



BRAIDEN ACOUSTICS LTD

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

RESIDENTIAL ACOUSTIC SURVEY

Prepared for : Studio Tashkeel Architects

Date : 28 Sep 2022

Site : Land Adjacent to 6 Earl Walk, Longsight

Report No. : 11064

1 INTRODUCTION

Braidens Acoustics has been commissioned by Studio Tashkeel Architects to undertake an acoustic survey at the site of Land Adjacent to 6 Earl Walk, Longsight in order to support a planning application for the erection of a residential dwelling.

1.1 AIM

This report assesses potential noise impact on the proposed residential site from surrounding noise sources and recommends any mitigation acoustic measures, if necessary, so that the noise thresholds are met.

2 DESCRIPTION OF SITE

The site is a plot of land that currently has a single storey side extension for 6 Earl Walk and an existing outbuilding (which will remain) to the north west of the site.



Figure 1
Site location

2.1 SITE LOCATION AND NEIGHBOURING USES

The site is outlined in Figure 2 and is bounded by Linnet Close to the south and Earl Walk to the north. Directly to the east is the existing residence of 6 Earl Walk and to the west is Mountain of Fire and Miracles Ministries which is a religious institution.

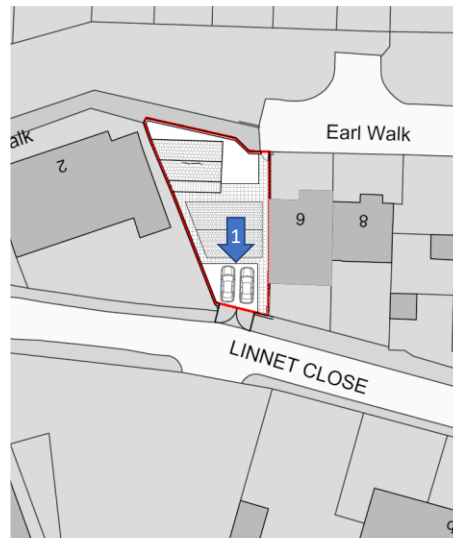


Figure 2

Site location showing proposed new property and monitoring location

To the south of the site, on the other side of Linnet Close, is a variety of vehicle garages and car sales which includes M.A. Autos, Kwik Autos, Clive's Auto and Manchester Auto Specialist.

The main railway line into Manchester is some 200m to the east with Longsight depot beyond.

The A6 is some 60m to the east of the proposed plot

2.2 PROPOSED USE

It is proposed to build a two-storey residential dwelling with an open plan Living/Dining/Kitchen on the whole of the ground floor. On the first floor there will be 4no. bedrooms and a bathroom.

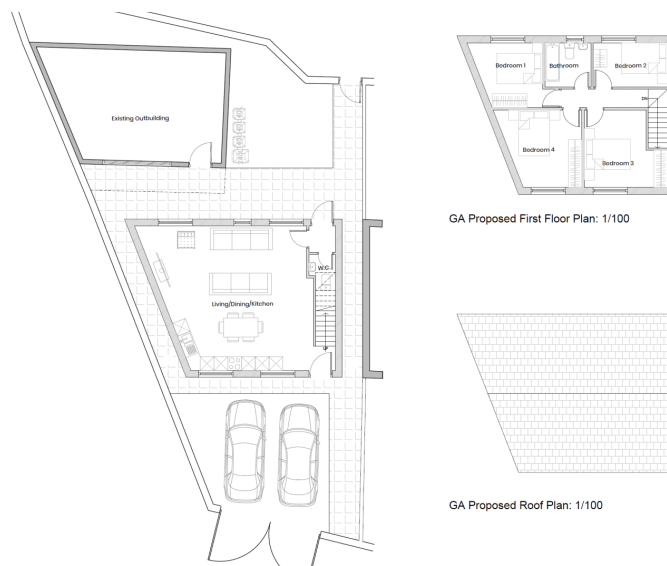


Figure 3

Proposed site layout

There will be parking for two cars at the front of the property.



