



BRAIDEN ACOUSTICS LTD

Innovation Forum | 51 Frederick Road | Salford | Manchester | M6 6FP

NOISE IMPACT ASSESSMENT

Prepared For : Ziggy Sixx Ltd

Date : 14 Oct 2024

Site : 393 Wilmslow Road, Fallowfield

Report No. : 11323

1 INTRODUCTION

Braiden Acoustics has been commissioned by Ziggy Sixx Ltd to undertake an acoustic survey at the site of 393 Wilmslow Road, Fallowfield to support planning application 140666/FO/2024 which proposes:

“Change of use from Class C1 (Hotel) & Class E (Commercial, Business & Service) to Class E (Gym), and retrospective erection of functional training tent to rear of main gym building”

The invalid letter, dated 30th July 2024 states:

5) We will require a noise impact assessment to accompany this application.

1.1 AIM

This report shall investigate all pertinent noise sources associated with the site that may affect surrounding ‘sensitive receptors’ and propose any mitigation, where necessary, so that noise levels are within relevant guidelines.

The operating hours will be confirmed as part of the assessment.

2 DESCRIPTION OF SITE

The application site is detached building, part single storey and part two storey. It is the former Ram Lodge restaurant.



Figure 1
Street view of the site

2.1 SITE LOCATION AND SURROUNDING USES

The gym is located in two adjoining buildings fronting Wilmslow Road, which is a main arterial route to and from Manchester city centre.

As Figure 2 shows, there is a walkway to the building to the east of the site – the walkway and the building to the east are not part of the gym although owned by the applicant.

The site is bounded by Wilmslow Road to the north west, Brook Road to the north, Milford Road to the east and residential dwellings to the south. Nearby residential properties are denoted green in Figure 2.



Figure 2
Site location and surrounding uses showing monitoring location

2.2 EXISTING USE

The site was previously a hotel and restaurant.

2.3 PROPOSED USE

The unit is currently being used as a gym and associated facilities.

2.3.1 Ground Floor

The proposed use is shown below.

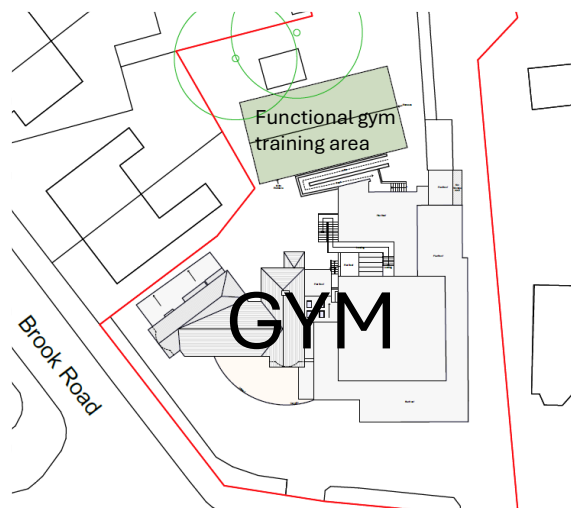


Figure 3
Proposed use

The main gym buildings have a variety of gym spaces, a sauna and changing rooms, as well as other ancillary uses.



To the rear of the main buildings is a stand-alone tent-like structure, called ‘functional gym and training area’ in Figure 3. It houses some fixed weight machines within its perimeter with an empty space in the middle for stretching and the like.

2.3.2 Opening hours

The opening hours are:

Weekdays 05:00 - 23:00.

Saturday 08:00 - 22:00

Sunday 08:00 – 18:00

2.3.3 Building services

2.3.3.1 Condenser units

There are three condenser units:

1. 2no. air conditioning
2. 1no. fresh air recirculation.

The three units are on the southern elevation of the main gym building.



