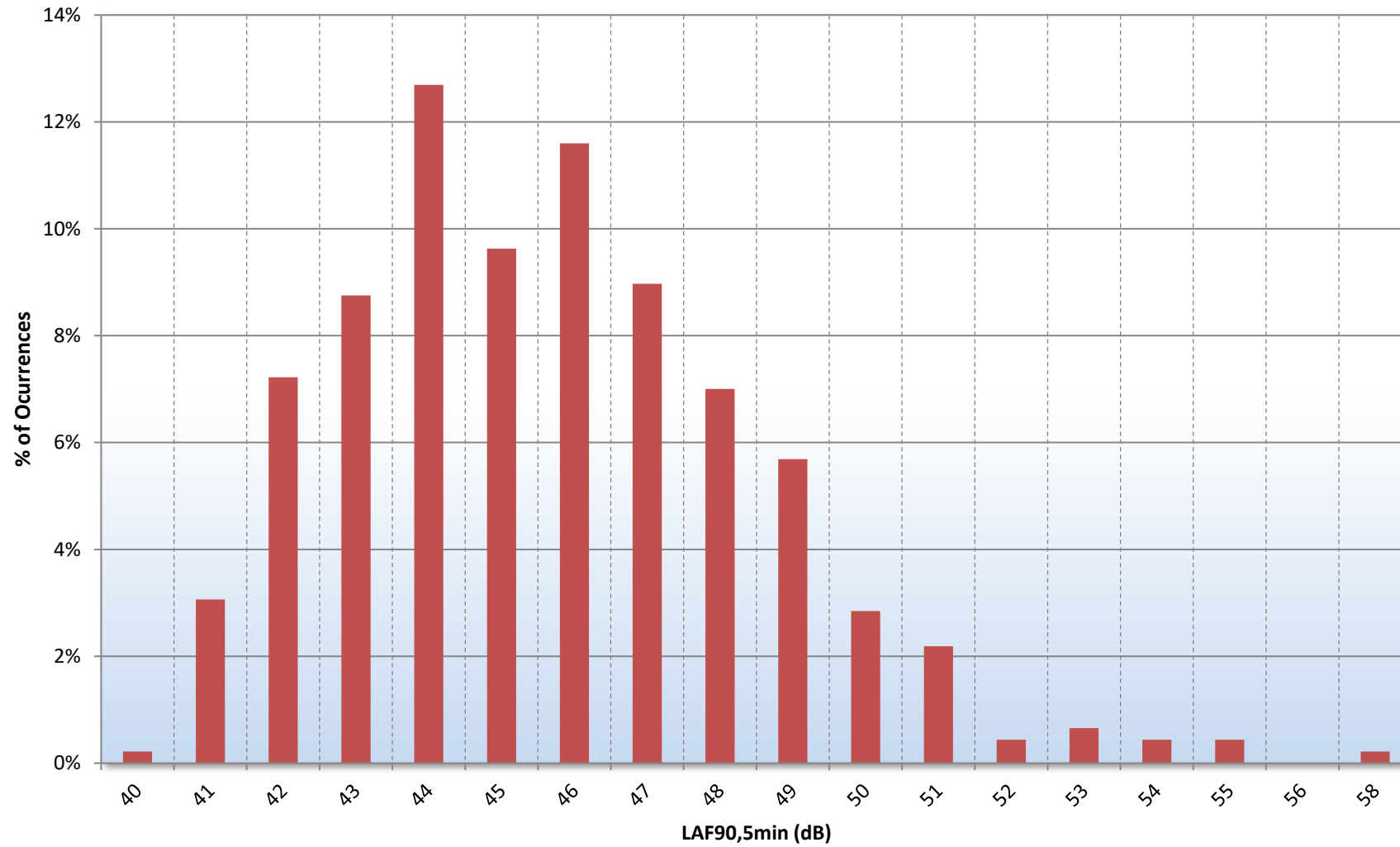


Figure 26887.Daytime L90.TH1

Ingestre Road, London - Position 1
Representative Night-time Background Noise Level
20/11/2023 to 22/11/2023

