MEC
Development Technical Consultants

# ACOUSTIC AIR


**Land West of Fringford Road, Caversfield**
Acoustics Assessment
December 2023

**Report Ref: 27877-ENV-0401**

# Land West of Fringford Road, Caversfield
# Acoustics Assessment
# December 2023

**REPORT REF: 27877-ENV-0401**

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**REGISTRATION OF AMENDMENTS**

| Date | Rev | Comment | Prepared By | Checked By | Approved By |
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**APPENDICES**

## 1.0 INTRODUCTION

1.1 MEC has been commissioned by Richborough (hereafter referred to as 'the Client'), to undertake an Acoustics Assessment for a proposed residential development on Land West of Fringford Road, Caversfield (hereafter referred to as 'the Site').

### Assessment Scope

1.2 The following scope of works has been undertaken:

- An environmental sound survey has been undertaken within the Site in order to determine the prevailing acoustics conditions;
- An acoustic model has been created in order to predict sound levels across the Site for comparison against relevant criteria contained within ProPG[1], the British Standard BS 8233[2] and AVOG[3]; and
- Where required, appropriate mitigation measures have been provided to demonstrate compliance with the relevant standards.

1.3 The conclusions of this report aim to demonstrate to the Local Authority that external and internal acoustic conditions will be compliant with the relevant British Standards and Acoustics Guidance.

### Disclaimer

1.4 MEC has completed this report for the benefit of the individuals referred to in Paragraph 1.1 and any relevant statutory authority which may require reference in relation to approvals for the proposed development. Other third parties should not use or rely upon the contents of this report unless explicit written approval has been gained from MEC.

1.5 MEC accepts no responsibility or liability for:

- The consequence of this documentation being used for any purpose or project other than that for which it was commissioned;
- The issue of this document to any third party with whom approval for use has not been agreed.

[1] Professional Practice Guidance on Planning and Noise, May 2017.
[2] BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'
[3] Acoustics Ventilation and Overheating, Residential Design Guide, V1.1. January 2020.

## 2.0 SITE DESCRIPTION

### Existing Site

2.1 The Site is bound by open green field to the northeast; Fringford Road to the southeast, with existing residential beyond; Aunt Elms Lane to the southwest, with open green field and the B4100 located beyond; and Caversfield House and grounds to the northwest.

2.2 The principal source of noise affecting the Site will be from local road traffic using Fringford Road, Aunt Elms Lane and the distant B4100.

2.3 An approximate redline boundary is presented in Figure 2.1.

**Figure 2.1: Approximate Redline Boundary**


### Development Proposals

2.4 Development proposals comprise of the following:

Demolition of existing structures and erection of up to 99 dwellings, access, open space and associated works (outline, all matters reserved save for access).

2.5 The Illustrative Masterplan is presented in **Appendix A**.

## 3.0 STANDARDS AND GUIDANCE

### General

3.1 An acoustic glossary is provided in **Appendix B** to assist the reader.

### Summary of Guidance and Standards

3.2 The following guidance and standards relevant to the assessment are outlined below:

- National Planning Policy Framework (NPPF) 2023;
- Noise Policy Statement for England (NPSE) 2010;
- Professional Practice Guidance on Planning and Noise (ProPG) 2017;
- BS 8233:2014 *'Guidance on sound insulation and noise reduction for buildings'*; and
- Acoustics Overheating and Ventilation Guide (AVOG) 2020.

3.3 For conciseness, the guidance and standards most appropriate to this assessment are summarised in this section.

ProPG

3.4 ProPG seeks to secure good acoustic design for new residential developments. The guidance includes a framework to enable situations where noise is not an issue but to help identify the extent of risk at noisier sites. The guidance does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy.

3.5 The guidance is restricted to sites that are exposed predominantly to noise from transportation sources. Where industrial or commercial noise is present on the site but is "not dominant", its contribution may be included in the noise level used to establish the degree of risk. However, if the industrial/commercial source is dominant, an assessment in accordance with BS 4142[4] should be conducted.

