



Noise Breakthrough Assessment

Site Address: Building 7/8, Circle Square, Oxford Road, Manchester, M1 7FS

Client Name: Concorde BGW

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1. Introduction

NOVA Acoustics Ltd has been commissioned to prepare an airborne noise breakthrough assessment for a bar venue ('the Proposed Development') located at ground floor level of Building 7/8, Circle Square, Oxford Road, Manchester, M1 7FS ('the Site').

The following report has been prepared to assess the sound insulation performance of the adjoining partition floor between the venue and the residential dwellings above, in accordance with the relevant criteria. Upgrades to the partition have been recommended where required.

This noise assessment is necessarily technical in nature; therefore, a glossary of terms is included in Appendix A to assist the reader.

1.1 Proposal Brief

The proposal is for the conversion of the existing ground floor retail unit into a bar. The design is currently in the early stages and as such the end user is not yet finalised; however, it has been confirmed by the client that there will not be live music played within the venue. Further to this, all recorded music will be set at a level to provide background ambience exclusively which will facilitate 'normal' conversation. The location of the development unit is shown in the figure below.



Figure 1 – Proposed Development Layout

1.2 Airborne Sound Insulation Criteria

The proposed development structurally adjoins commercial units on the ground floor (L2, L3 and L8) via separating walls, and residential dwellings on the first floor via a separating floor.

It is stated in BS8233:2014 that internal noise levels within residential bedrooms should not exceed 30 dBA during the night-time to ensure adequate living conditions are achieved. This is approximately equal to the NR25 frequency curve.

In order to ensure the BS8233 criteria are not exceeded, and achieve relative inaudibility in the residential flats, it is recommended that internal noise levels instead do not exceed the more stringent NR15 frequency curve, which equates to approximately 20 dBA. Further to this, to avoid adverse impact due to low frequency noise emissions, the Moorhouse curve criteria should also not be exceeded in the 63Hz and 125Hz octave bands (as specified in the 'Noise from Pubs and Clubs' document endorsed by DEFRA).

2. Noise Breakthrough Assessment and Sound Insulation Scheme

2.1 Minimum Required Airborne Sound Insulation

The following table shows the minimum required sound reduction that must be provided by the adjoining floor partition.

The predicted internal noise levels are taken from a previous assessment completed by NOVA Acoustics for similar development (report ref: 6690CM). The measurement was taken within a busy bar, with background music being played through ceiling-mounted Bose 802 speakers and ground-mounted Bose subwoofers. The measured levels are thought to be representative of a typical medium sized 'bar/restaurant'.

Description	1/1 Octave Frequency Band (Hz, dB)							Overall (dB)
	63	125	250	500	1k	2k	4k	
Internal Noise Level of Bar (L_{eq})	83	79	73	77	77	74	66	81
NR15 Curve + Moorhouse (L_{eq})	47	35	26	19	15	12	9	20
Min. Required Sound Reduction (D_{nT})	36	44	47	58	62	62	57	--

Table 1 – Minimum Required Airborne Sound Insulation – Separating Floor

The noise levels shown in the table above are within the maximum permissible internal noise levels for daytime operation defined in the acoustic assessment for the development ('Phase 1B Circle Square Noise Impact Assessment' compiled by Deloitte).

The noise level in the 63 Hz band is 6 dB above the criteria during the night-time period, and as such, it may be necessary to install a noise limiter to ensure the criteria are not exceeded in this octave band.

2.2 Noise Breakthrough Assessment

Sound insulation testing was carried out on the floor partition on 23/04/2024 in 3 No. locations. During the tests, it was found that the core of the existing floor is likely to be the same throughout the development. No information is available regarding the construction of the existing floor; however, considering the sound insulation test results and the visual inspection carried out during the site visit, the floor is assumed to comprise of a minimum of 250mm in-situ concrete with a minimum density of 2300 kg/m³.

It should be noted that during the site visits, the noise transference through the separating floor itself was of a low level, however, flaking noise could clearly be heard through the exposed ductwork and concrete columns. This is addressed further in Section 3.

The results of the sound insulation testing are compared with the recommended criteria in the table below.

Source Room	Receiving Room	1/1 Octave Frequency Band (D_{nT} , Hz, dB)							Overall ($D_{nT,W} + C_{tr}$, dB)
		63	125	250	500	1k	2k	4k	
Ground Floor Unit L1	Apartment 107 – Lounge	28	46	55	62	65	71	72	58
Ground Floor Unit L1 and	Apartment 107 – Bedroom 1	24	45	55	62	65	70	71	58
Ground Floor Unit L1	Apartment 107 – Bedroom 2	33	48	57	64	68	72	71	60
Min. Required Sound Reduction (D_{nT})		36	44	47	58	62	62	57	--

Table 2 – Measured Airborne Sound Insulation of Separating Floor

As can be seen, the criteria are achieved in all octave bands with the exception of the 63 Hz band. Given this exceedance, it is recommended that the floor partition is upgraded.

