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Union T2, Manchester

Gym Noise Impact Assessment

October 2026

Report Reference: T2-FAC-A180-Rp-00-001 P03

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PROJECT TITLE	UNION T2, MANCHESTER
REPORT TITLE	GYM NOISE IMPACT ASSESSMENT
CLIENT	UNION LIVING LIMITED HORSESHOE FARM ELKINGTON WAY ALDERLEY EDGE CHESHIRE SK9 7GU
REPORT REFERENCE	T2-FAC-A180-RP-00-001 P03
DATE	15 OCTOBER 2026
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DOCUMENT HISTORY

P01	4 JUNE 2026
P02	10 JUNE 2026
P03	15 OCTOBER 2026

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1.0 SUMMARY

Union T2 is located on Water Street, Manchester and is a 36 storey plus basement mixed use building which comprises co-living units, amenity space, co-working space and flexible commercial space. The co-working space and flexible commercial space is currently at 'shell and core' stage

A full planning application is to be submitted for change of use on the ground floor of Union T2 from commercial space to a residents' gymnasium, WC, Laundry and a further space of yet-to-be-defined use.

Fisher Acoustics Ltd has been commissioned by Vita Living T2 Limited to carry out an assessment of the potential noise impact of the proposed gym on the co-living residential units within the building at Level 3 and above. A noise impact assessment has been carried out that determines the effect of noise breakout and internal noise transfer due to use of the gym, with reference to the document 'ProPG: Gym Acoustics Guidance', published in March 2023.

An assessment of noise break out from the gym has determined that compliance with external noise limits is expected.

Maximum recommended airborne noise levels within the gym have been determined such that compliance with guidance published by Manchester City Council can be achieved.

Potential impact noise from the gym due to the dropping of free weights is mitigated by the structural elements of the gym and is to be further controlled by the provision of a high performance proprietary resilient gym floor covering specifically designed to reduce low frequency impact noise, such that audible noise due to weight drops is not expected in the residential areas and compliance with the recommendations of the ProPG document relating to daytime and night time noise due is expected.

Adverse impacts due to Synchronised Repetitive Excitation of the gym structure is not expected given the proposed structural arrangement of the gym.

2.0 INTRODUCTION

Union T2 is located on Water Street, Manchester and is a 36 storey plus basement mixed use building which comprises co-living units and amenity space.

A full planning application has been submitted for change of use on the ground floor of Union T2 from commercial space to residents' gymnasium, WC, Laundry and a further space of yet-to-be-defined use.

Fisher Acoustics Ltd has been commissioned by Vita Living T2 Limited to carry out an assessment of the potential noise impact of the proposed gym on the co-living residential units within the building at Level 3 and above. A noise impact assessment has been carried out that determines the effect of noise breakout and internal noise transfer due to use of the gym, with reference to the document 'ProPG: Gym Acoustics Guidance', published in March 2023.

The report advises on the maximum allowable internal noise levels within the gym such that compliance with external noise criteria guidance published by Manchester City Council can be achieved. Assessments of airborne and impact sound transmission from the proposed gym to the residential units within the building are also provided.

3.0 DESCRIPTION OF SITE

General Site Description

Union T2 is located on Water Street, Manchester and is bounded by Water Street to the east, Aviva Studios to the south, the Manchester Marriott Victoria and Albert Hotel located to the north and the River Irwell to the west. Also to the east of the site is the Union T1 co-living residential building.

Further to the west of the site lies the Ordsall Chord rail line which spans the River Irwell. Across the River Irwell is the A6042, Trinity Way. Trinity Way is a busy major road that is trafficked by passenger vehicles, goods vehicles, motorbikes and buses.

The existing buildings around Union T2 include residential and commercial uses. The closest residential dwellings to the proposed gym will be those within the Union T2 building itself and the Novella Building, Stanley Street, Salford.

Figure 1 identifies Union T2 in the context of the surrounding roads and buildings.

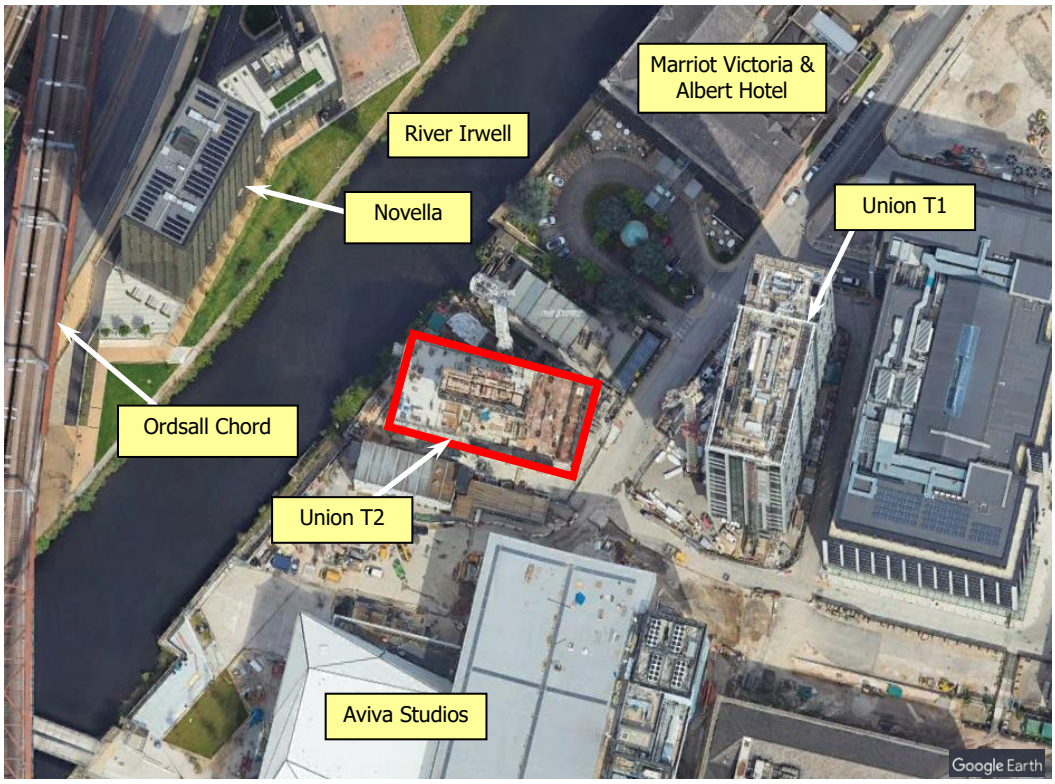


Figure 1: Site location plan – Union T2

4.0 CURRENT USES WITHIN BUILDING

The current room uses within Union T2 are as follows:

