



Equitable Building Manchester

Planning Conditions Discharge Report

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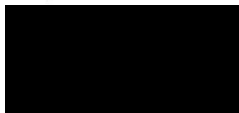
Client: PHPH

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REVISION HISTORY

Revision	Date	Revision Details	Author	Checked
R02	16/05/2025	Initial Issue	Ben Tomlin BSc MIOA	Susan Witterick BSc MIOA
R02A	20/05/2025	Updated following planning consultant comments	Ben Tomlin BSc MIOA	Susan Witterick BSc MIOA
R02B	28/05/2025	Updated following client and M&E consultant comments	 Ben Tomlin BSc MIOA	 Susan Witterick BSc MIOA

1 INTRODUCTION

- 1.1 dBx Acoustics Ltd has been appointed by PHPH to provide Manchester City Council with requested information regarding noise/acoustic matters relating to the proposed Equitable Building residential development.
- 1.2 The development comprises the refurbishment of the 2nd and 3rd floors of the former commercial building, as well as a new build penthouse apartment on the roof.
- 1.3 The scheme has been submitted for planning permission, under Manchester City Council (MCC) planning application references 141994/FO/2025 and 141995/FO/2025.
- 1.4 This report responds to comments 4, 5, 7 and 9, which relate to noise/acoustic issues, along with an unnumbered comment relating to plant noise. These items are addressed below.
- 1.5 A glossary of acoustic terminology has been supplied in Appendix A to assist the reader.

2 COMMENT 4 – VENTILATION NOISE

- 2.1 Comment 4 states:

“Once the ventilation system has been selected, we will need an assessment of the noise level from the system and insulation recommendations to ensure that when in full use (including any boost function where applicable) it does not lead to an exceedance of the internal noise criteria.”
- 2.2 This is unusual, and Manchester City Council’s (MCC) conditions usually relate to noise ingress only. A methodology for indoor ambient noise level verification measurements has been agreed with Manchester City Council which explicitly states that mechanical services noise is switched off during measurements.
- 2.3 The associated condition is reproduced below, which appears to confirm this relates to noise ingress only;

“a) Prior to the commencement of development, a scheme for acoustically insulating the proposed residential accommodation against noise from surrounding streets and City Centre activity shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises such as noise from street entertainers, plant from existing premises etc”
- 2.4 Regardless, achieving the suggested noise limits in BS8233 with ventilation systems operational is considered good practise, and is the design aim. On this basis, an assessment of the internal noise levels from the MVHR units is provided below, as well as the Fan Coil Units (FCUs) on the fourth floor.
- 2.5 The proposed MVHR units are Nuaire MRXBOX-ECO, and have the noise data shown in Figure 1, below.

Figure 1: MVHR Sound Power Levels

	Sound Power Levels dB re 1pW (Frequency Hz)								dBA @3m
	63	125	250	500	1k	2k	4k	8k	
Open inlet	61	61	62	60	53	45	35	32	
Open outlet	69	69	69	74	67	63	55	49	
Breakout	70	58	60	60	50	49	42	29	42

2.6 A typical ventilation layout within an apartment is shown as Figure 2, below.

Figure 2: Typical Ventilation Layout



2.7 On this basis, calculations have been undertaken to determine the noise levels in the most affected bedroom (supply system) and living room (extract system).

2.8 The predicted noise level in the bedroom (with no mitigation) is around 48dBL_{Aeq,T}, and 41dBL_{Aeq,T} in the living rooms.

