



Krave, 43a Lake Bank, Littleborough

Noise Impact Assessment

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23071-R01B-SW 43a Lake Bank Littleborough

Client: Krave

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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R01	10/07/2023	Original Issue	Susan Witterick BSc MIOA	Ben Tomlin BSc MIOA
R01A	26/07/2023	Added details of extended noise survey, assessed for potential extended opening hours.	Susan Witterick BSc MIOA	Ben Tomlin BSc MIOA
R01B	25/01/2024	Updated to take into account EHO comments.	<i>Susan Witterick</i> Susan Witterick BSc MIOA	<i>Ben Tomlin</i> Ben Tomlin BSc MIOA

1 INTRODUCTION

- 1.1 dBx Acoustics Ltd has been appointed by Krave to carry out a noise impact assessment for proposed use of an external seating area to the rear of their premises at 43a Lake Bank, Littleborough, OL15 0DQ.
- 1.2 Further consideration is given to the potential requirement to extend the opening hours from the current closing time of 17:00h to 22:00h.
- 1.3 The Local Authority is Rochdale Borough Council.
- 1.4 This report presents the results of a noise survey carried out at the premises, and an assessment of potential noise impact from use of the external area by patrons.
- 1.5 A glossary of acoustic terminology is provided in Appendix A, to assist the reader.

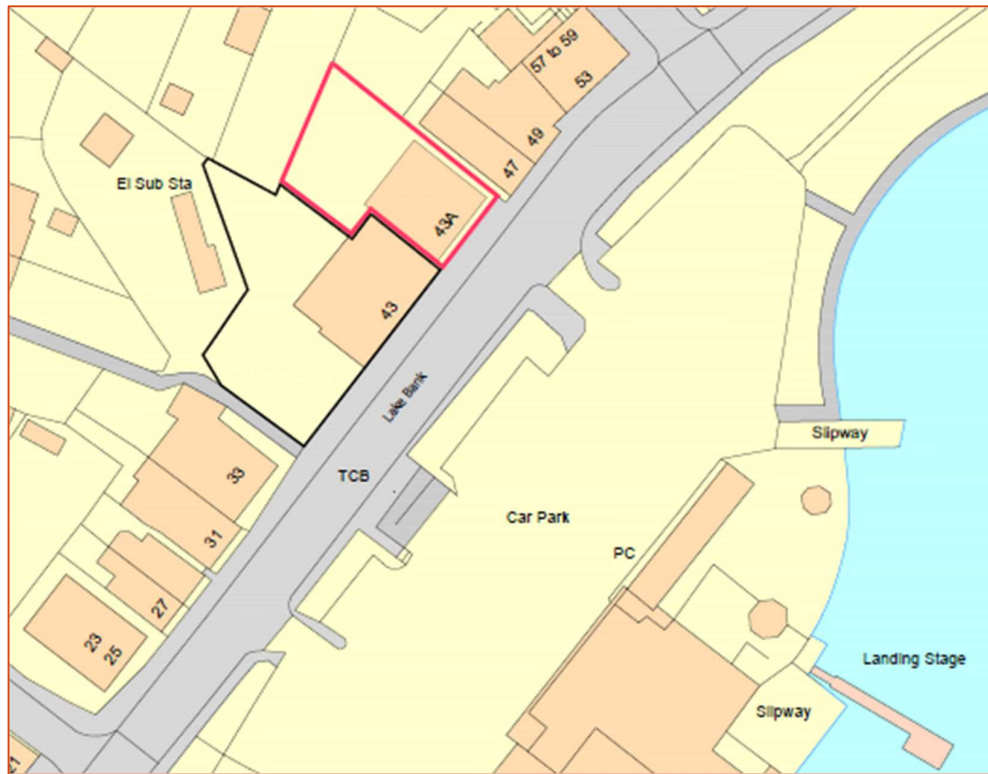
2 LOCAL AUTHORITY REQUIREMENTS

- 2.1 Following submission of the previous version of this report (R01A dated 26/07/2023), dBx Acoustics has spoken to Mr Paul Fletcher, Environmental Health Officer at Rochdale Borough Council.
- 2.2 Mr Fletcher has requested that this assessment be updated to include the following;
 - Assessment of noise post 20:00h, and consideration to restricting number of occupants in this area after if necessary.
 - Consideration of additional mitigation.
 - Change assumption such that there will be 2 people speaking in each group of 4 people (previous assumption was 1 person per group of 4).
 - Add comparative measured noise data from crowds in typical outdoor seating areas, if available.
- 2.3 Mr Fletcher also confirmed that no amplified music will be permitted in the external seating area.

