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ENVIRONMENT

Richborough Estates Limited

Upper Heyford,
Oxfordshire

Noise Impact Assessment

BMW3171

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March 2022

DOCUMENT ISSUE RECORD

Revision	Date of Issue	Status	Author:	Checked:	Approved:
1	22/03/2022	ISSUE	Nick Adamson BSc (Hons), MIOA	Lucy Elmer BA (Hons), MSc, MIOA	Dawit Abraham MSc, MIOA

Notice

EXECUTIVE SUMMARY

BWB Consulting (BWB) has been instructed by Richborough Estates Limited to undertake a Noise Impact Assessment to support a planning application for a proposed residential development in Upper Heyford, Oxfordshire.

The assessment draws on the results of a baseline noise survey undertaken at the Site and has been undertaken based on relevant standards and guidance documents, following consultation with Cherwell District Council.

The assessment indicates that the upper limit guideline value from BS 8233 is predicted to be achieved in all rear gardens, without mitigation.

Internal noise levels have been predicted in accordance with the calculation methodologies from BS 8233 and it has been demonstrated that with the incorporation of standard double glazing and trickle ventilators, the desirable internal guideline values from BS 8233 can be achieved.

Based on the findings of this assessment, noise need not be a determining factor in granting planning consent for the proposed development.

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1. INTRODUCTION

Appointment & Background

1.1 BWB Consulting (BWB) has been instructed by Richborough Estates Limited to undertake a Noise Impact Assessment to support a planning application for a proposed residential development in Upper Heyford, Bicester, Oxfordshire.

1.2 The assessment draws on the results of a baseline noise survey undertaken at the Site and has been undertaken in accordance with relevant standards and guidance, following consultation with Cherwell District Council.

1.3 This report is necessarily technical in nature, so to assist the reader, a glossary of acoustic terminology can be found in **Appendix A**.

Site Location and Layout

1.4 The development site comprises a parcel of land approximately 7 km northeast of Bicester, Oxfordshire. To the east of the development site is Chilgrove Drive, beyond which is open farmland. To the south of the site is Camp Road, beyond which is also open farmland. The site's western boundary is adjacent to dwellings off Trenchard Circle (to the north) and open farmland (to the south), which is subject to undetermined planning applications for up to 120 new dwellings. The northern site boundary is adjacent to the former Upper Heyford airbase site, which is now used as an industrial and commercial estate. The site location is shown in **Figure 1.1**.

Figure 1.1: Site Location

Proposed Development

1.5 The proposed residential development comprises a total of 210 residential dwellings, and enhancements to some areas of natural woodlands and ponds which exist on the site. The proposed development layout is shown in **Figure 1.2**.

Figure 1.2: Proposed Development Layout

2. STANDARDS AND GUIDANCE

National Planning Policy Framework (NPPF)

1.1 Published in July 2021, this document sets out the Government's planning policies for England and supersedes the previous NPPF published in 2012. It makes the following reference to noise in the section entitled Conserving and enhancing the natural environment:

"174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

[…]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."

- It also makes the following references to noise in the Section entitled *Ground conditions and pollution*:

"185. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life[60];

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

[60] See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)."

And

"187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on

new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings

2.1 This Standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use.

2.2 The Standard provides design ranges for internal ambient noise levels for open plan and executive offices, which are considered relevant for the proposed flexible working spaces. **Table 2.1** below details the relevant design ranges.

Table 2.1: Design Ranges from BS 8233

Description	Location	Design Range dB $L_{Aeq,T}$
Typical noise levels for acoustic privacy in shared spaces	Open plan office	45 – 50
Study and work requiring concentration	Executive office	35 – 40

2.3 For this assessment a criterion of 40 dB $L_{Aeq,T}$ has been adopted for the assessment of environmental noise break-in within the flexible working spaces, assuming that study and work requiring concentration will need to be undertaken within the spaces.

BS 4142:2014+A1:2019: Methods for Rating and Assessing Industrial and Commercial Sound (BS 4142)

2.4 BS 4142 describes methods for rating and assessing the following:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

2.5 The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The Standard advises the purpose of the methodology includes the assessment of sound from any plant and activities associated with existing industrial and/or commercial uses at proposed residential dwellings.