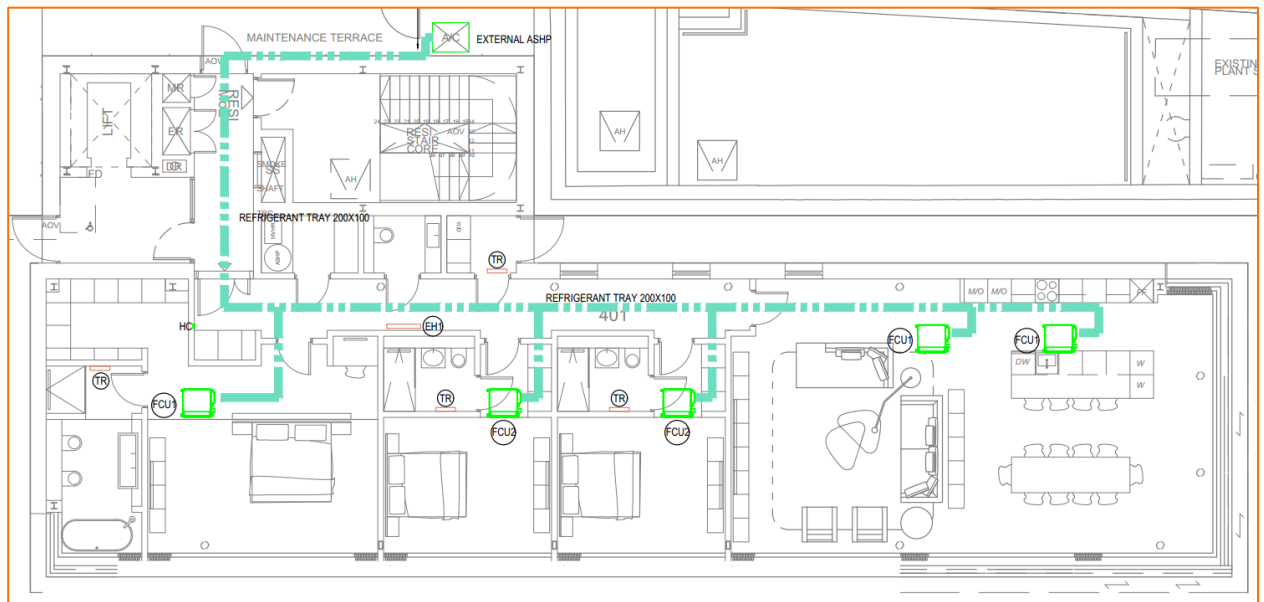
2.9 This exceeds the recommended limits of 30dBL_{Aeq,T} in the bedrooms, and 35dBL_{Aeq,T} in living rooms.

2.10 Calculations indicate that the suggested targets can be achieved with 900mm long attenuators with a 33% free area in the supply system, and 600mm long attenuators with 50% area in the extract system.

2.11 These are not onerous requirements and can also be achieved with many alternative attenuators.

2.12 On the fourth floor, FCUs are also located in bedrooms and living rooms, as indicated in Figure 3, below.

Figure 3: FCU Layout



2.13 The noise levels for these units are shown in Figure 4, below.

Figure 4: FCU Noise Levels

		FCU1		FCU2
PEFY-M-VMA-A1 INDOOR UNITS		PEFY-M20VMA-A1	PEFY-M25VMA-A1	PEFY-M32VMA-A1
CAPACITY (kW)	Heating (nominal)	2.5	3.2	4.0
	Cooling (nominal)	2.2	2.8	3.6
	UK Heating	2.5	3.2	4.0
	UK Total Cooling - Hi (Sensible)	2.00 (1.90)	2.50 (2.10)	3.20 (2.60)
	UK Total Cooling - Mi1	1.92	2.40	3.05
	UK Total Cooling - Mi2	1.83	2.28	2.87
POWER INPUT (kW)	Heating (nominal)	0.04	0.04	0.06
	Cooling (nominal)	0.04	0.04	0.06
AIRFLOW (l/s) Cooling	Lo-Mi2-Mi1-Hi	100-125-142-166	100-125-142-166	123-150-175-208
AIRFLOW (l/s) Heating	Lo-Mi2-Mi1-Hi	100-125-142-166	100-125-142-166	123-150-175-208
EXTERNAL STATIC PRESSURE (Pa)		35-50-70-100-150	35-50-70-100-150	35-50-70-100-150
SOUND PRESSURE LEVEL (dBA)*1	Lo-Mi2-Mi1-Hi	21.5-23-26.5-30	21.5-23-26.5-30	24-28-31.5-35.5
(50Pa) Cooling				
SOUND PRESSURE LEVEL (dBA)*1	Lo-Mi2-Mi1-Hi	21.5-23-26.5-30	21.5-23-26.5-30	24-28-31.5-35.5
(50Pa) Heating				

2.14 Calculations indicate that noise levels in rooms served by FCU1 would be around 28dBL_{Aeq,T}, and hence meet the recommended noise limits.