Figure 4
Condenser units' location

Details of the condenser units are shown below:

AC 1 Panasonic U-250PZH2E8

AC2 Panasonic U-250PZH2E8

Fresh Air Panasonic U-100PZ3E5

Panasonic U-250PZH2E8

Outdoor Sound Pressure dB(a) (Cool-Heat) 59-63 @1m¹

Panasonic U-100PZ3E5

Outdoor Sound pressure Cool / Heat (Hi) 52 / 52 @1m

The logarithmic sum of the three units, in hemispherical space, would be 66 dB.

As the condenser units are for air conditions then they operate only when the site is open.

¹ The noise data does not state at what distance the SPL measurement has been taken, therefore, 1m is presumed.



3 ACOUSTIC CRITERIA AND METHODOLOGY

3.1 BS 4142

BS 4142:1999 “Method for rating industrial noise affecting mixed residential and industrial areas” [1] assesses industrial noise with regards to nearby residential dwellings. The guidance is commonly used to compare the equivalent noise from an industrial source only (specific noise level), L_{Aeq} , to the background noise level, L_{A90} , at the nearest sensitive receptor (NSR).

This Standard has been recently updated, BS 4142:2014 “Methods for rating and assessing industrial and commercial sound” [2]. Whereas the old standard added 5dB ‘penalty’ to the Specific Noise Level (SNL) if the noise source has a ‘character’ that can draw attention that may be described as tonal, intermittent or impulsive, the new standard gives clearer guidance on noise ‘character’. Furthermore, the previous Standard gave only one 5 dB penalty whereas the new Standard may not. When added to the specific noise level it forms the rating level. The new Standard gives the guidance for the following types of noise character:

Where appropriate, establish a rating penalty for sound based on a subjective assessment of its characteristics. This would also be appropriate where a new source cannot be measured because it is only proposed at that time, but the characteristics of similar sources can subjectively be assessed.

Correct the specific sound level if a tone, impulse or other characteristic occurs, or is expected to be present, for new or modified sound sources.

NOTE 1 The prominence of tonal or impulsive sound from a source can be masked by residual sound. In many cases the amount of masking varies as the residual sound changes in level and possibly character. The source’s tonal and/or impulsive characteristics could also vary with time.

Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention.

Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

NOTE 2 Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the



reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Once a penalty for noise character is added to the Specific Noise Level then this is termed the *Rating Level*.

The background level is then compared to the rating level. It is usual that the rating level due to the source should be below the background noise level at the nearest sensitive receptor; indeed BS 4142 states:

“The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”

3.1.1 Council BS4142 criterion

Hitherto, there has been no mention of a BS4142 noise criterion.

However, section 11 d) of BS 4142:2014 says

“Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact”

Therefore, minimally, the Rating Level should not exceed the Background Level to ensure any potential noise has a low or no impact.

3.2.1 Residential

The British Standard BS 8233:2014 “Guidance on sound insulation and noise reduction for buildings” gives guidance on recommended indoor ambient noise levels for residential dwellings.

Room	Criterion	$L_{Aeq,T}$	
		night	day
Bedroom	Sleeping	30	35
Dining Room/Area	Dining	--	40
Living Room	Resting	--	35

Table 1

Recommending indoor ambient noise level thresholds from anonymous noise (taken from Table 4, BS 8233:2014)

Internal levels are simply predicted by the subtraction of the estimated sound reduction index (SRI) of the building façade from the external free field noise measurements. When considering the SRI of a particular façade it is usual to only consider the glazing as this is the weakest element acoustically.

Table 2 in BS 8233:2014 give a range of target noise levels for a variety of internal spaces, such as offices. The upper limits should not be breached in order for the occupants of the space to not be disturbed. However, for open-plan offices for example, a minimum noise level can be useful to provide masking for acoustic privacy.



Table 2 Indoor ambient noise levels in spaces when they are unoccupied and privacy is also important

Objective	Typical situations	Design range $L_{Aeq,T}$ dB
Typical noise levels for acoustic privacy in shared spaces	Restaurant	40 – 55
	Open plan office	45 – 50
	Night club, public house	40 – 45
	Ballroom, banqueting hall	35 – 40
	Living room	35 – 40

NOTE See Noise control in building services [28] and BS EN ISO 3382.

