



BRAIDEN ACOUSTICS LTD

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

NOISE IMPACT ASSESSMENT

Prepared For : Arch Designs

Date : 6 Jul 2022

Site : 1143-1145 Rochdale Rd, Blackley

Report No. : 11052

1 INTRODUCTION

Braiden Acoustics has been commissioned by Arch Designs to undertake an acoustic survey at the site of 1143-1145 Rochdale Rd, Blackley in order to support planning application 132775/FO/2022 for the following proposal:

change of use of the basement, from storage (Use Class B8) to create a self-contained flat (Use Class C3(c) and part retrospective for extension of the retail shop

The requirement for a noise assessment focusses on the potential for noise impacting upon the proposed residential property.

1.1 AIM

This report assesses noise from all potential sources affecting the proposed residential dwelling and recommends mitigation acoustic measures, if and where necessary, so that the council's noise thresholds are met.

2 DESCRIPTION OF SITE

The site is the basement section to the rear of 1143-1145 Rochdale Road, and so it is effectively on Middleton Old Road.

2.1 SITE LOCATION AND SURROUNDING USES

The site is in a predominantly residential area, although there are some commercial uses nearby.

2.1.1 Adjacent uses

Directly above the proposed dwelling, there are retail shops that front on to Rochdale Road, above which is an existing residential flat that is accessed via external stairs to the rear of the properties – as can be seen in the middle section in Figure 1.



Figure 1
Proposed site and adjoining uses

Adjacent to the proposed plot on the right, there is the rear of a take-away with an extraction vent; as shown in Figure 1. To the left is the rear of a healthy eating take away and, as such, has no associated ventilation system. The entrances to both of these adjacent commercial properties are on Rochdale Road.

To the right of the proposed flat there is a car body workshop at basement level, with the rear of a takeaway and tattoo shop above.

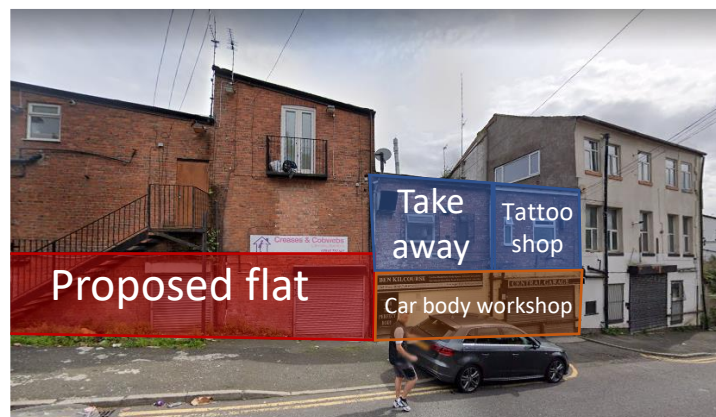


Figure 2
Proposed site and adjacent uses to the right

The white building furthest to the right in Figure 2 is a barber called House of Trend, at ground level at the front. However, it is unclear what the rest of the building is used for but it most likely offices and/or storage.

On the opposite side of Middleton Old Road, is a car tyre supplier called Contact Tyres and directly to the south is a furniture outlet called Solo Furniture Outlet, the edge of the building can just about be seen in Figure 3.





Figure 3
Site and surrounding uses

2.2 EXISTING USE

The basement of the three adjoining properties, that make up the proposed basement flat, are currently used for storage.

2.3 PROPOSED USE

The proposal is for a two-bedroom flat with the layout shown below in Figure 4.

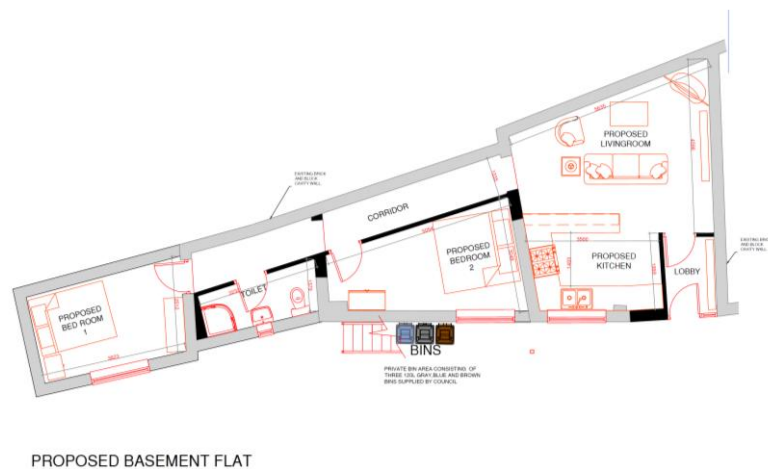


Figure 4
Proposed basement flat layout

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 criteria for BS 4142

It is usual for Council's to recommend that the Rating Level from mechanical services is 5 dB below the background at the nearest resident.

