

**RESIDENTIAL DEVELOPMENT
LAND OFF WORKHOUSE LANE, BURBAGE**

APPROVED DOCUMENT O NOISE ASSESSMENT

On behalf of:
Cameron Homes Ltd



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TABLE OF CONTENTS

1. INTRODUCTION	1
2. ACOUSTIC CRITERIA	2
3. NOISE SURVEY & ROAD TRAFFIC NOISE MODEL	4
4. RESULTS & RECOMMENDATIONS	6
5. SUMMARY	12
FIGURE 1: SITE LOCATION	13
FIGURE 2: NOISE PLOT $L_{AEQ,8HR}$ – NIGHT	14
FIGURE 3: NOISE PLOT L_{AFMAX} – NIGHT	15
FIGURE 4 – PLOT & FAÇADE NUMBERS	16
APPENDIX A: ACOUSTICS UNITS & INDICES	17
APPENDIX B: NOISE SURVEY RESULTS	19

1. INTRODUCTION

- 1.1 Hepworth Acoustics was commissioned by Cameron Homes Limited to carry out additional noise assessment work for an approved residential development at a site known as Land off Workhouse Lane, Burbage; allowed on appeal as per PINS reference: APP/K2420/W/22/3311038.
- 1.2 The assessment has been carried out in the first instance to address the requirements of the Environmental Health Officer at [Hinckley & Bosworth Borough Council](#), following review of an earlier reserved matters noise assessment report (Hepworth Acoustics report ref P26-266-R01v1), which was prepared to addition the requirements of Condition 13 of the appeal decision, which states the following:
- “No development approved by this permission shall be commenced until details of noise mitigation to be incorporated as part of the development as well as a timetable for the provision of mitigation measures has been submitted to and approved in writing by the local planning authority. The approved measures shall be provided in accordance with the approved timetable and thereafter they shall be retained.”*
- 1.3 This additional noise assessment has been prepared to determine the plots/facades within the development where windows can be modelled as open in the CIBSE TM59 DTM, whilst still achieving the internal ambient noise level requirements of Approved Document O of the Building Regulations (ADO).
- 1.4 This information may subsequently be used by the project sustainability consultant carrying out the CIBSE TM59 dynamic thermal modelling (DTM) for the scheme.
- 1.5 A layout for the site boundary of the proposed residential development is shown in **Figure 1**.
- 1.6 The site is bounded by Workhouse Lane to the northeast, by existing residences to the northwest and, generally, by open fields to all other sides, plus a further existing residence to the southeast.
- 1.7 Workhouse Lane is a no-through road that carries very limited amounts of traffic. The M69 motorway runs southeast/northwest at a distance of about 300m southeast from the closest part of the site, across intervening land predominantly of open fields.
- 1.8 The various acoustics indices referred to in this report are described in **Appendix A**. All noise levels in the text have been rounded to the nearest decibel as fractions of a decibel are imperceptible.

2. ACOUSTIC CRITERIA

Approved Document O of the Building Regulations (2021 Edition)

2.1 Requirement O1(2)(a) of ADO is reproduced below:

“O1 Overheating mitigation

- (1) *Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel (“residences”) to –*
 - a. *Limit unwanted solar gains in summer;*
 - b. *Provide an adequate means to remove heat from the indoor environment.*
- (2) *In meeting the obligations in paragraph (1) –*
 - a. **Account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and**
 - b. *Mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.”*

“In the Secretary of State’s view, requirement O1(2)(a) is met in a new residential building if the building’s overheating mitigation strategy for use by occupants takes account of all of the following.

- a. **Noise at night – paragraphs 3.2 to 3.4. [Emphasis added]**
- b. *Pollution – paragraph 3.5.*
- c. *Security – paragraphs 3.6 and 3.7.*
- d. *Protection from falling – paragraphs 3.8 to 3.10.*
- e. *Protection from entrapment – paragraph 3.11.”*

“3.1 The standards in this section may mean that the standards of the simplified method cannot be met. For example, if external noise is an issue, it is unlikely that windows would be opened by an occupant and therefore the minimum free areas of the simplified method cannot be met. In such cases, dynamic thermal modelling should be used.

3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

a. 40 dB L_{Aeq,T_8} averaged over 8 hours (between 11pm and 7am).

b. 55 dB L_{AFmax} more than 10 times a night (between 11pm and 7am).

3.4 Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants’ Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use.”

