Report

Noise Survey and Acoustic Design Advice v.3

Site: Carlton Road, Barnsley

Date	Project Reference	Prepared for
18th July 2019	**R001126**	**Keepmoat Homes**

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Introduction & Summary

Resonance Acoustics were instructed by Keepmoat Homes to carry out noise surveys at a site adjacent to Carlton Road, Barnsley, in order to offer acoustic advice on achieving the required external envelope performance and background ventilation for the proposed new homes, in addition to predicting the expected noise levels of the external amenity areas.

The site is mainly an enclosed field and adjacent farmland, partially surrounded by woodland and existing housing, with an industrial estate a short distance to the east.

The internal and external noise levels of the completed dwellings should conform with the recommendations given in BS 8233:2014 and World Health Organisation advice, which are reproduced in the table below.

Table 1 - Required maximum noise levels

Situation	Daytime 07.00-23.00hrs	Night-time 23.00-07.00hrs
Living room	35 dB $L_{Aeq,16hr}$	-
Dining room	35 dB $L_{Aeq,16hr}$	-
Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$
Amenity areas	50* dB $L_{Aeq,16hr}$	-

*55 dB would be acceptable in noisier environments

In addition, during the night-time the occurrence of individual noise events above 45 dB ($L_{Amax,F}$) should be limited in number to between 10 – 15.

In summary the measured noise levels were sufficiently low to indicate that standard double glazing and standard trickle ventilation will be adequate to maintain indoor noise levels below the levels in Table 1 above.

Also the external amenity areas will have noise levels within the guideline limits over the entire site.

Method

The expected main sources of noise for this development site are the B6132 Carlton Road to the west and the industrial estate to the east and a class 1 sound level meter (SLM) was set up in the positions shown in Figure 1 below.

Full details of the instruments used, their calibration and the ambient meteorological conditions are given in Appendix 3.

Two positions were used for measurement.

Position 1

Position 1 was to monitor the typical daytime noise levels close to Carlton Road and adjacent to St Helen's Boulevard which is an access road for a school. An attended noise survey was undertaken on Wednesday 17th July 2019 between 11.50 and 14.00 hrs. This

time period was chosen as being representative of a typical school day during term time and over the course of the survey the access road was used by 54 vehicles per hour.

During the survey the ambient noise climate consisted of vehicles travelling along Carlton Road and down St Helen's Boulevard. Other contributors were birdsong, aircraft, human conversation and at one point a car alarm. The monitoring was paused briefly as mechanical grass cutting was taking place in a garden adjacent to the measurement position.

Position 2

Position 2 was as shown in Figure 1 below, and was to monitor the noise levels from a nearby industrial estate to the east. Two attended surveys were undertaken at this position; the first on Friday the 20th April 2018 between 01.57 and 03.57 hrs, and the second on Wednesday 17th July 2019 between 10.27 and 11.27 hrs.

During both of these surveys the ambient noise climate consisted of distant road traffic and some noise from the industrial estate such as vehicle movements and occasional warning tones and hammering. It is important to note that there is considerable topographical screening of the proposed development site from the industrial estate due to the presence of an embankment and the differences in relative height, which will have the effect of attenuating the noise level.

Figure 1 - Measurement positions

Results

Position 1

The noise level at position 1 over the measurement period was 48.3 (48) dB(A), and this is tabulated below in octave bands.

Table 2 - Position 1 results in octave bands

Position 1							
Hz	63	125	250	500	1k	2k	4k
dB	60.5	53.8	47.7	42	44.1	40.4	36.5
dB(A)	33.6	37.3	38.4	39.0	44.0	41.5	37.6

The L_{A10} of the measured noise was 50.5 (51) dB. This the level of the top 10% of the measured noise, and using the procedures laid down in CRTN and BS 8233 it can be used to give an anticipated 16hr L_{Aeq}. If these procedures are followed the $L_{Aeq,16hr}$ is calculated to be 47.5 (48) dB which suggests the measurement period chosen is representative of the overall daily average as the measured level was 48 dB(A).

Position 2 – daytime measurement

As Position 2 was chosen to measure the ambient noise which includes that produced by a nearby industrial estate it is important to look at the data obtained both in terms of compliance with the requirements of BS 8233 as shown in Table 1 above, and also according to the guidance given in BS 4142 which rates industrial noise and its likely impact on nearby sensitive receptors.