3.6 A two-stage approach is considered whereby:

- Stage 1 – an initial noise risk assessment of the proposed development site is undertaken;
- Stage 2 – a systematic consideration of internal and external noise levels is considered ensuring good acoustic design and consideration of other relevant issues is recognised.

3.7 ProPG also references the World Health Organisation (WHO) guidance on maximum noise levels at night. Guidance from the WHO states that indoor sound pressure levels should not exceed approximately 45 dB $L_{AFmax}$ more than 10 – 15 times per night. ProPG indicates that individual noise events do not exceed 45 dB $L_{AFmax}$ more than 10 times a night and therefore this is considered as criteria in addition to that outlined in Table 3.1.

[4] BS 4142:2014 +A1:2019 *'Methods for rating and assessing industrial and commercial sound.'*

3.8 Whilst ProPG does not define a measurement interval for the assessment of $L_{AFmax}$ levels, research[5] has been undertaken which indicates that, for Maximum Event Level assessments, a sampling interval of between 1 and 3 minutes relates most closely to how awakening events are experienced by people in reality when compared to longer sampling periods.

3.9 For brevity, within the study, the majority of people (circa 75-85%) under test returned to a sleep state by approximately 2.5 minutes after the initial awakening event.

3.10 In summary, a longer sampling period can result in the under assessment of the 10th highest maximum level, therefore, based upon research and the recommendation of the Institute of Acoustics (IOA), a sample measurement of 2 minutes has been used to inform this assessment.

3.11 Upon completion of the ProPG's Stage 1 and 2 assessments, the findings should enable one of four possible recommendations to be presented to the decision maker, namely to grant permission without conditions, grant with conditions, 'avoid' or 'prevent'.

BS 8233

3.12 BS 8233 provides recommendations for the control of noise in and around buildings.

3.13 The guidance provided includes appropriate internal and external noise level criteria which are applicable to residential buildings exposed to steady external noise sources. It is stated in the British Standard that it is desirable for internal ambient noise levels to not exceed the criteria set out in Table 3.1.

**Table 3.1: BS 8233: 2014 Table 4 – Indoor Ambient Noise Levels for Dwellings**

| Activity | Location | 07:00 – 23:00 $L_{Aeq, 16hr}$ dB | 23:00 – 07:00 $L_{Aeq, 8hr}$ dB |
|---|---|---|---|
| Resting | Living Room | 35 | - |
| Dining | Dining Room/Area | 40 | - |
| Sleeping (daytime resting) | Bedroom | 35 | 30 |

3.14 Additional guidance in BS 8233 indicates that appropriate ventilation should be provided, if relying on closed windows to meet the guide values, and that such ventilation should not compromise the façade insulation and resulting noise levels.

3.15 BS 8233 additionally includes guidance on external amenity areas whereby it states that external noise levels should not exceed 50 dB $L_{Aeq, T}$ with an upper guideline of 55 dB $L_{Aeq, T}$ which would be acceptable in noisier environments.

[5] Paxton et al., Assessing $L_{max}$ for residential development: The AVO Guide Approach, Institute of Acoustics, 2019

AVOG

3.16 AVOG outlines a methodology for the assessment of airborne sound during overheating conditions, and emphasises the co-dependency of acoustics, ventilation and overheating design.

3.17 Many developments require closed windows to provide good internal acoustic conditions which is in direct contrast to residents opening windows to keep a building cool. These opposing requirements are becoming a significant issue in residential building design as only one environmental comfort is then possible: either comfortable noise levels with windows closed or thermal comfort with windows open.

3.18 AVOG prescribes a two-level assessment procedure, the first stage is based upon external sound levels and provides a risk of adverse acoustic conditions during periods of overheating. The second stage is a formal assessment which considers both internal acoustic conditions and increased ventilation during overheating concurrently. A Level 2 AVOG assessment is typically reserved for detailed design stage as the Level 1 assessment would inform any future required works for reserved matters.

3.19 It should be noted, that whilst AVOG is typically applicable at planning stage, with the introduction of AD-O[6] for Building Control purposes, which contains acoustic criteria for bedrooms during the night-time, a detailed AVOG assessment is likely to be required at some point in the project cycle.