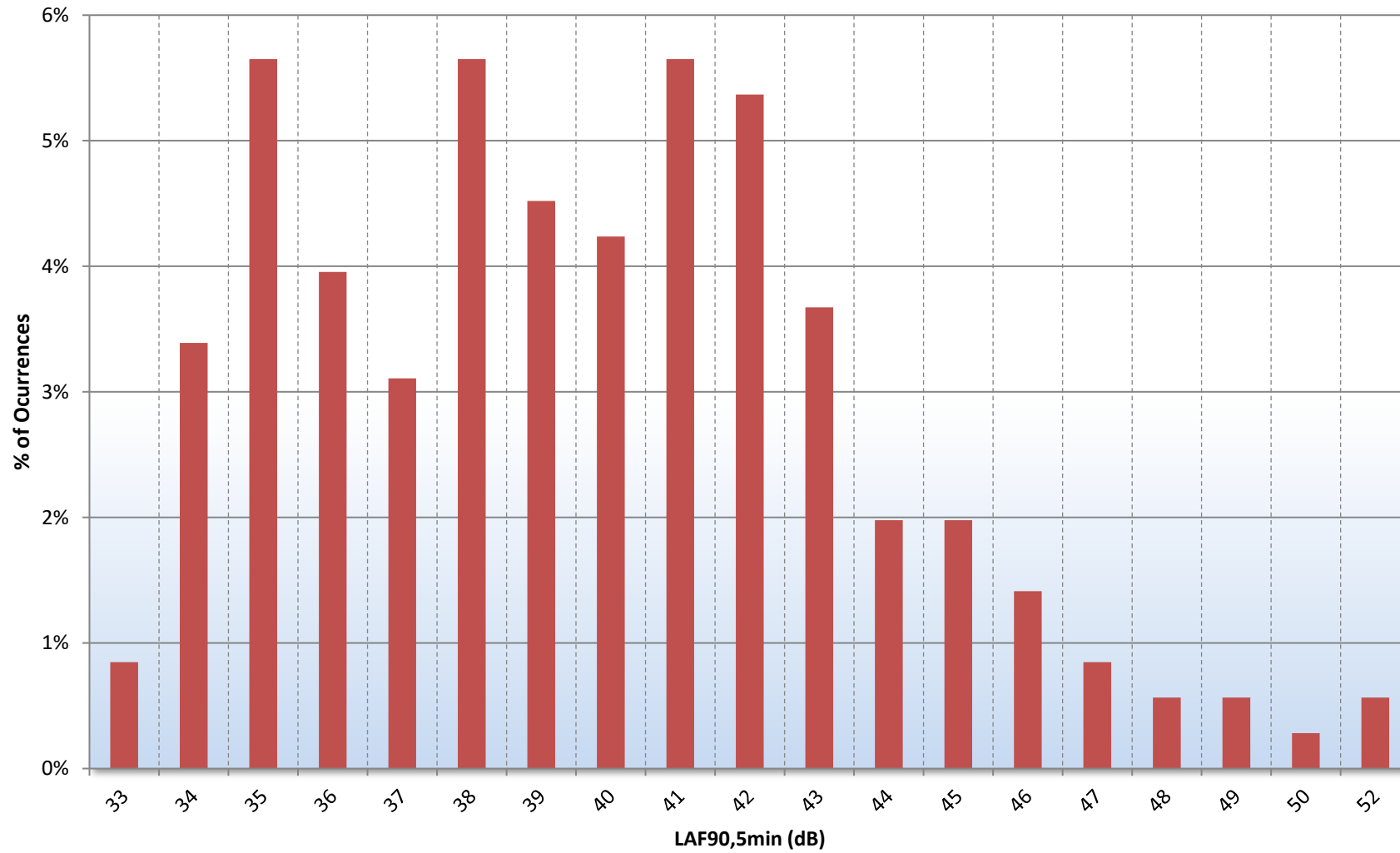


Figure 26887.Night-time L90.TH1

Ingestre Road, London - Position 2
Environmental Time History
20/11/2023 to 22/11/2023