With regard to BS 4142 the noise level at Position 2 over the daytime measurement period on the 17th July 2019 was 43.0 dB(A), with a background level (L_{A90}) of 38.7 (39) dB. A difference of 5 dB is likely to be an indication of an adverse impact, but in this case the difference is 4 dB, indicating that the risk of an adverse impact is reduced.

In relation to BS 8233 the measured daytime level of 43.0 dB is sufficiently low so as to negate the need for a detailed calculation of the proposed dwellings internal noise levels. Typical masonry wall construction with standard double glazing and open unattenuated trickle ventilators will maintain internal noise levels below the recommended maximums given in Table 1.

Position 2 – night time measurement

As some of the activities taking place on the industrial estate take place over 24 hours, a separate measurement was undertaken during the night-time period of the 20th April 2018 from 01.57 to 03.57 hrs. This resulted in an $L_{Aeq,2hr}$ measurement of 39.1 (39) dB, which is again sufficiently low that a detailed calculation of internal noise levels of dwellings in this area is unnecessary, although this is included in Appendix 2 for completeness. Typical masonry wall construction with standard double glazing and open unattenuated trickle ventilators will maintain internal noise levels below the recommended maximums given in Table 1.

In addition, at Position 2 during the night-time period there were no instances of sudden noise events of 80 dB or greater. This would indicate that it is unlikely that there will be any

$L_{Amax,F}$ events internally of 45 dB or more if using standard double glazing (see Conclusions below).

The results of the measurements during both periods are shown below in octave bands. Graphical representations of the data are also given in Appendix 1.

Table 3 - Position 2 daytime results in octave bands

Position 2 daytime							
Hz	63	125	250	500	1k	2k	4k
dB	53.5	51.2	46.0	38.2	35.9	33.0	29.8
dB(A)	26.9	35.4	37.1	34.5	35.8	34.1	30.8

Table 4 - Position 2 night-time results in octave bands

Position 2 night-time							
Hz	63	125	250	500	1k	2k	4k
dB	53.5	47.5	38.4	33.7	33.0	25.4	32.1
dB(A)	27.3	31.4	29.8	30.5	33.0	26.6	33.1

Graphical representations of the above data are also given in Appendix 1.

Conclusions

Internal noise levels

It can be seen from the data above that the measured noise levels at both positions are not high and do not contain any particular tonality. However, calculations for internal noise levels using standard double glazing (4mm/12mm airgap/4mm) and standard trickle ventilation based on typical masonry wall constructions were carried out. The results of these calculations are as shown in the table below.

Table 5 - Internal noise levels

Habitable space	**Assumed volume m^3**	**Assumed reverberation time (seconds)**	**Internal noise level (dB)**
Living room	50	0.5	18
Bedroom	30	0.3	9

As can be seen above, the internal noise levels with attenuated ventilators open and windows closed are acceptable when compared to the values in Table 1.

In addition, as indicated earlier, the external noise levels were sufficiently low to indicate that there should be no incidences of individual internal noise events of 45 dB or above.

Copies of the calculations are given in Appendix 2.

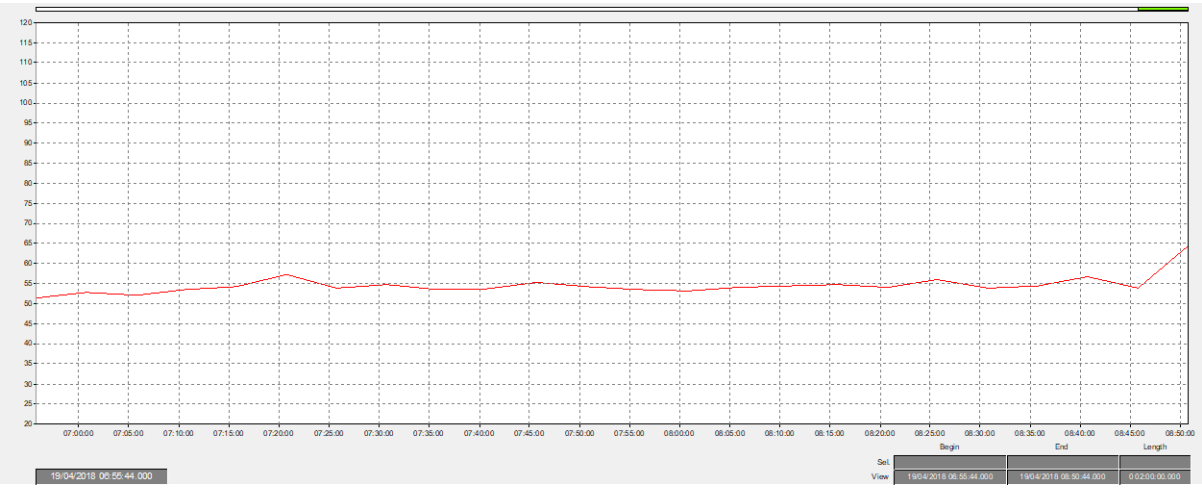
External noise levels.