2.2 In our interpretation, to satisfy **Requirement O1(2)(a)** of ADO, noise ingress under overheating mitigation conditions needs to be *considered* at the Building Control application stage, taking into

account the effects of the overheating mitigation strategy on noise ingress and the indoor limits in **Table 1** need to be achieved.

Table 1: Requirement O1(2)(a) Indoor Noise Limits

Description	Limits
Average night-time noise level (23:00-07:00)	40 dB $L_{Aeq,8h}$
Maximum noise levels exceeded no more than 10 times a night (23:00-07:00)	55 dB L_{AFmax}

- 2.3 The O1(2)(a) noise limits **only apply in bedrooms** (i.e. only rooms specifically intended for use as a bedroom in the design) during the **night-time (23:00-07:00)** whilst the **overheating mitigation strategy is in use** (e.g. windows open to provide passive ventilative cooling).

3. NOISE SURVEY & ROAD TRAFFIC NOISE MODEL

- 3.1 A survey of currently prevailing noise levels at the site was carried out over a continuous 24-hour period commencing at 0800hrs on Monday 3 August 2026, at a single location identified as Location 1 in **Figure 1**.
- 3.2 Location 1 is representative of the closest area of proposed residential development to the M69, as per the reserved matters layout.
- 3.3 The noise monitoring was undertaken using a Nti Audio XL2-TA 'Class 1' sound analyser (serial no. A2A-23512), field calibrated using a Norsonic Acoustic Calibrator, Type 1251 (serial no. 20804), with no variation in calibration level observed.
- 3.4 The measurement microphone was fitted with a wind shield and mounted in free-field conditions at 1.4m above local ground.
- 3.5 The weather during the survey was generally dry, warm and clear with a light easterly / south-easterly wind. Hence, there was a positive wind vector from the M69 towards the site throughout the noise survey period.
- 3.6 The measured noise levels were processed to determine the sequential 2-minute period noise levels for the full monitoring period. The night-time $L_{Aeq,8hr}$ noise exposure levels have been obtained from the logarithmic average of all the $L_{Aeq,2min}$ noise measurement samples over each of those periods.
- 3.7 The measured noise levels are presented in **Appendix B**.
- 3.8 To comply with ADO guidance, the night-time L_{Fmax} levels have been assessed based on the 10th highest level.
- 3.9 On the basis of the above, the relevant results of the noise survey are summarised in **Table 2**.

Table 2: Summary of Night-time Noise Survey Results

Description	Noise level (dB)
Average night-time noise level (23:00-07:00) [dB $L_{Aeq,8h}$]	55
Maximum noise level exceeded no more than 10 times a night (23:00-07:00) [dB L_{AFmax}]	64

Computerised Road Traffic Noise Model

- 3.10 A computerised noise model of the development site and surrounding roads was developed using DataKustik CadnaA noise modelling software.
- 3.11 The road traffic noise propagation model of the average night-time noise levels (dB $L_{Aeq,8h}$) was calculated using the CRTN (1988) procedure.

- 3.12 The noise propagation model of the maximum night-time noise levels (dB L_{AFmax}) was calculated using the ISO 9613 'Acoustics - Attenuation of sound during propagation outdoors' procedure. To simulate the behaviour of the attenuation of sound over distance from discrete maximum noise levels events, the propagation of the maximum night-time noise levels (dB L_{AFmax}) was modelled as a single moving point source along the line of the roads.
- 3.13 The noise model was calibrated to the noise survey reference levels shown in **Table 2** to ensure that the model reflects real world road traffic noise levels across the site as far as practicable.
- 3.14 The noise model plots for external noise levels have been divided into three categories based on the extent to which windows can remain open whilst still achieving the ADO indoor noise limits. The categories are shown in **Table 3**.
- 3.15 Noise model plots for the relevant dwellings for the average night-time levels (dB $L_{Aeq,8h}$) and the maximum night-time levels (dB L_{AFmax}) are shown in **Figure 2-3** respectively. The vast majority of the site sits within the windows open category and therefore only the affected dwellings have been focused on in the figures.

Table 3: External Noise Threshold Categories

Description	Noise level (dB)	
	dB $L_{Aeq,8h}$	dB L_{AFmax}
Windows Open ¹	≤50	≤65
Windows Partially Open ²	50 < 60	65 < 75
Windows Closed ³	>60	>75

1: Based on a nominal sound attenuation of 10dB through an open window for a 'moderate risk' area as per the ADO Section 1: Simplified Method.