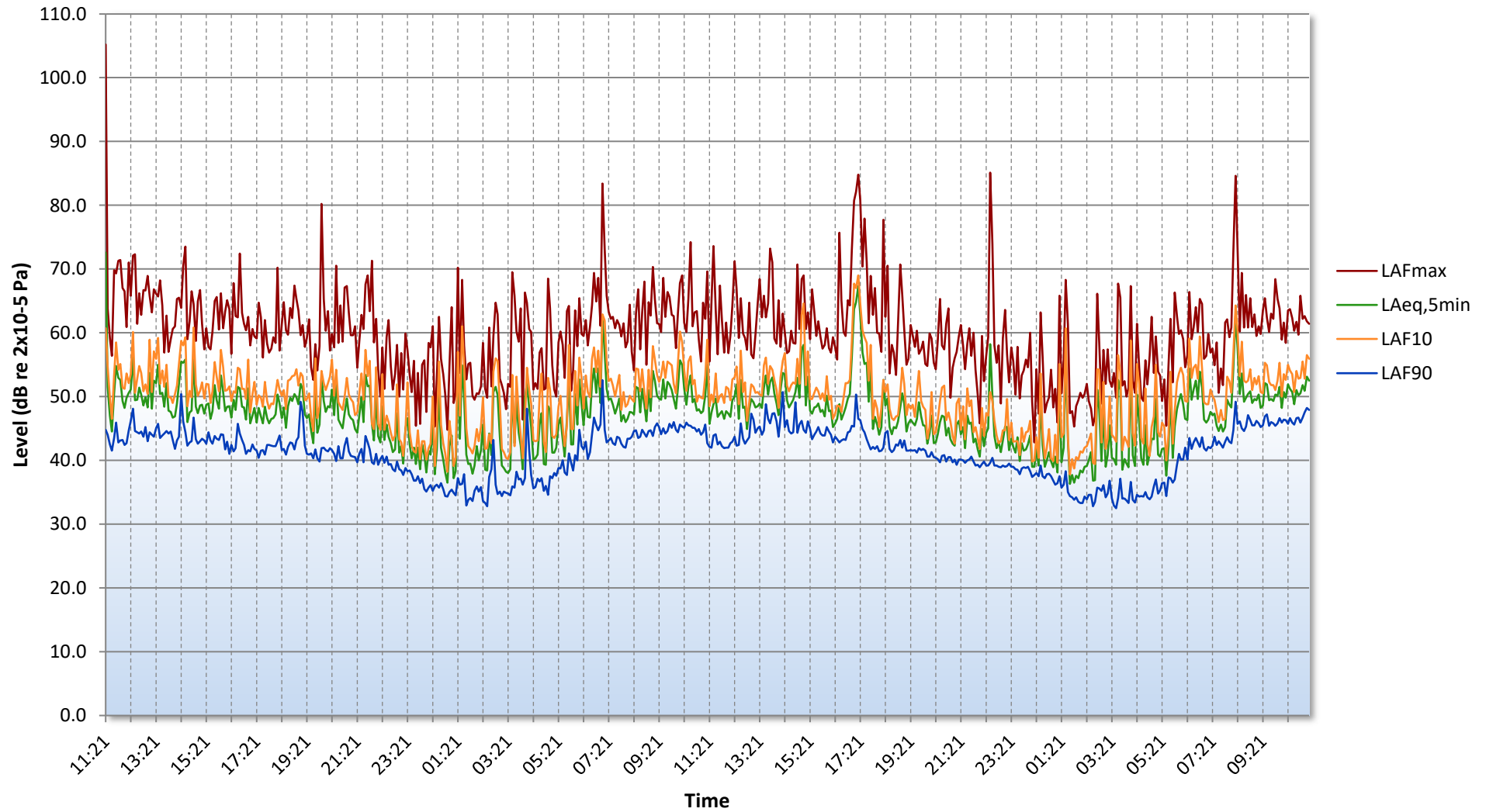


Figure 26887.TH2

Ingestre Road, London - Position 2
Representative Daytime Background Noise Level
20/11/2023 to 22/11/2023