2.6 If appropriate, the specific sound level of the source ($L_{Aeq,T}$) is corrected, by the application of one or more corrections for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ($L_{Ar,Tr}$). The Standard effectively compares

and rates the difference between the rating level of the specific sound and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound.

2.7 The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) the source in question operates or is proposed to operate in the future.

2.8 Comparing the rating level with the background sound level, BS 4142 states:

> "Typically, the greater this difference, the greater the magnitude of impact.
>
> A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
>
> A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
>
> 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."

Consultation with Cherwell District Council

2.9 Consultation was undertaken with the Environmental Health Department at Cherwell District Council (CDC) via email to agree the noise assessment methodology. The following was proposed:

- Undertake an unattended 24-hour noise survey adjacent to Camp Road to the south of the site to determine noise emissions from road traffic on Camp Road. Undertake a 24-hour unattended noise survey adjacent to the northern site boundary to determine noise emissions from commercial activities to the north of the site at the former Upper Heyford airfield.
- Noise propagation from road traffic on Camp Road to the south of the site will be predicted across the proposed development. Predicted noise level in external amenity spaces (i.e. private gardens) will be compared with the guideline values from BS 82333:2014 'Guidance on sound insulation and noise reduction for buildings' (i.e. 50 – 55 dB LAeq,T). Where exceedances are predicted, consideration will be given to mitigation measures to reduce noise levels to meet the guideline values from BS 8233 Furthermore, noise break-in to dwellings will be predicted and recommendations provided for minimum sound insulation performance specifications for façade elements (i.e. glazing and ventilators) as necessary to ensure the internal ambient noise level limits in habitable spaces from BS 8233 are achieved.
- Where noise from commercial activities to the north is noted to be audible on the site, we will undertake an assessment in accordance with the methodology outlined in BS 4142:2014+A1:2014 'Methods for rating and assessing industrial and commercial sound'.

2.10 A response was received from Jim Guest stating that the methodology looked fine and the report would be assessed following submission.

3. BASELINE NOISE AND VIBRATION SURVEY

Summary

3.1 A baseline noise survey has been undertaken to determine noise levels incident on the site due to the passage of road traffic on Camp Road to the south. The noise measurement position adopted during the survey is identified in **Figure 3.1**.

Figure 3.1: Baseline Survey Measurement Location

Survey Methodology

Noise Measurement Position 1 (NMP1)

3.2 Noise monitoring was undertaken at NMP1 over a 24-hour period commencing at 13:15 on Monday 7th March 2022. The microphone at NMP1 was established in free-field conditions at 1.5 m above local ground level circa. 5 m from the nearside kerb edge of Camp Road. The noise climate at NMP1 was dominated by road traffic on Camp Road throughout the survey period.

Observations

3.3 BWB engineers walked the perimeter of the site to gain an understanding of the potential for noise impact on the site from commercial operations associated with the former Upper Heyford Airfield to the north. It was found, however, that no noise generative operations, or items of fixed plant and equipment associated with any commercial uses, were audible anywhere on the Site. It is therefore considered that the dominant source of noise across the proposed development site is road traffic on Camp Road.

Measurement Equipment

3.4 The baseline noise survey was undertaken using the Class 1 specification noise measurement equipment detailed in **Table 3.1**. Equipment was calibrated using a portable calibrator immediately before and after the measurements with no significant drift in calibration observed. The sound level meters, pre-amplifiers and microphones were calibrated to traceable standards at an accredited laboratory within the 24 months prior to the measurements. The portable calibrators were calibrated within the 12 months preceding the date of the survey.

Table 3.1: Noise measurement equipment

Position	Equipment	Make & Model	Serial Number	Calibration due Date
NMP1	01 dB Fusion	11327	01 dB Fusion	18/06/2023
	Grass 40CE	259479	Grass 40CE	
	01 dB PRE 22	1605201	01 dB PRE 22	
	Calibrator	B&K DB0311	449050	19/08/2022

Weather Conditions

3.5 The weather throughout the survey remained conducive to environmental noise measurement, it being dry with negligible winds (<5ms^{-1}).

Measurement Results

3.6 A summary of daytime and night-time noise levels at NMP1 is presented in **Table 3.2**, and a summary of the octave band sound pressure levels is presented in **Table 3.3**. A full summary of the survey data is presented in **Appendix B**.