- Basement Level 1: Cycle storage, laundry room, gas utility room, LV switch room, life safety room, staff welfare, accessible staff WC, plant room
- Ground Floor: Reception lobby, commercial area, substation, residential / co-work bin store, post room/staff office, DDA WC
- Mezzanine Level: Comms room, plant rooms, plant room (commercial unit), post room (overspill), void over commercial area, void over reception lobby
- Level 1: Bar, bar lounges, club room, cellar/ bar store, WCs, cleaners store, U+ lounge, amenity lobby
- Level 2: Currently only shell & core. Proposed uses are residents' amenity spaces, WCs, cleaners store
- Level 3 to 4: Currently only shell & core. Proposed use is self-contained serviced apartments and studios.
- Level 5 to Level 35: Self-contained serviced apartments and studios, store room
- Roof: Internal plant area, external plant area

5.0 LOCATION OF GYM

The proposed gym is to be located internally on the ground floor of the building. Figure 2 shows the proposed layout of the gym.

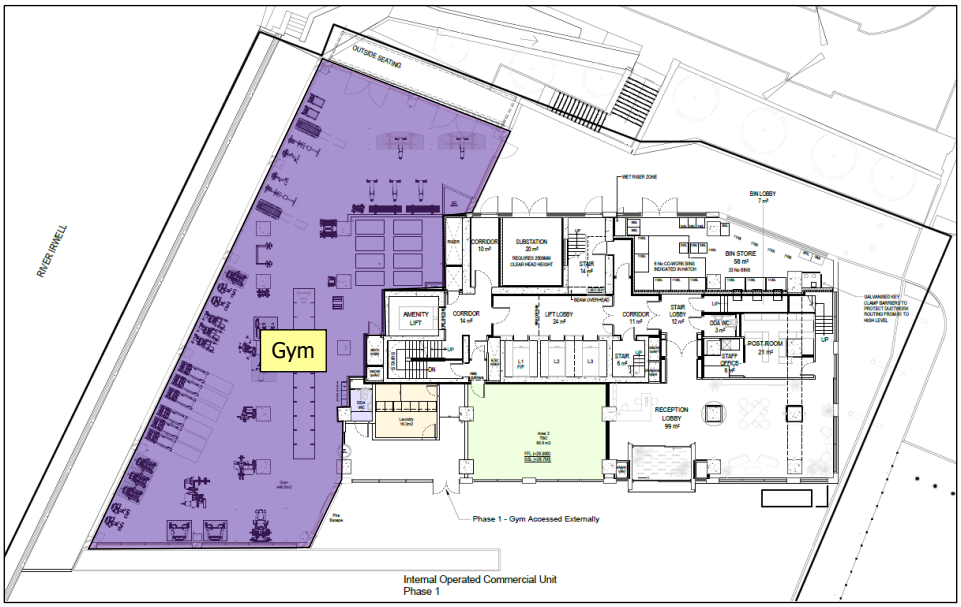


Figure 2: Ground Floor plan showing layout of gym

Currently, the residential units within the building are located at Level 5 and above. It is proposed that Levels 3 and 4 will undergo a change of use from co-working space to self-contained serviced apartments and studios.

Figure 3 overlays the proposed Level 3 and 4 floor plan onto the ground floor plan. It can be seen that a large area of the gym lies outside the curtilage of the residential tower.

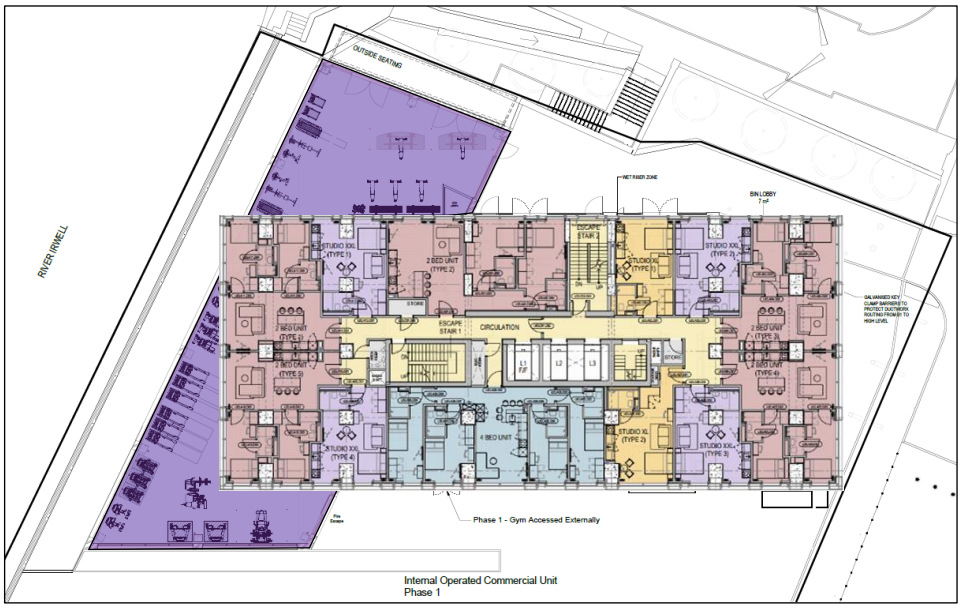


Figure 3: Proposed Level 3 & 4 floor plan overlaid onto ground floor plan

6.0 NOISE SENSITIVE RECEPTORS

Figure 4 identifies the nearest noise sensitive receptors (NSR) to Union T2. The buildings that are not identified as an NSR in Figure 4 are at a greater distance from the proposed gym than the identified receptors and are subject to similar or greater levels of pre-existing ambient noise. It should be noted that Union T2 itself is an NSR due to the residential rooms at and above Level 3 of the building. These residential rooms at Union T2 are substantially closer to the gym than any other building in the area, such that if satisfactory conditions are expected at the Union T2 residential rooms, then satisfactory conditions can also be expected at any other NSR.