3.20 However, as AD-O is required at Building Control stage and not necessarily for planning, an AVOG assessment for night-time is also presented in this report, to give context to the environment and the potential risk of internal acoustic conditions during periods of overheating. It should however be noted that the requirement to provide a suitable Overheating strategy that considers internal acoustic conditions is a Building Control matter or something that can be considered in more detail at reserved matters stage.

3.21 This report considers an AVOG Level 1 assessment only.

[6] The Building Regulations 2010, Overheating, Approved Document 'O'.

## 4.0 ENVIRONMENTAL SOUND SURVEY

4.1 An environmental sound survey was undertaken between Wednesday 26th and Monday 31st July 2023. The survey was undertaken in full accordance with the guidance set out in BS 7445[7].

4.2 Sound Level Meters (SLMs) were installed at two locations, as follows:

- Continuous Measurement 1 (CM1): on the south western boundary, approximately 7m from the carriageway edge of Aunt Elms Lane;
- Continuous Measurement 2 (CM2): on the south eastern boundary, approximately 11.5m from the carriageway edge of Fringford Road.

4.3 A monitoring location plan is provided in Figure 4.1.

**Figure 4.1: Measurement Positions**


### Equipment

4.4 Measurements were taken using Class 1 integrating/averaging SLMs housed in environmental protection apparatus. The SLMs were installed in a free field position at a height of 1.5m above local ground level, and field calibrated before and after the survey using a Class 1 calibrator, with no significant drift in calibration noted.

[7] BS 7445-1:2003 'Description and measurement of environmental noise, Part 1: Guide to quantities and procedures.'

4.5 The SLMs were set up to capture the following parameters at a minimum: $L_{Aeq,}$ $L_{A90}$ and $L_{AFmax}$ values, and full details of the equipment used to undertake the survey are presented in Table 4.1.

**Table 4.1: Equipment and Calibration Details**

| Measurement Position | Description | Manufacturer & Type No. | Serial No. | Calibration Due Date |
|---|---|---|---|---|
| CM1 (SLM1) | Sound Level Meter | Type NOR140 | 1407932 | 26/02/2025 |
| | Pre-Amplifier | Type 1209 | 23695 | |
| | Microphone | Type 1225 | 505583 | |
| | Calibrator | Norsonic 1251 | 34315 | 05/03/2024 |
| CM2 (SLM2) | Sound Level Meter | Type NOR140 | 1407599 | 04/09/2024 |
| | Pre-Amplifier | Type 1209 | 22646 | |
| | Microphone | Type 1225 | 384571 | |
| | Calibrator | Norsonic 1255 | 125525494 | 18/09/2024 |

### Meteorological Conditions

4.6 During setup of the SLMs, weather conditions were dry and mild, with very light westerly winds of up to 0.2 m/s. On collection, weather conditions were noted to be dry, with south westerly winds of up to 2.6 m/s.

### Observations

4.7 Site notes indicate the dominant source of noise, at all times, to be from local road traffic using Fringford Road, Aunt Elms Lane and the distant B4100.

### Results

4.8 Table 4.2 and Table 4.3 provide a summary of measured assessment appropriate sound levels at CM1 and CM2 respectively.

4.9 Time history graphs are provided in **Appendix C.**

**Table 4.2: Summary of Measured Sound Levels at CM1, dB**

| Date | Daytime 07:00 – 23:00 | Night-time 23:00 – 07:00 | |
|---|---|---|---|
| | $L_{Aeq, T}$ | $L_{Aeq, 8hr}$ | Typical Maximum Event Level[(a)] $L_{AFmax, 2min}$ |
| Wed 26th | 53[(b)] | 48 | 69 |
| Thu 27th | 54 | 45 | 69 |
| Fri 28th | 53 | 43 | 67 |
| Sat 29th | 54 | 45 | 68 |
| Sun 30th | 53 | 48 | 69 |
| Mon 31st | 56[(c)] | - | - |

[(a)] Maximum noise level not exceeded more than 10 times per night.
[(b)] T = 12hr
[(c)] T = 5hr

4.10 At CM1, the measured daytime $L_{Aeq, T}$ ranged between 53 dB and 56 dB dB (rounding to the nearest whole number for assessment purposes), while the measured night-time $L_{Aeq, 8hr}$ ranged between 43 dB and 48 dB.