Noise levels in external amenity areas will be below the required 50 dB $L_{Aeq,16hr}$ over the entire site with no further attenuation necessary.

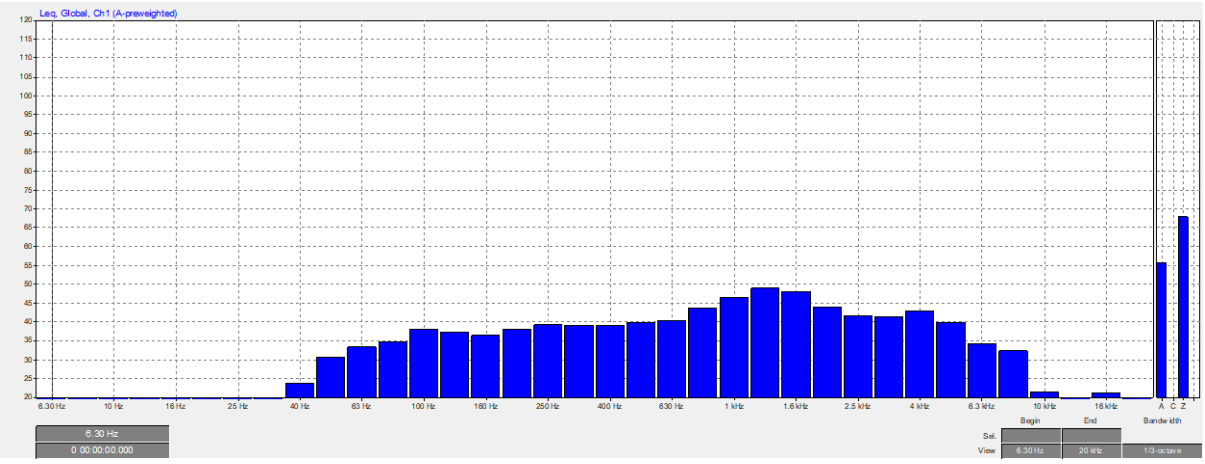
Appendices

Appendix 1 – Recorded data

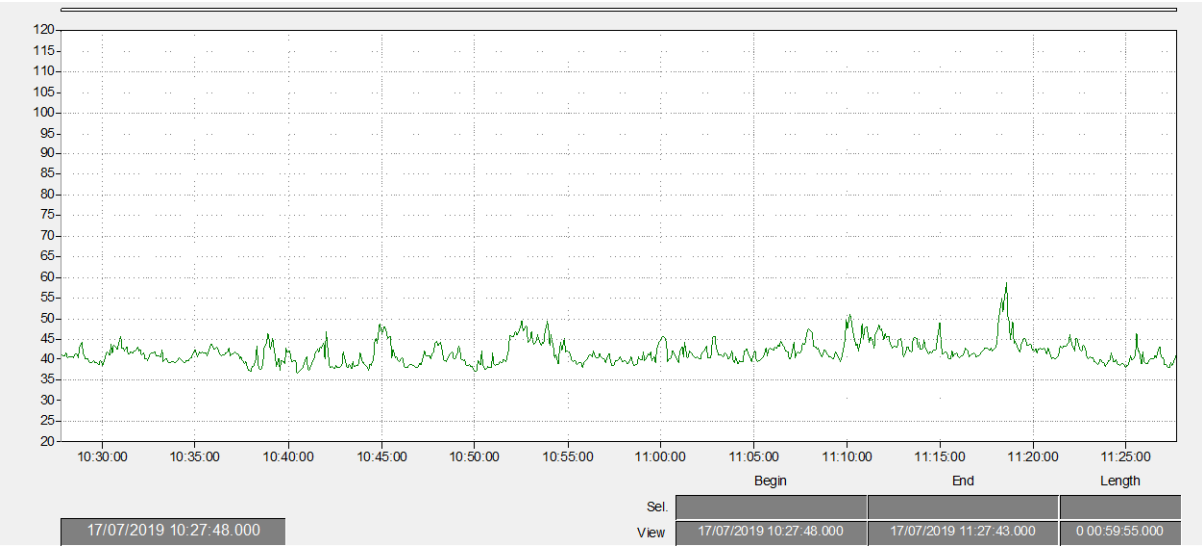
Position 1 noise levels over time (dB on left axis)