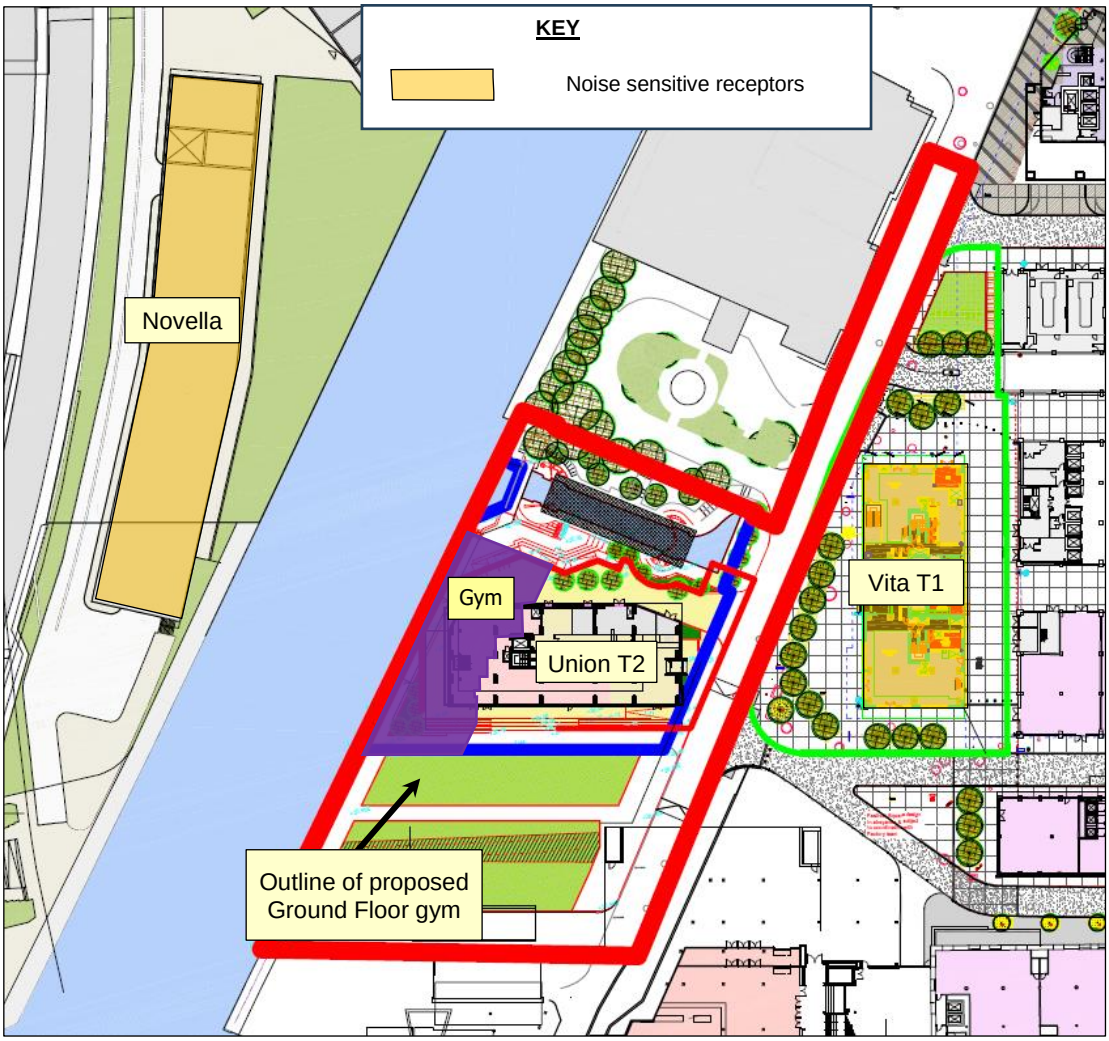


Figure 4: Noise sensitive residential receptors in the vicinity of the development

7.0 ENVIRONMENTAL NOISE SURVEYS AND EXTERNAL NOISE CRITERIA

Gym activity noise breakout limits

With regard to noise break-out from an 'entertainment venue' to residential properties that are structurally detached, 'Planning & Noise, Technical Guidance' (October 2022) issued by Manchester City Council states:

- 'A planning application for a new entertainment venue that is structurally detached from other building uses should demonstrate that music noise from the proposal will not be 'audible' in nearby residential properties, assuming that the residential properties in question have their windows open. The criterion here is:

  Entertainment noise (LAeq,5 min) should be controlled to 5dB below the typical background noise level (LA90) without the entertainment noise present, in each octave band at the nearest noise sensitive location'.

Although the gym is not an 'entertainment' space, it is to be provided with a sound system with the ability to play background music. It is therefore appropriate to design to the noise levels identified in the above guidance.

In order to determine the prevailing ambient and background noise levels at and around the site, a daytime noise survey of the existing noise environment at the site was carried out by Fisher Acoustics on Friday 13 March 2020 and a daytime and night-time noise survey was carried out at the site by Fisher Acoustics between 13:35 on Friday 26 April 2024 and 11:50 on Tuesday 30 April 2024.

The measurement locations used for the survey are identified on Figure 5 and are described below.

- Location 1: Representative of proposed northwest elevation of the Proposed Development, at a microphone height of 5 m above ground level
- Location 2: Representative of proposed northeast elevation of the Proposed Development, at a microphone height of 26 m above ground level, 1m from the facade

The long-term background noise levels at and around the site is determined primarily by distant road traffic.