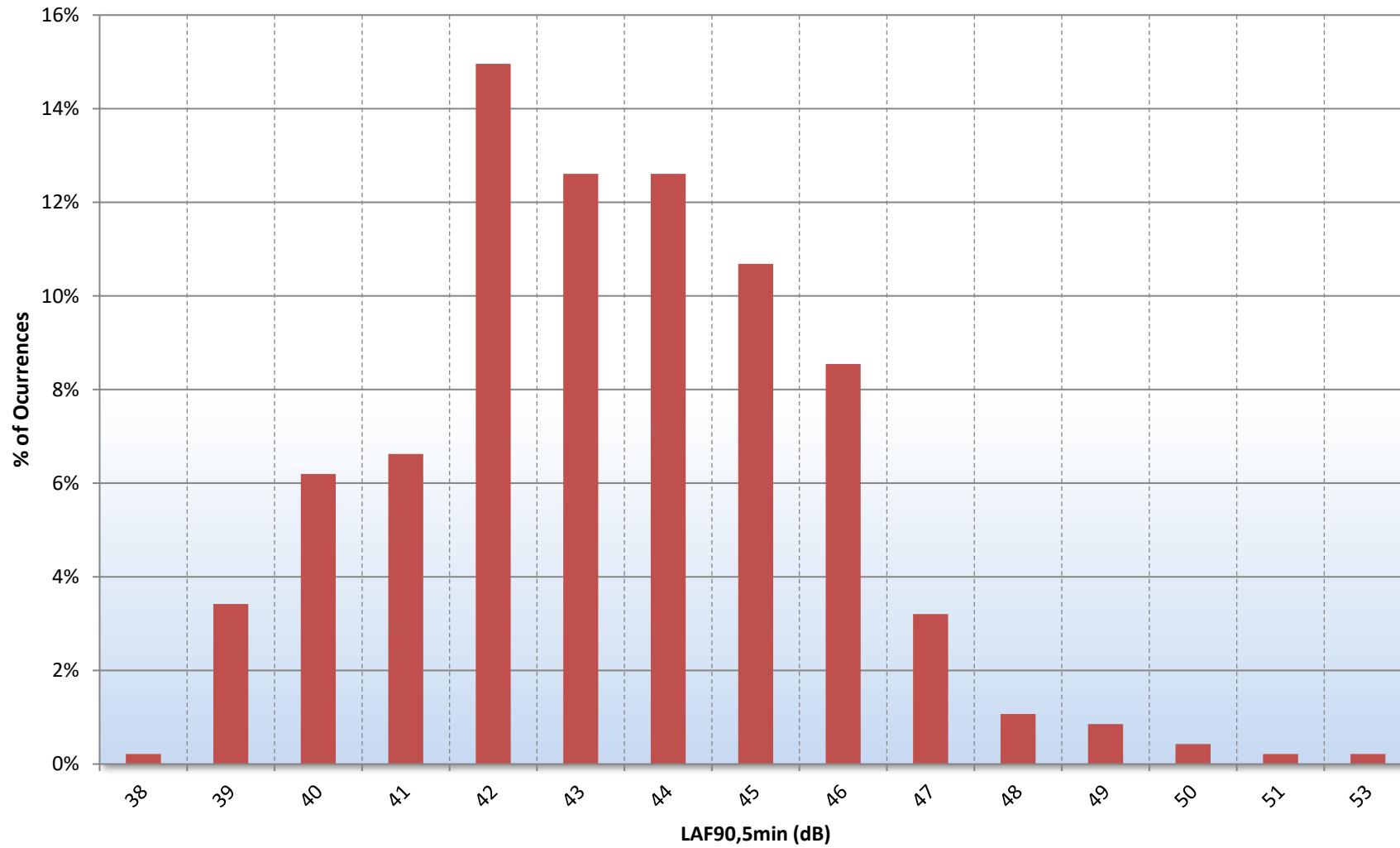


Figure 26887.Daytime L90.TH2

Ingestre Road, London - Position 2
Representative Night-time Background Noise Level
20/11/2023 to 22/11/2023

