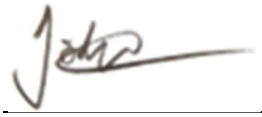
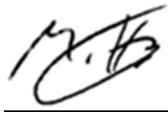
Unit 11, Brunel Court, Gadbrook Park, CW9 7LP
01565 632535
info@solacoustics.co.uk
www.solacoustics.co.uk

Commercial Unit 2 Gym, No.3 Circle Square

Acoustic Feasibility Report

P2849-REP01-R2-JLS

16 January 2026

PROJECT	Commercial Unit 2 Gym, No.3 Circle Square Acoustic Feasibility Report
CLIENT	Bruntwood Union 2-10 Albert Square Manchester M2 6LW
DOCUMENT REFERENCE	P2849-REP01-R2-JLS
SIGNED	 JOE SINKER MIOA
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REVISIONS

Issue No.	Reviewer	Authorised by	Approval Date	Summary of Revisions
R0	MH	MH	11/12/2025	Initial issue
R1	MH	MH	15/12/2025	Minor revisions to reflect team comments
R2	MH	MH	16/01/2025	Revised in response to EHO comments

Disclaimer

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Name of Organisation	Sol Acoustics Limited
Company Registration Number	4218702

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1 Introduction

1.1 Sol Acoustics (Sol) have been appointed by Bruntwood SciTech (BST) to undertake a noise and vibration feasibility study to support an upcoming change of use application related to Commercial Unit 2 at No.3 Circle Square in Manchester to allow introduction of a gym.

1.2 Sol attended site on Thursday 4 December 2025 to undertake benchmark noise and vibration testing in accordance with BS EN ISO 16283-1:2014 and ProPG Gym Acoustic Guidance (HIR Method 1).

2 Description of Site

2.1 General Overview

2.1.1 The Site is bound by Newman Street (formerly Brancaster Road) to the north, Princess Street to the east, Cloak Street and the Mancunian Way to the south and Manchester Technology Centre to the West.

2.1.2 However, the scope of the upcoming Change of Use Application only relates to Commercial Unit 2.

2.1.3 Commercial Unit 2 is a double height unit spanning ground and mezzanine floors on the Newman Street elevation of the building.

2.1.4 Commercial Unit 2 is horizontally adjacent to the main building entrance hall/lobby and another retail unit. At first floor level above Commercial Unit 2 is open-plan office space.

2.1.5 The proposed layout of the gym comprises a small number of cardio and resistance training equipment and two free-weights areas at ground floor, with the mezzanine to be used as a yoga/fitness studio zone. The indicative layouts are illustrated in Figure 1 and Figure 2 below with the free-weights areas highlighted in blue.