Table 3.2: Summary of Measured Sound Pressure Level at NMP1

Period	Start Time	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,T}$[2]	dB L_{AFmax}[3]
Daytime[1]	07/03/2022 13:15	16-hours	63	47	-
Night-Time	07/03/2022 23:00	8-hours	56	40	79

[1] includes periods between 13:15 and 23:00 on 07/03/2022 and between 07:00 and 13:15 on 08/03/2022
[2] arithmetic average $L_{A90,15mins}$ during measurement period
[3] 90th percentile L_{AFmax} noise levels during measurement period

Table 3.3: Summary of Octave Band Sound Pressure Levels at NMP1

Period	Octave Band Sound Pressure Levels (L_{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Daytime	66	60	56	58	60	55	48	45	63
Night-Time	59	52	48	51	53	49	41	32	56

4. ASSESSMENT

Noise Model

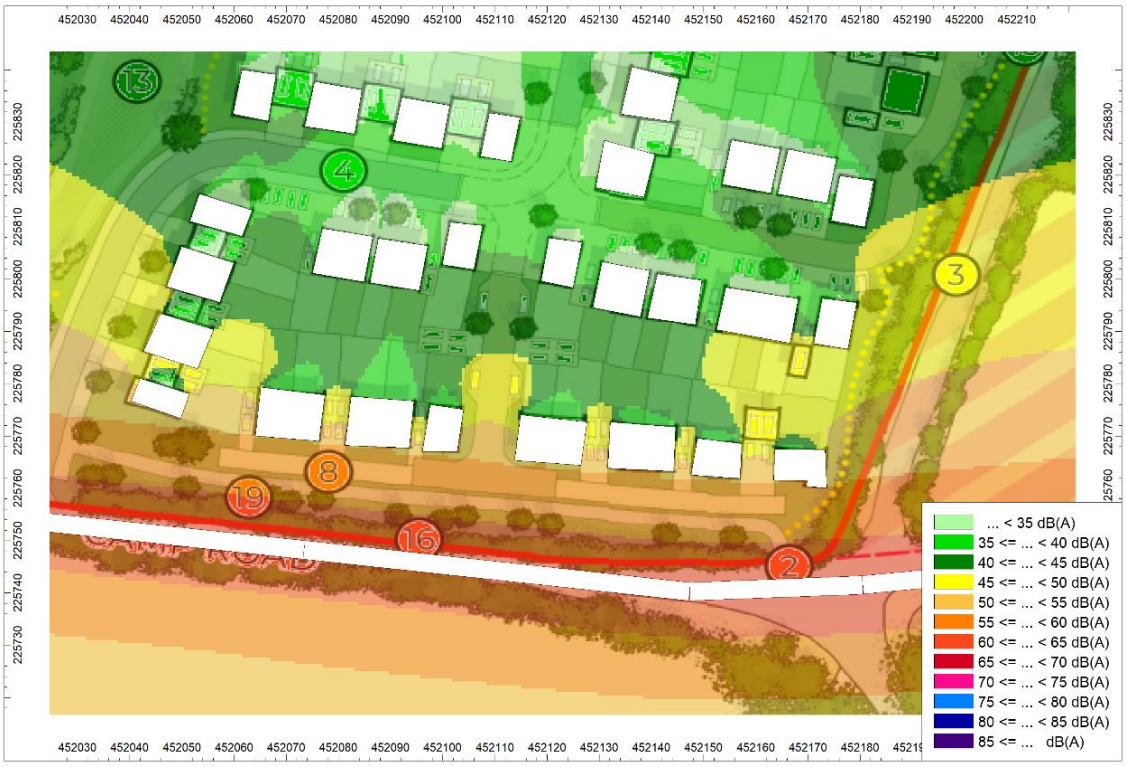
4.1 A detailed computer based acoustic model of the site was generated in order to predict the daytime and night-time noise propagation across the site due to road traffic on Camp Road. The noise model was generated applying the following methodology:

- The model was generated using the PC based CadnaA® noise modelling package;
- The noise model was set to apply the prediction methodology from the Department of Transport document *Calculation of Road Traffic Noise* (CRTN) 1988 for the prediction of L_{Aeq} noise levels from Camp Road;
- To reflect local ground cover, ground absorption was set to G=1 (100% absorptive ground);
- Noise emissions from Camp Road were calibrated to the measured noise levels at NMP1; and
- L_{AFmax} noise levels from Camp Road have been predicted using a simplified model of a 6 dB reduction in noise level per doubling of distance from the nearside kerb edge.

