



BRAIDEN ACOUSTICS LTD

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

RESIDENTIAL ACOUSTIC SURVEY

Prepared For : Tang & Associates Ltd.

Date : 25 Apr 2016

Site : Earl St, Heywood

Report No. : 10428

1 INTRODUCTION

Braiden Acoustics has been commissioned by Tang & Associates Ltd. to undertake an acoustic survey at the site of Earl St, Heywood in order to support a planning application for the erection of residential apartments.

1.1 AIM

The aim of the report is to describe the site and its surroundings with regards to potential noise sources affecting the site. The noise assessment, along with any recommendations, shall be also described in order that future occupants are not disturbed by external environmental noise.

2 DESCRIPTION OF SITE

The site is a vacant plot of land bounded by Bethel Street, Earl Street and Taylor Street near to the centre of Heywood.



Figure 1
Site edge red and surrounding uses

2.1 SITE AND NEIGHBOURING USES

The site is surrounded by a mix of commercial uses with some residential dwellings.

Directly to the north of the site is the rear of commercial properties on Market Street. There may be some residential above although most of the upper rooms look like they're used for storage. There are no external plant associated with the surrounding commercial uses.

To the south of the site, on the opposite side of Earl Street, there is a single storey Methodist Church.

On the opposite side of Bethel Street, to the west, there are some disused commercial units

2.2 EXISTING USE

The site has been used a car park.

2.3 PROPOSED USE

A new building will be erected on the empty plot to accommodate 14no. apartments over three floors.



Figure 2
Site layout showing ground floor plan

3 ACOUSTIC CRITERIA AND METHODOLOGY

This is a residential development that may be susceptible to environmental noise, such as road traffic noise and/or noise from local industry. Recommended noise levels due to environmental noise are taken from BS 8233:2014 “Guidance on sound insulation and noise reduction for buildings” [1] which, in turn, takes guidance from the research based World Health Organisation “Guidelines for Community Noise”. Where necessary, mitigation measures have been recommended so that the noise level thresholds are not breached.

Noise levels are usually given separately 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.

Unfortunately, the NPPF supersedes the previous planning guidance for noise, PPG 24, which is much more descriptive regarding noise assessments and limits; hence, PPG 24 is sometimes still used to assess a site, with relation to noise, by some Councils.

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 8233:2014.

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.



The L_{Amax} criterion is used where the level is not exceed more than 10 times during the night time period.

4 MONITORING DETAILS

4.1 MONITORING OVERVIEW

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 drift reported.

Monitoring was unmanned.

Noise measurements were made at one location. Background noise (L_{A90}), 'average' noise levels (L_{Aeq}) and maximum noise levels (L_{Amax}) were taken in 5 minute intervals.

4.1.1 Monitoring times

Noise monitoring was taken either side of 7am to capture night and day noise levels during a rush hour period.

The measured noise levels shall be extrapolated to represent the whole daytime period (07:00 – 23:00) and the whole night time period (23:00- 07:00).

4.1.2 Monitoring location

The microphone was approximately 2m from the ground at the south western corner of the site. The microphone protruded through the wooden hoarding, so there will be a façade effect.

4.2 MONITORING RESULTS

The recent noise monitoring will be presented here as well as the previous monitoring in 2016 for comparative purposes.

4.2.1 2016 monitoring

The 2016 monitoring was manned and therefore not 24 hour monitoring.

Day	Weather	Time		Duration	Time Period	L_{A90} dB	L_{Aeq} dB	L_{Amax} dB	PPG 24 NEC
		Start	Finish						
Thu 24/03/2016	8degC, <5m/s wind, 80- 100% cloud	06:10	07:00	00:50	night	52	54	78	B
		07:00	09:20	02:20	day	55	57	85	B

Table 2
Summary of noise monitoring results – 1st visit

Many of the surrounding commercial units seem to be disused and hence no discernible noise coming from them. However, due to the proximity to Market Street and the surrounding roads, noise from road traffic was the predominant noise source. This is reflected in the noise levels shown in Figure 3 where the noise on site increased as the rush 'hour' period progressed.



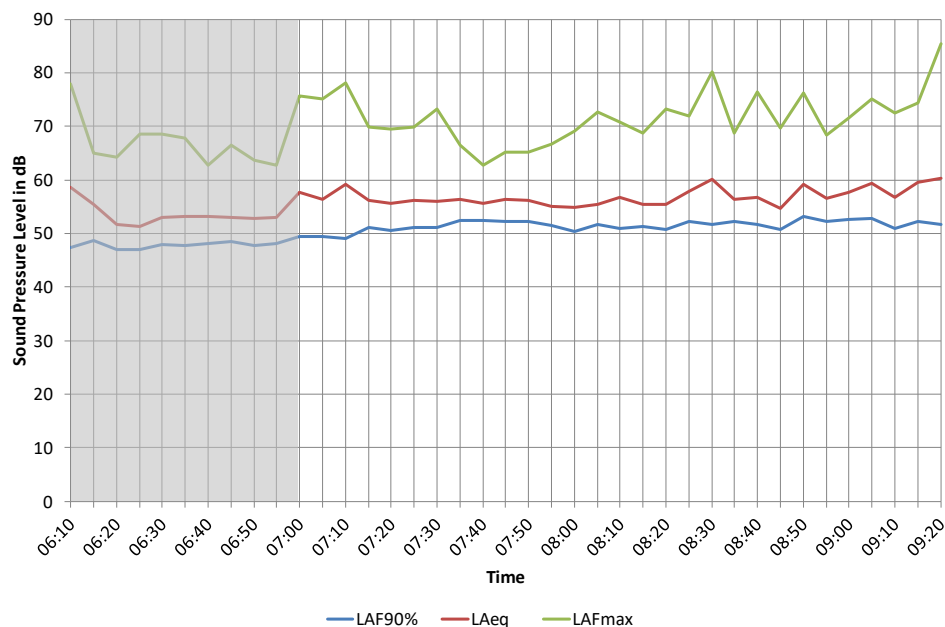


Figure 3
Time history of measured noise levels

4.2.2 2021 monitoring

The 2021 monitoring was taken over an approximate 24 hour period.

