

DDN-AC-024

TO	CRUK, MCC	FROM	R Marriner – WSP Acoustics
DATE	10 November 2022	CONFIDENTIALITY	Public
SUBJECT	Meadowside – Gym Noise Assessment in Response to MCC Comments		

Introduction

Manchester City Council's Planning team has requested (email 21 September 2022) that a gym noise assessment is carried out and submitted, following the completion of plot 3, Meadowside. From this email it is unclear which planning condition this request relates to. The building has a concierge, who would deal with any noise complaints, in the event that they arise from residents. As such, it is unlikely that any noise complaints would need to be addressed by MCC's Environmental Health team.

No amplified music system is installed in the plot 3 gym, but there is the potential for general noise from the gym to be transmitted to the apartments above and below it.

Criteria

This memo is based on MCC's *Planning and Noise Technical Guidance* document dated October 2022. It is noted that the gym is for use by residents only, so it is not a commercial gym. However, for consistency with the MCC guidance, it has been assessed against the guidance in section 3.7.1.2 (Entertainment Venues) as this contains the most appropriate criteria.

This guidance states that a suitable criterion 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*'.

The following criterion curve has been adopted herein, based on a combination of the above requirement (for low frequencies), and the NR15 curve (for mid and high frequencies).

Table 1: Criterion curve adopted for assessment

Sound level in octave bands, dB $L_{eq,5min}$							
63	125	250	500	1000	2000	4000	8000
47	41	26	19	15	12	9	7

Suitable noise limits have been determined below, based on this criterion and the results of sound insulation tests that have now been carried out.

Gym Design

The following measures are incorporated in the gym design to control noise, and maximise the flexibility in the use of the space:

- Mass barrier ceiling, comprising 2x12.5mm SoundBloc on resilient hangers
- Sound insulating concrete floating floor throughout

Tests

The following tests have been undertaken:

- Airborne sound insulation tests from the gym to one apartment below (B3.01.01)
- Airborne sound insulation tests from the plot 3 gym to one apartment above (B3.03.06)
 - This apartment is not wholly above the gym, so it shares a relatively small surface area of floor (approx. 12.6 m²). It was the most relevant apartment for the test as access was not available to B3.03.01 at the time. A correction has been applied to the results, to account for this small surface area (see Table 3).

Airborne sound insulation tests were carried out using BS EN ISO 140-4:1998¹ and rated in accordance with BS EN ISO 717-1:1997². Tests were carried out by Robert Marriner MIOA and Chris Clayden AMIOA of WSP. The equipment used to carry out these measurements is summarised below.

Table 2: Equipment Details

Equipment Description	Manufacturer & Type No.	Serial No.	Calibration Due Date
Sound Level Meter	Brüel & Kjær Type 2250	3023998	04 February 2024
Pre-amplifier	Brüel & Kjær ZC 0032	26900	
Microphone	Brüel & Kjær 4189	3130582	
Calibrator	Brüel & Kjær 4231	2524534	03 February 2023

Sound Insulation Test Results

The results of the sound insulation tests are summarised in Table 3.

Table 3: Summary of sound insulation test results

Source room	Receive room	Test result in octave bands, dB D									Comments
		63	125	250	500	1000	2000	4000	8000	D _w	
Gym	B3.01.01	48	62	74	82	79	81	81	77	80	As measured
Gym	B3.03.06	43	60	70	76	77	77	77	77	77	As measured
Gym	B3.03.06	38	55	65	71	72	72	72	72	72	Includes correction for small surface area ($10 \cdot \log(12/34) = -5$ dB)

¹ ISO 140-4:1998 *Acoustics – Measurement of sound insulation in buildings and of building elements – Part 4: Field measurements of airborne sound insulation between rooms*. International Organization for Standardization

² BS EN ISO 717-1:1997 *Acoustics - ratings of sound insulation in buildings and of building elements. Airborne sound insulation*. British Standards Institute.

Limiting Noise Levels

Based on the criterion curve, the following limiting noise levels have been calculated. As a worst case, these are based on the lowest test result (gym to B3.03.06 with -5 dB adjustment).

Table 4: Calculation of limiting sound level in gym

Calculation step	Sound level in octave bands								Broadband
	63	125	250	500	1000	2000	4000	8000	
Criterion curve	47	41	26	19	15	12	9	7	-
Sound insulation test result, dB D	38	55	65	71	72	72	72	72	72 D _w
Limiting sound level in gym, dB L _{Aeq,5min}	85	96	91	90	87	84	81	79	93 L _{Aeq,5min} / NR 87 L _{Aeq,5min}

Discussion

The construction as built would permit sound levels of up to 93 dB L_{Aeq,5min} / NR 87 L_{Aeq,5min} in the gym, whilst complying with the relevant limit in the apartments above and below. This is subjectively equivalent to 'loud music' such as a party or lively bar, and is substantially higher than a level that would be required to provide 'background music'. It is therefore considered that this noise limit would permit a wide range of activities to take place, whilst meeting MCC's recommended criteria.

Conclusion

WSP's Acoustics team has carried out sound insulation testing of the residents' gym in plot 3, Meadowside. Limiting sound levels have been set for activities that may take place in the gym, based on Manchester City Council guidance for entertainment sound, and the sound insulation tests.

A limiting sound level of 93 dB L_{Aeq,5min} / NR 87 L_{Aeq,5min} applies in the gym (full spectrum supplied above). This is subjectively equivalent to 'loud music' and is substantially higher than a level that would be required to provide 'background music'. It is therefore considered that this noise limit would permit a wide range of activities to take place, whilst meeting MCC's recommended criteria.