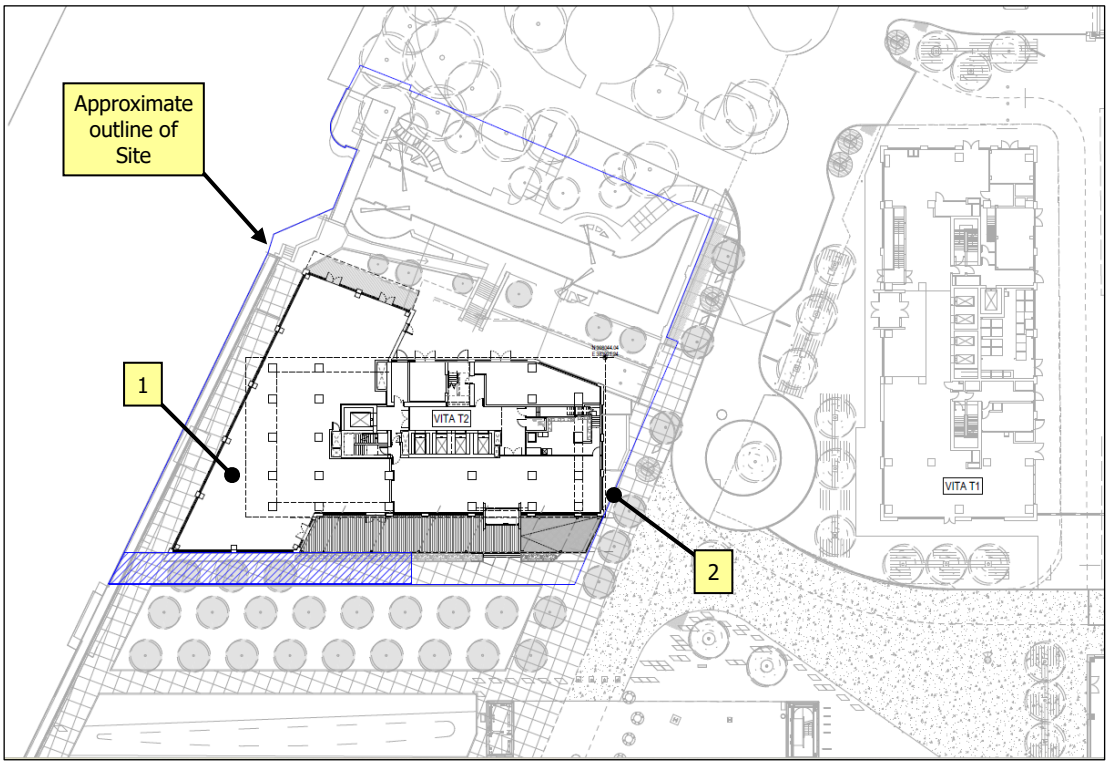


Figure 5: Noise survey measurement locations

The measured noise levels during the day and night at and around the Site are summarised in Table 1.

Location & Date	Measured Noise Level					
	Daytime (defined as 0700 to 2300)			Night time (defined as 2300 to 0700)		
	dB, L_{Aeq}	dB, L_{Amax}	dB L_{A90}	dB, L_{Aeq}	dB, L_{Amax}	dB L_{A90}
1 - Friday 13 March 2020	60	61 to 73	53 to 62	-	-	-
2 - Friday 26 April 2024	55	62 to 83	47 to 61	52	48 to 79	43 to 58
2 - Saturday 27 April 2024	54	53 to 77	47 to 60	51	48 to 76	43 to 55
2 - Sunday 28 April 2024	54	53 to 84	46 to 57	52	49 to 73	44 to 56
2 - Monday 29 April 2024	58	56 to 86	49 to 69	53	56 to 87	44 to 56
2 - Tuesday 30 April 2024	56	57 to 72	51 to 66	-	-	-

Table 1: Summary of measured environmental noise levels – existing and proposed receptors

The statistical noise levels ('L_{Amax}' and 'L_{A90}') given in Table 1 show the range of noise levels measured over the sample periods. The quoted average (L_{Aeq}) noise levels are the average noise levels measured over the full measurement periods in question at each measurement position.

From the results of the external noise surveys, the typical lowest prevailing background noise levels have been determined and are identified in Table 2.

Period	**Sound Pressure Level (dB L90) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Daytime (07:00 to 23:00) – Sunday 28 April 2024	46	46	48	44	45	38	24
Night time (23:00 to 07:00) – Friday 26 April 2024	43	46	45	40	40	33	22

Table 2: Typical lowest background noise levels at sensitive receptors close to the proposed gym

Table 3 identifies the maximum allowable cumulative daytime and night time free-field external noise levels at the closest residential façades due to activity noise from the gym to comply with the guidance published by Manchester City Council.

Period	**Sound Pressure Level (dB Leq) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Daytime (07:00 to 23:00)	43	41	43	39	40	33	19
Night time (23:00 to 07:00)	43	41	40	35	35	28	17

Table 3: Maximum allowable external music noise levels due to proposed gym

It should be noted that it is not considered necessary for the noise limits at 63 Hz in Table 3 to be 5dB lower than the corresponding values in Table 2. This follows from Manchester City Council's published guidance that a noise level no greater than 47 dB at 63 Hz is considered to be 'inaudible/virtually inaudible'. External noise levels can also be expected to reduce by around 10 dB when passing through an open window to a dwelling. Therefore the suggested external noise limit of 43 dB at 63 Hz would lead to a noise level of around 33 dB internally which would be inaudible and well below Manchester City Council's criterion.

8.0 INTERNAL NOISE TRANSFER

'Planning & Noise, Technical Guidance', dated October 2022 has been issued by the Environmental Protection, Environmental Health and The Neighbourhoods Service sections of Manchester City Council. The document provides guidance to applicants and consultants concerning the assessment and prediction of environmental noise associated with a particular development.