3 SITE DESCRIPTION

- 3.1 Krave is located at 43a Lake Bank Road, Littleborough. A site location plan is presented as Figure 1, below.

Figure 1: Site Location Plan



- 3.2 The current opening hours are understood to be 09:00h-17:00h, Monday to Sunday. The Client has expressed a desire to extend hours to a maximum of 09:00h-22:00h.
- 3.3 It is proposed that the garden to the rear of the premises be used to provide external seating for patrons, as shown in Figure 2, below.

Figure 2: Proposed Layout



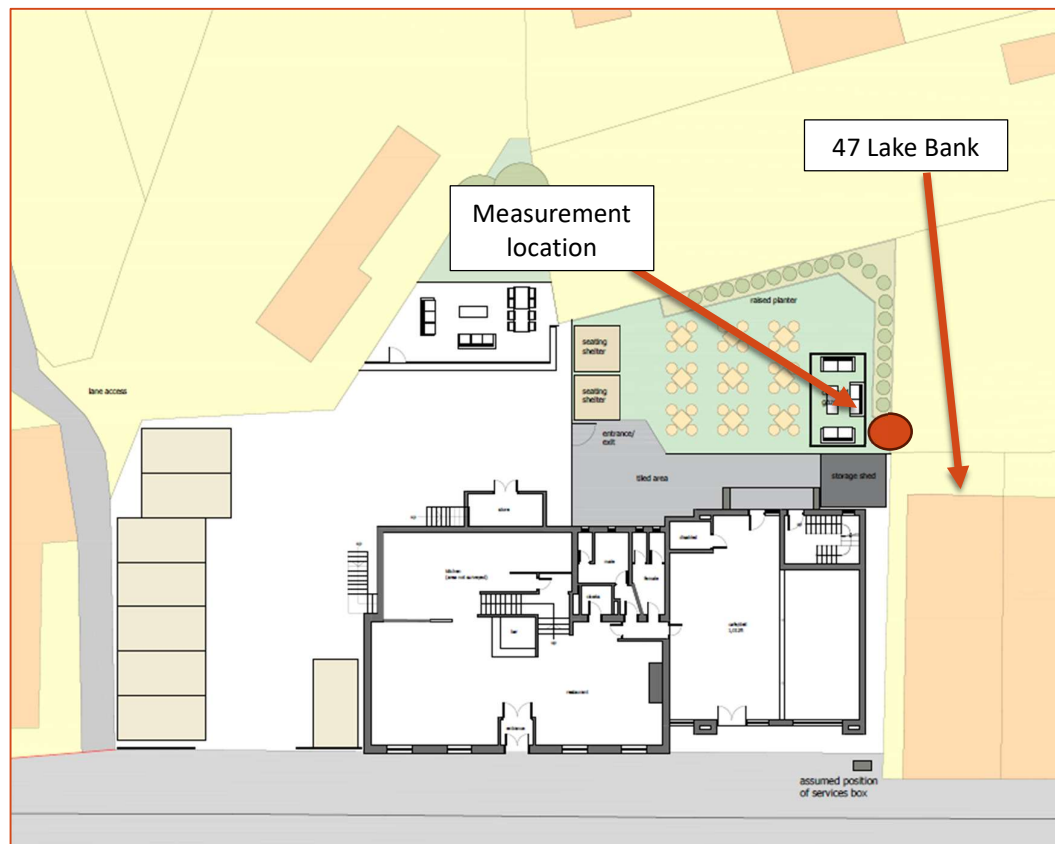
- 3.4 The nearest noise sensitive receptors (NSRs) have been identified as follows;
- Upper floor residential receptor at 43a Lake Bank, currently occupied by Krave's owner.
 - Upper floor residential receptor at 47 Lake Bank, approximately 14m from the centre of the proposed external area.
 - Residential property at 3 Higher Cleggswood Avenue, approximately 22m from the centre of the proposed external area.
- 3.5 This assessment has therefore been carried out with reference to the NSR at the adjacent property, 47 Lake Bank.
- 3.6 It is understood that no amplified music is proposed in the external seating area.