Table 2
Target internal noise levels of unoccupied spaces

As Table 2 above shows, the noise levels within an open plan office should be between 45 – 50 dB(A).

4 MEASUREMENT DETAILS

4.1 BACKGROUND NOISE LEVELS

4.1.1 Monitoring overview

Personnel: John Braiden, BSc & MSc Acoustics, MIOA.

Equipment: NtI XL2 integrated real time analyser & B&K 4231 calibrator.

Weather 14- 18degC, <5m/s wind, 40-60% cloud

Time / Date: Fri 6th September-from 15:53 for over 36 hours.

The sound level meter was calibrated before after the measurements with no drift reported.

Monitoring was unmanned.

Background noise (L_{A90}), ‘average’ noise levels (L_{Aeq}) and maximum noise levels (L_{Amax}) were taken in 15-minute intervals.

4.1.2 Monitoring location

The monitoring location was at 2m from ground and, at least, 2m from any other surface, shown in Figure 2.

4.1.3 Monitoring results

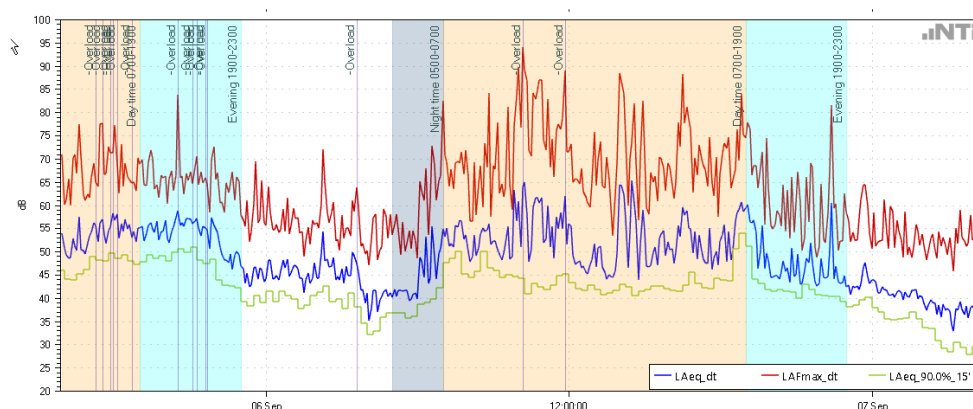


Figure 5
Time history



Noise levels in the 'rear yard' were due to staff clearing / tidying the rear yard, i.e. moving items around the yard.

Other than that, there were airplane passes and distant road traffic noise.

From approximately 5am there was bird song.

No noise from the gym or the functional training area, were detected at the monitoring location.

4.1.3.1 Typical Background Noise Levels

The opening hours of the gym are 05:00 – 23:00, therefore, the typical Background Noise Levels were split into three time periods:

1. Night time 0500 - 07:00,
2. Day time 07:00 – 19:00 and
3. Evening time 19:00 – 23:00

Typical Background Noise Levels were found using histograms.