With regard to entertainment venues, the document states:

- 'When considering the potential impact of a proposal for an entertainment venue, consultants should consider the overall noise level (LAeq) and the 63 Hz and 125 Hz octave band noise levels (Leq). Music noise in the 63 Hz and 125 Hz octave bands, which is often described as "bass noise", is particularly difficult to contain and the impulsive character of this low frequency music noise is particularly disturbing for local residents exposed to it'.

- ….a criterion that would achieve a condition of 'inaudible' / 'virtually inaudible' which is applicable for new residential developments that are structurally connected to entertainment venues (or vice versa) would be:

  'Music noise levels in the 63Hz and 125Hz octave centre frequency bands (Leq) should be controlled so as not to exceed (in habitable rooms) 47dB and 41dB (Leq,5min), respectively'.

Although the gym is not an 'entertainment venue', it is to be provided with a sound system with the ability of playing background music. It would therefore be appropriate to design to the music noise levels identified in MCC's guidance document.

MCC's guidance document does not provide allowable noise levels at frequency bands above 125 Hz. However, section 3.7.1.2 'Entertainment Venues' of the document states that in relation to entertainment noise 'the [NR15] curve may be too stringent at mid and higher frequencies'. It is therefore suggested that at frequency bands above 125 Hz, the allowable noise level in apartments due to entertainment (music) noise from adjoining amenity spaces lies between NR15 and NR20.

With reference to the above, it is recommended that the internal noise levels within a residential dwelling within Union T2 due solely to music replay in the gym does not exceed the values given in Table 4.

Location	Sound Pressure Level (dB Leq) @ Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Residential dwellings within Union T2	47	41	26	20	17	15	12

Table 4: Maximum recommended noise levels in residential units due to music replay in gym

There are no published guidelines relating to music or entertainment noise transfer to the non-residential spaces within the building. However, in order to avoid disturbance to the non-residential areas of Union T2, it is recommended that noise levels within the non-residential spaces at Levels 1 and 2 do not exceed the values given in the first row of Table 5 due solely to airborne noise transfer from the proposed gym.

The suggested noise limit at 63 Hz is only 3dB greater than MCC's recommended limit for residential rooms. The noise limit at 125 Hz is 1dB more onerous than MCC's recommended limit for residential rooms. The noise limits in the first row of Table 5 equate to an overall noise level of 30dB(A). This noise level is considered wholly appropriate as it is 10 dB lower than the recommended noise level identified in BS8233: 2014 for offices.

Compliance with the noise limits in the first row of Table 5 should achieve the near-inaudibility within the non-residential areas of airborne noise from the gym on the basis that there will be a degree of ambient noise in the non-residential spaces due to the normal operation of building services systems. (For information, Table 5 also shows the maximum recommended noise levels in both office areas and retail areas from the ProPG: Gym Acoustics Guidance document. It can be seen that the recommended noise levels in the non-residential areas of T2 are substantially more stringent than those recommended in the ProPG document for similar spaces).

Receptor Type	Sound Pressure Level (dB Leq) @ Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Non-residential areas within Union T2	50	40	32	25	20	15	15
For info only-ProPG limits for commercial offices	62	51	44	38	35	32	28
For info only-ProPG limits for retail areas	70	60	53	48	45	42	39

Table 5: Maximum recommended noise levels in non-residential areas due to music replay in gym

As identified above, the closest residential dwellings within the building will be located three storeys above the proposed gym. Therefore direct noise transfer via a common separating floor is not a concern. However, there is the possibility of internal structureborne noise transfer between the gym and the apartments above and to non-residential spaces at Level 2 via the concrete frame of the building.

The party floors at Levels 1 to 3 between the ground floor gym and the proposed Level 3 residential areas are 275 mm thick flat concrete slabs. Given the party floor slab and associated structures, Table 6 identifies the calculated maximum allowable music noise levels that could be generated in the gym without exceeding the noise limits given in Table 4 and Table 5 relating to both residential and non-residential spaces.

Room	**Sound Pressure Level (dB Leq) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Gym	85	83	80	80	75	75	75

Table 6: Maximum allowable noise levels in gym– re internal noise transfer

The music noise levels identified in Table 6 would allow background music replay in the gym, whilst achieving compliance with the criteria given in Tables 4 and 5 above.

9.0 ACTIVITY NOISE BREAKOUT FROM GYM

Noise egress calculations have been carried out to determine the expected noise level at the closest residential properties due to activity noise breakout from the proposed gym. The gym is to be a fully mechanical ventilated and cooled space such that the opening of windows and doors is not required to ventilate the space. Therefore, the determinant of the sound insulation performance of the external envelope will be the glazed curtain wall.

The installed curtain wall to the proposed gym is fitted with double glazing of minimum weighted sound reduction index 40 dB Rw. The expected minimum weighted sound reduction index octave band values of the curtain wall system are given in Table 7.

Building element	**Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Fixed glazed areas	25	27	32	39	39	40	53
External Doors	18	20	25	28	30	30	34

Table 7: Expected sound reduction index of gym curtain wall

Table 8 identifies the calculated music noise levels that could be generated in the proposed gym with the gym doors closed whilst complying with the daytime external noise limits identified in Table 3.

Location	**Spatially averaged sound pressure level (dB Leq) @ Octave Band Centre Frequency (Hz)**						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Gym	82	82	89	92	93	87	85

Table 8: Maximum allowable music noise levels within commercial units, daytime - doors closed

Table 9 identifies the music noise levels that could be generated in the proposed gym with the gym doors closed whilst complying with the night time external noise limits given in Table 3.

Location	Spatially averaged sound pressure level (dB Leq) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Gym	82	82	86	88	88	82	83

Table 9: Maximum allowable music noise levels within commercial units, night time - doors closed

The allowable daytime and night time noise levels within the gym with the gym doors closed would permit reasonably high levels of background music to be generated in the gym without breaching the noise limits detailed in Table 3.

Table 10 identifies the music noise levels that could be generated in the proposed gym with the gym doors open whilst complying with the daytime external noise limits given in in Table 3.