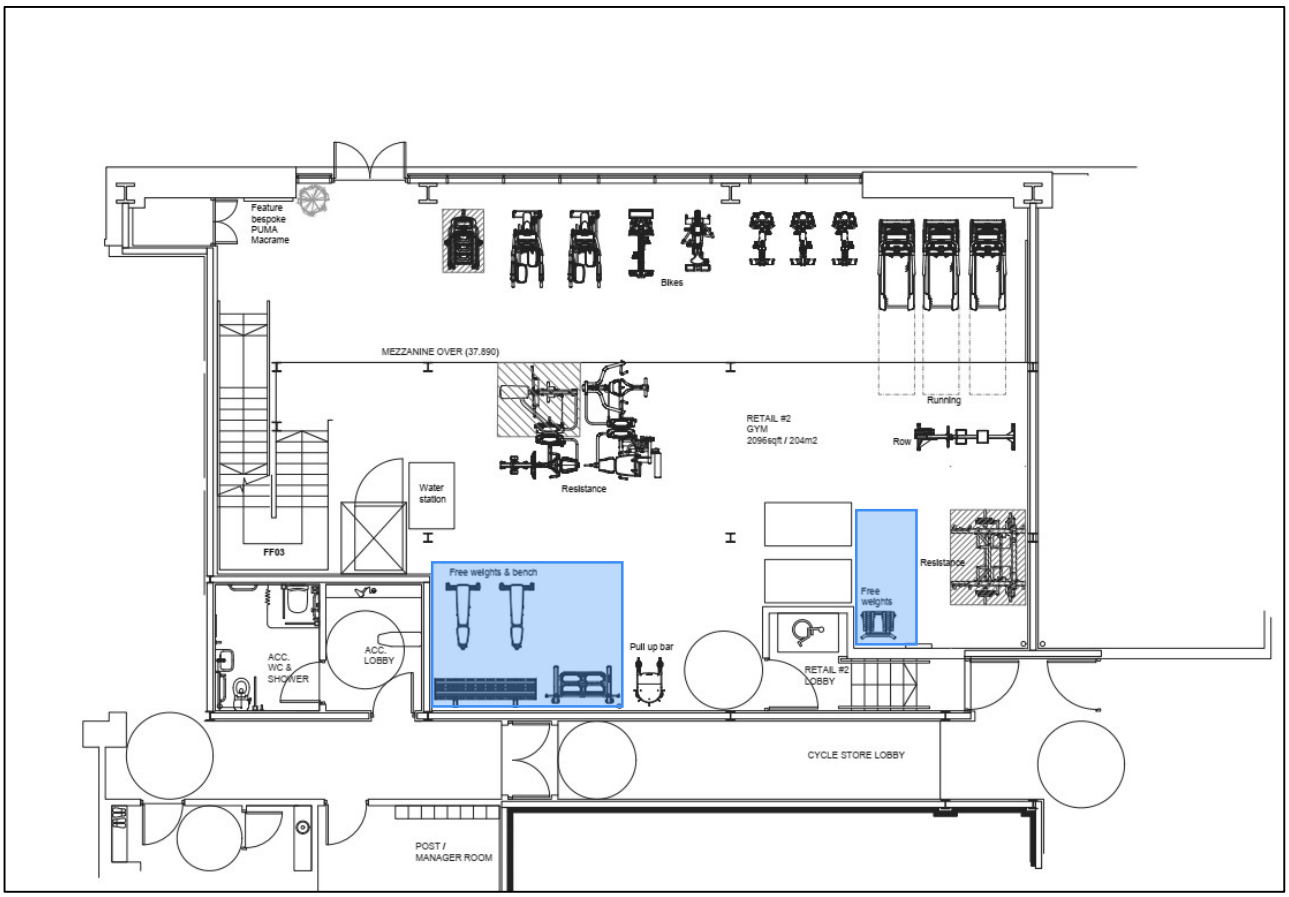


Figure 1: Indicative ground floor layout

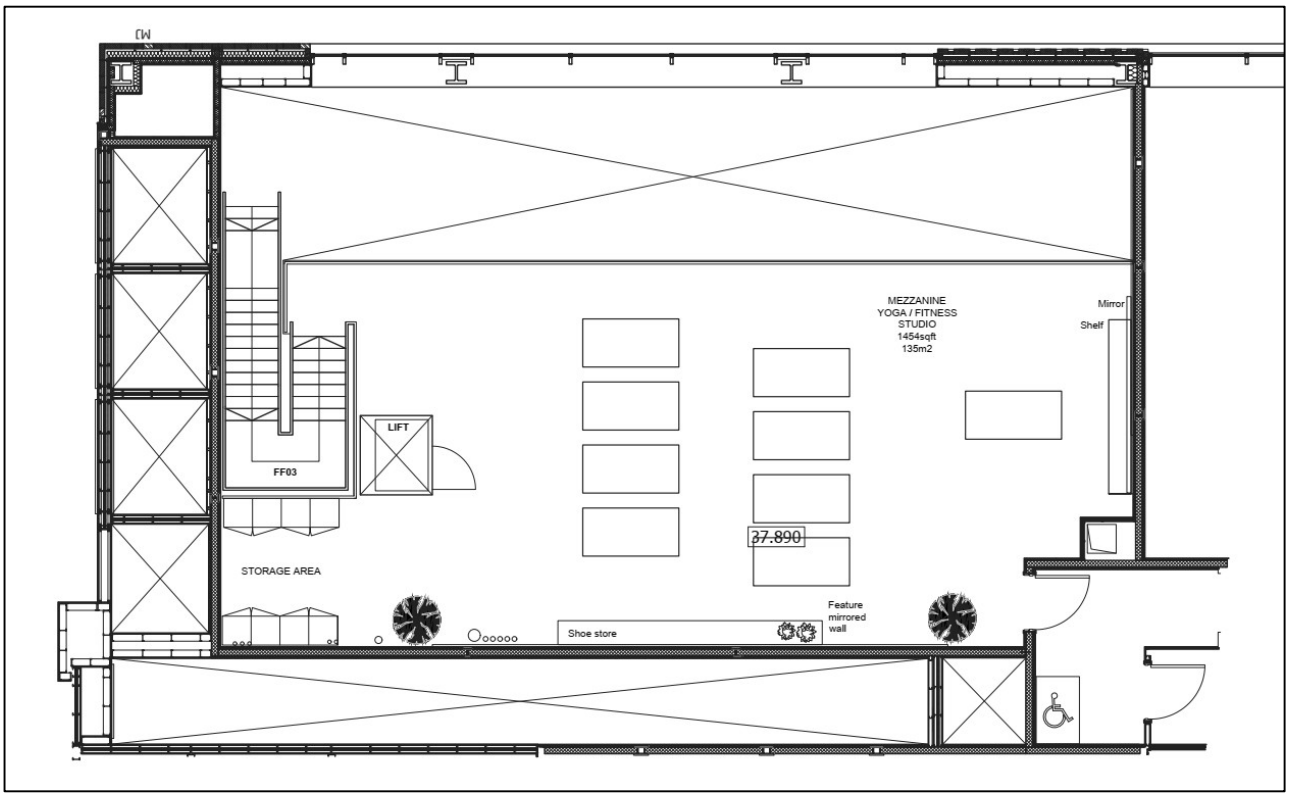


Figure 2: Indicative mezzanine layout

3 Details of Investigations

3.1 Basis of Assessment

3.1.1 The feasibility assessment of the proposed gym unit considers the following:

- Airborne sound insulation of the separating wall and floor constructions between the proposed gym unit and adjacent sensitive spaces as measured by in-situ testing.
- Re-radiated noise and vibration levels within horizontally and vertically adjacent sensitive spaces due to heavy impact excitation associated with free weights activities, measured in accordance with ProPG GAG HIR Method 1.
- Music noise egress via the unit glazed frontage based on desktop review of the glazing specification and environmental survey works and entertainment noise limits set for the development by Sandy Brown Associates.

4 Acoustic Guidance and Criteria

4.1 Local Authority Criteria

4.1.1 Manchester City Council's *'Planning and Noise Technical Guidance'* document published in October 2022 provides guidance on the assessment of noise and vibration impacts associated with various types of development within Manchester.

4.1.2 With regards to noise from commercial development it states:

> *"...The development should be designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location..."*

4.1.3 With regards to noise from fixed building services plant it states:

> *"...Externally mounted ancillary plant, equipment and services shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location..."*

4.1.4 With regards to noise from entertainment sources it states:

> *"Entertainment noise ($L_{Aeq,5min}$) should be controlled to 5dB below the typical background noise level (L_{A90}) in each octave band at the nearest noise sensitive location'.*

4.1.5 Based on recent experience working with Manchester City Council it is understood that noise and vibration associated with the proposed gym unit should be assessed and designed with reference to the ProPG: Gym Acoustic Guidance.

4.2 ProPG: Gym Acoustics Guidance (GAG)

4.2.1 The ProPG: Gym Acoustic Guidance (GAG) was published in March 2023 by the Association of Noise Consultants, Institute of Acoustics, and Chartered Institute of Environmental Health.

4.2.2 The GAG provides various good practice guidance and suggested criteria for the assessment and design of gym and fitness spaces.

4.2.3 Figure 3 shows the recommended criteria for noise transfer from gym activity (e.g. music) to other internal areas set out in the GAG.

