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GYM NOISE ASSESSMENT

6 Nab View, Whalley BB7 9YG

Client: Alexander Weldon

Report Date:	15th April 2025
Ref:	20250415 9772 Whalley Gym BS8233
RVBC Ref:	3/2024/0982
Site Visited by:	M A Kenyon
Site Visit:	3rd April 2025

Prepared by: M A Kenyon MSc BSc MIOA

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ANC | ACOUSTICS & NOISE CONSULTANTS

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1.0 INTRODUCTION

At the request of Ribble Valley Architecture Ltd on behalf Alexander Weldon, Martec Environmental Consultants Ltd undertook a noise assessment of a home gym located at 6 Nab View, Whalley, Clitheroe BB7 9YG.

Recently Ribble Valley Borough Council refused consent [Ref.03/2024/0982] for *"Regularisation of conversion of garage to home gym"* partly on noise grounds. In connection with the application, it is understood that the local authority stated:

"Notwithstanding paragraph 2.3 of the submitted Planning Statement, the Environmental Health Officer requires a noise assessment to be submitted prior to the determination of the application.

They consider a fully detailed scheme for the sound insulation of the residential buildings against internally and externally generated noise shall be submitted to the Local Planning Authority. The sound insulation works shall be engineered so the dB levels within the residential buildings adhere to the levels shown in Table 4 on page 24 of the publication 'BS8233:2014, Guidance on Sound Insulation and Noise Reduction for Buildings'. The design criteria for external noise shown in this document also need to be adhered to (see para 7.7.3.2, page 25)."

This report outlines the local authority's noise criteria, details measurements made on site and assesses the noise impact.

Acoustic terminology is explained at Appendix 1 and the Consultants' qualifications are at Appendix 2.

2.0 ASSESSMENT CRITERIA

2.1 British Standard 8233:2014 (Guidance on Sound Insulation and Noise Reduction for Buildings)

The local authority has requested compliance with the criteria at Table 4 on Page 24 of BS8233 which states the following:

Table 4: Indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 LAeq,16hr	--
Dining	Dining Room/Area	40 LAeq,16hr	--
Sleeping (daytime resting)	Bedroom	35 LAeq,16hr	30 LAeq,8hr

With regard to external levels, BS8233:2014 states:

"7.7.3.2 Design criteria for external noise

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all *circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.*

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB LAeq,T or less might not be possible at the outer edge of these areas but should be achievable in some areas of the space."

