



BRAIDEN ACOUSTICS LTD

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

NOISE IMPACT ASSESSMENT

Prepared For : Alsadiq Academy

Date : 9 Aug 2023

Site : Briarmede, 426-428 Rochdale Rd, Middleton

Report No. : 11095

1 INTRODUCTION

Braiden Acoustics has been commissioned by Alsadiq Academy to undertake an acoustic survey at the site of Briarmede, 426-428 Rochdale Rd, Middleton in order to support a planning application which proposes the following:

Change of use to community centre.

1.1 AIM

This is a noise impact assessment report that shall identify potential noise sources and receivers and determine noise limits for industrial and break-out noise.

Noise break-in-in will also be assessed for the residential accommodation.

2 DESCRIPTION OF SITE

The site is a large two-storey detached property, as shown in Figure 1.



Figure 1
Site location

2.1 SITE LOCATION AND SURROUNDING USES

The site is bounded by Rochdale Road to the west, residential properties either side and a playing field to the rear that belongs to the local school.



Figure 2
Site location

2.2 PROPOSED USE

The proposed development is a change of use from a care home (C2) to mixed use primarily consisting of community programmes and education.

The development is proposed to have 14 classrooms, male and female toilets, two receptions, three offices, storage rooms, kitchen, funeral room, main hall, 5 guest rooms and a library over two floors.

There are no external changes shown on the proposed plans except that windows will be replaced. The property would have access off Rochdale Road.

Parking and bin storage is proposed.

There will be accommodation for overnight stays and a security guard will be present at night. This is considered ancillary to the main use.

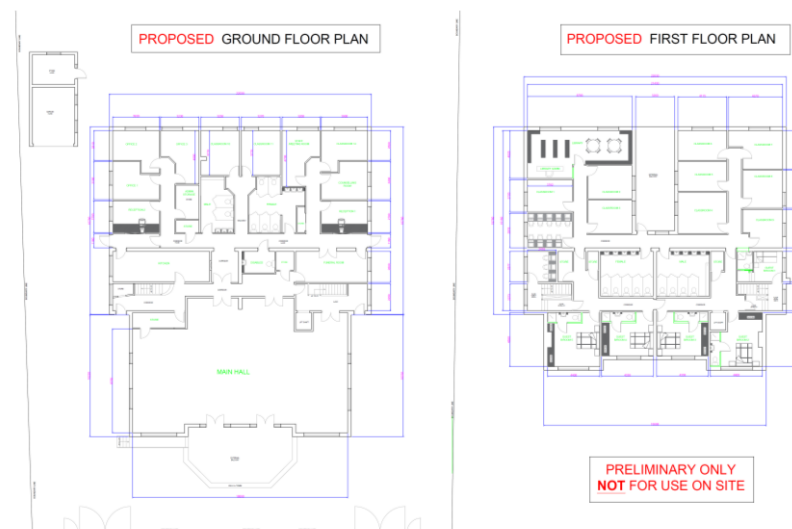


Figure 3
Proposed ground and first floor layout

2.2.1 Opening hours

The exact opening hours have yet to be finalised, although the typical hours of use are as follows:

Monday Friday	10pm - 10pm	Islamic School
Friday - Sunday evenings	10pm - 10pm	wedding functions
Saturday & Sunday mornings	11am - 4pm	wedding functions.



2.2.2 Building services

There will not be kitchen ventilation or condenser units for air conditioning.

2.2.3 Sound system

There will be a modest sound system within the Main Function Room that will only be for amplified speech.

Exact details of the sound system are not yet known.

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.**”*

3.2 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)

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.

3.3 COUNCIL CRITERIA

3.3.1 Industrial noise

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

3.3.2 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

4 MEASUREMENT DETAILS

A site visit measured external background noise levels at the front, for the following:

- ambient noise for noise break-in
- background noise for noise break-out.

Spot noise measurements revealed that the rear is 10dB less than the front of the building due to road noise being predominant.

Internal noise levels have also been taken from a previous job where there was the same activity; namely, rhythmic loud voices and clapping during prayers.

4.1 BACKGROUND NOISE MONITORING

In order to assess the noise levels from the any potential plant and noise breakout, background noise levels have been taken from a first-floor window at the front of the building.

Background noise measurements were made in line with Section 8 – Background sound level, of BS4142:2014.

4.1.1 The Measurement Time Interval, T_m

The Measurement Time Interval, T_m is given (in BS4142:2014 Section 3.6) as:

total time over which measurements are taken

For measuring background noise levels, Section 8.1.3 of BS 4142:2014 states:

“Ensure that the measurement time interval is sufficient to obtain a representative value of the background sound level for the period of interest. This should comprise continuous measurements of normally not less than 15 min intervals, which can be contiguous or disaggregated.”