4.2.4 Figure 4 shows the recommended criteria for vibration transfer from gym activity to other internal areas set out in the GAG.

Table 2: Guidance Internal Sound Target Criteria for Gym Activity – Residential & Other Areas

Receptor type	**Guide Criteria** (for third octave band values plots against the stated G curve - see Figure 2)	
	Airborne Sound (e.g., music) $L_{eq,T}$ (31.5Hz to 8kHz)	Heavy Impact Sound $L_{max,F}$ (31.5Hz to 8kHz)
Commercial Offices	G25-G35	G35-G45
Retail Areas	G30-G45	G35-G50
Residential Areas	G15-G25 (day) G10-G20 (night)	G20-G25 (day) G15-G20 (night)

Table 2 Notes:

1. *The Working Group generally found in their experience that levels below the upper values tended to avoid significantly adverse impacts (SOAEL) occurring and higher levels than these should generally be avoided, but this is highly dependent on context. The background and ambient noise levels at any given site can fluctuate (e.g., a building in an urban setting adjacent to busy infrastructure versus a building shielded from external adverse noise intrusions and/or quieter location). This variation will also cause a subjective variance in relation to the perceived noise impact, both during the design phase and the completed development and the SQA should be cognisant of which target criteria would be most appropriate to their Gym scheme.*
2. *In rooms with low background noise levels (below ~20 dB $L_{A90,5minutes}$), the criteria should be carefully considered and fully justified. It has been noted that the subjective impression of low frequency noise could still cause issues of disturbance, despite meeting the above target ranges. Therefore, it is recommended that resulting heavy impact noise levels at frequencies 80Hz and below, do not exceed a level of 20dB above the existing background noise dB $L_{A90,5minutes}$ within commercial and retail adjacencies (without source/Gym related activities). Where good sound insulation and closed windows results in very low background sound levels this can result in the loss of masking sound making intruding low frequency sound from Gyms more prominent and so potentially more likely to cause disturbance*
3. *For heavy impact noise at least 1/3 octave bands analysis is desirable over the audible range from 31.5Hz, although measuring down to 20Hz is desirable to cover the audible range and may assist in identifying outlying peaks of energy.*
4. *For music noise, particular care should be given to controlling noise in the low frequency region, in the range 31.5Hz to 200Hz and $L_{max,F}$, L_1, L_{10} may also be used as parameters as a substitution for $L_{eq,T}$.*