The footprint of the new property will be in line with the existing property at 6 Earl Walk.

3 ACOUSTIC CRITERIA AND METHODOLOGY

This is a residential development that may be susceptible to environmental noise. Potential mitigation measures are determined by recommended indoor noise levels from BS 8233 “Sound insulation and noise reduction for buildings” [1] which, in turn, takes guidance from the research based World Health Organisation “Guidelines for Community Noise”.

Noise level thresholds are usually given for the night-time – 2300-0700 hrs and day time – 0700-2300 hrs.

3.1 NATIONAL PLANNING POLICY FRAMEWORK (NPPF)

The National Planning Policy Framework is the current document for planning guidance. Paragraph 123 of the NPPF says that planning decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum, other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

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)

NOTE 7 Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

Internal noise levels in habitable rooms are calculated using either the simple or rigorous method as described in Annex G in BS 8233:2104.

3.2.1 Noise levels in external living areas



For external living areas such as gardens and balconies, BS 8233:2014 § 7.7.3.2 recommends an upper limit of 55dB $L_{Aeq,day}$ although there is a caveat:

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.

3.2.2 Maximum noise levels

In the 2014 edition of the Standard, the criterion of 45dB L_{AFMax} inside bedrooms has been removed although there is Note 4:

NOTE 4 regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,P}$ depending on the character and number of events per night. Sporadic noise events could require separate values.

The use of the phrases ‘may be set’ and ‘could require’ imply that this is a discretionary criterion.

3.3 BS 4142

BS 4142:1999 “Method for rating industrial noise affecting mixed residential and industrial areas” [2] 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” [3]. 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.”

3.4 COUNCIL CRITERIA

It is usual that Councils adhere to noise levels given in BS 8233.

L_{Aeq} 35 dB 16 hours – indoors, daytime (07.00-23.00)

L_{Aeq} 30 dB 8 hours – indoors, night-time (23.00-07.00)

L_{Aeq} 55 dB 16 hours – indoors, daytime (07.00-23.00)

4 MONITORING DETAILS

4.1 MONITORING DETAILS

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

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

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

4.2 VISIT 1

Noise measurements focussed on noise from the nearby industrial uses and road noise.

Weather: 14 – 20-°C temperature; ~5ms⁻¹ wind; ~20 -40% cloud; some light precipitation.

Monitoring was unmanned.



4.2.1 Location

The microphone was 1.2m from the ground, in a free field position, at the location of the arrow denoted '1' in Figure 2.

4.2.2 Results

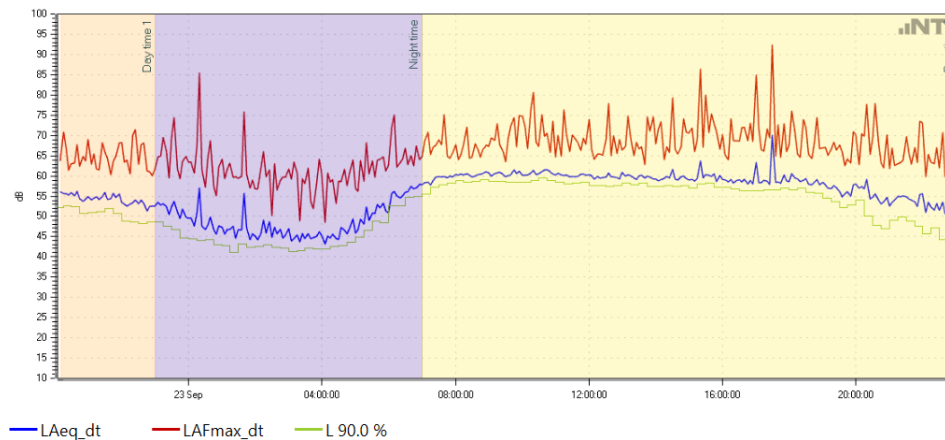


Figure 4
Time history

Date	Time		Duration	Time Period	L_{A90} dB	L_{Aeq} dB	L_{Amax} dB
	Start	Finish					
Thurs 22/09/2022	20:08:58	23:00:00	02:51:02	day	49.5	54.4	71.4
	23:00:00	07:00:00	08:00:00	night	42.8	51	85.4
	07:00:00	23:00:00	16:00:00	day	52.3	59.3	92.3

Table 2
Summary of free field noise monitoring results

There was some distant industrial noise from the various vehicular garages but there were no dominant noise sources. Road traffic noise was evident, as the busy A6 was nearby.