4 NOISE SURVEY

Methodology

- 4.1 In order to establish the typical ambient and background noise levels affecting the NSRs during the typical periods of use of the external seating area, dBx Acoustics Ltd attended site to carry out a noise survey between 17:00h on Thursday 20th July 2023 and 21:00h on Saturday 22nd July 2023, when measurements ceased due to heavy rain.
- 4.2 Measurements were made within the external seating area; the selected location was considered representative of the surrounding noise sensitive receptors. The measurement location is shown in Figure 3, below, with reference to the closest NSR at 47 Lake Bank.

Figure 3: Measurement Location and NSRs



Noise Sources

- 4.3 The ambient and background noise levels were dominated by road traffic on Lake Bank, as well as audible noise from passing pedestrians, and aircraft.

Weather Conditions

- 4.4 Weather conditions during the measurement period were generally dry, with a temperature of 8-18°C.
- 4.5 Wind speeds were within suitable parameters for the measurement of environmental noise (i.e. under 5ms⁻¹). The microphone was protected with a windshield for the duration of the survey.

Equipment Used

4.6 The equipment used in the survey is shown in Table 1, below.

Table 1: Equipment Used in Noise Survey

Equipment	Manufacturer & Part No.	Serial Number	Calibration Date	Certificate Number
Meter	NOR 140	1403443	24/05/2023	06256/2
Pre-Amp	NOR 1209	12967		
Microphone	NOR 1225	18437		
Calibrator	B&K 4231	1821323	24/05/2023	06256/1

4.7 The sound level meter was calibrated before and after measurements, with no significant drift recorded. An accredited laboratory calibrated the equipment not more than two years prior to the measurements being made, with the exception of the calibrator, which had been calibrated not more than one year prior to the survey.

Measurement Results

4.8 Noise levels were measured continuously in 15-minute periods throughout the noise survey.

4.9 The measured ambient noise levels are summarised in Table 2 below. A comparison is shown for the current opening hours (09:00h-17:00h), the proposed evening opening period (17:00h-22:00h), and the full extended opening period (09:00h-22:00h). At the request of the EHO, the period 20:00h-22:00h has also been considered.

Table 2: Summary of Measured Ambient Noise Levels, dBL_{Aeq,15min}

Measurement Period	Current Opening Hours 09:00h-17:00h	Proposed Opening Hours 09:00h-22:00h	Extended Hours Only 17:00h-22:00h	Evening Period 20:00h-22:00h
Thursday 20 th July	-	-	55	58
Friday 21 st July	55	55	55	53
Saturday 22 nd July	55	54	54	48

4.10 It can be seen that there is little variation in ambient noise level between the current opening hours and the proposed evening opening period.

4.11 When considering the period past 20:00h, it can be seen that the Saturday evening noise level is 6dB lower than during the full opening period and the 17:00h-22:00h period.

