

**APPROVED DETACHED DWELLING:
SOUTHVIEW HOUSE, NUT BANK LANE, MIDDLETON**

ASSESSMENT OF NECESSARY NOISE MITIGATION

**On behalf of:
Kevin McNally**

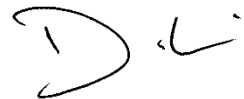
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Report prepared by:
Hepworth Acoustics Ltd
21 Little Peter Street
Manchester
M15 4PS

On behalf of:
Kevin McNally

Report prepared by:
Donald Quinn BSc FIOA – Managing Director



Report checked by:
Paul Bassett BSc MSc FIOA – Technical Director



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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Kevin McNally to carry out a assessment of the necessary noise mitigation in connection with an approved new single two-storey detached dwelling known as Southview House at Nut Bank Lane, Middleton.
- 1.2 The location of the approved dwelling, which is currently open and unused land, is shown in Figure 1. Nut Bank Lane is a private road with very little road traffic, but the clockwise slip road of junction 20 of the M60 motorway is located approximately 150m to the south-west of the development site, with the main carriageway of the motorway a further 15m to the south-west. Steady road traffic noise is the main noise source on the land. There are no other significant noise sources in the vicinity.
- 1.3 Planning condition 12 of Manchester City Council consent ref. 130641/FO/2021 is as follows:

12) Before the development commences a scheme for acoustically insulating the proposed residential accommodation against noise from the M60 Motorway shall be submitted to and approved in writing by the City Council as local planning authority. There may be other actual or potential sources of noise which require consideration on or near the site, including any local commercial/industrial premises. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied.

Noise survey data must include measurements taken during a rush-hour period and night time to determine the appropriate sound insulation measures necessary. The following noise criteria will be required to be achieved:

Bedrooms (night time - 23.00 - 07.00) 30 dB L_{Aeq} (individual noise events shall not exceed 45 dB $L_{Amax,F}$ by more than 15 times)

Living Rooms (daytime - 07.00 - 23.00) 35 dB L_{Aeq}

Gardens and terraces (daytime) 55 dB L_{Aeq}

b) Prior to first occupation of the residential units, a verification report will be required to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic consultant's report. The report shall also undertake post completion testing to confirm that the internal noise criteria have been met. Any instances of non-conformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the internal noise criteria.

Reason - To safeguard the amenities of the occupiers of nearby residential accommodation, pursuant to policies SP1 and DM1 of the Core Strategy.

- 1.4 This noise assessment addresses the first part of the planning condition and therefore has included the following:

- An inspection of the site and surrounding area;
- Measurement of noise levels during a 24-hour period during the weekday and therefore covering both weekday morning and weekday evening rush-hour periods and the whole of a night-time period;
- Recommendation of appropriate mitigation measures where necessary in order to meet the acoustic design criteria as set out in the planning condition.

1.5 The various noise units and indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 NOISE SURVEY

- 2.1 Noise measurements were taken at a location representative of the front elevation of the dwelling, facing the M60 motorway as indicated in Figure 1. This position was also considered representative of the proposed private garden area.
- 2.2 The noise survey was carried out in terms of a series of consecutive 5-minute measurements from 10:30 on Thursday 14 October 2021 through until 10:30 on Friday 15 October 2021 using automated noise monitoring instrumentation. Frequency analysis and audio recording was also carried out.
- 2.3 The noise measurements were taken at a microphone height of approximately 1.4m above the ground. Calibration checks were carried out both before and after the measurement periods with no variance in levels noted.
- 2.4 The weather conditions during the noise survey were generally dry (with only a short period of very light drizzle in the early hours of 15 October 2021), partially overcast and mild/cool (approx. 15°C in the daytime and down to around 7°C at night), with light winds below 4m/s and so were suitable for the purposes of the survey and subsequent assessment.
- 2.5 The details (including equipment used) and results of the noise survey are shown in Appendix II and summarised in Table 1.