3.2 BS 8233: 2014

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)

3.3 COUNCIL NOISE CRITERIA

There are two issues of potential noise emanating from the site:

1. Internal noise transfer from the take away to the adjacent residential, especially late in the evening.
2. Noise from external plant.

3.3.1 Residential noise criteria

For residential developments, the noise thresholds are taken from BS8233:

- *Bedrooms (night time - 23.00 - 07.00) 30 dB LAeq (individual noise events should not normally exceed 45 dB LAmax,F by more than 15 times)*
- *Living Rooms (daytime - 07.00 - 23.00) 35 dB LAeq*
- *Gardens and terraces (daytime) 55 dB LAeq*

3.3.2 Industrial noise criteria

For external plant the noise criterion is as follows:

'The development should be designed so as to achieve a rating level of 5dB (LAeq) below the typical background (LA90) level at the nearest noise sensitive location'.

4 MONITORING DETAILS

As part of the acoustic assessment, the following noise measurements have been undertaken:

1. external ambient noise measurements



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

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

Weather: 6-10°C temperature; ~5ms⁻¹ wind; ~60-80% cloud, some light precipitation

Location: microphone approx. 1 m from rear facade on the first floor

Date : 25th May 2022 for over 24 hours.

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

Monitoring was unmanned with audio recorded.

4.1 RESULTS

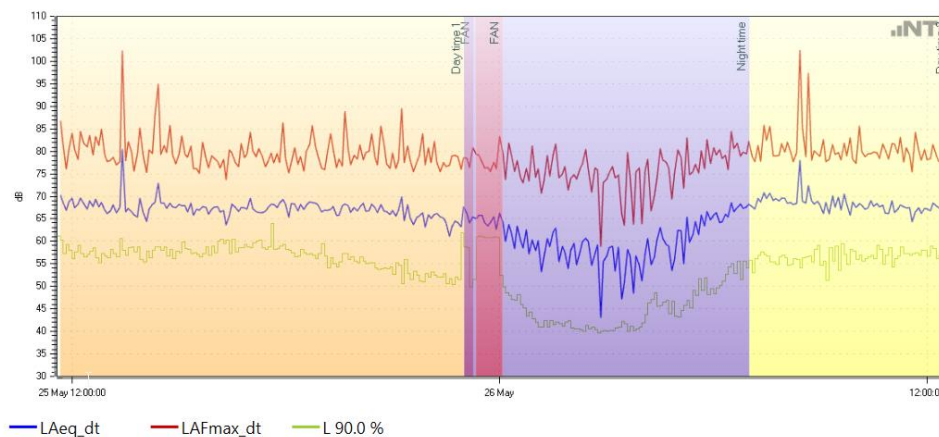


Figure 5
Time history

There was plenty of passing traffic on Middleton Old Road, which is reflected in the impulsive maximum levels see in Figure 5.

There was some noise from the nearby vehicle-related establishments, although not noticeable in the noise measurements.

There was a noticeable increase (approx. 10 dB) in the background noise level between 22:55 - 23:11 and 23:16 – 00:03. This was from the nearby extract duct, mentioned in Figure 1, that belonged to the adjacent take away on ground floor level. Noise from the extract duct was not evident at any other time during the monitoring period.

Day	Time		Duration	Time Period	L_{A90} dB	L_{Aeq} dB	L_{Amax} dB
	Start	Finish					
Wed 25 th May 22	11:37:38	23:00:00	11:22:22	day	55.8	67.9	102.3
	23:00:00	07:00:00	08:00:00	night	41.9	62.6	84.4
	07:00:00	12:32:04	05:32:04	day	56.4	68.8	102.4

Table 2
Summary of noise monitoring results



The overall free field¹ noise levels are as follows:

$$L_{Aeq}(\text{night}) \quad 63 - 3 = 60 \text{ dB(A)}$$

$$L_{Aeq}(\text{day}) \quad 68 - 3 = 65 \text{ dB(A)}$$

5 ACOUSTIC ASSESSMENT

5.1 INTERNAL NOISE TRANSFER

Details of the separating partitions to the adjacent commercial uses are out of the scope of this report and will be assessed, and described, in a separate Sound Insulation Detailing report. However, minimum sound insulation noise limits for the separating floors and walls are given below.