External Noise Levels

4.2 The predicted daytime noise levels across the southern (loudest) portion of the site, at a height of 1.5 m, are shown in **Figure 4.1**.

Figure 4.1: Predicted Daytime (07:00 – 23:00) Noise Levels at 1.5 m Height, dB $L_{Aeq,16h}$



4.3 It can be seen from **Figure 4.1** that the upper limit guideline value of 55 dB L_{Aeq} from BS 8233 is predicted to be achieved in all rear gardens and therefore further mitigation measures are considered unwarranted.

Internal Noise Levels within Dwellings

4.4 To achieve compliance with the guideline values from BS 8233 with windows partially open, the external daytime noise level should not exceed 50 dB $L_{Aeq,16hr}$ while the night-time noise level should not exceed 45 dB $L_{Aeq,8hr}$.

4.5 The noise model has been used to predict free-field noise levels incident on the façades of dwellings across the proposed development Site at both ground and first floor level. The results of the modelling indicated that the guideline values from BS 8233 will be achieved in most dwellings across the site with partially open windows. The noise levels predicted at the worst-affected elevation of the worst affected dwelling were 59 dB $L_{Aeq,16h}$ and 52 dB $L_{Aeq,8h}$/67 dB L_{AFmax} during the daytime and night-time respectively. However, with windows partially open, noise levels in dwellings located adjacent to the southern boundary on elevations facing Camp Road are predicted to exceed the desirable guideline values from BS 8233 by 9 dB(A) during the daytime and 7 dB(A) during the night-time. Consideration has therefore been given to the predicted internal noise levels with windows closed. In accordance with the 'Simple Calculation' from Section G.1 of BS 8233 internal noise levels can be estimated from external free-field noise levels, assuming closed windows, by subtracting the R_w sound insulation performance of the proposed glazing.

4.6 Thermally proficient double glazing with a configuration similar to 4 mm glass/ 12 mm air gap/ 4 mm glass has a sound insulation performance predicted to be 27 dB $R_w + C_{tr}$. Standard window mounted trickle ventilators achieve a performance predicted to be 32 dB $D_{n,e,w} + C_{tr}$ in the open position.

4.7 Based on the above performances and prediction methodology, the predicted internal noise levels in the dwellings facing Camp Road would be as shown in **Table 4.2**. It is noted in BS 8233 that the simple calculation method can underestimate internal noise levels by up to 5 dB. Therefore, a 5 dB uplift has been applied to the predicted noise levels to account for any potential underestimation.

Table 4.2: Predicted Internal Noise Levels

Assessment Period	Parameter	Predicted External Noise Level	Predicted Internal Noise Level	Internal Noise Criteria	Internal Criteria Achieved?
Daytime	$L_{Aeq,16hour}$	59	33	35	Yes
Night-Time	$L_{Aeq,8hour}$	52	26	30	Yes
Night-Time	L_{AFmax}	67	41	45	Yes

4.8 It can be seen from **Table 4.2** that the desirable internal guideline values of 35 dB $L_{Aeq,16h}$ and 30 dB $L_{Aeq,8h}$ during the daytime and night-time respectively, from BS 8233, will be

achieved with windows closed and vents open. Typical L_{AFmax} noise levels will also be significantly below the adopted 45 dB criterion.

4.9 Given the findings of the above assessment, it is considered that any further mitigation measures beyond installation of standard window mounted trickle vents and thermally proficient double glazing, are unwarranted.

5. CONCLUSION

5.1 BWB Consulting (BWB) has been instructed by Richborough Estates Limited to undertake a Noise Impact Assessment to support a planning application for a proposed residential development in Upper Heyford, Oxfordshire.

5.2 The assessment draws on the results of a baseline noise survey undertaken at the Site and has been undertaken based on relevant standards and guidance documents.

5.3 Drawing on the results of a baseline noise survey and noise modelling exercise an assessment of external noise levels identified that the upper limit guideline value from BS 8233 is predicted to be achieved in all rear gardens.

5.4 Internal noise levels have been predicted in accordance with the calculation methodologies from BS 8233 and it has been demonstrated that with the incorporation of standard double glazing and trickle ventilators, the desirable internal guideline values from BS 8233 can be achieved. Therefore, no further mitigation measures are considered warranted.