Table 1: Summary of measured free-field ambient noise levels (dB)

Location	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)	
	L_{Aeq}	L_{Aeq}	15 th highest L_{Amax}
Front elevation of approved dwelling	59	51	61

- 2.6 The daytime noise level shown in Table 1 has been calculated excluding the period 11:00 – 11:40 on 14 October 2021 as the clearly elevated noise levels measured during this period were, upon review of the audio recordings, found to be due to extraneous noise from use of mobile plant on the site.
- 2.7 The prevailing noise climate in the area is therefore fairly moderate.
- 2.8 Based upon the octave band noise levels measured at the site, the adopted free-field noise levels at the site for the purposes of determining the requirement for sound insulation measures are as follows:

Table 2: Adopted noise exposure values for sound insulation design purposes (dB)

Description	Octave band centre frequency (Hz)							A
	63	125	250	500	1k	2k	4k	
Daytime L_{eq}	63	57	50	54	57	49	34	59
Night-time L_{eq}	57	50	43	46	49	41	28	51
Night-time L_{max}	67	62	56	58	59	50	37	61

- 2.9 The above noise exposure values have been used to determine the type and extent of any noise mitigation measures necessary to achieve the planning noise criteria as set out in Section 3.

3.0 NOISE MITIGATION MEASURES

Private Garden Area

- 3.1 The measured daytime noise level was 59 dB $L_{Aeq,16hour}$ which is 4 dB above the Manchester City Council noise criterion for outdoor amenity spaces/private gardens of 55 dB $L_{Aeq,16hour}$. As such a modest reduction in road traffic noise is warranted.
- 3.2 We recommend that a minimum 2.0m high proprietary acoustic barrier is installed around the south-western and north-western boundaries of the private garden area as shown in Figure 2.
- 3.3 The acoustic barrier could be a solid brick wall or proprietary acoustic fence constructed using boards of at least 20mm thickness with double rebated edges or cover strips over the joints to ensure that there are no holes or gaps. Gates in the fencing, if/where required, are acceptable as long as they are built to the same specification as the fence.
- 3.4 Purpose made acoustic fencing is available from a number of suppliers including Jacksons Fencing (www.jacksons-fencing.co.uk), Ransfords (www.ransfords.co.uk), and Gramm Barrier Systems (www.grammbarriers.com).