5.1.1 Separating wall

The southern separating wall that separates the vehicle garage should be upgraded so the in-situ sound insulation reduction is a minimum of :

$$50\text{dB } D_{nT,w} + C_{tr}.$$

5.1.2 Separating floor

The separating floor to the shops above will only need to adhere to the minimum standard for Building Regulations Part E, as the shops are only retail. The minimum sound insulation of the separating floor above should therefore be :

$$43\text{dB } D_{nT,w} + C_{tr}.$$

5.2 ENVIRONMENT NOISE BREAK IN – BS 8233

Given the external noise levels, the initial glazing scheme can be suggested. However, it should be noted that this assumes windows closed in order to achieve the internal noise levels based on BS 8223:1999.

The amount of attenuation from the building façades were readily computed using the simple method in Appendix G of BS 8233:2014 whereby the sound insulation index (SRI) of the glazing (the weakest element of the building façade, acoustically) is determined by simply deducting the required internal noise level from the external free field noise level.

5.2.1 Façade effect

A -3dB façade correction was necessary as the noise monitoring was not free-field.

5.2.2 Distance correction

There was no distance correction applied as the monitoring location was representative of the location of proposed residential dwelling.

5.2.3 Barrier effect

There is no barrier correction due to direct line of sight to the noise sources.

¹ Monitoring was made in a free field location



5.2.4 BS 8233 assessment

The weakest structural element is the glazing. The required glazing was calculated using recommended internal values. The Table below shows the required Sound Reduction Indices (SRI) for the bedrooms (night) and living areas (day) on each relevant elevation.

Only the Middleton Old Road façade needs to be considered as there are no windows on the Rochdale Road elevation.

Façade	period	room	External Levels measured / calc'd		Internal Levels recommended		Required glazing	
			L_{Aeq} (dB)	L_{Amax} (dB)	L_{Aeq} (dB)	L_{Amax} (dB)	SRI ($R_w + C_{tr}$)	Example Spec ²
ALL	night	bedroom	60		30		30	10 / (6-16) / 4mm
	day	lounge	65		35		30	10 / (6-16) / 4mm

*Table 3
Calculated SRI values and recommended glazing*

Upgraded double glazing is required for the whole development with a minimum sound reduction index: of 30 dB $R_w + C_{tr}$ which can be achieved by 10 / (6-16) / 4mm glazing.

6 CONCLUSION

An acoustic survey has taken place at 1143-1145 Rochdale Rd, Blackley to support a planning application for a basement residential dwelling.

The main issue of noise was passing vehicles on the nearby road network, which resulted in relatively high noise levels.

Adequate Internal noise levels will be achieved with upgrade double glazing throughout the development with minimum sound reduction index of 30 dB $R_w + C_{tr}$.

Examples of such glazing build-ups have been given.

² Example glazing build up and performance from BS 12354-3 – table in Appendix. Other glazing build-ups available.