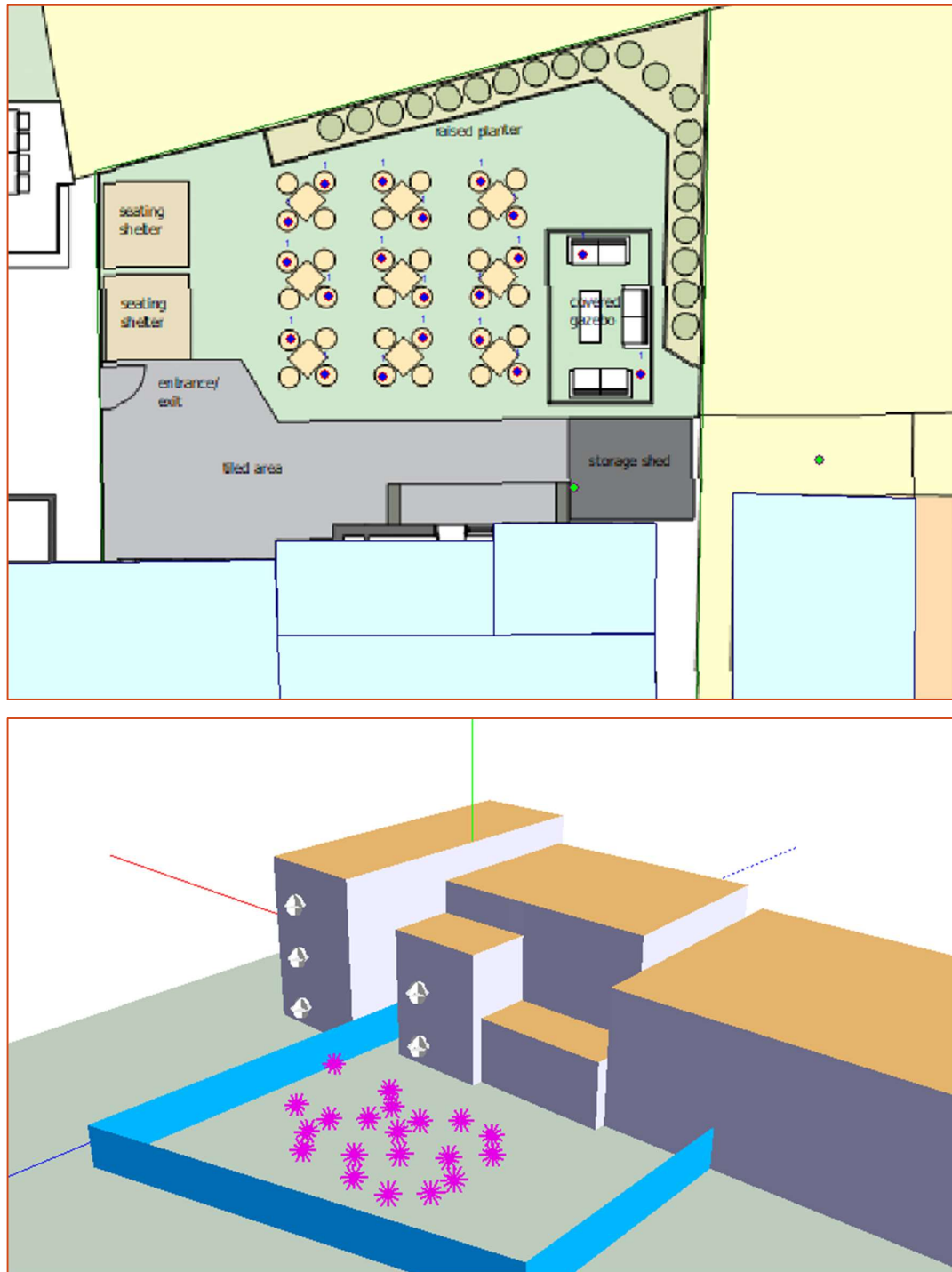
5 NOISE IMPACT ASSESSMENT

- 5.1 It is understood that up to 40 patrons can be accommodated in the external area simultaneously.

Noise Model

- 5.2 Noise levels in the external seating area have been determined using the calculation method presented in the J.H. Rindel, C.I.Christensen, A.C. Grade research paper: '*Dynamic sound source for simulating the Lombard effect in room acoustic modelling software*' (Proceedings of Inter-Noise 2012, New York, USA, (2012)).
- 5.3 Based on observations of the noise climate within Krave during the site visit, it has been deemed appropriate to use a noise level representative of 'normal' speech conversation levels. The sound power level of a person speaking in a normal voice is equal to approximately 68dBL_{WA} (ref. ANSI 3.5).
- 5.4 Converting this to allow for a group of people in the proposed seating area used the following method.
- The first step is to calculate the number of speaking persons (NS) at any one time, where N is the total number of persons (40) and G is the assumed group size (typically 4).
 - The EHO has requested that the modelling exercise assumes a potential worst case situation where two people in each group are speaking simultaneously. In this scenario, this would equate to up to 20 people speaking simultaneously (40/2).
- 5.5 A model of the site and NSR at the adjacent property has been produced using the Soundplan 9.0 noise modelling software. The model includes the proposed seating, and close boarded timber fencing around the perimeter of the external area, and allows any partial screening between the residential receptors and external seating area due to angle of view to be accurately calculated.
- 5.6 Twenty noise sources have been distributed at seated head height (1.2m above ground level) to represent patrons, each with a sound power level for speech of 68dBL_{WA}.
- 5.7 Receptors have been assigned to the location of the first floor windows both above Krave, and at the adjacent property (47 Lake Bank).
- 5.8 Screenshots from the model are presented as Figure 4, below.