4.11 Analysis of the night-time $L_{AFmax, 2min}$ levels shows that the individual events did not exceed 69 dB more than 10 times during the measured night-time period and, that this value was only exceeded once by more than 5 dB. Therefore, a value of 69 dB $L_{AFmax, 2min}$ is considered appropriate for the assessment.

**Table 4.3: Summary of Measured Sound Levels at CM2, dB**

| Date | Daytime 07:00 – 23:00 | Night-time 23:00 – 07:00 | |
|---|---|---|---|
| | $L_{Aeq, T}$ | $L_{Aeq, 8hr}$ | Typical Maximum Event Level[(a)] $L_{AFmax, 2min}$ |
| Wed 26th | 57[(b)] | 49 | 72 |
| Thu 27th | 55 | 48 | 71 |
| Fri 28th | 55 | 46 | 70 |
| Sat 29th | 55 | 47 | 71 |
| Sun 30th | 55 | 49 | 72 |
| Mon 31st | 57[(c)] | - | - |

[(a)] Maximum noise level not exceeded more than 10 times per night.
[(b)] T = 12hr
[(c)] T = 5hr

4.12 At CM2, the measured daytime $L_{Aeq, T}$ ranged between 55 dB and 57 dB dB, while the measured night-time $L_{Aeq, 8hr}$ ranged between 46 dB and 49 dB.

4.13 Whilst the higher daytime $L_{Aeq, T}$ sound level of 57 dB was recorded on two days, it is noted that these days did not consist of the full 16-hour daytime periods. Therefore, the more prevalent sound level of 55 dB is considered more appropriate for the purpose of the assessment.

4.14 Analysis of the night-time $L_{AFmax, 2min}$ levels shows that the individual events did not exceed 72 dB more than 10 times during the measured night-time period and, that this value was not exceeded by more than 5 dB. Therefore, a value of 72 dB $L_{AFmax, 2min}$ is considered appropriate for the assessment.

## 5.0 ASSESSMENT METHODOLOGY

### Acoustic Modelling

5.1 An acoustic model of the Site and environs has been generated in Datakustik CadnaA® modelling software. Noise source emissions have been informed by the environmental sound survey presented in Section 4.

5.2 Based on the measured sound levels at CM1 and CM2, the following levels will be used to calibrate the 3D acoustic model.

CM1

- Daytime, $L_{Aeq, 16hr}$ – 54 dB;
- Night-time, $L_{Aeq, 8hr}$ – 48 dB; and
- Night-time $L_{AFmax, 2min}$ – 69 dB.

CM2

- Daytime, $L_{Aeq, 16hr}$ – 55 dB;
- Night-time, $L_{Aeq, 8hr}$ – 49 dB; and
- Night-time, $L_{AFmax, 2min}$ – 72 dB.

5.3 CadnaA® considers various inputs, including topography, buildings and road noise sources, and calculates sound levels in accordance with national and international standards; in this case, the relevant UK standards are the procedures set out within ISO 9613-2[8].

5.4 The modelling assumptions and input information for the acoustic model are as follows:

- Digital Terrain Model – Lidar 1m (Environment Agency, downloaded on 28th July 2023);
- Open Street Map data (publicly available);
- Ground absorption for the Site = 0.5 (mixed ground);
- Building heights estimated following site observations or based upon masterplan;
- Buildings set to be reflective only with no absorption coefficient;
- First order reflections included in the modelling;
- Temperature set to 10°C; and
- Relative humidity set to 70%

5.5 With reference to the noise criteria outlined in Section 3.0, the acoustic model has been used to predicted sound levels across the Site for the following scenarios:

- Daytime $L_{Aeq, 16hr}$ external sound levels at ground floor (1.5m) height;
- Night-time $L_{Aeq, 8hr}$ external sound levels at first floor (4m) height; and
- Night-time $L_{AFmax, 2min}$ external sound levels at first floor (4m) height.