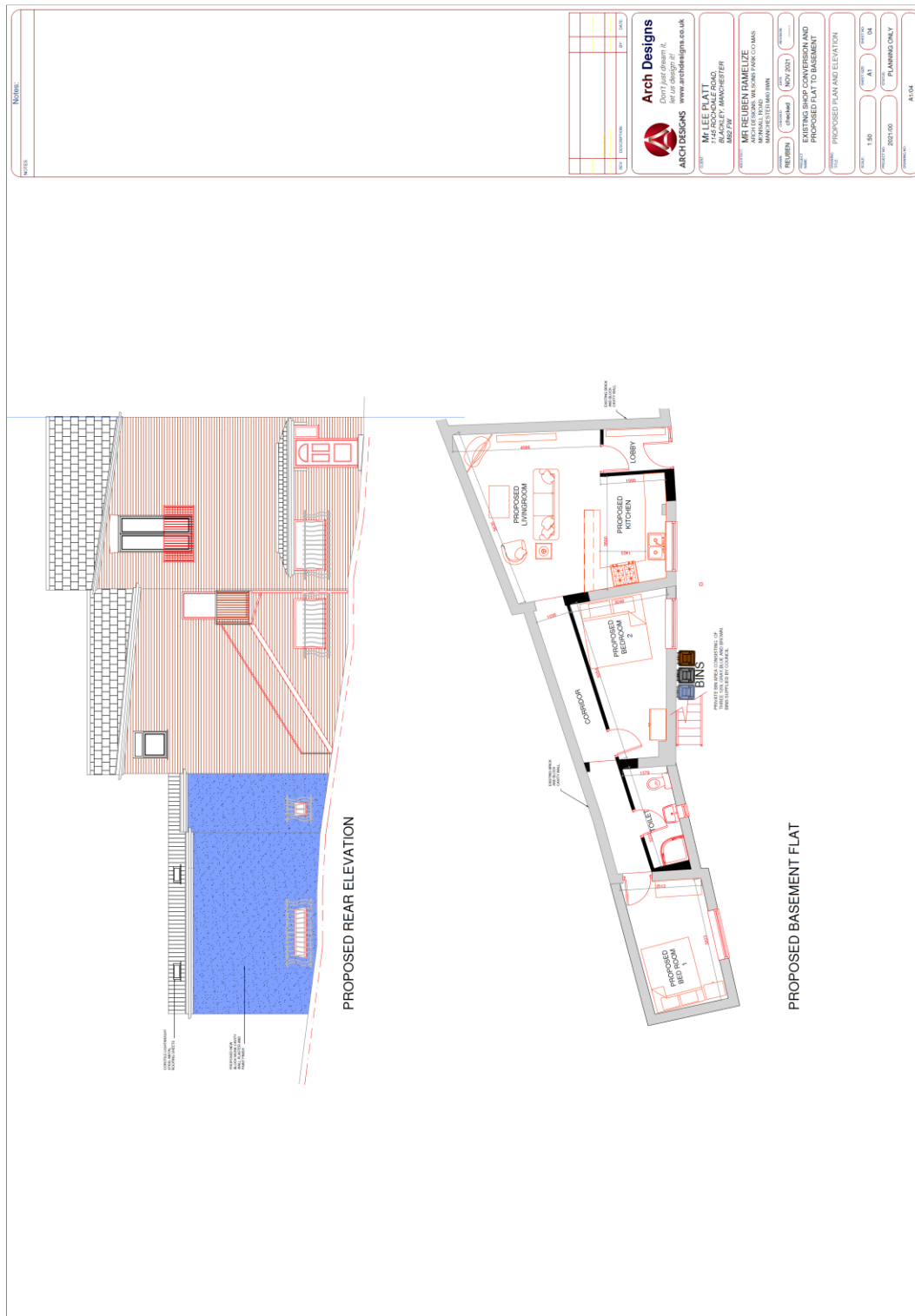
7 REFERENCES

- [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 SITE LAYOUT



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Table B.1 - Examples of the sound reduction index of glazing

Glazing type	Sound reduction index (dB)						
	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 k Hz	R_w (C;C _{tr}) dB
Single panes (mm)							
3	14	19	25	29	33	25	28 (-1; -4)
4	17	20	26	32	33	26	29 (-2; -3)
5	19	22	29	33	29	31	30 (-1; -2)
6	18	23	30	35	27	32	31 (-2; -3)
8	20	24	29	34	29	37	32 (-2; -3)
10	23	26	32	31	32	39	33 (-2; -3)
12	27	29	31	32	38	47	34 (0; -2)
Laminated panes (mm) + plastic laminate (0,5 to 1) mm							
6+	20	23	29	34	32	38	32 (-1; -3)
8+	20	25	32	35	34	42	33 (-1; -3)
10+	24	26	33	33	35	44	34 (-1; -3)
Double pane units with single or laminated panes (mm); air filled cavity from (6 to 16) mm							
4-(6-16)-4	21	17	25	35	37	31	29 (-1; -4)
6-(6-16)-4	21	20	26	38	37	39	32 (-2; -4)
6-(6-16)-6	20	18	28	38	34	38	31 (-1; -4)
8-(6-16)-4	22	21	28	38	40	47	33 (-1; -4)
8-(6-16)-6	20	21	33	40	36	48	35 (-2; -6)
10-(6-16)-4	24	21	32	37	42	43	35 (-2; -5)
10-(6-16)-6	24	24	32	37	37	44	35 (-1; -3)
6-(6-16)-6+	20	19	30	39	37	46	33 (-2; -5)
6-(6-16)-10+	24	25	33	39	40	49	37 (-1; -5)
NOTE 1 This selection and the values are in accordance with prEN 12758-1. The single number ratings are deduced from results in 1/3-octave bands and therefore single number ratings deduced from the given octave band data might result in values which differ 1 dB at the most. NOTE 2 Though it is known that for a given double pane unit the sound reduction increases with increasing cavity width, this effect has been found to be too small to take into account here for air filled cavities in the light of the inherent spread in results for nominally identical units.							