Figure 4: Screenshots from Noise Model



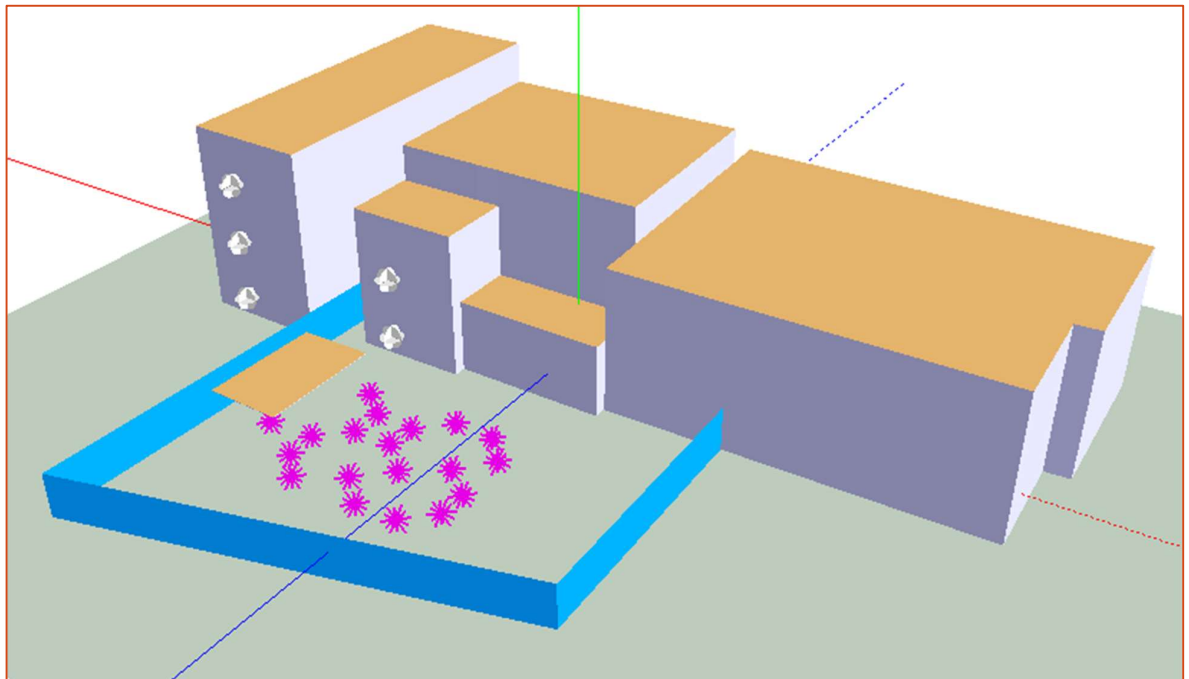
Predicted Noise Levels and Assessment

- 5.9 With twenty people speaking simultaneously in the external seating area, the predicted noise levels arising at the NSR at the first floor of 47 Lake Bank is 51dB_{L_{Aeq,T}}.
- 5.10 The predicted noise level at 47 Lake Bank is 4dB below the typical ambient noise level measured during the noise survey, leading to a short-term increase in cumulative noise levels at the NSR of up to 1.5dB with the external seating area in full occupation.
- 5.11 Based on Table 7-10 of the IEMA guidelines, this would be considered a negligible impact. With residential receptors considered as being of medium sensitivity (high sensitivity receptors would include, for example, hospital operating theatres, or highly sensitive processes such as electron microscopes and some micro-electronic manufacturing equipment).
- 5.12 With reference to the matrix in Table 7-7 of the IEMA guidelines, this therefore is considered to have no discernible effect on the receptor.
- 5.13 For the Saturday evening period post 20:00h, the predicted noise level at 47 Lake Bank is 3dB higher than the measured ambient noise level. This would lead to a short-term increase in cumulative noise levels at the NSR of up to 4.8dB with the external seating area in full occupation.
- 5.14 This would be considered a small effect (IEMA Table 7-10) having a moderate impact (IEMA Table 7-7). This is described in IEMA Table 7-12 as follows:
- 'Noise impact can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; closing windows.'*
- 5.15 It should be noted that this is a worst-case assessment, considering 20 people speaking simultaneously. If, for example, half the people were present or speaking, then noise levels would reduce by 3dB.
- 5.16 Given the context of the proposals, the following factors should also be taken into consideration;
- The external seating area will only generally be occupied during fine weather.
 - The noise climate includes existing noise from pedestrian activity and voices.