[8] ISO 9613-2 *'Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.*

5.6 For conciseness, this report tabulates the most exposed receptors to give context to the most stringent mitigation measures. All other receptors are assessed through the various sound level contour and mitigation reference drawings presented in the various appendices to this report.

5.7 As plot numbers are currently unavailable, the most exposed proposed receptor to Aunt Ems Lane will be named Plot ‘X’ and the most exposed proposed receptor to the Fringford Road will be named Plot ‘Y’. These Plots are illustrated on the drawings presented in **Appendix D**.

## 6.0 ACOUSTICS ASSESSMENT

### ProPG Initial Noise Risk Assessment

6.1 As required by the ProPG, an Initial Noise Risk Assessment (INRA) is presented in Table 6.1.

**Table 6.1: Initial Site Noise Risk Assessment, dB**

| Risk | Negligible | | Low | | Medium | | High | |
|---|---|---|---|---|---|---|---|---|
| Period | Day | Night | Day | Night | Day | Night | Day | Night |
| Pro PG Threshold[(a)] | < 50 | < 40 | 50 – 60 | 40 – 50 | 60 – 70 | 50 – 60 | > 70 | > 60 |
| Plot X | 49 | | | 45 | | | | |
| Risk Assessment | Negligible | | | Low | | | | |
| Plot Y | 47 | | | 43 | | | | |
| Risk Assessment | Negligible | | | Low | | | | |

[(a)] $L_{Aeq, 16hr}$ dB for daytime assessment purposes and $L_{Aeq, 8hr}$ dB for night-time assessment purposes.

6.2 Based on the modelled sound levels, the most exposed dwelling overlooking Aunt Ems Lane (Plot X) and Fringford Road (Plot Y) fall within the ProPG risk category of 'Negligible' during the daytime, for which the guidance states the Site is likely to be acceptable from a noise perspective and the application need not normally be delayed on noise grounds.

6.3 During the night-time the most exposed dwellings fall in the ProPG risk category of 'Low', for which the guidance states the Site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed.

### BS 8233 External Amenity Criteria

6.4 The daytime $L_{Aeq, 16hr}$ sound level contour map, shown on drawing 27877_04_120_01 in **Appendix D**, indicates that BS 8233's lower-level criterion of 50 dB $L_{Aeq, 16hr}$ will be satisfied at all garden locations on the Site without the need for mitigation.

### Internal Acoustic Criteria

6.5 Table 6.2 presents the required external to internal reduction requirements for Plot X and Plot Y.

**Table 6.2: Required Façade Performance, dB**

| Plot | Parameter | External Level | Internal Criteria | Required Reduction[(a)] |
|---|---|---|---|---|
| X | Daytime Ambient $L_{Aeq, 16hr}$ | 49 | 35 | 14 |
| | Night-time Ambient $L_{Aeq, 8hr}$ | 45 | 30 | 15 |
| | Night-time Maximum $L_{AFmax, 2min}$ | 66 | 45 | 21 |

| Plot | Parameter | External Level | Internal Criteria | Required Reduction[(a)] |
|---|---|---|---|---|
| Y | Daytime Ambient $L_{Aeq, 16hr}$ | 47 | 35 | 12 |
| | Night-time Ambient $L_{Aeq, 8hr}$ | 43 | 30 | 13 |
| | Night-time Maximum $L_{AFmax, 2min}$ | 66 | 45 | 21 |
| [(a)] External to internal reduction to achieve BS 8233 and ProPG criteria. | | | | |

6.6 For the most exposed dwelling overlooking Aunt Ems Lane (Plot X), the results in Table 6.2 show that a sound reduction of approximately 14 dB will be required to achieve the 35 dB $L_{Aeq, 16hr}$ criteria within habitable rooms during the daytime, with maximum sound levels driving the acoustic design for bedrooms and a sound reduction of up to 21 dB required to achieve the 45 dB $L_{AFmax, 2min}$ criteria within bedrooms during the night-time.