2.15 For the bedrooms served by FCU2, noise levels would be around 35dBL_{Aeq,T}, and hence exceed the recommended limits.

2.16 A basic 600mm long 50% free area attenuator would reduce this to around 25dBL_{Aeq,T}, and hence meet the recommended limits.

2.17 Attenuator specifications will be developed for all systems as the design progresses, but it can be seen that the recommended internal noise limits can be easily achieved.

3 COMMENT 5 – FAÇADE PENETRATIONS

3.1 Comment 5 states:

“Any new or existing façade penetrations to the building for ventilation intake / extract for example will need assessment and details of any necessary acoustic treatment recommending to ensure these penetrations do not compromise the acoustic integrity of the building and lead to an exceedance of the internal noise criteria.”

3.2 This therefore relates to noise ingress via the intake and outlet ducts serving the MVHR units.

3.3 The external grilles measure 500mm x 200mm, and there are two per apartment. There is also to be a small attenuator on the inlet/discharge paths to control noise egress to external noise sensitive receptors (discussed further below).

3.4 On this basis, the effective sound insulation performance of this path is at least 60dBR_w, which is at least 20dB better than the glazing, and hence noise ingress via this path will be completely inaudible.

4 COMMENT 7 – NOISE TRANSFER VIA FLOOR

4.1 Comment 7 states:

“We will need an assessment of noise transfer from the lower floor retail units into the proposed residential properties and details of any separating floor upgrades required along with any sound transmission paths such as structurally adjoining columns being identified and any necessary acoustic insulation measures to these areas recommending.”

4.2 The building contains a combination of concrete encased and exposed steel structures, and reinforced concrete slabs and beam and block floors (some being hollowcore).

4.3 The worst case acoustically is the hollow-core base slab, which, comprises a 200mm hollow-core plank, with 50mm screed above. With the proposed design, this will have a resilient layer and a further 40mm screed above.

4.4 The exact type/mass of the hollowcore element is unknown, but a 200mm plank would typically be around 250-300kg/m², depending on the size of the core. The lower value has been used in our calculations.

4.5 On this basis, the predicted airborne sound insulation performance of the base slab and screed is around 52dBR_w. Any ceilings in the retail units would increase this further.

4.6 It is generally accepted that if one noise level is 10dB lower than another then the lower noise is inaudible.

4.7 On this basis, a limit of around 25dBL_{Aeq,T} in the living rooms in the day would ensure than noise from the floor below would be inaudible, or barely perceptible. The retail units do not operate at night.

4.8 Calculations based on the sound insulation performance of the hollowcore floor indicate that this limit would not be exceeded unless noise levels in the retail area are higher than around 75dBL_{Aeq,T}.

4.9 This is highly unlikely to be the case. BS8233 indicates that typical noise levels in a ‘department store’ (albeit unoccupied) are around 50-55dBL_{Aeq,T}. Noise from the retail tenancy (currently a jeweller) is therefore likely to be completely inaudible in the rooms above.

- 4.10 The concrete columns are of sufficient mass that flanking will not be an issue. Any exposed steel columns will be clad with plasterboard and mineral fibre, which will adequately control flanking.
- 4.11 On this basis, noise from the retail units is expected to be completely inaudible.

5 COMMENT 9 – OVERHEATING

- 5.1 Comment 9 states:

“An overheating assessment will need to be undertaken and submitted with mitigation measures recommending where required for review.”