2.3 Floor Partition Upgrades and Installation Advice

The following sound insulation upgrades should be implemented prior to the first operation of the proposed development and retained thereafter. The client has stipulated that the remedial works must be carried out from the ground floor.

- Existing finished floor covering (e.g., engineered timber),
- Existing concrete floor slabs (min. depth of 250mm and min. density of 2300 kg/m³),
- Suspended MF ceiling on acoustic hangers (min. drop of 150mm) with 25mm mineral wool insulation (min. density of 10 kg/m³),
- 1 No. 19mm iKoustic MuteBoard plasterboard.

Installation Guidance:

- Ensure ALL products are installed in accordance with the manufacturer's guidance.
- Ensure existing concrete slabs are in a high condition and any gaps or holes are fully sealed to an airtight condition.
- Mark fixing points to the structure at 1200mm centres (to form a 1200mm x 1200mm grid). Secure each hanger with a suitable proprietary fixing including steel washers to ensure fixing does not pull through acoustic rubber.
- Fix MF Suspended Ceiling to the Acoustic Hangers. Ensure there is a minimum air cavity of 150mm.
- Ensure the mineral wool insulation is laid to cover the ceiling whole area without sagging.
- Fix board to steel channel with long edges at right angles to the framing.
- Ensure a 3mm gap is maintained around the perimeter and seal with acoustic sealant.
- Don't route service pipes through party floors.
- Ensure all flanking routes are suppressed.

3. Flanking Risks

The following section highlights common flanking risks found during the site inspection and the associated treatments that should be installed.

3.1 Steelwork Supporting Structures

To avoid sound insulation flanking risks associated with steel beams it is important to ensure the separating walls and ceilings (including framework and plasterboard) completely envelope the structures and importantly do not touch or are directly connected to the steel beams.

If there is an unavoidable need to connect separating walls or ceilings to these structures, then specific details and section drawings should be issued to NOVA Acoustics for review. Indicative details are provided below of how to treat common steelwork configurations.

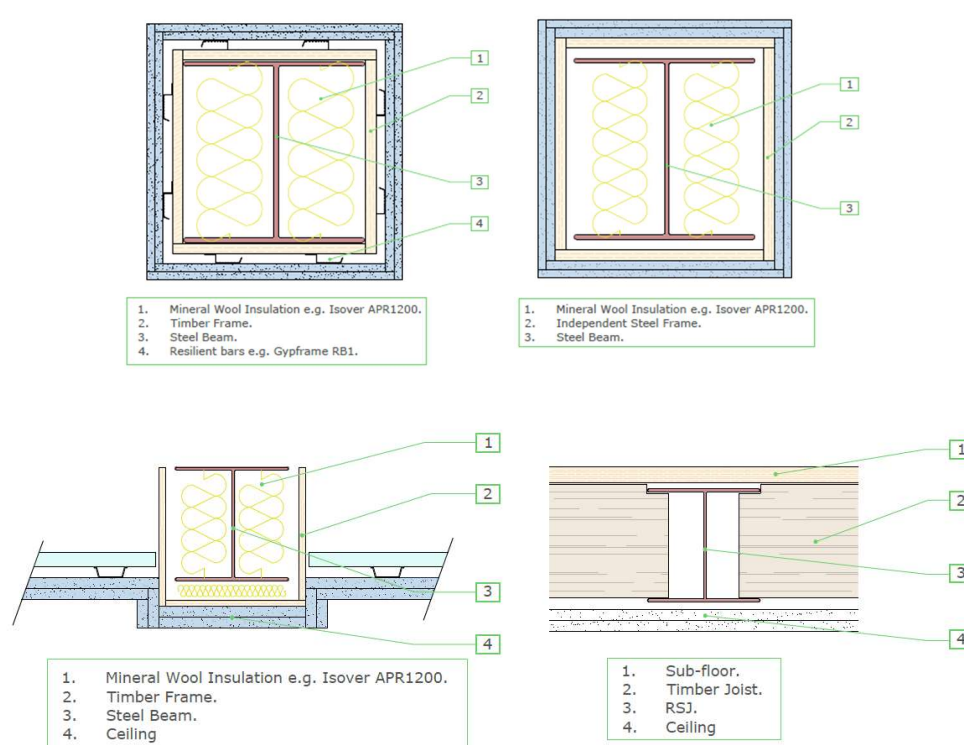


Figure 2 – Steel Beam Detailing

3.2 Concrete Pillars

Where concrete pillars abut, penetrate or flank separating walls or floors there is a risk of flanking sound through the concrete pillars. The concrete pillars must have a mass per unit area of at least 120kg/m², and where this is not the case, an acoustic lining treatment is required. The lining construction consists of timber or steel frames affixed to the column, with 25mm absorbent mineral wool between the frames finished with 1 No. 12.5mm SoundBloc plasterboard (min. surface mass 10.6 kg/m²), as shown in the figure below.