6.7 For dwellings most exposed to the Fringford Road (Plot Y), the results in Table 6.2 show that a sound reduction of approximately 12 dB will be required to achieve the 35 dB $L_{Aeq, 16hr}$ criteria within habitable rooms during the daytime, with maximum sound levels driving the acoustic design for bedrooms and a sound reduction of up to 21 dB required to achieve the 45 dB $L_{AFmax, 2min}$ criteria within bedrooms during the night-time.

6.8 Notwithstanding any additional ventilation measures to satisfy overheating criteria, typical window constructions to achieve the required reduction values presented in Table 6.2 can commonly be found in standard thermal double glazing accompanied by direct airpath window mounted trickle ventilators to achieve the whole-dwelling ventilation requirements of AD-F[9].

6.9 This would be installed as standard across all residential developments and as such, there are no significant acoustic concerns for any part of the Site.

**AVOG Level 1 Assessment**

6.10 AVOG prescribes a two-stage assessment. Level 1 looks to determine if overheating needs to be considered further, based on the predicted external façade levels for the most exposed receptors. The initial Level 1 assessment is presented in Table 6.3.

[9] The Building Regulations 2010, Ventilation, Approved Document F, 2021 Edition.

**Table 6.3: AVOG Level 1 Assessment**

| Plot | Parameter | Predicted External Level dB | Level 1 Risk Grading | Level 2 Advised? |
|---|---|---|---|---|
| X | Daytime Ambient $L_{Aeq, 16hr}$ | 49 | Negligible | Not Required |
| | Night-time Ambient $L_{Aeq, 8hr}$ | 45 | Negligible | Not Required |
| | Night-time Maximum $L_{AFmax, 2min}$ | 66 | Internal Level < 65 dB<br>No further consideration required. | |
| Y | Daytime Ambient $L_{Aeq, 16hr}$ | 47 | Negligible | Not Required |
| | Night-time Ambient $L_{Aeq, 8hr}$ | 43 | Negligible | Not Required |
| | Night-time Maximum $L_{AFmax, 2min}$ | 66 | Internal Level < 65 dB<br>No further consideration required. | |
| [(a)] Internal level calculated based upon an external to internal reduction of 9 dB provided by an open window to combat overheating as outlined in AD-O. | | | | |

6.11 The results demonstrate that at the most exposed receptors overlooking Aunt Ems Lane and Fringford Road, an AVOG Level 2 assessment is not required, due to the negligible levels of noise, therefore, no further consideration to overheating will be given.

6.12 However, it should be noted that the maximum levels will drive the acoustic design and therefore, with the introduction of the more stringent maximum night-time criteria presented within AD-O[10], the mitigation schedule may be subject to change at Building Control stage based upon the outcome of any Dynamic Thermal Modelling assessment.

6.13 Nevertheless, demonstrating a suitable overheating strategy is not necessarily a planning application consideration, and could therefore be considered at a later stage, as part of other Building Control matters.

[10] The Building Regulations 2010, Overheating, Approved Document 'O'.

## 7.0 MITIGATION

### External Sound Levels

7.1 BS 8233's lower-level criterion of 50 dB $L_{Aeq}$ will be satisfied at all garden locations on the Site without the need for mitigation. Nevertheless, standard 1.8m high close boarded timber fencing is recommended for all garden areas with a direct line of sight to the road to minimise impacts in accordance with BS 8233.

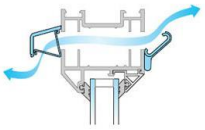
### Internal Sound Levels

7.2 Acoustic modelling has demonstrated potential façade sound levels and, in accordance with BS 8233, ProPG and AVOG, sound reduction performance requirements of the façade have been determined.

7.3 In terms of acoustics, windows and ventilation strategies are the 'weakest' acoustics point in any façade and subsequently, the composite sound reduction performance is typically dominated by these elements. Therefore, minimum performance requirements to be provided by the glazing and ventilation elements at all dwellings are presented herein.

7.4 Drawing on the above, and the acoustic modelling undertaken, Table 7.1 provides typical reduction requirements and potential glazing and ventilation solutions across the Site in order to demonstrate compliance with the internal sound level criteria outlined in BS 8233, ProPG, and the ventilation requirements of AD-F.