3.0 BACKGROUND TO ASSESSMENT

3.1 Site Layout

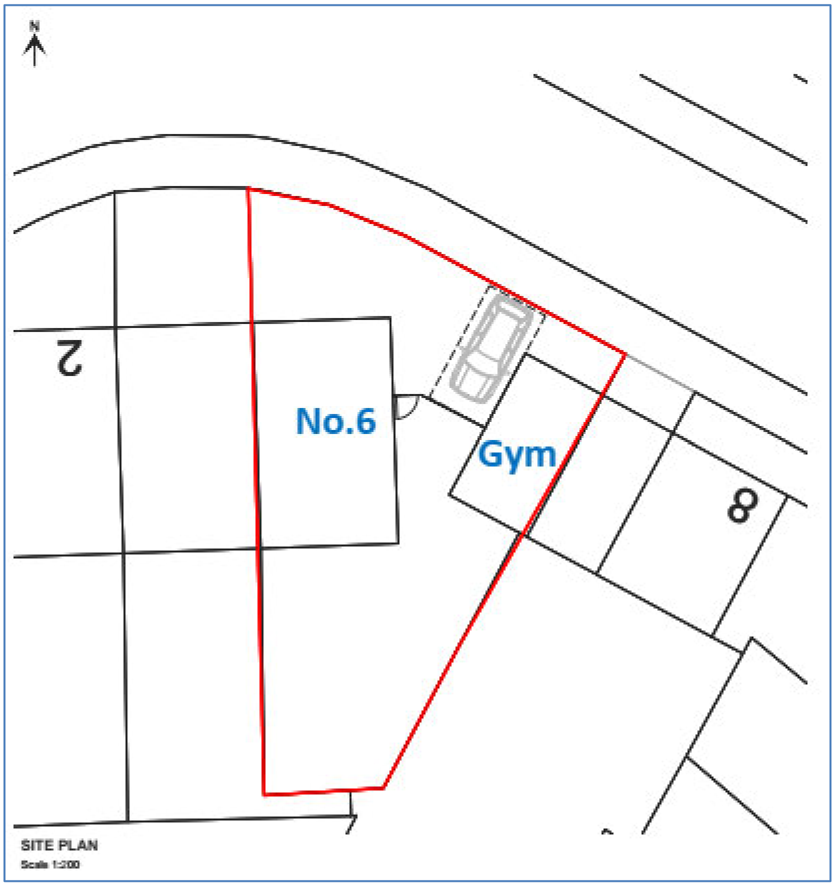

Figure 1: Site [from Plan. Ap. Documents]

From Figure 1 above, it can be seen that the former garage of No.6 [marked 'Gym'] is detached from No.6. It is actually under part of No.8 [See Figures 2 and 3 below]. The central empty space in both the elevation in Figure 2 and the ground floor plan of Figure 3 is a pass-through to allow cars from a number of properties to access their parking spaces at the rear.

From Figure 3, it can be seen that No.6's home gym lies under No.8's kitchen and partly under a bedroom.