Potential Mitigation

- 5.17 The noise model has been used to consider the effect of a solid 'roof' to the proposed gazebo within the external area at a height of 2.2m. This would break the line of sight between the residential receptor and much of the external area, as indicated in Figure 5, below.
- 5.18 The 'roof' should comprise any solid material with no openings or gaps, with a minimum mass of 10kg/m², for example, 17.5mm plywood.

Figure 5: Noise Model with Gazebo Roof



- 5.19 With the screening provided by this roof, the predicted noise level at the first floor of 47 Lake Bank is reduced by 3dB to $48\text{dBL}_{\text{Aeq,T}}$.
- 5.20 The short-term increase in cumulative noise levels at the NSR during the post 20:00h Saturday evening period would be 2.9dB which would be considered negligible.

6 CONCLUSION

- 6.1 This report presents the details of a noise survey and noise impact assessment carried out for the proposed external seating area to the rear of Krave, at 43a Lake Bank, Littleborough, OL15 0DQ.
- 6.2 A worst-case noise impact assessment, based on full occupancy of the external area, and ambient noise levels measured on site towards the end of the proposed opening hours, indicates that the noise impact associated with use of the external seating area would be considered negligible, other than the post-20:00h period on Saturday evening when the lowest ambient noise levels were measured during the environmental noise survey.
- 6.3 During this period (20:00h-22:00h one day per week) a 'moderate' noise impact may occur under the worst-case noise assessment. This can be mitigated by adding a roof to the external gazebo as detailed above.
- 6.4 The assessment is based on a worst-case of full occupancy of the external seating area, and with reference to ambient noise levels measured during the proposed extended opening period to 22:00h.
- 6.5 Taking the above into account, noise should therefore not be a limiting factor in any planning application.

APPENDIX A – GLOSSARY OF ACOUSTIC TERMINOLOGY

Decibel, dB	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. For sound pressure level (L_p) the reference quantity is 2×10^{-5} N/m ² . The sound pressure level existing when microphone measured pressure is 2×10^{-5} N/m ² is 0 dB, the threshold of hearing.
L	Instantaneous value of Sound Pressure Level (L_p) or Sound Power Level (L_w).
Frequency	Number of cycles per second, measured in hertz (Hz), related to sound pitch.
A-weighting	Arithmetic corrections applied to values of L_p according to frequency. When logarithmically summed for all frequencies, the resulting single "A weighted value" becomes comparable with other such values from which a comparative loudness judgement can be made, then, without knowledge of frequency content of the source.
$L_{eq,T}$	Equivalent continuous level of sound pressure which, if it actually existed for the integration time period T of the measurement, would possess the same energy as the constantly varying values of L_p actually measured.
$L_{Aeq,T}$	Equivalent continuous level of A weighted sound pressure which, if it actually existed for the integration time period, T, of the measurement would possess the same energy as the constantly varying values of L_p actually measured.
$L_{n,T}$	L_p which was exceeded for n% of time, T.
$L_{An,T}$	Level in dBA which was exceeded for n% of time, T.
L_{Fmax}	The instantaneous maximum sound pressure level which occurred during the measurement. F indicates that the fast time-weighting is used.
L_{AFmax}	The instantaneous maximum A weighted sound pressure level which occurred during the measurement. F indicates that the fast time-weighting is used.
$L_{Ar,Tr}$	The rating level: the equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise.
Reverberation Time, T	The time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped. The descriptor T, often includes other nomenclature to describe the type of reverberation time measurement or if the reverberation time is an average taken for specific frequencies. For example, a T_{mf} is the mid-frequency reverberation time.
Absorption Coefficient, α	The fraction of reverberant sound energy absorbed by a material. It is expressed as a value between 1.0 which equates to perfect absorption and 0 which equates to zero absorption.
Acoustic Class, A - E	Classification of sound absorbers into Sound Absorption Classes A-E, according to BS EN ISO 11654, including frequencies 200-5000 Hz
NRC	A single-number rating system used to compare the sound-absorbing characteristics of building materials. A measurement of the acoustical absorption performance of a material, calculated by averaging its Sound Absorption Coefficients at 250, 500, 1000 and 2000 Hz
STI	Speech Transmission Index , Metric ranging between 0 and 1 representing the transmission quality of speech with respect to intelligibility by a speech transmission channel
R	Sound Reduction Index , the laboratory measured sound insulation properties of a material or building element in octave or third octave bands.
R_w	Weighted Sound Reduction Index , a single number which represents the sound reduction of a material. It is derived by plotting the sound reduction index against a set of reference curves. The curves are shifted until a best-fit is established and the curve which best fits the sound reduction spectrum is used to represent the single figure value.
D_w	Weighted Level Difference , the weighted level difference between a pair of rooms, stated as a single figure.