2: Based on sound attenuation of between 10dB-20dB for partially open windows with varying opening sizes.

3: Based on an assumed maximum sound attenuation of 20dB for a partially open window (IoA/ANC ADO Noise Guide, November 2024).

4. RESULTS & RECOMMENDATIONS

- 4.1 The CadnaA Building Evaluation tool has been used to obtain facade levels for the different floors of the exposed facades for each of the plots.
- 4.2 The maximum permissible window opening whilst still achieving the ADO indoor noise limits has been estimated using Equation 1 from the IOA/ANC ADO Noise Guide, November 2024. This equation estimates the maximum total surface area of an opening in the façade permissible to maintain the façade sound level difference required to achieve the ADO indoor noise limits.
- 4.3 The ‘Standardized Façade Sound Level Difference’ (dB $D_{2m,nT}$) has been recommended based on the calculations for the most onerous façade sound levels at 2m (i.e. $L_{Aeq,8h}$ or L_{AFmax}). The window condition recommendations are provided for each of the three categories in **Table 3**:
- **Windows Open:** Windows can be modelled as open as per the ADO Section 1: Simplified Method for a ‘moderate risk’ area.
 - **Windows Partially Open:** Windows can be modelled as partially open, and the corresponding maximum opening size is given in metres squared to two decimal places.
 - **Windows Closed:** Windows should be modelled as closed.
- 4.4 The floor areas of the bedrooms have been sourced from layouts provided by Cameron Homes Ltd in September 2026, which have then been multiplied by a nominal ceiling height of 2.4m.
- 4.5 A summary of the results is provided in **Table 4**, for the plots/facades where windows can be partially open. For the rest of this development, not listed in **Table 4**, the windows can be modelled as open as per the ADO Section 1: Simplified Method. No plots/facades require windows to be fully closed.
- 4.6 **Figures 4** shows the plot numbers along with the corresponding facade numbers for each of the plots listed in **Table 4**.

Table 4: Recommendations for TM59 Model - Partially Open Windows

Plot Number ¹	House Type	Façade Number ¹	Floor	dB $D_{2m,nT}$	Window Opening for TM59 Model [m ²]
Plot 08 & 09	761	1	FF	14	0.36
Plot 08 & 09	761	4	FF	14	0.33
Plot 13	761	1	FF	13	0.41
Plot 13	761	3	FF	15	0.31
Plot 10 & 11	920	1	FF	14	0.33
Plot 10 & 11	920	5	FF	14	0.28
Plot 10 & 11	920	6	FF	15	0.28

Plot 10 & 11	920	3	FF	11	0.62
Plot 12	920	4	FF	15	0.27
Plot 06 & 07	Alford	1	FF	14	0.31
Plot 06 & 07	Alford	5	FF	14	0.28
Plot 06 & 07	Alford	6	FF	14	0.28
Plot 38	Cardew	1	FF	12	0.24
Plot 38	Cardew	4	FF	13	0.17
Plot 29	Cardew	1	FF	11	0.33
Plot 29	Cardew	4	FF	14	0.16
Plot 30	Cardew	1	FF	14	0.14
Plot 30	Cardew	4	FF	14	0.14
Plot 31	Cardew	1	FF	13	0.21
Plot 31	Cardew	4	FF	15	0.13
Plot 32	Cardew	1	FF	14	0.15
Plot 32	Cardew	4	FF	15	0.13
Plot 34	Cardew	1	FF	14	0.14
Plot 34	Cardew	4	FF	14	0.14
Plot 25	Cardew	1	FF	14	0.15
Plot 25	Cardew	3	FF	11	0.30
Plot 25	Cardew	4	FF	15	0.12
Plot 27	Cardew	1	FF	14	0.15
Plot 27	Cardew	4	FF	14	0.14
Plot 23 & 24	Cardew_Semi	1	FF	14	0.15
Plot 23 & 24	Cardew_Semi	4	FF	11	0.29
Plot 23 & 24	Cardew_Semi	5	FF	15	0.13
Plot 23 & 24	Cardew_Semi	6	FF	15	0.12
Plot 35	Chapman	1	FF	14	0.19
Plot 35	Chapman	4	FF	14	0.20
Plot 26	Chapman	3	FF	15	0.17
Plot 26	Chapman	4	FF	14	0.18
Plot 33	Comber	1	FF	15	0.17
Plot 33	Comber	4	FF	15	0.15
Plot 05	Comber	1	FF	13	0.22