Sound Insulation Measures

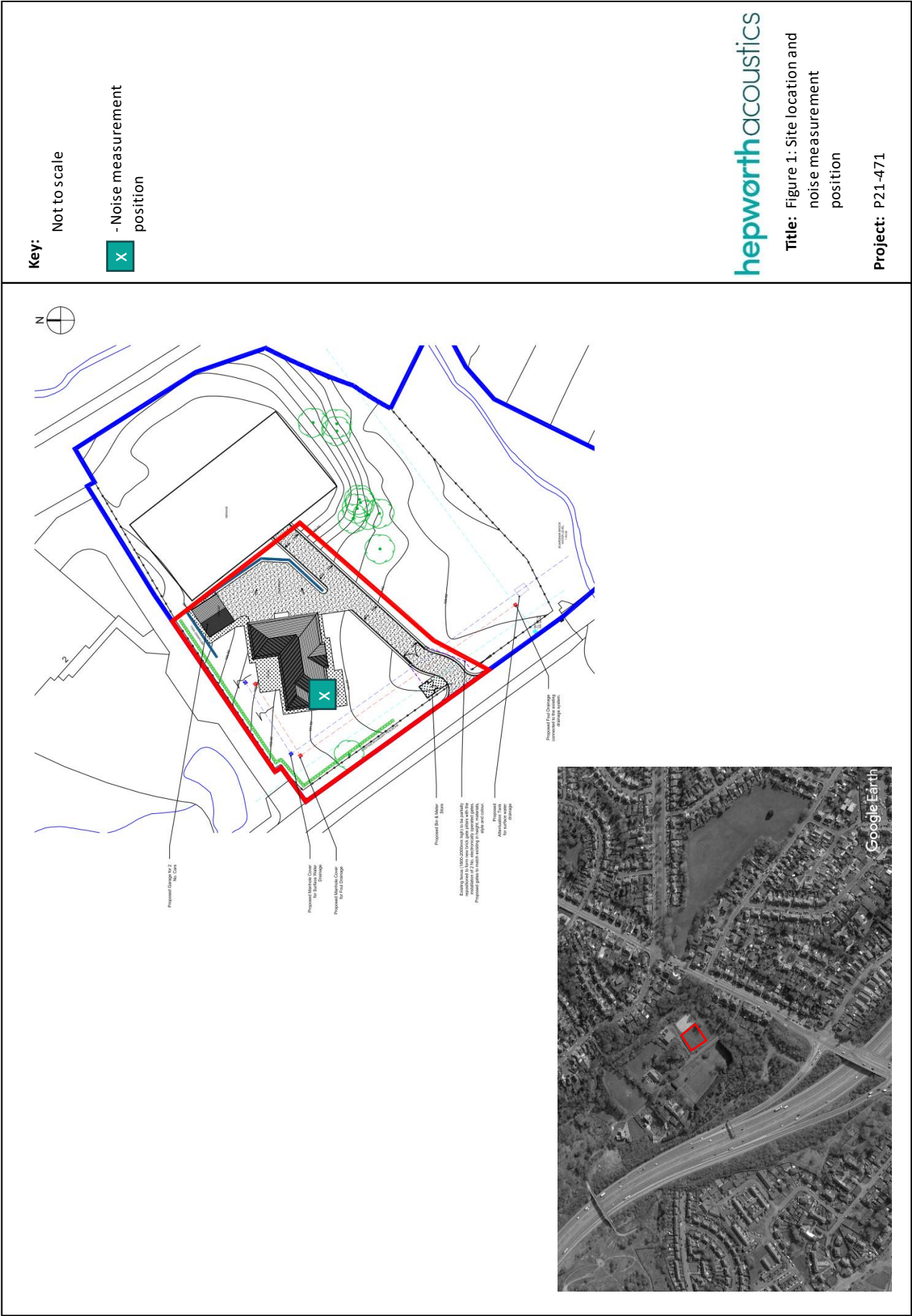
- 3.5 Using the adopted noise exposure values as shown in Table 2, we have carried out a series of noise break-in calculations using the rigorous calculation method as set out in BS 8233:2014 *Guidance on sound insulation and noise reduction for buildings*. As well as the adopted noise exposure values, the calculations have taken into account the dimensions of the rooms and area of the windows and external wall, along with typical expected reverberation times within the furnished rooms.
- 3.6 The calculations, a sample of which are included in Appendix III, show that the internal noise criteria set out in the planning condition will be achieved with standard well-fitted thermal double glazing e.g. 6mm glass – nominal (12-20mm) cavity – 6mm glass with standard well-fitted non-acoustic trickle vents.
- 3.7 We would nevertheless note that, in order to adequately control external noise ingress, it is crucial that the windows are very well fitted with no gaps around the edge and with effective seals. Trickle vents should also be fitted fully in line with the manufacturer's guidance and without oversized holes being cut into windows frames.