Figure 3: ProPG GAG Suggested Noise Criteria

Table 3: Guidance Internal Vibration Target Criteria for Gym Activity – Residential & Other Areas

Receptor type	Guide Criteria (see Figure 3) Tactile Vibration (point of entry to the body) Acceleration (mm/s²)		
Commercial Offices	rms 20mm/s² W_g	Peak 40mm/s² W_g	base curve multiplier of 4 (ref. BS 6472:1992)
Retail Areas	rms 20mm/s² W_b	Peak 60mm/s² W_b	base curve multiplier of 4 (ref. BS 6472:1992)
Residential Areas	rms 7mm/s² W_b	Peak 21mm/s² W_b	base curve multiplier of 1.4 (ref. BS 6472:1992)

Table 3 Notes:

1. *When measuring vibration, a similar approach down to at least 6Hz is recommended;*
2. *For facilities that are particularly sensitive (like scientific facilities) a specific methodology might be appropriate*

Figure 4: ProPG GAG Suggested Vibration Criteria

4.2.5 Based on the above guidance it is proposed to target the gym activity noise and vibration criteria as set out in Table 1 below.

Adjacent Space	Gym Activity Noise Criteria	Gym Activity Vibration Criteria
Office	≤ G35 $L_{eq,T}$ ≤ G45 $L_{max,F}$	rms 20mm/s² W_g Peak 40mm/s² W_g base curve multiplier of 4 (ref BS 6472:1992)
Retail/Lobby	≤ G45 $L_{eq,T}$ ≤ G50 $L_{max,F}$	rms 20mm/s² W_b Peak 60mm/s² W_b base curve multiplier of 4 (ref BS 6472:1992)

Table 1: Summary of Proposed Gym Activity Noise and Vibration Criteria

5 Airborne Sound Insulation Investigation

5.1 Survey Methodology

5.1.1 Airborne sound insulation testing was carried out between the proposed gym unit and the horizontally adjacent retail unit, and the vertically adjacent open plan office space in general accordance with the requirements of BS EN ISO 16283-1:2014: "Field measurement of sound insulation in buildings and of building elements".

5.1.2 In order to conduct airborne sound insulation tests, a pink noise test signal is played through a tripod-mounted loudspeaker in the "source room" and the resultant noise level (each of $L_{eq,30second}$) is measured using the moving microphone technique for each of two loudspeaker locations, giving a total of two measurements. Following each measurement, the sound spectrum is checked to ensure that in the sound level is not more than 6dB between any adjacent frequency bands. If this is not achieved, the speaker position is then adjusted, and the measurement is repeated until compliance with the 6dB rule is achieved.

5.1.3 The room on the other side of the party construction is the "receiver room" and the noise transmitted to this room is also measured using the moving microphone technique (each of $L_{eq,30second}$) for each of two loudspeaker locations, giving a total of two measurements.

5.1.4 The background ($L_{eq,30second}$) noise level is recorded using a moving microphone technique (each measurement is a 30 second L_{eq}) in the receiver room with the sound source turned off. There was a significant level of background noise during airborne sound insulation testing, which can be attributed to various factors including personal computers, laboratory equipment and staff activities in the hallways.

5.1.5 The differences between source and receiver third octave band noise levels are then calculated in accordance with BS EN ISO 16283-1:2014: "Field measurement of sound insulation in buildings and of building elements" and duly corrected for the measured background noise.

5.2 Airborne Sound Insulation Test Results

5.2.1 Table 2 shows the results of the airborne sound insulation testing undertaken between the proposed gym unit and adjacent retail and office spaces.

Test	Measured Level Difference *D* (dB) in each Octave Band (Hz)																			
	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k
Gym to Retail	18	20	22	26	31	36	38	38	39	40	42	41	41	42	41	41	39	42	45	47	49
Office to Gym	28	36	31	26	29	34	31	35	43	46	46	48	49	47	50	≥50[1]	≥50[1]	≥50[1]	52	52	55
Note 1: Measurement background limited																					

Table 2: Airborne sound insulation test results

5.2.2 The results of the airborne sound insulation show a good standard of airborne sound insulation between the gym unit of and both the adjacent retail unit and open plan office unit of No. 3 Circle Square.

6 Details of the Gym Activity Investigation

6.1 Survey Methodology

6.1.1 Sol attended the site during Thursday 4 December 2025 in order to undertake noise and vibration testing of the floor within the proposed gym unit.