Plot 05	Comber	4	FF	14	0.19
Plot 28	Comber	1	FF	14	0.17
Plot 28	Comber	4	FF	15	0.15
Plot 04	Gardener	1	FF	14	0.28
Plot 04	Gardener	2	FF	12	0.38
Plot 04	Gardener	5	FF	13	0.30
Plot 36	Gardener	1	FF	14	0.26
Plot 36	Gardener	5	FF	14	0.27
Plot 14	Gardener	1	FF	14	0.28
Plot 14	Gardener	3	FF	11	0.51
Plot 14	Gardener	4	FF	15	0.23
Plot 14	Gardener	5	FF	15	0.22
Plot 16	Gardener	1	FF	14	0.24
Plot 16	Gardener	4	FF	15	0.20
Plot 16	Gardener	5	FF	15	0.20
Plot 21	Gardener	1	FF	14	0.25
Plot 21	Gardener	3	FF	11	0.54
Plot 21	Gardener	4	FF	15	0.20
Plot 21	Gardener	5	FF	15	0.23
Plot 2	Heywood	3	FF	12	0.46
Plot 2	Heywood	4	FF	13	0.33
Plot 2	Heywood	5	FF	13	0.34
Plot 2	Heywood	6	FF	11	0.59
Plot 39	Heywood	3	FF	12	0.40
Plot 39	Heywood	4	FF	13	0.33
Plot 39	Heywood	5	FF	13	0.34
Plot 15	Heywood	1	FF	13	0.33
Plot 15	Heywood	2	FF	13	0.33
Plot 15	Heywood	3	FF	15	0.24
Plot 15	Heywood	4	FF	11	0.51
Plot 15	Heywood	5	FF	11	0.53
Plot 20	Heywood	1	FF	15	0.23
Plot 20	Heywood	2	FF	15	0.24

Plot 20	Heywood	4	FF	11	0.54
Plot 20	Heywood	5	FF	11	0.52
Plot 20	Heywood	6	FF	15	0.20
Plot 22	Heywood	1	FF	14	0.27
Plot 22	Heywood	4	FF	11	0.61
Plot 22	Heywood	5	FF	14	0.28
Plot 22	Heywood	6	FF	14	0.28
Plot 18	Kipling	1	FF	14	0.27
Plot 18	Kipling	4	FF	11	0.61
Plot 18	Kipling	5	FF	15	0.21
Plot 18	Kipling	6	FF	15	0.21
Plot 17	Kipling	1	FF	15	0.21
Plot 17	Kipling	2	FF	14	0.29
Plot 17	Kipling	4	FF	11	0.61
Plot 17	Kipling	5	FF	15	0.22
Plot 37	Type_A	1	FF	13	0.25
Plot 37	Type_A	2	FF	12	0.30
Plot 37	Type_A	6	FF	13	0.24
Plot 3	Type_A	1	FF	13	0.25
Plot 3	Type_A	2	FF	13	0.27
Plot 3	Type_A	6	FF	14	0.22
Plot 19	Type_A	1	FF	15	0.15
Plot 19	Type_A	2	FF	15	0.17
Plot 19	Type_A	3	FF	15	0.18
Plot 19	Type_A	5	FF	11	0.43
Plot 19	Type_A	6	FF	11	0.41
Plot 1	Webb	1	FF	12	0.51
Plot 1	Webb	2	FF	11	0.55
Plot 1	Webb	3	FF	12	0.44
Plot 1	Webb	4	FF	11	0.53
Plot 1	Webb	11	FF	12	0.44
Plot 1	Webb	12	FF	12	0.51
Plot 40	Webb	1	FF	12	0.44

Plot 40	Webb	7	FF	13	0.41
Plot 40	Webb	8	FF	12	0.45
Plot 40	Webb	9	FF	13	0.41
Plot 40	Webb	10	FF	12	0.43
Plot 40	Webb	11	FF	13	0.40
Plot 40	Webb	12	FF	13	0.41

1: See Figures 5 & 6

GF = Ground Floor, FF = First Floor

- 4.7 The information provided in **Table 4** can be used by the project sustainability consultant to build the TM59 overheating model and where required specify alternative overheating mitigation measures if the window openings in **Table 4** are not sufficient for overheating purposes.
- 4.8 It is noted that there are no instances on this scheme where windows must be modelled as closed, at the outset, although for those listed in **Table 4** some additional overheating mitigation may be required.