- 5.2 The M&E consultant (Ridge) has provided the following statement in terms of overheating;

“... in regards to the overheating, we have conducted an assessment on one sample apartment (Apartment 205). Following an assessment we have achieved a pass under Part O, using the 2020 DSY1 Manchester weather file with a mechanical ventilation design strategy with windows open during the day (7am – 11pm) and closed overnight. Please note, a full simulation of all bedrooms and adjacent spaces of the proposed development is recommended, this should be undertaken as part of Detailed Design Stage 4 as the results selection at an early stage can only go so far in attributing probable overheating risks. It should be noted that as occupancy and building use is based on set parameters outlined in Approved Document Part O and has been assumed for the bedrooms and living spaces, there is no guarantee the temperatures estimated will match the actual building temperatures as the ‘real’ building may have differing operations and heat gain patterns with external weather conditions not normal to the historical data provided by the standard CIBSE weather files. It therefore should be noted that there is no guarantee that the thermal comfort assessment will match the occupied building. The benefits of this analysis are to inform building design decisions and encourage best practice in design development. The presented results will need to be revised as changes are made to building design in future design stages.”

- 5.3 From this, it can be seen that the overheating strategy relies on openable windows in the day, but not at night where the MVHR system will control overheating.
- 5.4 The external ambient noise levels in the day on the noisiest façade are around 63dB_{L_{Aeq,T}} (façade measurements).
- 5.5 The AVO Level 1 Assessment is used to determine the ‘Potential Effect without Mitigation’ and to establish if there is a requirement for a Level 2 Assessment.
- 5.6 AVO indicates that a Level 2 assessment is ‘recommended’ when 65dB_{L_{Aeq,16hour}} (daytime) and/or 55dB_{L_{Aeq,8hour}} (night-time) are exceeded.
- 5.7 Based on the external daytime noise levels of 63dB_{L_{Aeq,T}}, a Level 2 assessment is ‘optional’.
- 5.8 For reassurance, the optional Level 2 Assessment is presented below.

AVO Level 2 Assessment

- 5.9 For the Level 2 assessment, there are no definitive criteria proposed, only a sliding scale of 'Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night'.
- 5.10 However, internal noise level limits of $50\text{dBL}_{\text{Aeq},16\text{hour}}$ in the day, and $42\text{dBL}_{\text{Aeq},8\text{hour}}$ and $65\text{dBL}_{\text{Amax},F}$ at night are the limits at which *'Noise causes a material change in behaviour e.g. having to keep windows closed most of the time.... Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep.'*
- 5.11 These limits would therefore appear to be a worst-case upper limit. Furthermore, any adverse effects relating to noise are affected by both the noise level itself, and the duration (how long overheating occurs) and frequency (how many times per year/month) the overheating condition occurs.
- 5.12 AVO specifies an expected reduction from external to internal noise levels of -13dB when a window is open to control overheating.
- 5.13 On this basis, the predicted indoor ambient noise levels assuming windows open for the control of overheating during the day are shown in Table 1, below.

Table 1: AVO Level 2 Assessment - Daytime

Parameter	Assessment
External Ambient Noise Level, $\text{dBL}_{\text{Aeq},16\text{hr}}$	63
Free-field correction, dB	-3
Reduction, open window, dB	-13
IANL Day-time ($\text{dBL}_{\text{Aeq},16\text{hr}}$)	47
Upper Limit Outlined in AVO	$>50\text{dBL}_{\text{Aeq},16\text{h}}$
Exceedance	-3

- 5.14 It can be seen that, during the daytime period, the IANL with windows open to control overheating would be within the upper limit suggested by AVO.

6 [NO NUMBER] – PLANT NOISE

6.1 This comment states:

“The plant has yet to be selected and the report includes recommended plant limits for once the plant has been selected. However, the plant limits proposed would not comply with the above condition as plant limits equal to the LA90 have been proposed which is not acceptable. Plant and equipment, including any plant located behind louvres or grilles will need to be selected and treated to not exceed 5dB below the LA90 at the proposed residential receptors and the nearby commercial properties so section 4.5 will need to be revised accordingly.”