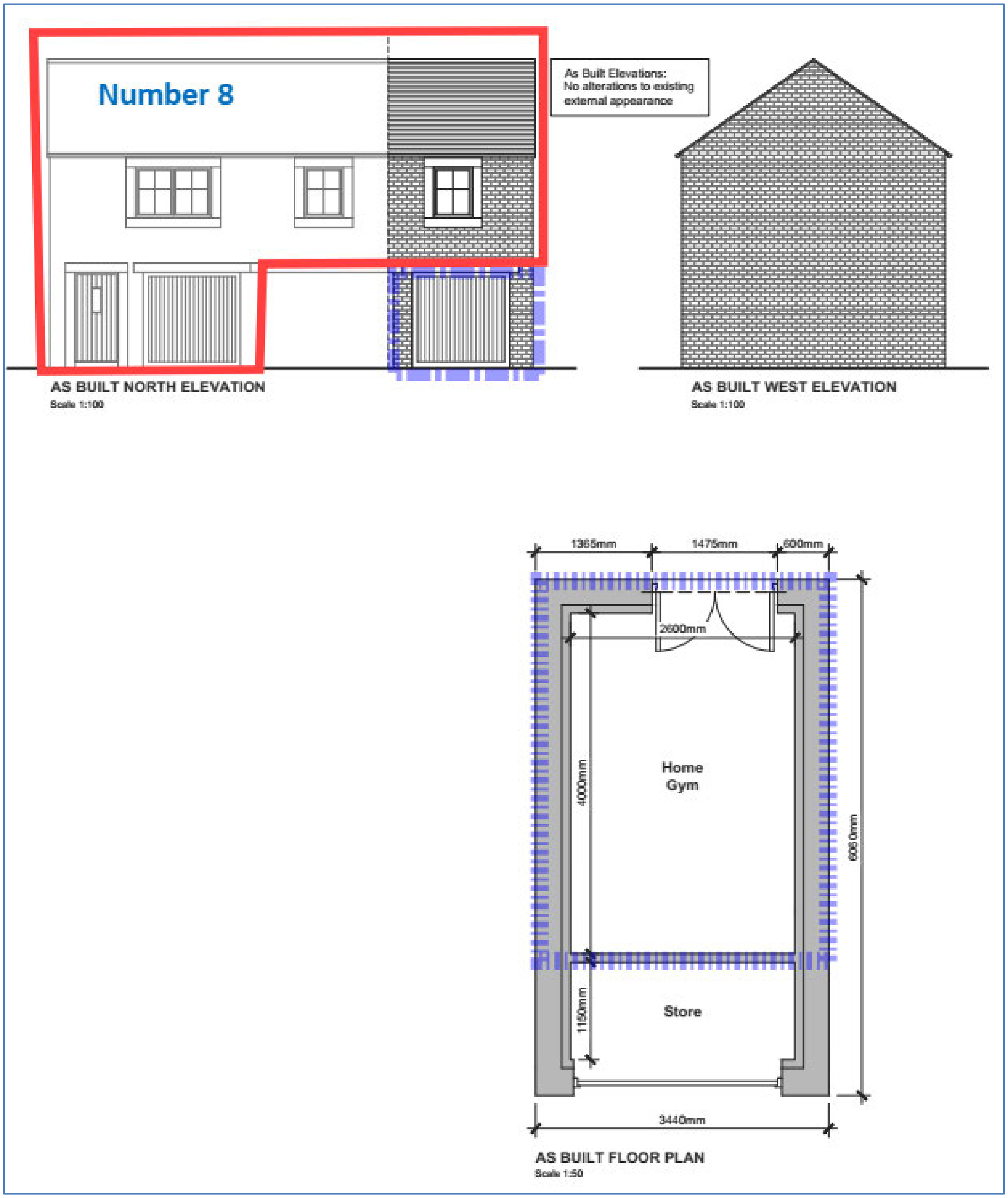

Figure 2: Floor Plan & Elevations from Plan. Ap. Documents]

Figure 3: No.8 Floor Plan [from sale details on Rightmove]

3.2 Home Gym Use Pattern

From discussions with the homeowner at No.6, we understand the following:

1. The gym is not used at night [23:00 – 07:00hrs].
2. The treadmill is used for walking and for 3 x 30min sessions/week
3. The weight machine is used for a total of 7 x 60 minute sessions/week.
4. The noisiest weight activity is probably the 'lap pull' because the weights can clank as they are lowered.
5. In hot/warm weather the fan is used.
6. Exercise sometimes occurs with a radio on.
7. The ceiling inside the home gym has been upgraded over the situation when it was used as a garage.
8. A 'gym grade' flooring system has been installed in the space, i.e. it should absorb impacts and be hard wearing.
9. The 'Renegade Rows' activity involves dumb-bells being placed on the floor and then lifted repeatedly.
10. The residents of No.6 are aware of the noise issues of the residents of No.8 and understand that they relate to the audibility of noise within their property, as opposed to noise as experienced in No.8's garden which lies on the far side of No.8, with the car park area in between.
11. The residents of No.6 are not aware of any other complaints from other residents.

Naturally the level of activity in the home gym varies from day to day, but from the above a 'busy' day would entail a maximum of say three hours total use.

3.3 Applicable Criterion

From 3.2 [point 1] above, the nighttime criteria from BS8233 do not fall to be considered.

From 3.2 [points 10 & 11] the external noise criteria from BS8233 do not appear to be at issue.

From Table 4 of BS8233 [Section 2.1 above], there are no noise criteria for kitchens, so the applicable criterion appears to be for daytime resting in bedrooms, i.e. 35 LAeq,16hr.

4.0 NOISE MEASUREMENTS

The site was visited in the afternoon of Thursday 3rd April 2025.

Arrangements had been made for access to both the home gym at No.6 and the property above, which would have permitted the sound insulation between the properties to be measured as well as for the noise of gym activities in No.6's gym to be directly measured inside No.8. Unfortunately, on arrival at the property, permission to access No.8 had been withdrawn. Accordingly, it was only possible to make measurements of gym activity at source, i.e. within the home gym itself.

The equipment was hand-held and fitted with a standard wind muff and moved through the gym space to obtain the average reverberant level of a given activity through the space.

For the purposes of measurement, the French doors [out to the garden of No.6] were kept closed during the measurements.

The sound level meter used, and associated equipment are shown in Table 1 below:

Model	Instrument	Serial No.	Lab Cal Certificate	Re-Calibration Due
C Svan 957	Sound Level Meter	23201	TCRT25/1260	24/3/2027
Svan SV12L	Preamp	24265	TCRT25/1260	24/3/2027
PCB 377B02	Microphone	LW136090	TCRT25/1260	24/3/2027
B&K 4231	Calibrator	2084928	TCRT25/1254	20/3/2027

Table 1: Instrumentation

The meter field-calibrated correctly before and after the measurements; all instrumentation had been laboratory calibrated within the preceding 2 years.

5.0 RESULTS

5.1 Measurement Results

Table 2 below contains the measurement results [line numbers 1 to 5 inclusive].