Day	Weather	Time		Duration	Time Period	L _{A90} dB	L _{Aeq} dB	L _{Amax} dB
		Start	Finish					
Thu 15/04/2021	8 - 14degC, <5m/s wind, 20- 40% cloud	12:07:48	23:00:00	10:52:12	day	49.1	57.5	92.9
		23:00:00	07:00:00	08:00:00	night	42.4	54.1	82.0
		07:00	11:56:11	04:56:11	day	50.2	58.9	100.4

Table 3
Summary of noise monitoring results – 2nd visit

The noise climate did not seem to change much from the 2016 study.

Many of the surrounding commercial units seem to be disused and hence no discernible noise coming from them. However, due to the proximity to Market Street and the surrounding roads, noise from road traffic was the predominant noise source. This is reflected in the noise levels shown in Figure 3 where the noise on site increased as the rush 'hour' period progressed.



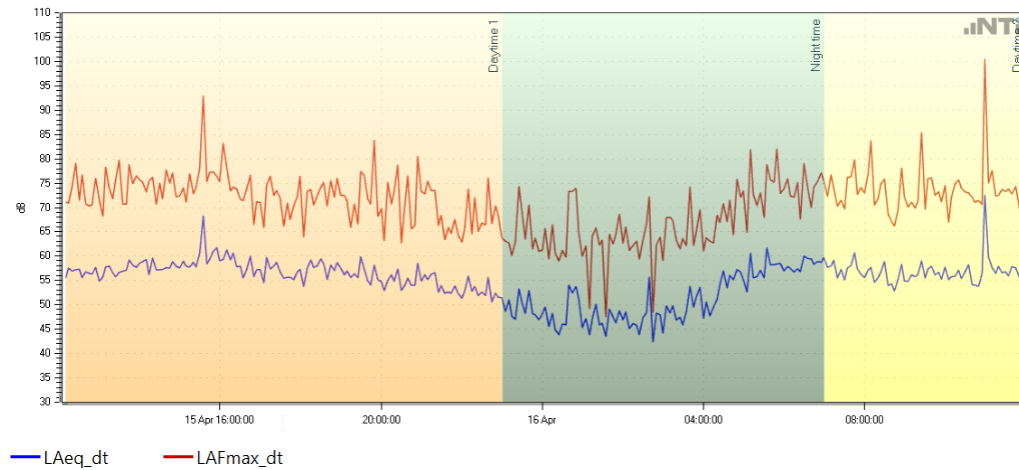


Figure 4
Time history of measured noise levels

The overall noise levels¹ are as follows:

L_{Aeq} (night)	54 dB(A)
$L_{Amax, <10}$ (night)	76 dB(A)
L_{Aeq} (day)	58 dB(A)

5 ACOUSTIC ASSESSMENT

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 level².

No -3dB façade correction was necessary as the noise monitoring was free field.

No distance attenuation required as noise monitoring was taken at the location of the front façade.

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

Hence, the day and night levels used for the assessment are:

- ⇒ night (07:00 – 23:00) L_{Aeq} is $55 - 3 = 52\text{dB}$
- ⇒ night (07:00 – 23:00) $L_{AFmax, <10}$ is $76 - 3 = 73\text{dB}$
- ⇒ day time (07.00-23.00) L_{Aeq} is $58 - 3 = 55\text{ dB}$

The noise levels will relate to all elevations.

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.

¹ These levels were measured at the façade.

² When the measured levels are façade levels, then 3dB is deducted to obtain the free field levels.



(night) and living areas (day) on each relevant 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 ³
ALL	night	bedroom	52	73	30	45	28	6 / (6-20) / 4
	day	lounge	55		35		20	4 / (6-20) / 4

Table 4
Calculated SRI values and recommended glazing

The bedrooms will require a slight upgrade which could be achieved by 6 / (6-20) / 4 glazing. All other habitable glazing can achieve adequate internal levels with standard double glazing – e.g. 4/12/4mm which achieves a SRI of 25 dB $R_w + C_{tr}$.

6 CONCLUSION

An acoustic survey has taken place at Earl St, Heywood to support a planning application for apartments.

Noise measurements reveal that the bedrooms need a slight upgrade in the glazing which can be achieved by 6 / (6-20) / 4 units. All other habitable rooms can be fitted with standard double glazing.

7 REFERENCES

- [1] BS8233: 2014
Guidance on sound insulation and noise reduction for buildings
British Standards Institute, 2014.

³ Example glazing build up and performance from Saint Gobain – table in Appendix. Other glazing build-ups available.



Appendix

A1 BS 12354-3:2000 – Glazing spec

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 kHz	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.							