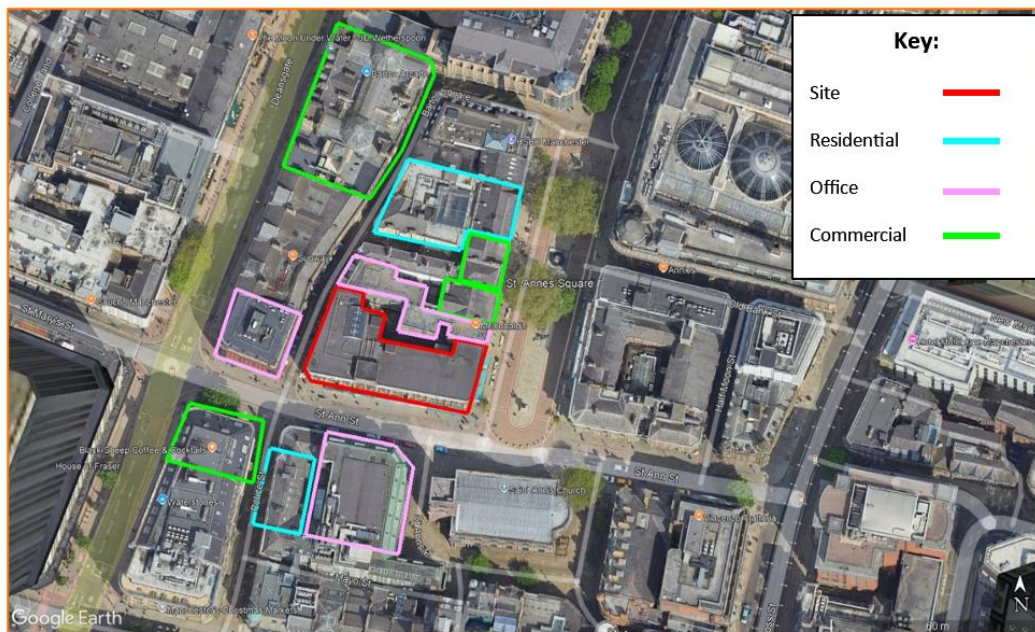
6.2 The original acoustic planning report issued by Professional Consult (their report reference 24.155.1.R6, dated 6th January 2025) set incorrect plant noise limits.

6.3 Based on the measured background noise levels of 56dBL_{A90,T} in the day, and 50dBL_{A90,T} at night, appropriate limits to meet Manchester City Council's condition are 51dBL_{Ar,Tr} in the day and 45dBL_{Ar,Tr} at night.

6.4 Since the issue of the Professional Consult report, the plant has been selected, as detailed in Section 2, above. A detailed assessment, in accordance with BS4142, is therefore provided below.

6.5 The nearest noise sensitive receptors are believed to be as shown in Figure 5, below.

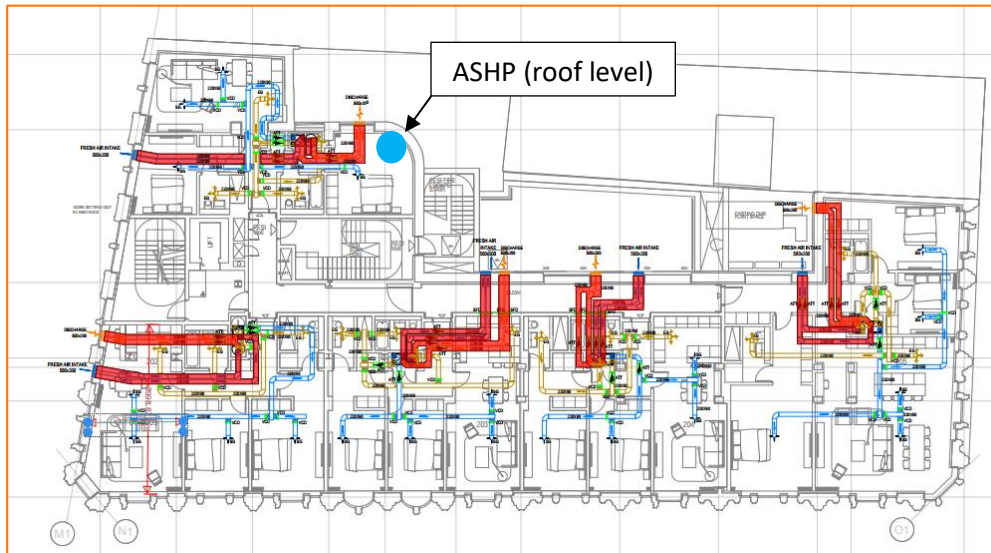
Figure 5: Nearby Noise Sensitive Receptors