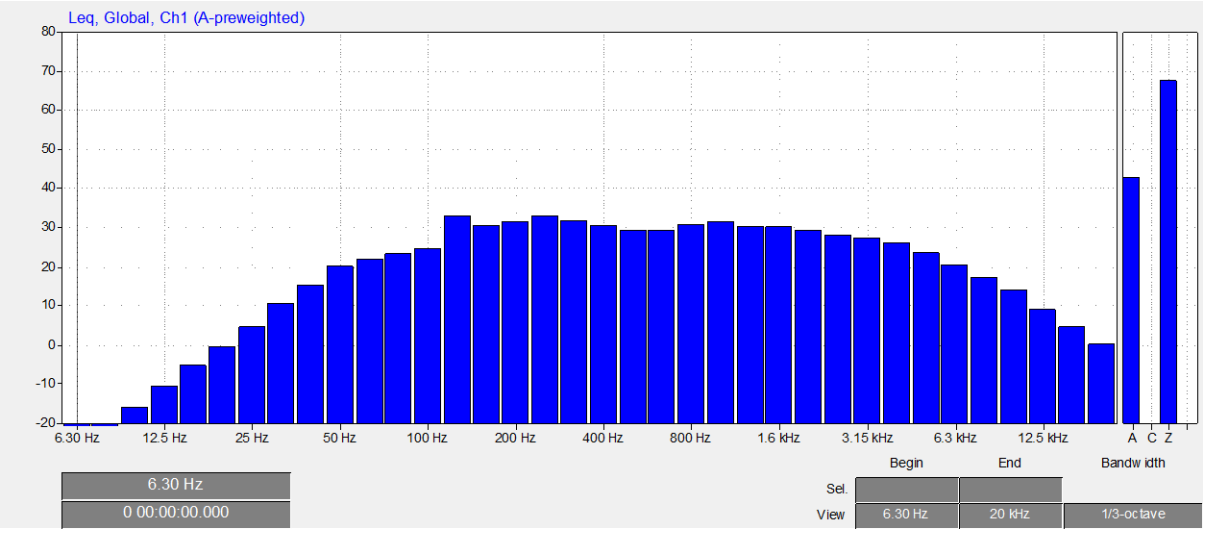
Position 1 frequency content of measured sound (dB on left axis)



Position 2 daytime noise levels over time (dB on left axis)

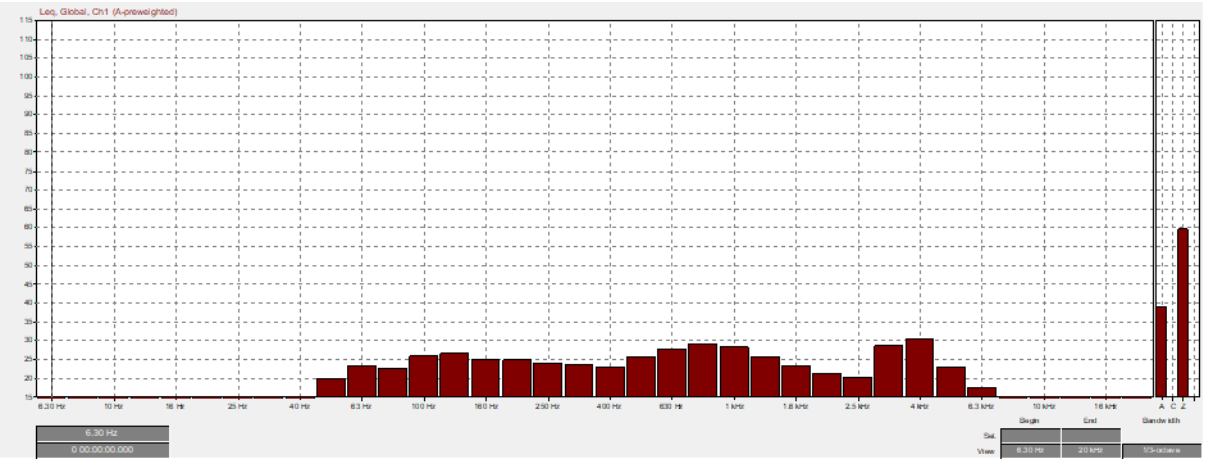


Position 2 daytime frequency content of measured sound (dB on left axis)