5 ACOUSTIC ASSESSMENT

The required internal noise levels are given in section 3.3 and the amount of attenuation from the building façades were readily computed using the simple method in Appendix G of BS 8233:2014.

From Table 2, and the raw data, the following external levels at the monitoring location are as follows:

⇒ day time (07.00-23.00) L_{Aeq} is 59 dB(A)

⇒ night time (23.00-07.00) L_{Aeq} is 51dB(A)

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

As a worse case, the noise levels are attributed to all elevations.



5.1 GLAZING REQUIREMENTS

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
All	night	bedroom	51		30		21	4 / (6-20) / 4
	day	lounge	59		35		24	4 / (6-20) / 4

Table 3
Calculated SRI values and recommended glazing

Standard 4mm double glazed units have a Sound Reduction Index (SRI) of 25 dB $R_w + C_{tr}$. This then applies to all habitable rooms on all elevations.

5.2 NOISE IN GARDENS

Whilst there is no useable outdoor living space, it would be prudent to install a 2.1m close boarded perimeter fence in order to protect the prospective tenants from potential impulsive or short term industrial noises.

6 CONCLUSION

An acoustic survey has taken place at Land Adjacent to 6 Earl Walk, Longsight to support a planning application for the erection of residential dwellings.

The acoustic survey reveals that no specific noise mitigation measures are required; although a 2.1m close boarded fence has been recommended.

7 REFERENCES

- [1] BS8233: 2014
Sound Insulation and noise reduction for buildings – Code of Practice,
British Standards Institute, 2014.
- [2] BS 4142: 1997
Method for Rating industrial noise affecting mixed residential and industrial areas
British Standards Institute, 1997.
- [3] BS 4142: 2014
Methods for rating and assessing industrial and commercial sound
British Standards Institute, 2014.



Appendix

A1 GLAZING TYPES FROM PILKINGTON



Pilkington **Optiphon™**

Glass	Sound reduction index (dB)									
	Octaveband Centre Frequency (Hz)						R _w (C;C _v)	R _w	R _w +C	R _w +C _v
	125	250	500	1000	2000	4000				
Single glazing										
6.8 mm Pilkington Optiphon™	26	27	31	36	40	39	36 (-1; -4)	36	35	32
8.8 mm Pilkington Optiphon™	24	28	34	38	37	43	37 (-1; -4)	37	36	33
9.1 mm Pilkington Optiphon™	26	29	34	38	38	43	37 (-1; -3)	37	36	34
12.8 mm Pilkington Optiphon™	30	32	37	39	41	51	39 (0; -2)	39	39	37
13.1 mm Pilkington Optiphon™	30	33	37	40	41	50	40 (0; -2)	40	40	38
Insulating glass units										
6 mm / 16 mm argon / 6.8 mm Pilkington Optiphon™	22	27	35	42	41	48	38 (-2; -5)	38	36	33
6 mm / 16 mm argon / 8.8 mm Pilkington Optiphon™	24	26	40	48	46	54	41 (-3; -7)	41	38	34
8 mm / 16 mm argon / 9.1 mm Pilkington Optiphon™	24	29	41	47	47	55	43 (-3; -7)	43	40	36
10 mm / 16 mm argon / 9.1 mm Pilkington Optiphon™	29	33	44	46	49	57	45 (-2; -5)	45	43	40
8.8 mm Pilkington Optiphon™ / 16 mm argon / 12.8 mm Pilkington Optiphon™	26	36	46	50	52	63	47 (-2; -7)	47	45	40
9.1 mm Pilkington Optiphon™ / 20 mm argon / 13.1 mm Pilkington Optiphon™	29	39	49	52	55	63	50 (-3; -8)	50	47	42