6.1.2 The testing was performed in accordance with the High Impact Response (HIR) Method 1 testing methodology presented in the ProPG: Gym Acoustics Guidance.

6.1.3 The Gym Acoustic Guidance recommends a minimum of three drop positions in the test area. In this case, three drop positions were judged to be able to provide a representative sample of the floor performance. Figure 2 presents the drop positions within the gym.

6.1.4 A 24kg vinyl coated kettlebell was dropped from a height of 0.5 metres at each of the three positions, three times on a sample of 70mm rubber gym flooring tile (Pliteq Geniemat FIT70).

6.1.5 The resultant sound and vibration levels were measured in the adjacent retail and office units using a tripod mounted microphone at a height of 1.5 metres above ground level and an accelerometer on a heavy mass base placed on the floor respectively.

6.1.6 Sound pressure level measurements were conducted using an omnidirectional microphone. The sound pressure level measurements comprised of full broadband A-weighted, $L_{Amax,f}$, and third-octave unweighted, $L_{max,f}$ sound pressure level measurements.

6.1.7 Tri-axial vibration measurements were taken within the adjacent retail and office spaces with the vibration logger placed upon the raised access flooring.

6.1.8 All noise measurements were carried out using Type 1 Precision Grade noise monitoring equipment. The complete noise measuring systems were field calibrated immediately prior to and following the noise survey periods. *Additional survey details are presented in Appendix B.*

Assessed Example Gym Floor Constructions

6.1.9 The existing shell retail and office units floor comprise concrete slab on composite deck with raised access floor.

6.1.10 A sample of the Pliteq Geniemat FIT70 floor system was tested and assessed for impact noise transfer in accordance with the ProPG: Gym Acoustics Guidance.

6.2 Survey Results

Vibration Transfer

6.2.1 Table 3 shows the results of the peak tactile vibration results of weight drops undertaken between the proposed gym unit and adjacent retail and office spaces.

Source Room	Drop Position 1	Drop Position 2	Drop Position 3
Retail Unit	2.4mm/s	3mm/s	1.1mm/s
Office Unit	-*	5mm/s*	-*
*Not discernible above background vibration levels			

Table 3: Airborne sound insulation test results

6.2.2 The measured levels of the peak acceleration during heavy impact testing are below the guidance criteria set out in in the ProPG: Gym Acoustics Guidance.

6.2.3 It should be noted that during measurements no vibration was subjectively perceived by the test engineer on site.

6.2.4 The measured vibration within the office space, as a result of the weight drop impact tests, was not discernible against the measured general vibration background levels. As such, the peak acceleration level measured over the testing period has been reported although this cannot be directly correlated with the drop tests the peak level is far below the guidance criteria of 40mm/s.

Noise Transfer Test Results

6.2.5 Figure 5 and Figure 6 provide a graphical representation of the airborne noise measured within the adjacent retail and office units during the weight drop testing compared against the G-Curves, as defined in the ProPG Gym Acoustic Guidance respectively.

6.2.6 It should be noted that within the office unit, noise from the weight drops was subjectively inaudible over the ambient noise due to external noise ingress and internal core building services, and objectively it has not been possible to identify individual drop events from the time trace data. As such, for the office unit, the maximum noise levels measured throughout the entire duration of the weight drop testing have been presented, but it should be noted that these levels are not attributed specifically to the weight drop events.

