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Project:	AS14077 TGG Oldham Street, Manchester		
Subject:	Acoustic Performance Overview		

Introduction & Project Targets

The Gym Group (TGG) is intending to take on vacant basement and ground-floor commercial spaces at The Quarters, Oldham Street, Manchester, M4 1LF.

Clarke Saunders Acoustics (CSA) has been instructed to undertake an acoustic appraisal of the premises.

Extensive testing has been carried out within the premises and adjoining uses in order to determine the requirements for mitigation works and treatments to control noise and vibration transfer. Mitigation works have been proposed on the basis of achieving noise levels within adjacent premises as follow.

AREA	CRITERIA FOR MECHANICAL SERVICES	CRITERIA FOR MUSIC & ACTIVITIES	NOISE CRITERIA FOR WEIGHTS EVENTS
Residential	$L_{eq} \leq G45$	$L_{max} \leq G45$	$L_{Fmax} \leq G45$
Commercial / Retail	$L_{eq} \leq G25$ (day) $L_{eq} \leq G20$ (night)	$L_{max} \leq G25$ (day) $L_{max} \leq G20$ (night)	$L_{Fmax} \leq G25$ (day) $L_{Fmax} \leq G20$ (night)

In addition, peak magnitudes of W_b weighted vibration are to be controlled to $\leq 21\text{mm/s}^2$ within the adjacent residential units and to less than 60 mm/s^2 within the commercial use.

Gym Layout

The gym layout has been planned to minimise the occurrence of conflicting adjacent uses so far as is practicable.

Free Weights and Functional areas (typically the highest impact noise generating spaces) are understood to be located at basement level only, minimising the impact of these activities on the residential apartments at first floor level.

The Free Weights / Plate Loaded area is proposed to be located away from the partition line shared with the adjoining commercial use.

Internal Airborne Sound Insulation

Amplified music is not typically played at a high volume within TGG premises, however the rhythmic nature of the background music is considered. Average reverberant noise levels of $L_{Aeq,5min}$ 70 dB to 73 dB and maximum levels of up to around L_{AFmax} 85 dB are typical inside the gym.

TGG typically target an airborne sound insulation performance of $D_{nT,w} + C_{tr} \geq 63\text{dB}$ between gym use and residential areas to control noise from typical gym operations to the target level. A lower performance of $D_w / D_{nT,w} \geq 40\text{dB}$ is typically adequate to meet the objectives in commercial uses.

Site testing has shown that the separating walls and floors achieve the following performances.

SOURCE	RECEIVE	PARTITION TYPE	PERFORMANCE
Gym Floor (ground floor)	Dwellings (first floor)	Floor	$D_w + C_{tr} 43dB^1$
Gym Floor (ground floor)	Foyer (ground floor)	Wall	$D_w 54dB$
Gym Floor (ground floor)	Sainsbury's (ground floor)	Wall	$D_w 38dB$
Functional and Glutes (basement)	Sainsbury's (ground floor)	Floor	$D_w 49dB$

In order to protect the dwellings at first floor, the following enhancements are recommended for ground floor areas where music may be played:

- Suspended MF ceiling: 2no. layers 15mm dense plasterboard suspended with void depth $\geq 200mm$. Cavity to be fitted with minimum 100mm mineral wool (density $\geq 30kg/m^3$)
- Exposed columns in active gym areas lined with 15mm dense plasterboard, with mineral wool between the studs
- Service penetrations in ceiling to be concealed

TGG does not have typical airborne sound insulation targets for foyer spaces. However, based on measured typical TGG ambient noise levels, no further protection is required.

The wall separating the ground floor gym areas and Sainsbury's presents a marginal failure of project targets, however the proposed mitigation measures to protect the first floor residences are anticipated to also slightly enhance this wall.

Studio/class areas should be located at basement level.

No additional protection is required for the floor separating the basement and ground floor.

Loudspeakers will be fixed on isolated mounts or on to independent linings only.

Atmospheric Sound Breakout

The building envelope comprises glazed curtain walls at ground floor level, with blockwork and concrete walls at basement level.

Once fitout is complete, noise levels at the closest detached residential receptors are anticipated to be suitably controlled during the daytime period. It is recommended that music levels in active gym areas be reduced during the night-time.

Weight Impact Noise & Vibration Transfer

Testing of weight drops associated with free weight activities was conducted from basement level to Sainsbury's above.

Flooring systems that are capable of controlling noise and vibration from typical usage to within TGG project targets in both the commercial and residential areas are presented below.

Suitable products are supplied by Total Vibration Solutions, but could be substituted with equivalent products from other suppliers:

¹ No reverberation measurements were undertaken in the first floor flat as testing was investigative and not for the purposes of satisfying the Building Control Authority. The flat was vacant and unfurnished, such that the resultant sound insulation performance including the effects of the reverberation correction are expected to be in the region of a few dB higher i.e. circa $D_{nT,w} + C_{tr} 45 dB$.

Free Weights / Plate Loaded Area Flooring

- 40mm rubberised tile system; over
- 2 no. layers 17mm agglomerated crumb rubber².

Where Olympic lifting stations are integrated into exercise rigs that lay flush with free weights flooring, an uplift in floor matting will be provided in the 'drop zones'.

Functional Area & Studio Flooring

- 10mm rubberised sheet; over
- 1 no. layer 40mm PUR foam bound with polyurethane³.

OR

- 40mm rubberised tile system; over
- 2 no. layers 17mm agglomerated crumb rubber.

Resistance Equipment

Resistance equipment (cable machines) will be fitted with isolating washer collars at the base of the weight stacks.

Heavier equipment items, including 8-stack cable machines will not be located directly beneath flats.

Building Services Noise Emissions

Ventilation and heating/cooling plant will be located externally at roof level, and internally within a plantroom on the south-east façade of the building. Fresh air and exhaust requirements will be serviced by attenuated louvres along the façade.

Attenuator performance has been determined to satisfy the standard requirements of Manchester City Council, wherein plant noise emissions should be controlled to a level 5dB below the pre-existing background level.

The measured background sound pressure levels and resultant plant sound criteria are shown below.

Period	Daytime (07:00-19:00)	Evening (19:00-23:00)	Night-time (23:00-07:00)
Background Sound Level	L _{A90} 49 dB	L _{A90} 50 dB	L _{A90} 42 dB
Criteria	L _{Aeq} 44 dB	L _{Aeq} 45 dB	L _{Aeq} 37 dB

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² Typically mass per unit area circa 6kg/m²
³ Typically 250kg/m³ (+ / - 15%)