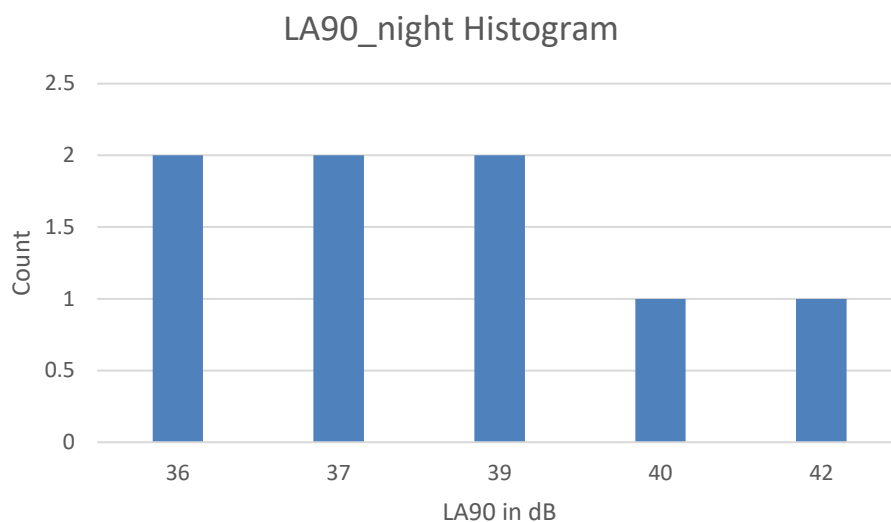


*Figure 6
Histograms showing typical nighttime Background Noise Levels*

Figure 6 shows that lowest typical night time Background Noise Level, when the site would be open (05:00 – 07:00), is

36 dB L_{A90} .

The same was done for the day time typical Background Noise Levels.



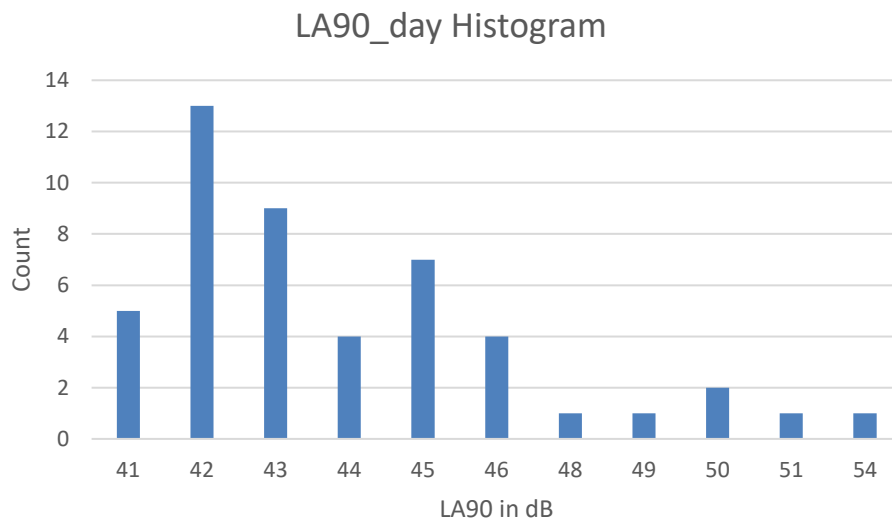


Figure 7
Histograms showing typical day time Background Noise Levels

Figure 7 shows that typical Background Noise Level during the day time period is

42 dB L_{A90} .

The same was done for the evening time typical Background Noise Levels.