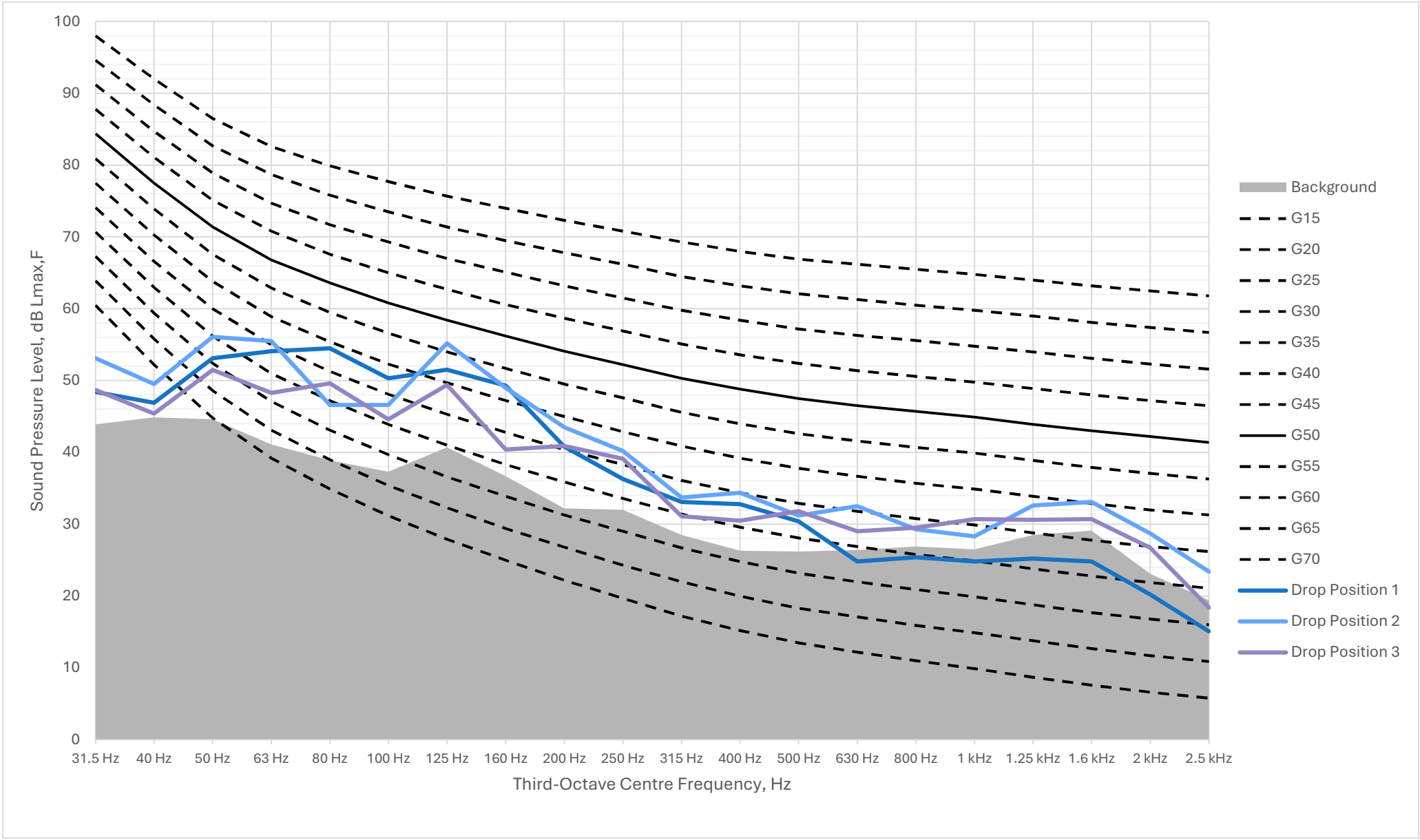


Figure 5: **Resultant maximum sound pressure levels in the ground floor retail unit compared with G-Curves**