5.5 Based on the findings of this assessment, noise need not be a determining factor in granting planning consent for the proposed development.

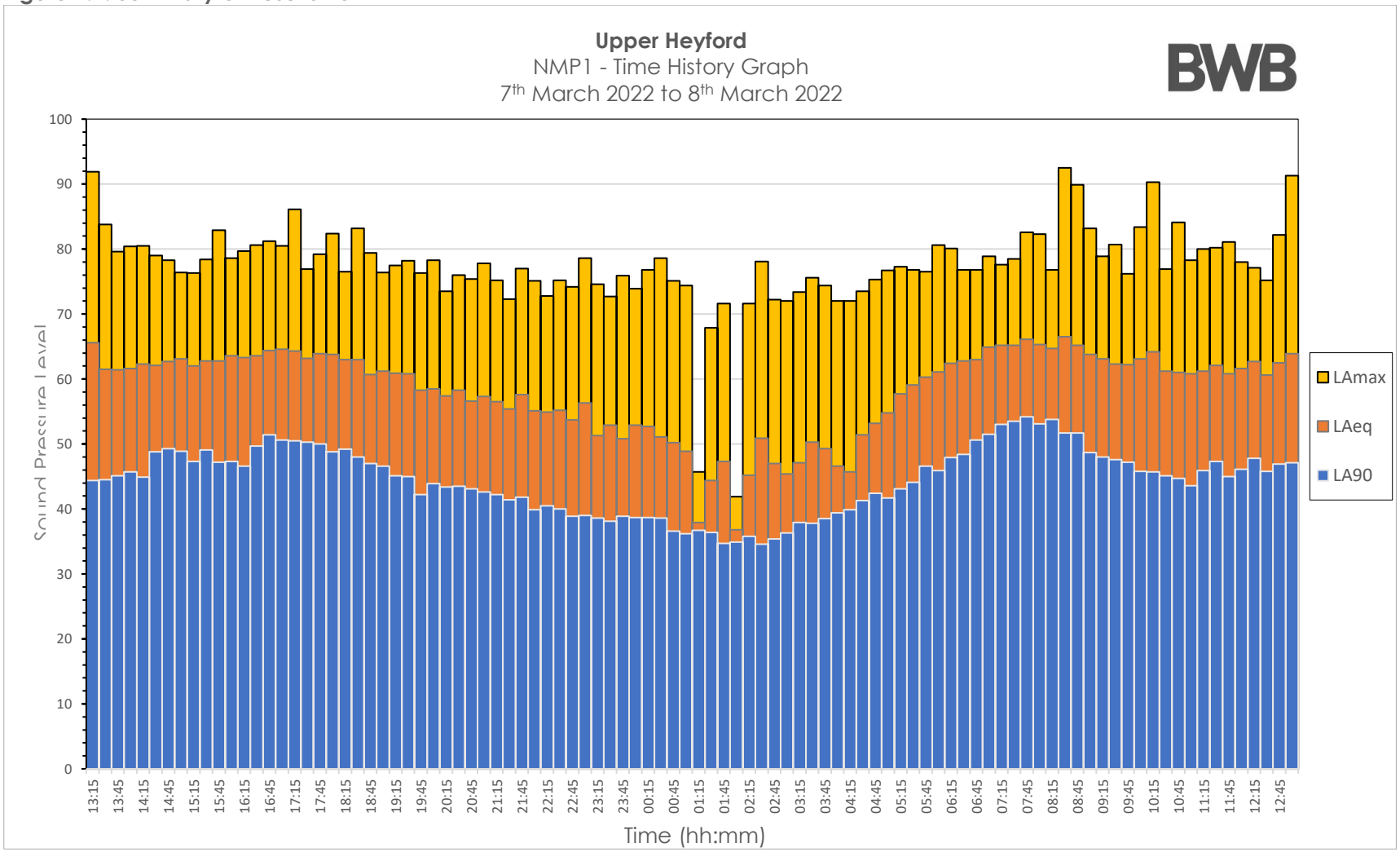
APPENDICES

APPENDIX A: Glossary of Terms

Term	Descriptions
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20 µPa (20x10-6 Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds S1 and S2 is given by 20 log10 (S1 / S2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20 µPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" noise level and is often used to describe the background noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5 m.
Façade	At a distance of 1 m in front of a large sound reflecting object such as a building façade.
Fast/Slow Time Weighting	Averaging times used in sound level metres.
Octave Band	A range of frequencies whose upper limit is twice the frequency of the lower limit.