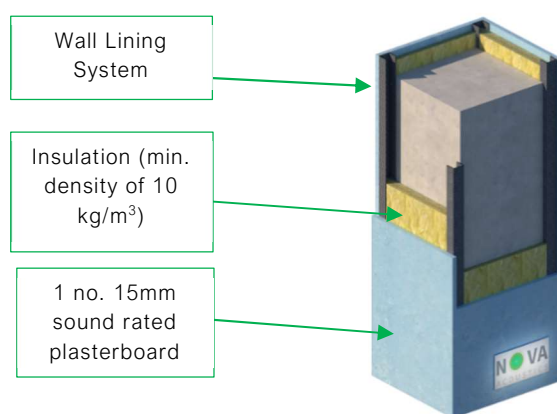


Figure 3 – Concrete Pillar Acoustic Detailing

3.3 Piped Services / Ducts

Piped services and ducts which pass through separating walls or floors should be surrounded with sound absorbent material and enclosed for their full height. The enclosure should be constructed as shown in the figure below.

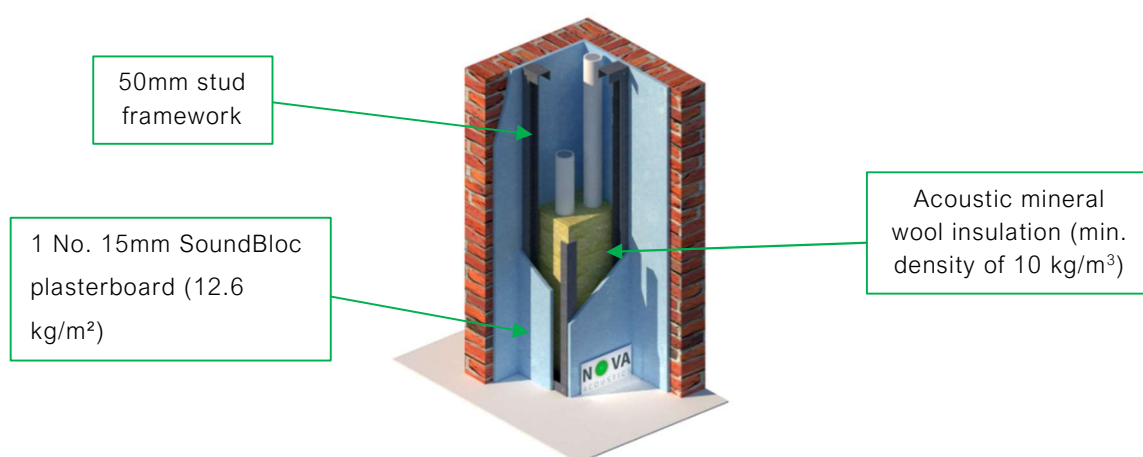


Figure 4 – Piped Service Detailing

3.4 Curtain Walls

Curtain walls can be problematic when the outer leaf of the building is non-structural. Since the curtain wall is non-structural, it can be made of lightweight materials, thereby increasing the chance of flanking noise. No information or drawings showing the existing junction between the concrete floor and the curtain wall are available.

During the sound insulation tests it was found that flanking noise through these junctions was of a reasonably low level. Nevertheless, it is important to note that in cases where a partition floor joins the curtain wall, the entire cavity between transoms needs to be fully filled with mineral wool insulation and the entire transom must be enclosed. The figure below shows an indicative option to cover the transom with a MF suspended ceiling:

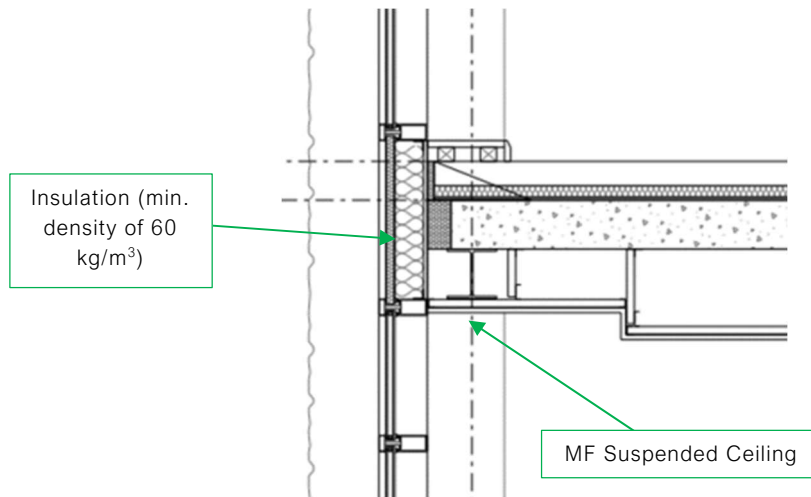


Figure 5 – Curtain Wall Detailing

The following images show the boxed-in the transoms. It is recommended that these enclosures are kept within the cavity of the proposed MF suspended ceiling.