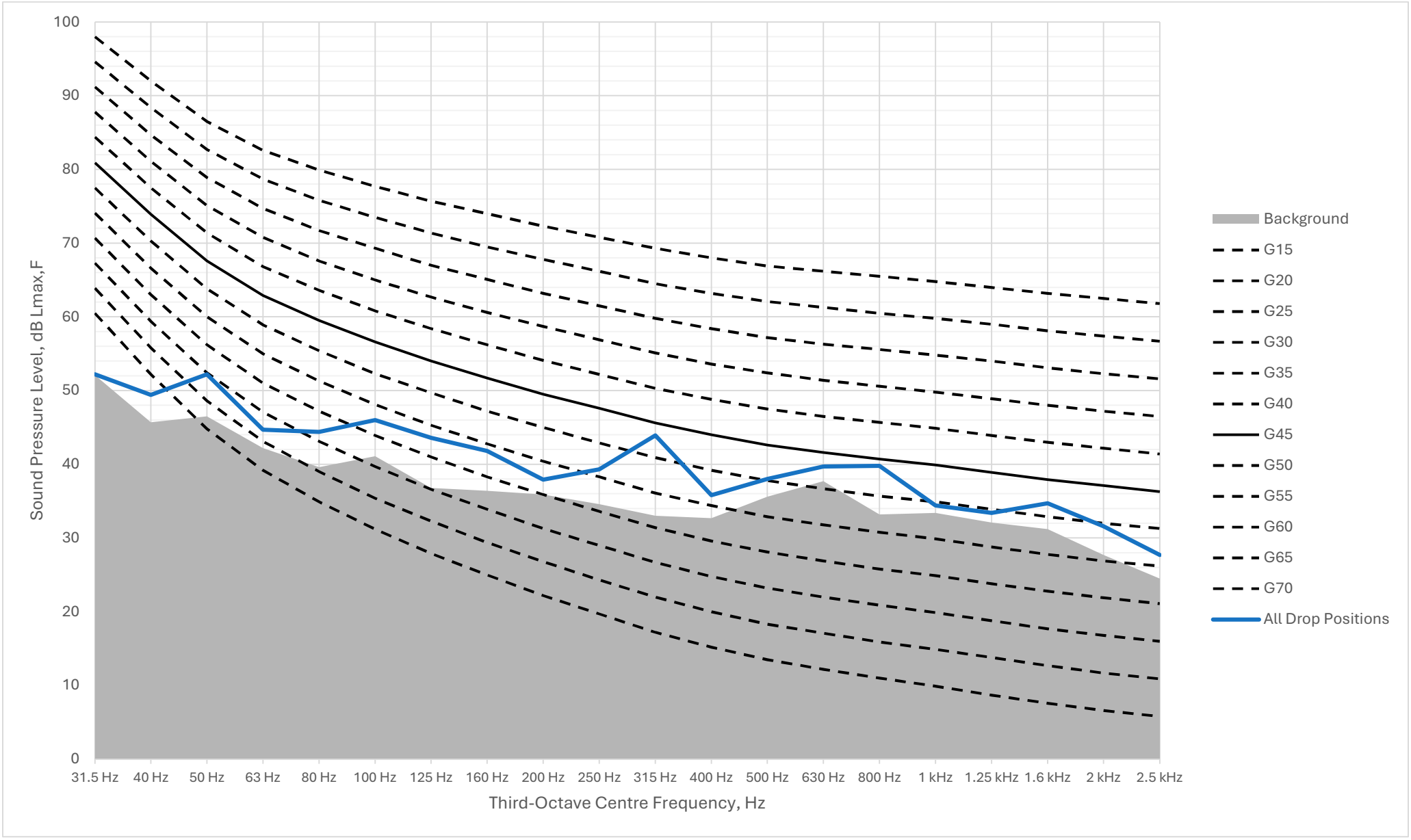


Figure 6: **Resultant maximum sound pressure levels in the first floor office unit compared with G-Curves**

7 Noise Impact Assessment

7.1 Summary of Assessment Criteria

7.1.1 The proposed ground floor Gym is a potentially significant source of airborne and structure-borne noise which can transfer between spaces and cause annoyance. It is recommended that a specialist floor build-up is provided for these areas with the aim of reducing impact noise transmission to adjoining areas.

7.1.2 The following limits are proposed when considering the impact of the gym with regards to noise transfer to adjacent spaces:

- L_{Aeq} noise levels not exceeding the guidance criteria upper limit of G45 in the vertically adjacent Office;
- L_{Aeq} noise levels not exceeding the guidance criteria upper limit of G50 in the horizontally adjacent Retail Unit.

7.1.3 Noise egress limits for amplified music for the development have been set out in the Sandy Brown Associates report L014-SAN-XX-01.XX-T-O-000001 P01; these limits are replicated below in Table 4.

Description	Music Noise Egress Limits (dB) in each Octave Band (Hz)							dBA
	63	125	250	500	1000	2000	4000	
Daytime $L_{Aeq,5mins}$	59	53	53	54	57	48	39	59
Nighttime $L_{Aeq,5mins}$	49	43	43	44	47	38	29	49

Table 4: Octave band noise egress limits for amplified music at off-site receptors

7.2 Operational Noise Limits

7.2.1 For commercial offices, the recommended criteria upper limit from airborne sound in the ProPG Gym Acoustic Guidance for the Office is **G25-G35** and the Retail Unit is **G30-G45**. The guidance states that "*levels below the upper values tended to avoid significantly adverse impacts (SOAEL) occurring.*"

7.2.2 As such the operational noise limits have been based on achieving the **G35** curve within the adjacent second floor office space and the **G45** curve within the horizontal retail unit adjacency. In addition to this based on the unit shell façade/glazing construction of the gym internal noise limits have been set as to not exceed MCC noise egress criteria at the nearest residential façade.

7.2.3 The glazed frontage of the proposed gym unit shell is understood to comprise a minimum of 40.8mm (8.8mm / 24mm / 8mm) double glazed units with sound insulation rating or 39dB R_w. No detailed technical submittal is available for review, as such octave band sound reduction indices for a similar glazing configuration and sound insulation rating have been utilised to allow detailed calculation. Table 5 below shows the configuration and minimum sound reduction indices.

Description	Sound Reduction Index (dB) in each Octave Band (Hz)							dBA
	63	125	250	500	1k	2k	4k	
8mm / 24mm / 5mm	26	21	29	35	44	38	46	38

Table 5: Minimum sound reduction indices of glazed frontage

7.2.4 The maximum allowable operational internal noise levels in the gym are set out in Table 6 below. These noise levels have been calculated based on the G-curves are as defined in ProPG: Gym Acoustics Guidance and the project noise egress limits for amplified music at external receptors:

Description	Maximum Internal Noise Level (dB) in each Octave Band (Hz)																				dBA
	50	63	80	100	125	160	200	250	315	400	500	630	800	1k	1.25k	1.6k	2k	2.5k	3.15k	4k	5k	
$L_{Aeq,5mins}$	86	83	81	72	72	75	72	73	79	80	79	80	80	77	79	78	76	76	77	77	77	88

Table 6: Gym music noise limits

7.2.5 The above maximum internal noise limit should be commensurate with typical gym use and classes with moderately amplified music based on the existing unit shell constructions. If noise levels are expected to exceed those set out in Table 4 additional mitigation should be considered.