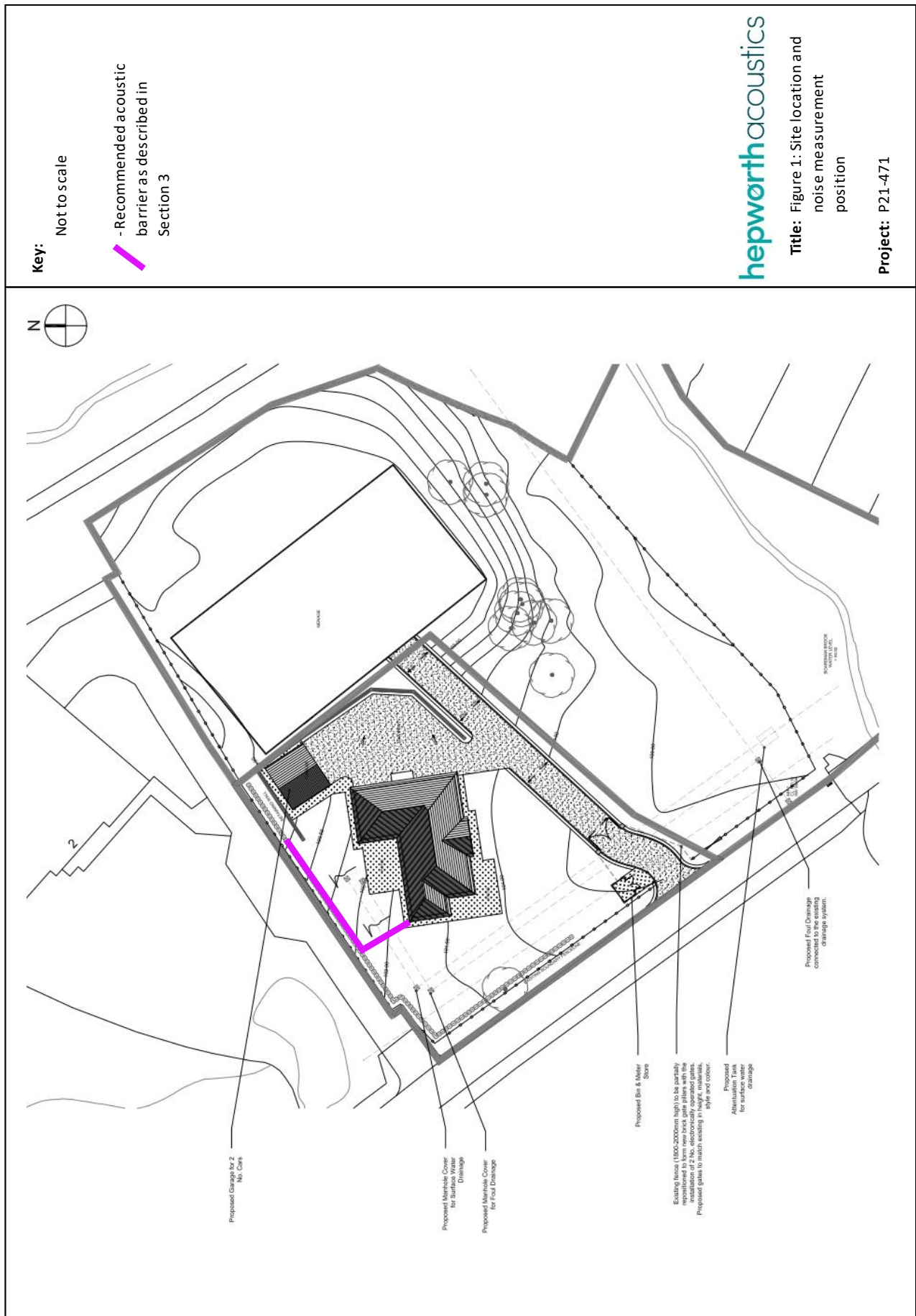
Post-Completion Compliance Testing

- 3.8 It is noted that part B of the planning condition requires a verification report to confirm that any sound insulation measures recommended herein have been incorporated into the development and post-completion acoustic testing to demonstrate compliance with the internal noise criteria as set out in the condition.
- 3.9 On the basis that our calculations have indicated that no specific sound insulation measures will be necessary in order to achieve the internal acoustic criteria, it is potentially the case that such a verification report and the post-completion testing is not warranted. We recommend that you seek clarification on this from Manchester City Council.

4.0 SUMMARY

- 4.1 The impact of road traffic noise has been assessed for an approved residential development on land off Southview House, Nut Bank Lane, Middleton. The assessment was requested in order to determine the noise mitigation measures that are necessary to meet the acoustic design criteria set out in a condition of the planning consent for the development.
- 4.2 The assessment has included the measurement of road traffic noise levels at an appropriate location on the site during a full 24-hour period during the week and so includes measurements during two rush-hour periods and a whole night-time period.
- 4.3 The measured noise levels were moderate. In order to meet the planning noise criteria, we have recommended that the private garden area is screened by way of installation of an acoustic barrier.
- 4.4 Our calculations have however indicated that no specific sound insulation measures are warranted for living rooms or bedrooms of the dwelling. The internal acoustic criteria will be achieved with the installation of well-sealed standard thermal double glazing and well-fitted non-acoustic trickle vents.
- 4.5 On this basis, it is potentially the case that the post-completion testing described in part B of the planning condition is not warranted. We recommend that you seek clarification on this from Manchester City Council.





Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

$L_{Aeq,T}$ This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.