No.	Condition	Third Octave Band Centre Frequency [Hz]																					LAeq
		50	63	80	100	125	160	200	250	315	400	500	630	800	1000	1250	1600	2000	2500	3150	4000	5000	
1	Treadmill walking on '5'	46.1	43.4	54.9	47	45.3	52.7	52.9	50.8	50.1	55.6	54.5	55.4	52.2	50.7	50.4	49.9	50.1	49.3	49.8	47.7	44.3	62
2	Lap Pull Cable m/c	53.3	45.5	46	41.9	41.7	46.4	47.2	46.6	46.2	46.5	49.6	52.6	49.6	49.3	54	56.2	57.8	60.3	68.1	49.2	48.7	69
3	Renagade Rows - dumbells on floor	57	55.9	63.7	60.2	59.7	59.2	50.4	43.2	41.4	40.3	41.6	38.4	35.6	35	36.1	34.8	32.9	35.3	37	35.6	32.8	52
4	Fan max level	50.3	47.1	45.9	57.5	49.3	44.9	55.3	49.7	51.1	47.5	48.2	49.3	50.2	49.3	49.5	51	50.1	49.4	48.7	46.8	44.1	60
5	Radio as found	37.6	38.6	43.7	44.8	40.1	39.1	40.4	42.7	39.9	44	44.5	43.6	44.1	43.1	43.6	44.9	45.6	44.9	42.9	39.1	38.5	54
6	Combined Level [2 + 4 + 5]	55.1	49.7	50.1	57.8	50.4	49.2	56.0	52.0	52.6	51.0	52.7	54.6	53.5	52.8	55.6	57.6	58.7	60.8	68.2	51.4	50.3	70
7	D - Conc Floor [DnTw+Ctr 41dB 8258]	33.7	29.0	26.2	28.2	33.4	29.7	35.1	39.7	39.9	44.7	49.5	54.7	61.4	65.2	67.2	70.8	68.5	71.7	78.0	79.4	75.1	
8	Level Upstairs [6 - 7]	21.4	20.7	23.9	29.7	17.0	19.4	20.9	12.3	12.7	6.3	3.1	-0.1	-8.0	-12.4	-11.6	-13.2	-9.8	-10.9	-9.9	-28.0	-24.8	17
9	D - Timber Floor [DnTw+Ctr 40dB 9717]	27.6	26.3	27.1	22.7	29.8	40.8	41.6	39.1	41.4	45.4	49.7	54.7	55.4	57.8	61.1	65.9	67.7	69.7	73.5	75.5	69.1	
10	Level Upstairs [6 - 9]	27.6	23.5	22.9	35.2	20.6	8.4	14.4	12.8	11.1	5.6	3.0	-0.1	-1.9	-5.0	-5.5	-8.3	-9.0	-9.0	-5.3	-24.1	-18.8	20

Table 2: Measurement Results [dBLin unless stated otherwise - free-field]

6.0 ASSESSMENT OF RESULTS

6.1 Prediction of Noise Levels inside No.8

As discussed, it had been intended to make direct measurements of ‘gym noise’ inside No.8 [the property above], as well as making measurements of the sound insulation of the separating floor/ceiling. Unfortunately, without access to No.8 this was not possible.

Generally, activities are undertaken by one person at a time; if we assume that the noisiest activity [Lap Pull – line 2 of Table 2] occurred with the radio and the fan on full [lines 4 & 5] then the combined sound level downstairs is shown at line 6 of Table 2. If no allowance is made for duration, this assumes the highest level of activity occurs continuously for the whole sixteen hours between 07:00 and 23:00 hours.

It isn’t clear whether the separating floor is concrete or timber based, but either way, under the Building Regulations, any structure separating a dwelling from another part of the same building must meet the sound insulation standards contained in Approved Document E of The Regulations; therefore, the floor/ceiling between No.8 and the garage of No.6 below should have been constructed so as to meet these standards. As detailed above in Section 3.2 point 7, the ceiling has since been upgraded which should have improved the sound insulation yet further.

Similarly, the fact that the gym is directly underneath only approximately half of the bedroom above, would also improve the effective sound insulation between the two spaces.

To meet Building Regs requirements, the sound insulation has to be 45dB $D_{n,Tw}+C_{tr}$ or better [See Appendix 1 for explanation of terminology].

However, if for the sake of these predictions we assume that the intervening floor/ceiling is 'poor' and **does not meet** the required standard, the measured performance [$\mathbf{D_w}$] for a 'poor' concrete floor and for a 'poor' timber floor [measured elsewhere], has been reproduced at lines 7 and 9 of Table 2, respectively; these floors failed to meet the required standard by 4 and 5 dB respectively.