In order to obtain a worse case methodology, noise measurements were made at a relatively quiet time of week.

The noise levels were measured at the rear of the site and are representative of the noise levels of the nearby residential dwellings.

4.2 EXTERNAL NOISE MONITORING DETAILS

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

Weather: 8-12- ° C; <5ms⁻¹ wind; ~40 - 60% cloud; no precipitation.

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

Date: Monday 17th July 2023

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

Monitoring was unmanned.



4.2.1 Monitoring locations

The noise monitoring location was 1m from a first-floor façade.

4.2.2 Monitoring results

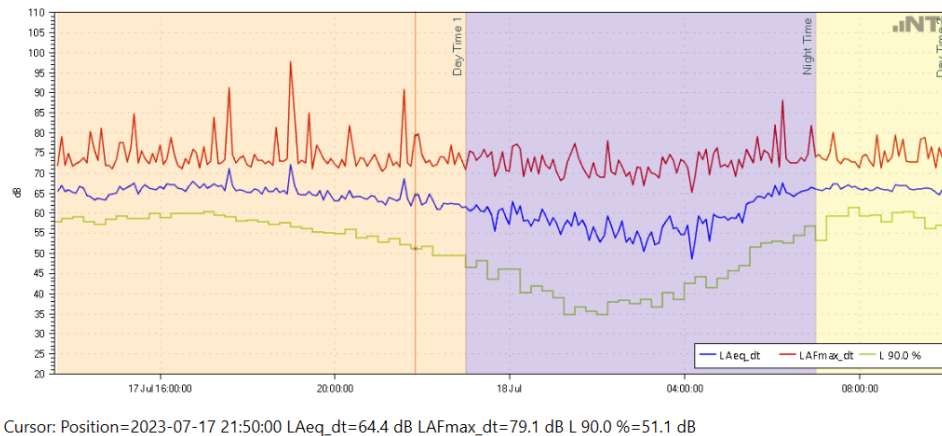


Figure 4
Time history

The lowest Background Level during opening hours is 51.1 dB L_{A90} between 21:45 and 22:00.

Noise levels at the rear will be 10dB lower than then front.

Location	Time		Duration	Time Period	L_{A90} dB	L_{Aeq} dB	L_{Amax} dB
	Start	Finish					
Front	13:35:56	23:00:00	20:26:31	day	55.4	65.4	97.7
	23:00:00	07:00:00	08:00:00	Night	39.4	60.6	87.9
	07:00:00	121:37:00	05:37:00	day	58.3	66.1	84.4

Table 2
Summary of noise monitoring results

Noise levels at the front were relatively high due to fast moving vehicles on Rochdale Road; as well as noise from the surrounding road network.

The overall free field¹ noise levels are as follows:

$$L_{Aeq}(\text{night}) \quad 61 - 3 = 58 \text{ dB(A)}$$

$$L_{Aeq}(\text{day}) \quad 66 - 3 = 63 \text{ dB(A)}$$

4.3 INTERNAL NOISE MONITORING

Internal noise levels have been taken from a very similar use where there was an Islamic congregation with amplified voices and clapping.

¹ Monitoring was made 1m from a façade.



Internal noise measurements were taken during a restricted religious meeting where there were only 30 or so patrons; however, the PA system was used, so a representative noise level was recorded. It should be noted that the loudspeakers were Public Address (PA) size.

4.3.1 Overview

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

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

Weather: n/a

Date: Saturday 22nd August 2020.

The sound level meter was calibrated before and after the measurements with no significant drift reported (<0.5 dB).

Measurements were unmanned.

4.3.2 Monitoring location

The microphone was located within some ornamental decoration approximately 2m from the ground.

4.3.3 Monitoring results

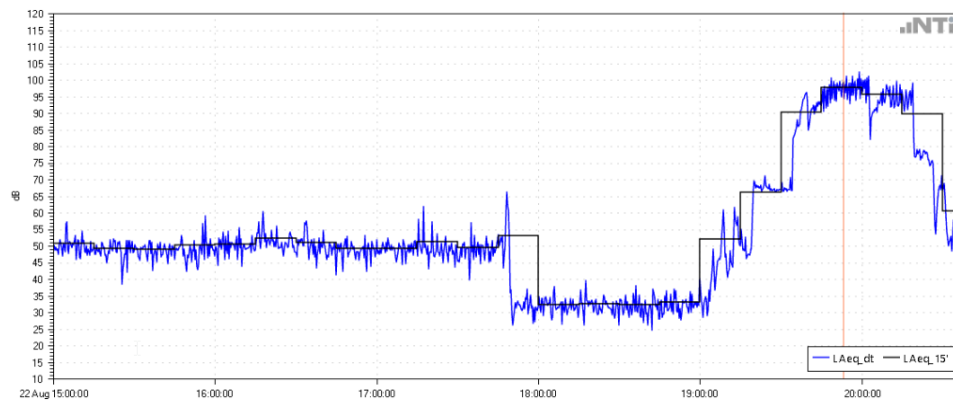


Figure 5
Measured Noise Levels

When the ceremony was at its loudest the noise level was around 95 dB(A) and reached an upper noise level of over 100 dB $L_{Aeq,20s}$.