L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

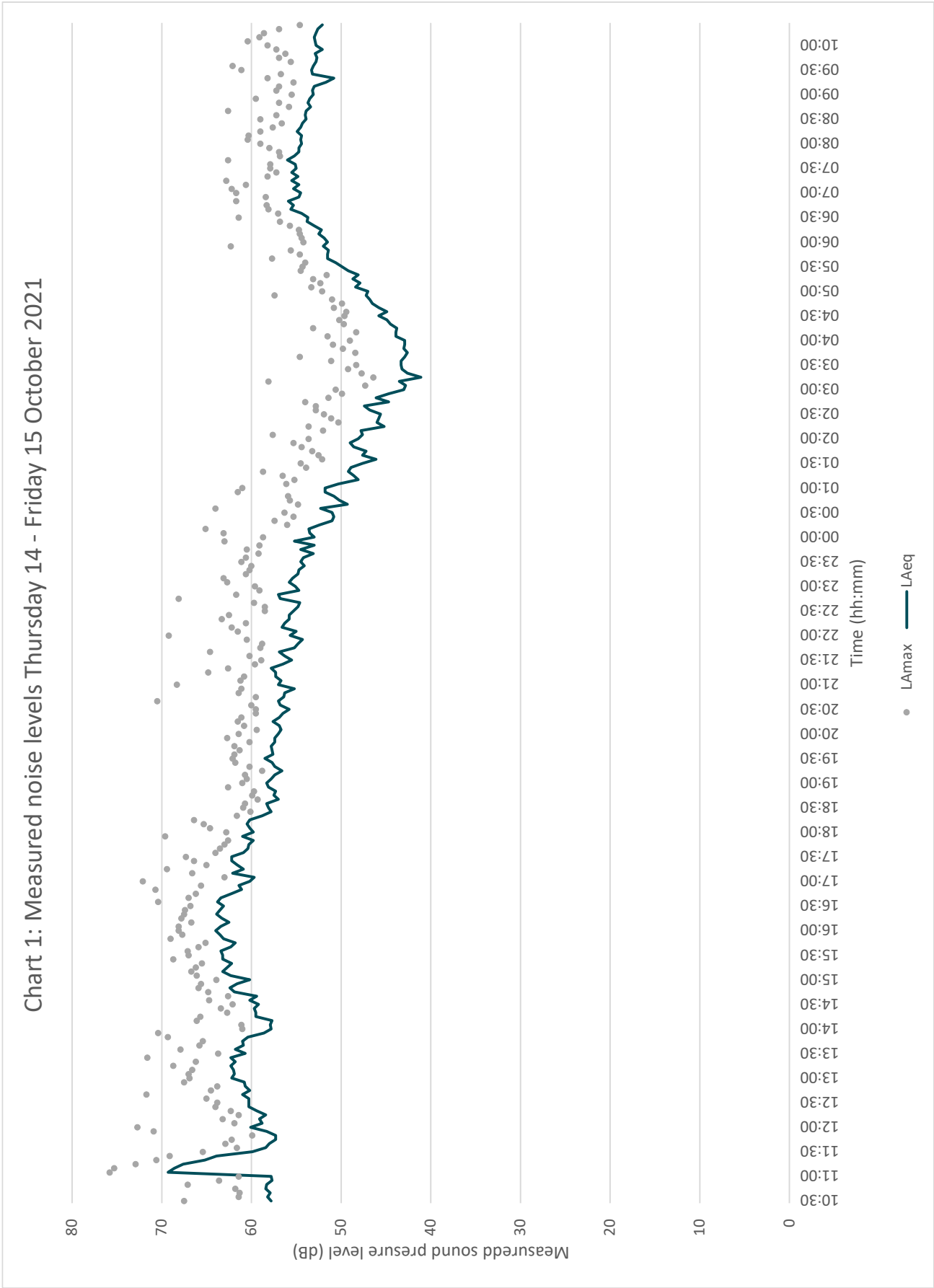
Appendix II: Noise Survey Results

Date(s): Thursday 14 October 2021 to Friday 15 October 2021

Equipment: Rion NL-52 'Class 1' sound level meter 00620870
calibrator and environmental kit, pole and windshield