Noise from the Mechanical Ventilation/Cooling System Itself

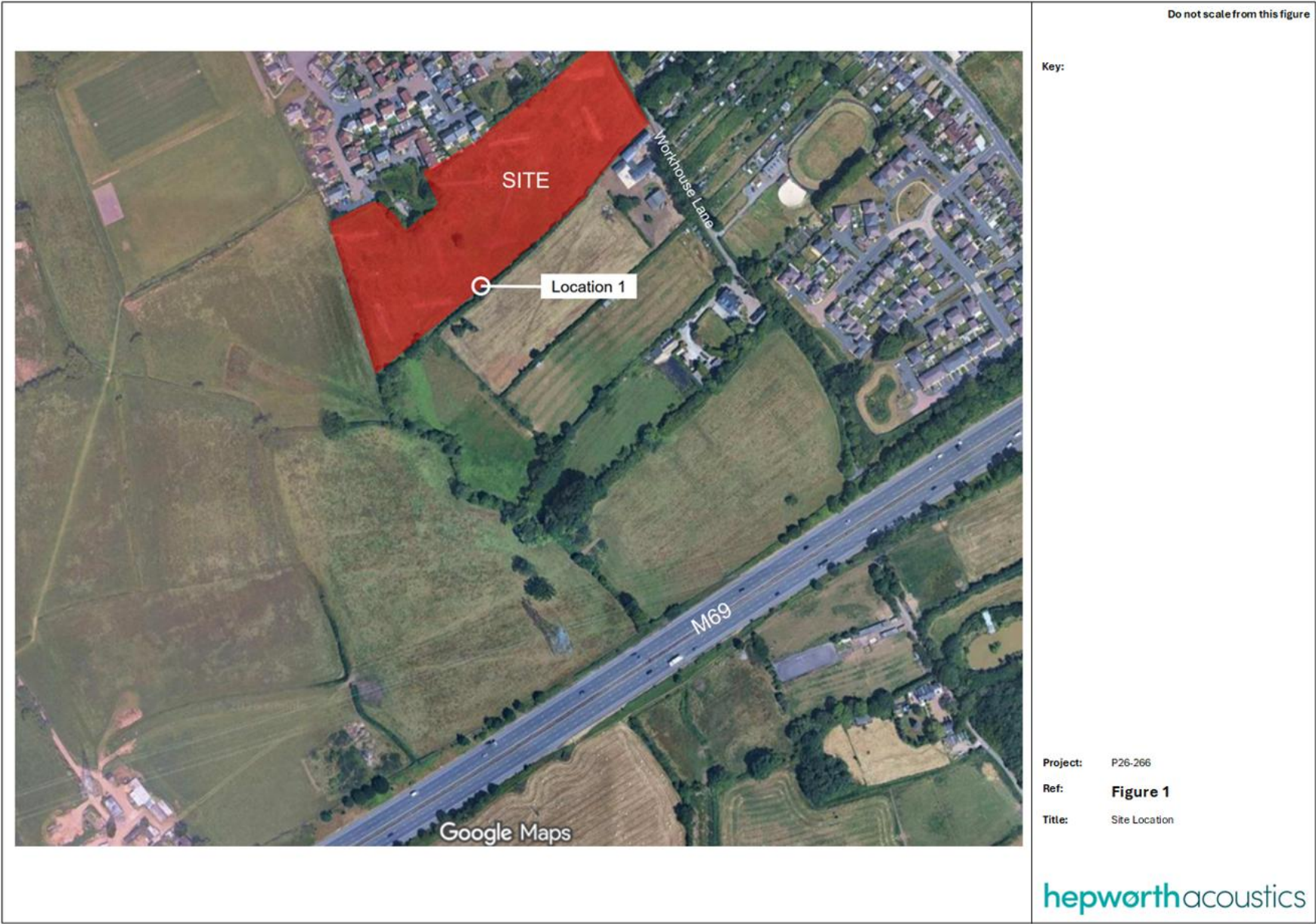
- 4.9 Noise generated by any mechanical ventilation or mechanical cooling system that forms part of the overheating mitigation strategy, is not covered by any ADO requirements and ADO provides no specific guidance on noise generated by these systems. Nevertheless, noise from these systems should be taken into account to ensure that it is controlled to within suitable levels.
- 4.10 A reasonable interpretation is that if 40 dB $L_{Aeq,8h}$ is considered the threshold above which noise ingress may affect how occupants use the means of mitigating overheating for opening windows, then it could be argued that the same would apply to noise from the ventilation/cooling system when mitigating overheating. However, the character of the noise is different in the two situations, i.e. the noise breaking in through the window does not generally have the same character as the noise from a ventilation/cooling system, which typically has a more noticeable character.
- 4.11 Thus, the noise levels during operation of a ventilation/cooling system functioning to mitigate overheating should be lower than the ADO 40 dB $L_{Aeq,8h}$ value. Ideally, they would be controlled to within the BS 8233 value of 30 dB $L_{Aeq,T}$, however a reasonable upper limit would be 35 dB $L_{Aeq,T}$.
- 4.12 The time period ' T ' over which the ventilation/cooling plant noise is assessed should be the 'on' time of the equipment. For example, it would be inappropriate to average the noise levels over periods during which the ventilation/cooling equipment is not operating.
- 4.13 On this basis, whilst it is not a requirement of ADO, we recommend ensuring that any mechanical ventilation or mechanical cooling systems are designed to achieve the following design targets in **Table 5** within bedrooms during operation.