The corresponding level upstairs can be predicted on the above basis, and with the assumed continuous level of 'maximum' activity downstairs and with a 'poor' concrete separating floor the predicted level upstairs would be 17 LAeq, or 20 LAeq with a 'poor' timber separating floor.

7.0 CONCLUSIONS

The local authority has stated that it wishes to ensure that the standards of BS8233:2014 are achieved.

From the use pattern of the gym, and the layout of the premises, the applicable criterion from BS8233:2014 is to achieve 35 LAeq,16hr in the upstairs bedroom.

Unfortunately, it was not possible to measure the levels of gym noise inside the neighbour's property, making predictions necessary.

If we assume that the loudest gym activities take place continuously from 7am to 11pm, then the 'gym noise' level predicted in the upstairs bedroom would not exceed 20 LAeq,16hr, even assuming a 'poor' intervening timber floor.

In summary, even significantly overestimating the 'gym noise' levels and significantly underestimating the likely sound insulation performance of the separating floor, the predicted 'gym' noise levels are well below [i.e. within] the criteria selected by the local authority, and therefore complies with planning requirements.

APPENDIX 1

EXPLANATION OF ACOUSTIC TERMS

The dB or the decibel, is the unit of noise. The number of decibels or the level, is measured using a sound level meter. It is common for the sound level meter to filter or 'weight' the incoming sound so as to mimic the frequency response of the human ear. Such measurements are designated **dB(A)**.

A doubling of the sound is perceived, by most people, when the level has increased by 10 dB(A). The least discernible difference is 2 dB(A). Thus most people cannot distinguish between, say 30 and 31 dB(A).

The Background level of noise is most commonly represented by the level which is exceeded for 90% of the time i.e. the LA90.

If a noise varies over time, then the **equivalent continuous level, or LAeq**, is the notional constant level of noise which would contain the same amount of acoustic energy as the time varying noise.

The $\mathbf{R_w}$ is a laboratory measure of the intrinsic airborne sound insulation capabilities of a structure. The $\mathbf{D_{nT,w}}$ is a measurement (or prediction) of the overall airborne sound insulation in situ and as such will depend on flanking conditions, the proportion of the separating structure's area to the receiving room volume, and well as the maximum permissible reverberation time of the receiver room. The larger the $\mathbf{R_w}$ or $\mathbf{D_{nT,w}}$ the better the sound insulation, i.e. the larger the decrease in noise from one site of the separating structure to the other; both these factors are single figure factors produced using reference curves and standardized reverberation times.

In sound insulation measurements $\mathbf{D_w}$ is the 'as measured' difference [in octave or third-octave bands] between the sound level on one side of the structure and on the other, i.e. with no correction for the echoiness [reverberation time] of the receiver room.

The following table gives an approximate indication of the comparative loudness of various noises expressed in terms of the A weighted scale:

Source of noise	dB(A)	Nature of Noise
Inside Quiet bedroom at night	25-30	Very Quiet
Quiet office	40-45	
Rural background noise	35-45	
Normal conversational level	55-65	
Busy restaurant	65-75	
Inside suburban electric train	70-80	
Hand clap @ 1m	75-85	
HGV accelerating @ 5m away	85-90	Very Loud

APPENDIX 2

QUALIFICATIONS AND EXPERIENCE OF M. A. KENYON

My full name is Melville Alexander Kenyon. I am the principal of the firm of Martec Environmental Consultants Ltd, a consultancy company that specialises in environmental noise assessment and control. I graduated in 1982 with a Bachelor's degree in Engineering and subsequently a Master's degree in Environmental Acoustics. I have been a corporate member of the professional body for noise and vibration specialists, the Institute of Acoustics, since 1988, and have sat on the British Standards Committee dealing with noise in buildings [BS.8233:1999].

I have lectured at Liverpool John Moores University on the Diploma of Acoustics course and at Manchester Metropolitan University on their Environmental Health degree course. I am currently an MSc Dissertation Supervisor at The University of Manchester.

The firm of Martec Environmental Engineering was formed in the 1970's and joined The Association of Noise Consultants in 1996. It is now known as Martec Environmental Consultants Ltd.

Since its formation, Martec has advised many groups of both residents and developers about the problems of noise and vibration in the environment.