Location	Spatially averaged sound pressure level (dB Leq) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Gym	81	81	86	84	85	78	65

Table 10: Maximum allowable music noise levels within commercial units, daytime - doors open

Table 11 identifies the music noise levels that could be generated in the proposed gym with the gym doors open whilst complying with the night time external noise limits given in in Table 3.

Location	Spatially averaged sound pressure level (dB Leq) @ Octave Band Centre Frequency (Hz)						
	63	125	250	500	1k	2k	4k
Gym	81	81	83	80	80	73	62

Table 11: Maximum allowable music noise levels within commercial units, night time - doors open

The allowable daytime noise levels within the gym with the gym doors open would permit background music to be generated in the gym without breaching the noise limits detailed in Table 3.

Given the calculated allowable noise levels due to internal and external noise transfer, Table 12 identifies the maximum allowable internal activity noise levels, including music replay, within the gym.

Time/	Sound Pressure Level (dB Leq) @ Octave Band Centre Frequency (Hz)						
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**
Day time – Doors Closed	82	82	80	80	75	75	75
Night-time – Doors Closed	82	82	80	80	75	75	75
Day time – Doors Open	81	81	80	80	75	75	65
Night-time – Doors Open	81	81	80	80	75	73	62

Table 12: Maximum allowable noise levels in gym

The sound system loudspeakers are proposed to be soffit-mounted within the gym. The loudspeakers will be linked to the existing control amplifier for the amenity sound system which is housed within a locked cabinet on Level 1 of the building. This cabinet is only accessible by the building management. The building staff have access to a control app which is installed on an ipad. The app is used to turn the music on and off and also controls the sound system volume, up to the maximum allowed by the control amplifier. The noise limiting by the control amplifier and app has been successfully implemented for the Level 1 bar and lounge.

Given compliance with the values in Table 12, it is expected that the proposed gym will be able to operate as proposed without causing disturbance to residential receptors.

10.0 IMPACT SOUND TRANSFER FROM GYM

There is the potential for disturbance of residents due to the dropping of weights on the floor of the proposed gym. There is no statutory performance requirement in relation to the transfer of noise from gyms to residential areas. However, guidance has been jointly published by the Institute of Acoustics, the Association of Noise Consultants and the Chartered Institute of Environmental Health. In particular, 'ProPG: Gym Acoustics Guidance', published in March 2023, provides suggested maximum noise levels in various building types, including residential dwellings and commercial offices, due to both airborne and impact noise transfer from gyms.

Table 13 identifies the applicable criteria for residential areas and commercial office areas, with reference to the 'G curves' presented within ProPG: Gym Acoustics Guidance. G curves provide a way to reference sound spectra data in a single figure.

Receptor Type	**Guide Criteria**	
	Airborne Sound (e.g. music) Leq, T (31.5Hz to 8kHz)	**Heavy Impact Sound Lmax,F (31.5Hz to 8kHz)**
Residential Areas	G15-G25 (day) G10-G20 (night)	G20-G25 (day) G15-G20 (night)
Commercial Offices	G25-G35	G35-G45

Table 13: Guidance Internal Sound Target Criteria for Gym Activity – Residential

It should be noted that the values in Table 4 to comply with the recommendations of Manchester City Council are more onerous than the upper noise limits of 'ProPG: Gym Acoustics Guidance' for daytime airborne noise transfer to residential areas and similar to the upper noise limits of 'ProPG: Gym Acoustics Guidance' for night time airborne noise transfer to residential areas. Therefore, the Manchester City Council noise limits have been designed to in relation to airborne noise transfer.

The ProPG guidance relates to all gyms, including commercial gyms. It could therefore be argued that the guidance is necessarily more onerous than needs to be the case for a gym that is solely for the use of the residents of the building, as the users of a residents-only gym can be instructed in the safe use of weights such that the dropping of weights on the floor does not occur frequently.

To date, the client has applied this method along with the installation of high performance proprietary resilient flooring, to successfully mitigate potential impact noise in numerous developments. On this basis, it would not normally be proposed to design fully for the impact noise targets of the ProPG.

However, it is understood that Manchester City Council's preference is that the guidance values of the ProPG document are targeted.

Free Weights area

The dropping of free weights such as dumbbells and kettlebells typically generates the highest levels of structureborne impact noise from a gym. Figure 6 shows the proposed free weights benches and racks within the gym.