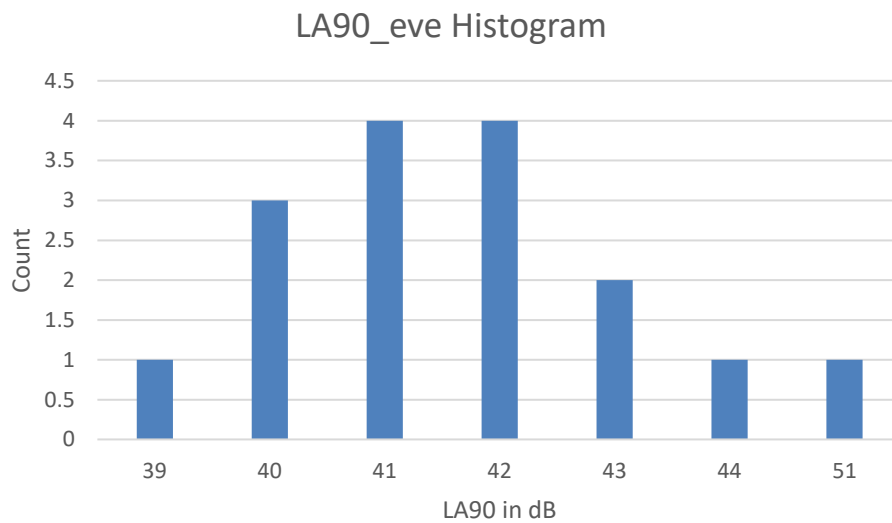


Figure 8
Histograms showing typical evening time Background Noise Levels

Figure 8 shows that typical Background Noise Level during the day time period is

41 dB L_{A90} .

4.2 EXTERNAL PLANT NOISE MEASUREMENTS

Spot measurements were made of the all the condenser units running simultaneously.



Description	Duration	Distance	Level dB(A)	Specific Noise dB(A)
Condensers OFF	1min	1m	54.9	n/a
All Condensers ON	1 min	1m	59.6	58
All Condensers ON	1 min	1m	69.1	69

*Table 3
External plant measured noise levels*

There were two readings of the condenser units with the second reading considerably higher in noise level. The higher noise level will be used in the assessment.

From the datasheets, the logarithmic sum of the three units is 66dB. When the reflections from the wall, that the units are attached to, are considered, then total noise level from the units would be 69 dB – as was measured.

4.3 TYPICAL INTERNAL NOISE LEVELS IN THE GYM

Within the gym, there is music playing through an amplified sound system but it is only at background noise level as some of the gym uses have their own headphones.

A spot measurement was made within the reverberant sound field, i.e. away from any loudspeaker, which was:

70 dB.

5 ACOUSTIC ASSESSMENT

The potential noise issues to be assessed are:

1. Noise from external plant
 - a. 3no. condenser units
2. Breakout noise from the main gym space
3. Noise from the external function training area

5.1 BACKGROUND NOISE LEVEL

The typical Background Noise Levels are given in Section 4.1.3.1

Night time (opening hours)	36 dB L_{A90}
Daytime	41 dB L_{A90}
Evening time	42 dB L_{A90}

5.2 CONDENSER UNITS

5.2.1 Distance to NSRs

The adjacent building, at 395 Wilmslow Rd, is residential. The nearest habitable windows are in the loft space, some 10m from the condenser units.

5.2.2 BS4142 assessments

For the three condenser units, as a whole, there will be a BS4142 assessment.

The following will be taken into account:



- Number of reflecting surfaces (for calculation only)
- Shielding
- Distance attenuation
- Acoustic characteristics such as, intermittency, tonality and impulsivity.

The condenser units abut up to two surfaces, as seen in Figure 4.

The sound pressure level of all the units is 69 dB L_{Aeq} at 1m. This considers the reflecting surfaces as the noise measurements were taken in-situ.

BS 4142 Noise Assessment All Condensers		Value	dB
All Condensers	1		69
Barrier	grazing		-5
Distance	10		-20
Total Specific Noise Level @ NSR			44
BS 4141			
Tonality	0/2/4/6		0
Impulsivity	0/3/6/9		0
Intermittency	0/3		3
Rating Noise Level			47
Background Noise Level	night		36
Rating minus Background			+11

Table 4
All Condenser

Error! Reference source not found. shows that the Rating Level for the Condenser units is 47 dB. This is 11 above the typical night time background noise level of 36 dB L_{A90} .

****Therefore, the larger condensers will require some mitigation****

In order to reduce noise levels from Larger Condensers, it is recommended it should be housed within acoustic enclosures, similar to the one shown below.



Figure 9
Acoustic enclosure for the larger condensers

The exact details of the acoustic enclosure need to be verified.

5.3 GYM - NOISE BREAKOUT

No breakout noise from the gym was detected at the monitoring location, however, the following recommendations should be adhered to:

- No windows or doors should be left open.
- Internal noise levels should not exceed background level, i.e. 70 dB(A)

5.4 FUNCTIONAL TRAINING AREA

Again, no noticeable noise breakout from the functional area at the monitoring location, although the following is recommended:

- No amplified music to be used in the functional area.