Measurements undertaken in accordance with BS EN ISO 10140 and R_w (C ; C_v) determined in accordance with BS EN ISO 717-1. For insulating glass units, there is little difference in the sound insulation for cavity widths in the range 6 to 16 mm. Pendulum body impact resistance to BS EN 12600 for all Pilkington **Optiphon™** is Class 1 (B) 1. To achieve low U values in insulating glass units, Pilkington **Optiphon™** can be combined with low emissivity glass from the Pilkington **K Glass™** or Pilkington **Optitherm™** ranges. To calculate performance data for Pilkington products, please use our Spectrum online calculator at www.pilkington.co.uk/spectrum. For glass combinations to achieve an R_w value higher than 50 dB, please contact us for more details.

Sound insulation data for standard products

Glass	Sound reduction index (dB)									
	Octaveband Centre Frequency (Hz)						$R_w(C;C_w)$	R_w	R_w+C	R_w+C_w
	125	250	500	1000	2000	4000				
Single glazing										
4 mm Float Glass	17	20	26	32	33	26	29 (-2; -3)	29	27	26
6 mm Float Glass	18	23	30	35	27	32	31 (-2; -3)	31	29	28
8 mm Float Glass	20	24	29	34	29	37	32 (-2; -3)	32	30	29
10 mm Float Glass	23	26	32	31	32	39	33 (-2; -3)	33	31	30
12 mm Float Glass	27	29	31	32	38	47	34 (0; -2)	34	34	32
6 mm Laminated Glass	20	23	29	34	32	38	32 (-1; -3)	32	31	29
8 mm Laminated Glass	20	25	32	35	34	42	33 (-1; -3)	33	32	30
10 mm Laminated Glass	24	26	33	33	35	44	34 (-1; -3)	34	33	31
12 mm Laminated Glass	24	27	33	32	37	46	35 (-1; -3)	35	34	32
Insulating glass units										
4 mm / (6 - 16 mm) / 4 mm	21	17	25	35	37	31	29 (-1; -4)	29	28	25
6 mm / (6 - 16 mm) / 4 mm	21	20	26	38	37	39	32 (-2; -4)	32	30	28
6 mm / (6 - 16 mm) / 6 mm	20	18	28	38	34	38	31 (-1; -4)	31	30	27
8 mm / (6 - 16 mm) / 4 mm	22	21	28	38	40	47	33 (-1; -4)	33	32	29
8 mm / (6 - 16 mm) / 6 mm	20	21	33	40	36	48	35 (-2; -6)	35	33	29
10 mm / (6 - 16 mm) / 4 mm	24	21	32	37	42	43	35 (-2; -5)	35	33	30
10 mm / (6 - 16 mm) / 6 mm	24	24	32	37	37	44	35 (-1; -3)	35	34	32
6 mm / (6 - 16 mm) / 6 mm Laminated	20	19	30	39	37	46	33 (-2; -5)	33	31	28
6 mm / (6 - 16 mm) / 10 mm Laminated	24	25	33	39	40	49	37 (-1; -5)	37	36	32

The above are generally accepted values for generic products taken from EN 12758. They are conservative values that can be used in the absence of measured data. Data for laminated glass is based on pvb interlayers (excluding acoustic pvb interlayers). Glass thickness for laminated glass excludes interlayer thickness. Data can be adopted for air or argon gas-filled cavities. R_w = Weighted sound reduction. This scale allows for the response of the human ear and could be used for determining a suitable product to reduce noise such as voices. C = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from music, radio, tv, high speed traffic and other medium to high frequencies. C_v = An adjustment to the R_w scale that could be used for selecting a product to reduce noise from urban road traffic, disco music and other noises with a large component of low frequencies.

John Braiden BSc MSc MIOA
Acoustic Consultant

0161 743 3621
john@braidenacoustics.co.uk



A2 PROPOSED SITE LAYOUT