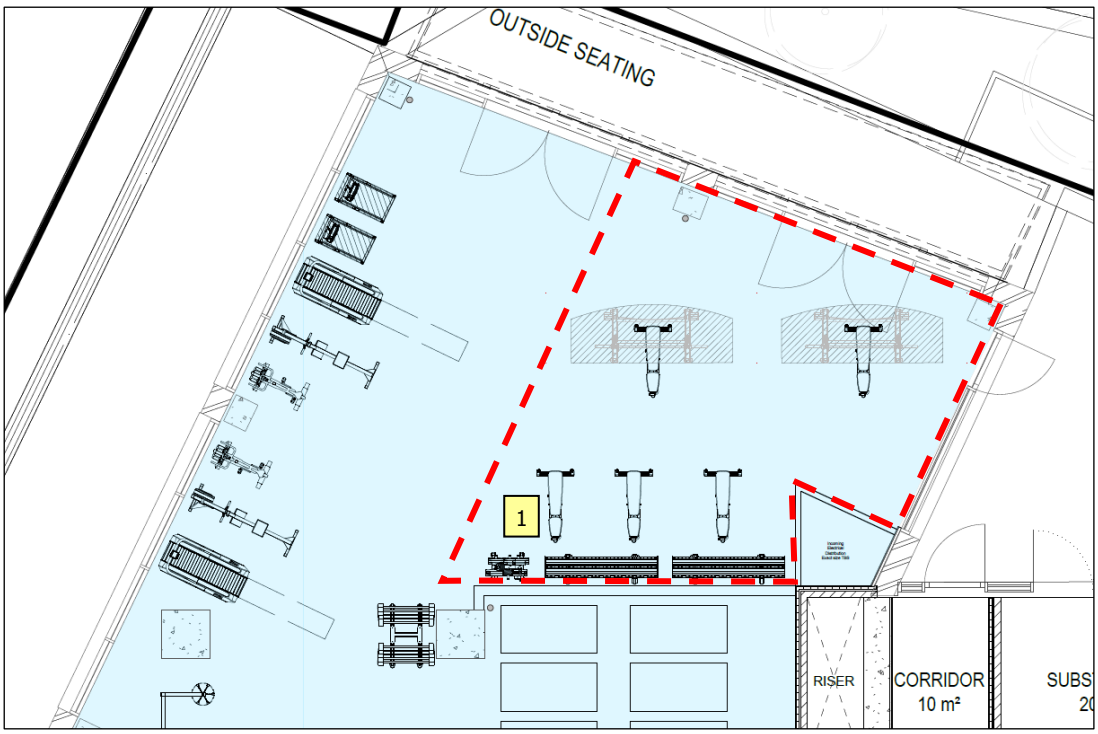


Figure 6: Ground Floor, Free Weights Area of Gym

The mitigation of impact noise due to the dropping of free weights can be achieved by the installation of a proprietary resilient floor covering in the free weights area of the gym.

Measurements of impact noise transfer have been carried out to determine the potential impact noise levels in the proposed residential areas at Level 3 due to weight drops within the proposed free weights area and to assess the impact sound insulation performance of a potential gym flooring system. Meaningful measurements of airborne noise could not be carried out on Level 3 as it currently exists, as noise from the gym weight drops were not audible or measurable above the ambient noise in the space. In addition, the Level 3 space is at 'shell and core' stage and measurements of noise carried out in this large open plan space would be expected to record lower noise levels than in the proposed residential rooms due to the much greater dimensions of the 'receiving' room. Therefore, the potential impact noise levels at Level 3 have been calculated based on the measured vibration levels in the Level 3 floor slab generated by the dropping of a 20 kg kettlebell in the proposed free weights area of the gym.

A 20 kg kettlebell, dropped from a height of 0.5 m was used to generate impact noise on the following flooring in the gym:

A. GenieMat FIT70 (70 mm thick) by Pliteq

The maximum (Lmax) vibration levels in the Level 3 floor slab generated by repeated impacts on the floor covering at location 1 identified in Figure 6 were measured. The expected impact noise levels in the completed residential room given floor covering A in the gym were then calculated using the following formula:

$$W = \rho c.S.v.\sigma$$

.

Where W = power radiated

ρc = characteristic impedance of air

S = surface area

v = surface vibration velocity

σ = radiation efficiency (of the floor slab)

Figure 7 identifies the expected impact sound levels in a Level 3 residential studio above the gym due to the dropping of free weights on gym floor covering A and also identifies the G15 to G25 curves to allow a comparison with the recommendations of the ProPG document.

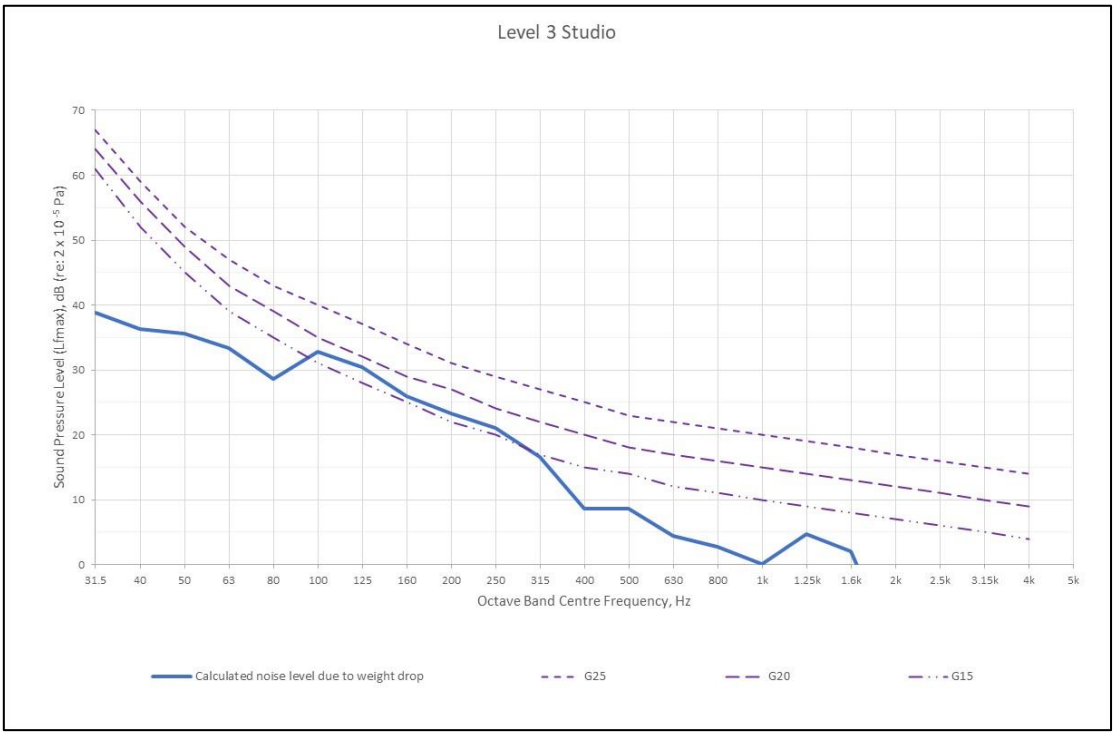


Figure 7: Calculated impact sound levels due to 20 kg kettlebell weight drops – Level 3 Studio

It can be seen that the calculated impact sound levels due to the weight drops are less than the G20 curve between 100 Hz and 250Hz and are less than the G15 curve at all other frequencies. As the measured vibration levels were so low and close to the 'noise floor' of the instrumentation (ie the background electrical noise), it is considered likely that the small uplift in predicted noise between 100 Hz and 250 Hz was due to ambient vibration in the slab rather than vibration induced by the gym weight drops.