Table 5: Noise Design Targets for Mechanical Ventilation/Cooling in Bedrooms

Condition	Noise Source	Upper Design Limit	
		Daytime (07:00-23:00)	Night-time (23:00-07:00)
Alternative overheating mitigation strategy in use	Mechanical ventilation /cooling	40 dB $L_{Aeq,T}$	35 dB $L_{Aeq,T}$

5. SUMMARY

- 5.1 Hepworth Acoustics was commissioned by Cameron Homes Limited to carry out additional noise assessment work for an approved residential development at a site known as Land off Workhouse Lane, Burbage; allowed on appeal as per PINS reference: APP/K2420/W/22/3311038.
- 5.2 An automated night-time noise survey has been carried out to establish the night-time noise levels incident upon the development site.
- 5.3 The calibrated noise model has been used to determine the facade noise levels at different floor heights for assessment against the ADO indoor noise limits.
- 5.4 The external noise levels have been split into three categories relating to the window opening conditions that can be used in the TM59 modelling.
- 5.5 A complete list of the plot and facade numbers has been provided along with the extent of the window opening size that can be permitted whilst still achieving the ADO indoor noise limits.
- 5.6 There are no instances on this scheme where windows must be modelled as closed, at the outset, although for those listed in Table 4 some additional overheating mitigation may be required.









APPENDIX A: ACOUSTICS 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. There are also a number of ways to describe sound insulation performance.

The indices used in this report are described below:

- $L_{Aeq,T}$** **A-weighted Equivalent Continuous Sound Level:** An average of the total sound pressure measured over a specified time period (T). In other words, $L_{Aeq,T}$ is the level of a steady sound which has the same total A-weighted sound pressure as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for most forms of environmental noise.
- L_{Amax}** **Maximum A-weighted Sound Level with Fast Time-weighting:** The maximum A-weighted sound pressure level during the measurement period, using the Fast time-weighting of 125ms. L_{Amax} used in this report refers throughout to L_{AFmax} with the Fast time weighting, denoted L_{AFmax} or $L_{Amax,f}$ in other documents but L_{Amax} in BS 8233:2014 standard notation.
- L_{ASmax}** **Maximum A-weighted Sound Level with Slow Time-weighting:** The maximum A-weighted sound pressure level during the measurement period, using the Slow time-weighting of 1s. Also denoted $L_{Amax,s}$ in other documents.
- $L_{A10,T}$** **A-weighted 10 Percentile Level:** The A-weighted sound level exceeded for 10% of a measurement time period (T). $L_{A10,T}$ is often used for calculations of road traffic noise, such as in 'Calculation of Road Traffic Noise' (CRTN) 1988.
- $D_{n,e}$** **Element Normalised Level Difference:** A laboratory value quantifying the sound insulation performance of a building element (such as an air vent) in a stated frequency band.
- $D_{n,e,w}$** **Weighted Element Normalised Level Difference:** A frequency weighted single figure laboratory value quantifying the sound insulation performance of a building element, such as an air vent.

APPENDIX B: NOISE SURVEY RESULTS