7.3 Floor Finish Recommendations

7.3.1 For Retail, the recommended upper limit criteria from heavy impact sound set out in the ProPG Gym Acoustic Guidance for Offices is **G45** and for Retail Units is **G50**. The guidance states that "*levels below the upper values tended to avoid significantly adverse impacts (SOAEL) occurring.*"

7.3.2 **Based on the tested floor type, the recommended minimum floor finish to all free weight areas, as to not exceed the upper limits suggested in the ProPG Gym Acoustic Guidance, would be the Pliteq Geniemat FIT70 or similar 70mm rubber floor tile.**

8 Conclusion

8.1 Weight drop testing was performed in accordance with guidance set out in ProPG: Gym Acoustics Guidance by Sol Acoustics. The results were compared against the Guide Criteria upper limit for heavy impact sound in retail and office spaces. With the tested sample of 70mm rubber tiles flooring in place, the maximum noise level in adjacent spaces from heavy impact sound does not exceed the upper limit of the criteria range.

8.2 Our on-site Method 1 measurements conclude that noise and vibration transfer levels can be suitably controlled below the recommended thresholds outlined in the ProPG Guidance, through the implementation of a proprietary gym floor construction consisting of 70mm rubber tile.

8.3 Based on the ProPG: Gym Acoustics Guidance, results of the airborne sound insulation testing of the base build construction, and review of the unit shell glazed façade construction, music noise level limits within the gym unit have been set in line with the Guide Criteria range for airborne sound transmission and the project noise egress limits for amplified music set previously by Sandy Brown Associates.

APPENDIX A
Glossary of Acoustic Terms

Term	Abbreviation	Description
Decibel	dB	A scale for comparing the ratios of two quantities, including sound pressure and sound power.
A-weighting	dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the change in sensitivity of the human ear at varying frequencies.
Sound Pressure Level	L_{pA}	A measure of the sound pressure at a particular location. Typically expressed in dB(A) referenced to $2x10^{-5}$ Pascals.
Equivalent Continuous Sound Level	$L_{Aeq,T}$	The steady level of sound over a prescribed period of time which would contain the same total sound energy as the actual fluctuating noise under consideration in the same period of time.
Statistical Sound Levels	L_{A10} and L_{A90}	The level of noise exceeded for a percentage of the time period being sampled, namely 10% or 90% respectively.
Background Sound Level	$L_{A90,T}$	The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of the time period being sampled.
Maximum Sound Level	L_{Amax}	The maximum sound or noise level determined with instrumentation set to either a fast time weighting, L_{AFmax}, or a slow time weighting, L_{Asmax}, as occurring during the time period being sampled.
Sound Power Level	L_{wA}	A measure of the total sound energy radiated from a source. Like sound pressure levels, this is also expressed in dB(A) terms, but it is referenced to 1×10^{-12} W.
Broadband		Sound sampled over a wide range of frequencies.
Narrow band		Sound sampled over a specific, restricted frequency range. Used to ascertain the amplitude and significant of individual, audible tones, and to assist in identifying particular sources of noise within a complex, multi-source soundscape environment.
Ambient Sound	$L_{eq,T}$	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, both near and far.
Specific Sound Level	$L_{eq,T}$	The Equivalent Continuous A-Weighted Sound Level at an assessment position produced by a specific sound over a given reference time interval, *Tr*
Rating Level	$L_{Ar,Tr}$	The Specific Sound Level plus any adjustment for the acoustic characteristic features of the noise (e.g. intermittency, tones etc.).
Residual Noise	$L_{Aeq,T}$	The ambient sound remaining at given position in a given situation, when the specific sound source is suppressed to such an extent that it no longer contributes to the ambient sound.
Sound Reduction Index	*SRI*	The reduction in sound energy when transmitted through a panel or similar planar element, typically used in relation to single octave or one-third octave frequency band values.
Weighted Sound Reduction Index	R_w	The Sound Reduction Index expressed as a single figure, as expressed against a reference curve.
Dynamic Insertion Loss	*DIL*	Reduction in acoustic energy resulting from the insertion of a noise control element (e.g. an attenuator, acoustic enclosure etc.).
Free Field		Noise measuring location that is free from the presence of sound reflecting objects (except the ground), usually taken to mean being at least 3.5 metres distance from reflective surface(s) or greater.