The G15 curve coincides with the threshold of hearing curve at low frequency, and thus the results of the measurements show that low frequency 'thuds' due to weight drops are expected to be inaudible in the residential rooms at Level 3 and above.

The calculation result is in accord with the subjective assessment on site that the gym weight drops were inaudible at both Level 1 and Level 3 of the building.

Compliance with the recommendations of the ProPG document relating to daytime and night time noise due to the dropping of free weights is therefore expected given the potential gym floor finish in the free weights area of the gym.

The findings of the above study are supported by consideration of the structural arrangement of the gym. Figure 8 shows the locations of contiguous piles and a 1500 mm deep capping beam, along with a 900 mm deep capping beam between columns. These structural elements beneficially screen the columns of the residential tower from vibration induced by activities within the gym.

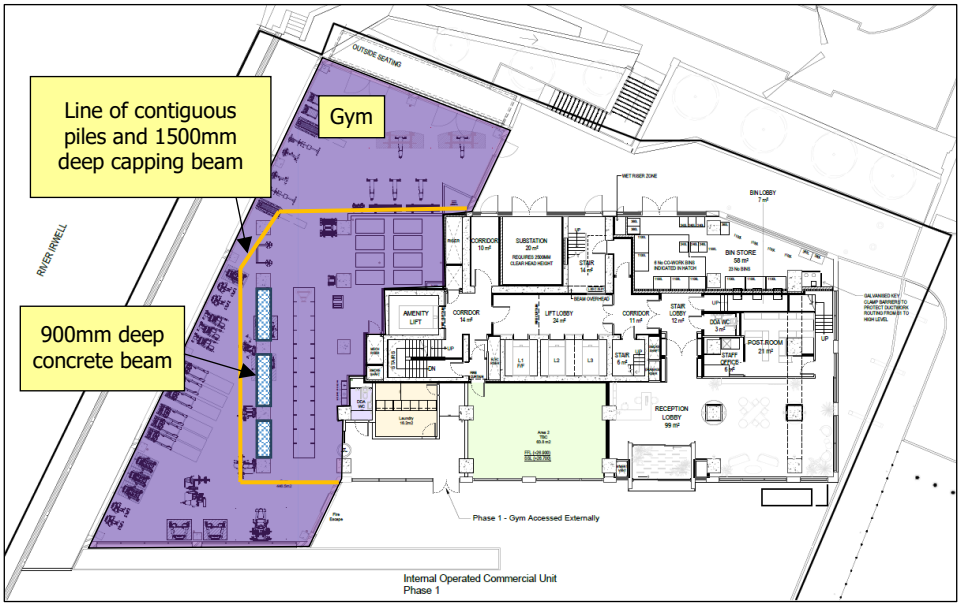


Figure 8: Ground Floor plan showing layout of gym

Resistance machines are to be installed in the non-free weights area of the gym, which lies outside of the structural curtilage of the building. Measurements carried out by Fisher Acoustics has shown that impact noise due to the dropping of a 50 kg weight stack within a resistance machine is typically 20 dB lower than the impact noise due to the dropping of a 20 kg kettlebell from a height of 500 mm. Therefore the impact sound performance of the gym flooring outside of the free weights area can be substantially lower than the performance of the free weights flooring.

Laboratory testing shows that impact sound levels generated by weight drops on Pliteq VersaTREAD08 are approximately 10dB greater than those generated by weight drops on Pliteq GenieMat FIT70. Therefore Pliteq VersaTREAD08 is a suitable gym flooring product below the resistance machines within the proposed gym.

'Functional' gym area

The functional area of the gym is to be provided with treadmills. With regard to the potential for 'Synchronised Repetitive Excitation' (SRE) of a gym floor and structure due to the use of treadmills, Section 3.5.3 of the ProPG guidance states:

> 3.5.3 SRE Testing Method
>
> Synchronised Repetitive Excitation would typically occur in Gyms where people are running/ stepping together. Estimates of the response factor and complementary heel-drop tests as described in SCI P354 can assist to determine if the structural floor is dynamically sensitive to footfall excitation.
>
> Walk-by or running (with flat-footed style) to a metronome set typically to 160 steps per minute (to represent 11km/hr) are ways that have been used by members of the Working Group to explore this, but it is the experience of the Working Group that this is not commonly done and is usually dealt with by a combination of the isolation within treadmills and also the floor treatment. It should be for the SQA to use their experience to advise in this regard, as it is the Working Group's view that this remains very hard to standardise.

As stated above, the ProPG relies on the 'Suitable Qualified Acoustician' to advise on control of SRE as there is no standardised testing method for treadmills.

Given the structural elements discussed above and the location of gym equipment outside the structural curtilage of the residential tower above, no further mitigation measures are expected to be required to treadmills or resistance machines within the gym.

Notwithstanding the above, in the 'Functional' gym area, a resilient floor covering that achieves an impact sound reduction of approximately 16 dB dLw is proposed,

A suitable gym flooring product for the functional area of the gym is Pliteq VersaTREAD08 (8 mm thick).

11.0 CONCLUSION

The expected internal airborne noise levels within the gym are such that compliance with guidance published by Manchester City Council in relation to internal noise transfer and external noise breakout is fully expected.

Potential impact noise from the gym due to the dropping of free weights is mitigated by the structural elements of the gym and is to be further controlled by the provision of a high performance proprietary resilient gym floor covering specifically designed to reduce low frequency impact noise, such that audible noise due to the dropping of weight is not expected in either the residential or non-residential areas within the building and compliance with the recommendations of the ProPG document relating to daytime and night time noise due is expected. Audible impact noise due to the dropping of weight stacks within resistance machines is not expected given the proposed structural arrangement of the gym and the provision of VersaTREAD08 below resistance machines.

Adverse impacts due to Synchronised Repetitive Excitation of the gym structure is not expected given the proposed structural arrangement of the gym.