APPENDIX B: Full Survey Results

Figure B.1: Summary of Results from NMP1



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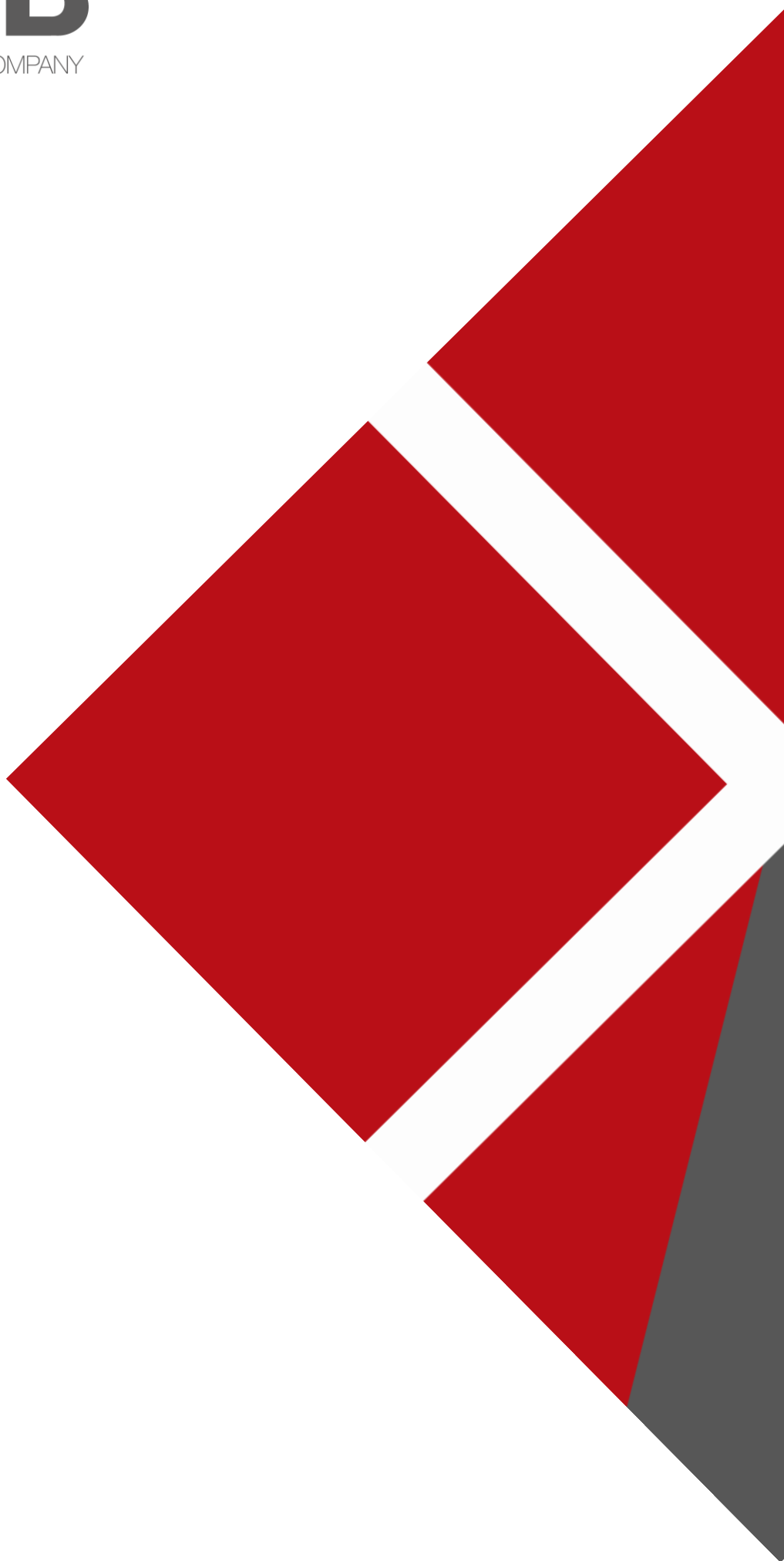

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