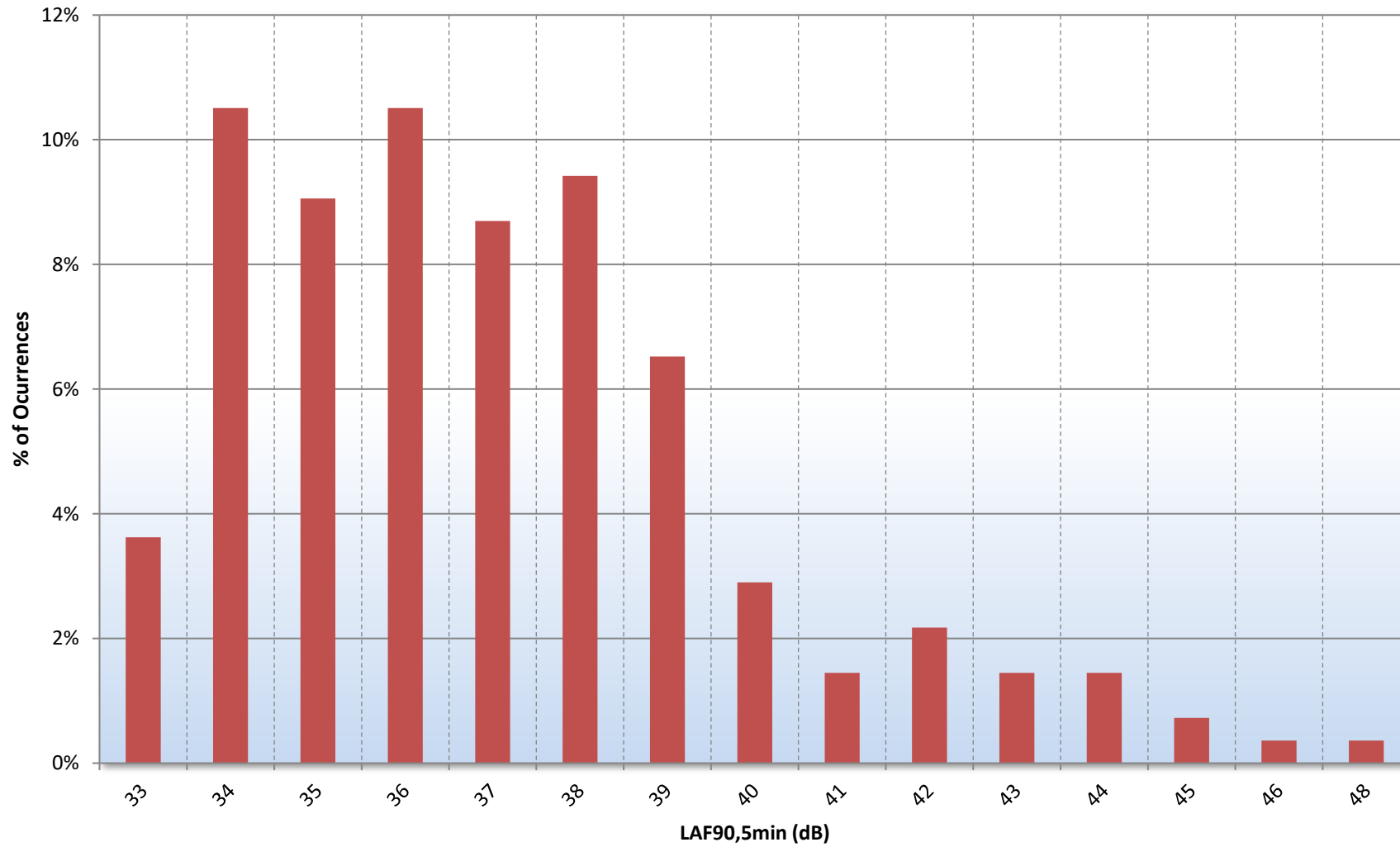


Figure 26887.Night-time L90.TH2

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq} . The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for no more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise.

L_{90}

This is the level exceeded for no more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPLIED ACOUSTIC TERMINOLOGY

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than a single source and 4 sources produce a 6dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Hearing perception is highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a guide to explain increases or decreases in sound levels for many scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.