The highest 15-minute level was 98 dB L_{Aeq} .

5 ACOUSTIC ASSESSMENT

5.1 ENVIRONMENT NOISE BREAK IN

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.

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.



5.1.1 Façade effect

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

5.1.2 Distance correction

There was a no distance correction applied because the monitoring position was at the location of the proposed accommodation.

5.1.3 Barrier effect

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

5.1.4 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.

Noise levels will be attributed to the front elevation only, as that is where the accommodation will be located.

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
FRONT	night	bedroom	58		30		28	6 (6-16) 4
	day	lounge	63		35		28	6 (6-16) 4

Table 3
Calculated SRI values and recommended glazing

The glazing for habitable rooms can achieve adequate internal noise levels with slightly upgrade double glazing of 6 / (6-16) / 4mm.

5.2 NOISE BREAK-OUT NOISE ASSESSMENT

The lowest Background Noise Level at the front was 51 dB L_{A90} .

Using the upper noise data in Figure 4, a noise breakout calculation used the following parameters:

- sound reduction of an open window
- internal to external correction (reverberant to free field)
- distance attenuation
- barrier effect (due to neighbours being set back from the front elevation of the site).

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



Noise Breakout Assessment (window open)	Value	dB
Internal Noise Level	LAeq	98
Open window		-15
Internal to External correc		-6
Distance Attenuation	21	-26
Barrier	grazing	-5
Noise Level @ NSR		46
Background Noise Level	LA90	51
Noise Level minus Background		-5

Table 4
Noise Breakout calculation

The above assessment shows that noise break-out should be below the background noise level at the front of the property.

However, the following windows and doors should be kept shut when there is any amplified sound.

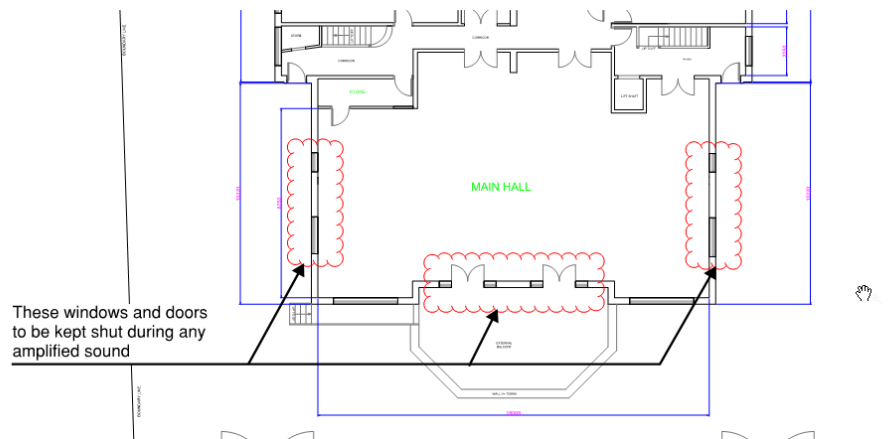


Figure 6
Doors and windows to be kept shut during any amplified sound

6 CONCLUSION

An acoustic survey has taken place at Briarmede, 426-428 Rochdale Rd, Middleton to determine noise levels in and around the proposed site.

Potential noise sources and receivers have been identified.

A noise break-out assessment should that noise levels should be below the background level at the nearest resident.

NB Certain windows and doors on the front elevation should be kept when there is amplified sound.**

The accommodation should have the following glazing: 6 / (6-16) / 4mm.



6.1 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.

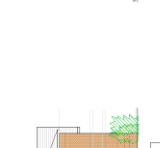
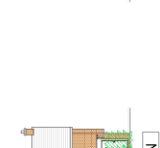


Appendix



A1 DRAWINGS

A1.1 Drawings

NOTES		REVISIONS		PROJECT: 428 - 428 ROCHDALE RD NEW 3-STOREY COMMUNITY CENTRE CLIENT: ADEL SCALE: 1:100 ON A3 PAPER REFERENCE NO: 1344 AS EXISTING	
PROPOSED FIRST FLOOR PLAN  PRELIMINARY ONLY NOT FOR USE ON SITE		PROPOSED GROUND FLOOR PLAN  PROPOSED REAR ELEVATION  PROPOSED SIDE ELEVATION- SOUTH VIEW 		PROPOSED FRONT ELEVATION  PROPOSED SIDE ELEVATION- NORTH VIEW 	
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