6 CONCLUSION

An acoustic survey has taken place at 393 Wilmslow Road, Fallowfield to determine noise break levels from the proposed site.

The assessment revealed the following external noise sources:

- 2no. Large condenser
- 1no. Small condenser

The BS 4142 “Methods for rating and assessing industrial and commercial sound” shows that Rating Level is above the typical Background Level for all external plant.

The following is recommended for the larger condenser units:

- Acoustic enclosure for the larger condenser – exact details to follow.

7 CONCLUSION

An acoustic survey has taken place at 393 Wilmslow Road, Fallowfield to assess noise from a variety of external plant.

The BS 4142 “Methods for rating and assessing industrial and commercial sound” shows that Rating Levels are below the typical Background Level for all external plant, except for the larger Condenser Unit.

The following is recommended:

- Acoustic enclosure for the larger condenser – exact details to follow.

8 REFERENCES

- [1] BS 4142: 1997
Method for Rating industrial noise affecting mixed residential and industrial areas
British Standards Institute, 1997.



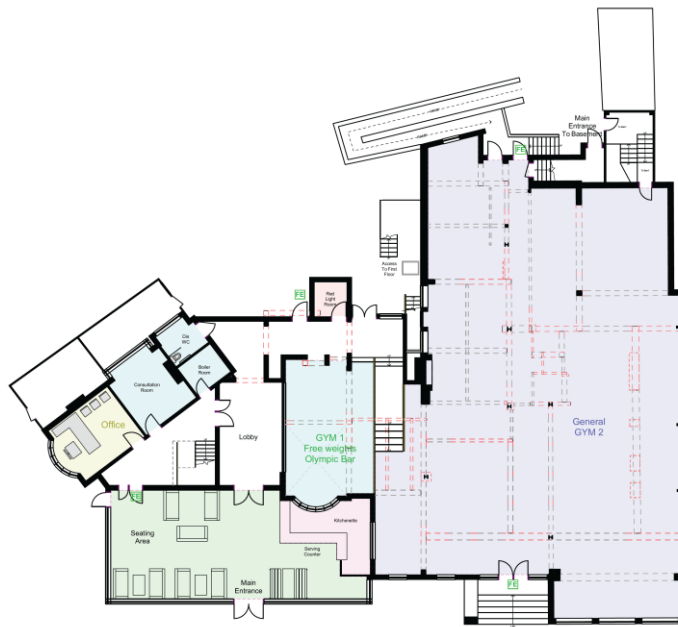
[2] BS 4142: 2014
Methods for rating and assessing industrial and commercial sound
British Standards Institute, 2014.



Appendix



A1 PROPOSED USE



PROPOSED GA GROUND
FLOOR PLAN

notes

This drawing is subject to a detailed building and site survey, therefore no guarantee of its accuracy can be given.
This drawing has been drafted in accordance with the clients design requirements.
All areas are approximate and are subject to a detailed building and site survey and further design development.
All dimensions should be checked prior to commencement of construction on site. Measurements should not be taken off the drawing.

All dimensions shown are in millimetres (mm).

PL0 Planning Issue

23.07.24



revisions
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PLANNING

D - design PL - planning PT - pre-tender
T - tender P - preliminary
C - construction R - record

MUSCLE MANOR

CHANGE OF USE
393 WILMSLOW ROAD,
MANCHESTER, M20 4WA

PROPOSED GA FLOOR PLAN

scale 1:200 @ A3 date 23.07.24 drawn MB checked AC

job no 24-1271 (category) dwg no (03)002 revision

PL0

Drawing measurements shall not be obtained by scaling. Verify all dimensions prior to construction. Immediately report any discrepancies on this drawing to Architect. This drawing shall be read in conjunction with associated specifications and related consultant's documents.