Position 2 night-time noise levels over time (dB on left axis)

Position 2 night-time frequency content of measured sound (dB on left axis)



Appendix 2 – Internal noise level calculations

Living room calculation

Noise break-in calculator									
R001126 - Carlton Road. 17th July 2019									
Living room calculation									
	Room volume (V)								
	50								
	Reverberation time (T)								
	0.5								
	Absorption area (A)								
	16								
	A0								
	10								
	Surface area glazing (m2)		**A0/S**	**Swi/S**	**Sew/S**	**S**			
	4		0.83	0.33	0.67	12			
	Surface area wall (m2)								
	8								
	Outside sound levels								
	Hz	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	
		60.5	53.8	47.7	42	44.1	40.4	36.5	
	SRI's								
	Hz	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	
	Glazing	22	24	26	28	35	41	39	4-12-4 glazing
	Wall	41	47	49	47	56	66	76	brick/cavity/block
	Trickle Vents	35	35	35	34	36	34	34	non-acoustic
	Internal sound levels								
	Hz	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
	Total	36.09	27.60	19.90	13.16	10.85	7.69	3.98	
	A Weighted	9.89	11.50	11.30	9.96	10.85	8.89	4.98	**18**

Bedroom calculation

Noise break-in calculator									
R001126 - Carlton Road. 23rd April 2018									
Bedroom calculation									
	Room volume (V)								
	30								
	Reverberation time (T)								
	0.3								
	Absorption area (A)								
	16								
	A0								
	10								
	Surface area glazing (m2)		**A0/S**	**Swi/S**	**Sew/S**	**S**			
	3		1.04	0.31	0.69	9.6			
	Surface area wall (m2)								
	6.6								
	Outside sound levels								
	Hz	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	
		53.5	47.5	38.4	33.7	33	25.4	32.1	
	SRI's								
	Hz	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	
	Glazing	22	24	26	28	35	41	39	4-12-4 glazing
	Wall	41	47	49	47	56	66	76	brick/cavity/block
	Trickle Vents	35	35	35	34	36	34	34	non-acoustic
	Internal sound levels								
	Hz	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**dBA**
	Total	28.00	20.29	9.69	4.14	-0.63	-7.39	-0.55	
	A Weighted	1.80	4.19	1.09	0.94	-0.63	-6.19	0.45	9

Appendix 3 – Calibration and Weather Details

Position 1. Field calibration at 1 kHz before measurement 114.1 dB, after measurement 114.0 dB.

Weather 50% cloud cover, wind 0-3.0 m/s, temperature 23 degrees C, RH 53%, pressure 1013 hPa.

Position 2. Field calibration at 1 kHz before measurement 114.1 dB, after measurement 114.1 dB.

Weather – 25% cloud cover, wind 0-1.0 m/s, temperature 22 degrees C, RH 55%, pressure 1013 hPa.

Instrument	Serial Number	Calibration Date	Certificate Number
Norsonic 140	1406857	29/03/2019	U31402
Norsonic 1251	34960	29/03/2019	U31400

Copies of the above certificates are available on request.

Glossary of Terms

$L_{Aeq,T}$

The A-weighted, sound pressure level over the time period, T which has been averaged to give a level, in dB, which is the continuous equivalent sound level over the same period of time.

$L_{Amax,F}$

The maximum RMS A-weighted sound pressure level occurring over a period of time, measured using the fast time constant.

L_{A10}

The A-weighted sound level which is exceeded for 10% of a specified time period.

L_{A90}

The A-weighted sound level which is exceeded for 90% of a specified time period, often taken to be the general background level as it will exclude irregular and sudden loud noises.

Bibliography

BS 4142:2014 Methods for rating and assessing industrial and commercial sound. British Standards Institution 2014.

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings. British Standards Institution 2014.

Calculation of Road Traffic Noise (CRTN). Department of Transport Welsh Office , 1988.

Guidelines for Community Noise. World Health Organisation, 1999.

PropPG: Planning & Noise. Professional Practice Guidance on Planning & Noise. ANC, IOA, CIEH, May 2017.