Figure 6 – On-site Curtain Wall Detailing

3.5 Vertical Steel Beams

Steel beams running vertical through the walls of the development must also be fully enclosed. An appropriate detail is shown below.

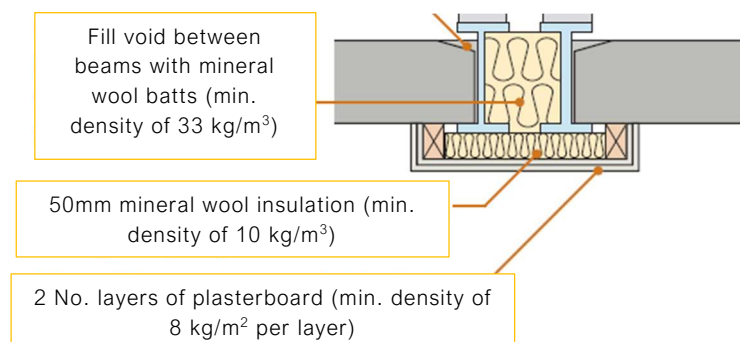


Figure 7 – Vertical Steel Detail

Examples of locations where this will be required are shown in the figure below.



Figure 8 – Vertical Steel Detail Locations

3.6 Maximum Amplified Music Limit Levels

Automated volume controls capable of limiting amplified music at specific frequencies to prevent significant low frequency music should be implemented within the proposed development.

The maximum amplified music limit levels shown in the table below should be set as a baseline, and during the calibration of the equipment, the limit levels should be adjusted to achieve relative inaudibility at the residential dwellings above once all the mitigation measured proposed in this report are implemented.

Description	Octave Frequency Band (Hz, L_{eq} dB)							Overall (dBA)
	63	125	250	500	1k	2k	4k	
Music Limit Levels	77	80	76	82	83	76	78	86

Notes:

[1] The limit levels shown above are in-line with the night-time limits defined in the original acoustic assessment for the development. In general, we would consider these levels to be appropriate for a busy restaurant or a 'moderately' busy medium-sized bar.

Table 3 – Maximum Amplified Music Limit Levels

An example system which could be used is the 'Cesva LRF04-F – Frequency Filter Sound Level Limiter-recorder', however, other products are available.

3.7 Additional Noise Control Measures

Furthermore, the additional noise control measures outlined below should be implemented:

- To minimise overall noise levels whilst achieving a uniform sound field within the venue, it is recommended that a distributed multi-speaker P.A. system is installed. This will allow the venue to have full control of the maximum noise level and will bring the speakers closer to the patrons, retaining a feeling of loudness. This will require further design guidance from a P.A. system installation company.
- All windows and doors should remain closed when amplified music is playing.
- Heating and cooling should be provided by air-conditioning systems so there will be no requirement for the ventilation systems to penetrate the façade and compromise the sound insulation of the building.

Appendix A – Acoustic Terminology

A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure given by the following formula in decibels (dBA). $L_{pA} = 10 \log_{10} (pA/p_0)^2$. Where: pA is the A-weighted sound pressure in pascals (Pa) and p_0 is the reference sound pressure (20 μ Pa)
Background Sound	Underlying level of sound over a period, T , which might in part be an indication of relative quietness at a given location
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T , has the same mean-squared sound pressure as the sound under consideration that varies with time
Facade level	Sound pressure level 1 m in front of the facade
Free-field level	Sound pressure level away from reflecting surfaces
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants
Noise Criteria	Numerical indices used to define design goals in a given space
Noise Rating (NR)	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves
Octave Band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit
Percentile Level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting “F”, which is exceeded for $N\%$ of a specified time interval
Rating Level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise
Reverberation time, T	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped
Sound Pressure, p	root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound
Sound Pressure Level, L_p	Quantity of sound pressure, in decibels (dB), given by the formula: $L_p = 10 \log_{10} (p/p_0)^2$. Where: p is the root-mean-square sound pressure in pascals (Pa) and p_0 is the reference sound pressure (20 μ Pa)
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies

Appendix B – Site Plan





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