D_{nT}	Standardised Level Difference, a frequency-dependent measurement of airborne sound insulation, calculated using the following formula: $D_{nT} = L_1 - L_2 + 10\log(T/T_0)$ dB Where: L_1 is the energy-averaged sound pressure level due to the pink noise source measured in the source room using a sweep technique. L_2 is the energy-averaged sound pressure level measured in the receiving room using a sweep technique. T is the mean receiving room reverberation time (derived from T_{30} measured in seconds). T_0 is the reference reverberation time (= 0.5s for dwellings).
$D_{nT,w}$	Weighted Standardised Level Difference, a single-figure value of airborne sound insulation performance, derived according to procedures in BS EN ISO 717-1, based on the D_{nT} values at different frequencies (100-3150 Hz third octave bands).
$D_{nF,w}$	Weighted, Normalised Flanking Level Difference, the normalised, weighted difference in sound level between a pair of rooms via a flanking element, such as mullion or ceiling detail. The level difference in octave bands is first normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
D_{ne}	Normalised Element Level Difference. The normalised difference in sound level between a pair of rooms via a small element such as a trickle ventilator. The level difference in octave bands is normalized to a reference amount of absorption.
$D_{n,e,w}$	Weighted, Normalised Element Level Difference. The normalised, weighted difference in sound level between a pair of rooms via a small element such as a trickle ventilator, stated as a single figure. The level difference in octave bands is normalized to a reference amount of absorption and then plotted against a set of reference curves to establish a single figure value.
C_{tr}	Spectrum Adaptation Term, a correction term applied to the sound insulation single-number values (R_w, $D_{w,w}$, and $D_{nT,w}$) in accordance with BS EN ISO 717-1. Applying the C_{tr} penalises a construction's performance if its low frequency performance is poor in relation its performance at higher frequencies.
Impact Sound	The noise generated by an impact on a structure. This is normally used to describe the noise created by people walking or moving furniture on a floor structure.
L_{nT}	Standardised Impact Sound Pressure Level, a frequency dependent measurement of impact sound insulation, calculated using the following formula: $L_{nT} = L_1 + 10\log(T/T_0)$ dB Where: L_1 is the mean sound pressure level due to the tapping machine measured in the receiving room using a sweep technique. T is the mean receiving room reverberation time (derived from T_{30} measured in seconds). T_0 is the reference reverberation time (0.5s for dwellings)
$L'_{nT,w}$	Weighted Standardised Impact Sound Pressure Level, a single-figure value (@ 500 Hz) of impact sound insulation, performance, derived according to BS EN ISO 717-2, based on the L_{nT} values at different frequencies (100Hz- 3150 Hz third octave bands).
Insertion Loss, IL	The reduction of noise level due to the presence of a noise control device such as an attenuator, excluding any regeneration noise created by its presence.
NR	The Noise Rating level. This is a single figure value derived by plotting a noise spectrum against a set of curves. The curve under which the spectrum fits is the resulting NR level.

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Final Audit Report

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