6.6 The proposed plant comprises an MVHR unit per apartment, and an Air Source Heat Pump (ASHP) located on the roof.

6.7 A typical floor ventilation layout is shown as Figure 6, below

Figure 6: Typical Ventilation Layout



- 6.8 Overall, there are 7 inlets and 9 outlets on the northern elevation, along with the ASHP, and 4 inlets and 2 outlets on the western elevation.
- 6.9 The nearest noise sensitive receptors are all offices. These would therefore only be expected to be in use in the day, and hence a limit of $51\text{dBL}_{\text{Ar,Tr}}$ would apply.
- 6.10 Calculations indicate that without mitigation, noise levels at the western NSR would be around $52\text{dBL}_{\text{Ar,Tr}}$, and at the northern NSR, around $61\text{dBL}_{\text{Ar,Tr}}$. These calculations are based on all units running simultaneously.
- 6.11 These noise levels therefore exceed the required noise limits.
- 6.12 Calculations indicate that a 600mm long attenuator with a 50% free area fitted to both the inlet and outlet paths would achieve a specific noise level of around $48\text{dBL}_{\text{Aeq,T}}$ at the nearest NSR to the north.
- 6.13 There is no indication of tonality in the noise data provided (Figure 1), and hence even allowing a +3dB for potential intermittency, the worst-case rating noise level would be $51\text{dBL}_{\text{Ar,Tr}}$, which meets MCC's requirements.
- 6.14 To the west the rated noise level would be around $42\text{dBL}_{\text{Ar,Tr}}$, and hence meet Manchester's requirements.
- 6.15 To the residential receptors at the north of the site, due to the additional distance and screening, the rating level at the nearest window would be around $35\text{dBL}_{\text{Ar,Tr}}$, which meets MCC's requirements at any time of day or night.

7 CONCLUSION

- 7.1 dBx Acoustics Ltd has been appointed by PHPH to provide Manchester City Council with requested information regarding noise/acoustic matters relating to the proposed Equitable Building residential development.
- 7.2 The development comprises the refurbishment of the 2nd and 3rd floors of the former commercial building, as well as a new build penthouse apartment on the roof.
- 7.3 The scheme has been submitted for planning permission, under Manchester City Council (MCC) planning application references 141994/FO/2025 and 141995/FO/2025.
- 7.4 This report responds to comments 4, 5, 7 and 9, which relate to noise/acoustic issues, along with an unnumbered comment relating to plant noise.
- 7.5 A detailed assessment of all comments has been undertaken, and the outcome presented.
- 7.6 In some cases, evidence is provided such that the requirements can be achieved on the basis of the baseline design.
- 7.7 Where the baseline design does not meet the requirements, mitigation measures are presented such that all of Manchester City Council's requirements are met.

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).
$D_{n,F,w}$	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 , 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.

This report (including any enclosures and attachments) has been prepared by dBx Acoustics with reasonable skill and care in accordance with generally accepted acoustic principles and the terms agreed between dBx Acoustics and our Client. Any information provided by third parties and referred to herein may not have been checked or verified by dBx Acoustics unless expressly stated otherwise. This document contains confidential information, and no part of this report should be reproduced, distributed or communicated to any third party without express prior written consent from dBx Acoustics. We do not accept any liability if this report is used for an alternative purpose from that for which it is intended, nor to any third party in respect of this report. Where a noise survey has been undertaken, this report is based on the noise climate at the site at the time of the survey and no warranty is given as to the possibility of changes at differing times.

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