Weather: Generally dry (with only a short period of very light drizzle in the early hours of 15 October 2021), partially overcast and mild/cool (approx. 15oC in the daytime and down to around 7oC at night), with light winds below 4m/s

All levels in dB(A)



Appendix III: Sample BS 8233 External Noise Break-in Calculations

BS8233 Calculation of Noise Break-in

The expected precision of this calculation is ± 2 dB

Site: Southview House, Nut Bank Lane
Period: Day
Room: Sitting room

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Term	Term Description	Value
S	Facade area (incl. window) (m ²)	30.8
S _w	Area of the windows (m ²)	8.1
S _{ew}	Area of the external wall (m ²)	22.7
x	Room Dimension x (m)	6.0
y	Room Dimension y (m)	5.2
z	Room Dimension z (m)	2.7

RT: Receiving Room RT

A: L_{oA}: Outside Room

D_{oA}: Insulation of the Acoustic Vents: Triton Maxiglaze 4000 Ventilator

R_w: SRI of the window: BS8233 Example - 6-12-6 insulated glass unit

R_{ew}: SRI of the external wall: BS8233 Example - Brick and block external wall

F: = 10 log (b + c + d)

G: = 10 x log (S*RT/0.161*V)

L_{oq}: Inside Room (A + F + G + 3dB facade correction)

A-weighting

L_{oAq}: Inside Room

Octave Band Centre Frequency					
125	250	500	1000	2000	
0.5	0.4	0.4	0.4	0.4	
57	50	54	57	49	
35	31	36	29	32	B = $\frac{A_o}{S} 10^{-\frac{D_{oA}}{10}}$
26	29	33	28	24	C = $\frac{S_{ew}}{S} 10^{-\frac{R_{ew}}{10}}$
40	44	45	51	56	D = $\frac{S_{ew}}{S} 10^{-\frac{R_{ew}}{10}}$
-31	-32	-36	-31	-29	
1	0	-1	-1	-1	
29	20	20	28	22	
-16	-9	-3	0	1	
13	11	17	28	23	

BS 8233 RESULT

L_{oAq}: 30

BS8233 Calculation of Noise Breakin

The expected precision of this calculation is ± 2 dB

Site: 0
Period: 0
Room: 0

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Term	Term Description	Value
S	Facade area (incl. window) (m ²)	23.0
S _w	Area of the windows (m ²)	12.9
S _{ew}	Area of the external wall (m ²)	10.1
x	Room Dimension x (m)	5.0
y	Room Dimension y (m)	5.0
z	Room Dimension z (m)	2.7

RT: Receiving Room RT

A: L_{oA}: Outside Room

A: L_{oA}: Outside Room

D_{oA}: Insulation of the Acoustic Vents: Triton Maxiglaze 4000 Ventilator

R_w: SRI of the window: BS8233 Example - 6-12-6 insulated glass unit

R_{ew}: SRI of the external wall: BS8233 Example - Brick and block external wall

R_{rr}: SRI of roof/ceiling: 0

F: = 10 log (b + c + d)

G: = 10 x log (S*RT/0.161*V)

L_{oAq}: Inside Room (A + F + 3dB facade correction)

L_{oq}: Inside Room (A + F + G + 3dB facade correction)

A-weighting

L_{oAq}: Inside Room

L_{oAq}: Inside Room

Octave Band Centre Frequency					
125	250	500	1000	2000	
0.5	0.4	0.4	0.4	0.4	
62	56	58	59	50	
50	43	46	49	41	
35	31	36	29	32	B = $\frac{A_o}{S} 10^{-\frac{D_{oA}}{10}}$
26	29	33	28	24	C = $\frac{S_{ew}}{S} 10^{-\frac{R_{ew}}{10}}$
40	44	45	51	56	D = $\frac{S_{ew}}{S} 10^{-\frac{R_{ew}}{10}}$
0	0	0	0	0	E = $\frac{S_{rr}}{S} 10^{-\frac{R_{rr}}{10}}$
-28	-30	-34	-29	-26	
0	-1	-1	-1	-1	
37	29	27	33	27	
25	16	13	22	17	
-16	-9	-3	0	1	
21	20	24	33	28	
9	7	10	22	18	

BS 8233 RESULT

L_{oAq}: 35

L_{oAq}: 24