**Table 7.1: Suggested Internal Mitigation Measures**

| Example Glazing Solution | Example Whole-Dwelling Ventilation Solution (AD-F) |
|---|---|
| 4mm glass panel<br>12mm air gap<br>4mm glass panel<br><br>Approx. 27 dB $R_w + C_{tr}$ | Standard Non-Acoustic Trickle Vent<br>Direct airpath trickle vent located in the top of the window frame<br>  <br>Approx. $D_{n,e,w} + C_{tr}$ = 32 dB |

7.5 For the mitigation requirement outlined in Table 7.1, the sound reduction performance requirements, in octave band and weighted reduction format, are presented in Table 7.2 below.

**Table 7.2: Glazing and Ventilation Octave Band Performance Requirements**

| Façade Element | Sound Insulation Performance Requirements (dB) in Octave Band Centre Frequencies (Hz) | | | | | | $R_w$ / $D_{n,e,w}$ (dB) | $C_{tr}$ (dB) |
|---|---|---|---|---|---|---|---|---|
| | 125 | 250 | 500 | 1k | 2k | 4k | | |
| **Glazing** | 22 | 20 | 26 | 36 | 39 | 31 | 31 | -4 |
| **Ventilation (Trickle)** | 32 | 32 | 31 | 33 | 31 | 31 | 32 | 0 |

7.6 It is appreciated that it is impractical to achieve every octave band minimum performance requirement, therefore, during procurement of solutions, the $R_w+C_{tr}$ or $D_{n,e,w}+C_{tr}$ should be adhered to at a minimum.

## 8.0 CONCLUSIONS

8.1 MEC has been commissioned by Richborough, to undertake an Acoustics Assessment for a proposed residential development on Land West of Fringford Road, Caversfield.

8.2 Assessments have been undertaken in accordance with ProPG and BS 8233, with consideration also given to internal sound levels during periods of overheating in accordance with AVOG.

8.3 Acoustic modelling has demonstrated that BS 8233's lower-level criterion of 50 dB $L_{Aeq}$, will be satisfied at all garden locations on the Site without the need for mitigation.

8.4 With regards to internal acoustic conditions, all dwellings will satisfy the criteria in BS 8233 and ProPG through the provision of standard thermal double glazing and direct airpath window mounted trickle ventilators to achieve the whole-dwelling ventilation requirements of AD-F.

8.5 When considering the planning guidance outlined in AVOG, an open window acoustics strategy is permissible during periods of overheating. However, at Building Control stage, further investigations may be required under AD-O. As this is not a planning consideration the application should not be delayed on these grounds.

8.6 It is therefore considered that with the implementation of the recommended mitigation strategy the Site is suitable for residential development.

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# APPENDICES

## APPENDIX A


**Do not scale from this drawing.**
This drawing is for discussion or planning purposes only.
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# PLANNING

- Site boundary
- 1 Proposed vehicular/cycle/pedestrian access
- 2 Proposed emergency/pedestrian & cycle access
- 3 Primary tree lined street
- 4 Secondary street
- 5 Village mews
- 6 Private lane/drive
- 7 Shared surface
- 8 Informal courtyard with agricultural theme
- 9 Historic track alignment
- 10 Cycle way
- 11 Play space (LEAP)
- 12 Natural play/ trail space
- 13 Sustainable drainage
- 14 Entrance green (wildflower planting)
- 15 Planted swale corridor
- 16 Existing vegetation retained and enhanced as necessary
- 17 Mown path
- 18 Open grassland
- 19 Community orchard
- 20 Garden Common
- 21 Natural open space
- 22 Soft development edge
- 23 Area to be fenced off for ecology/ wildlife
- 24 Drop bollards

| Rev. | Date | Description |
|---|---|---|

Land West of Fringford Road
CAVERSFIELD

## Illustrative Masterplan

| Job ref: | Drawing number: | Revision: |
|---|---|---|
| 501 | P07 | - |

| Scale: | Date: |
|---|---|
| 1:1,500 @ A3 | December 2023 |

EDGE URBAN DESIGN

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# APPENDICES

## APPENDIX B

**GLOSSARY OF TECHNICAL TERMS**

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurements, and the levels are denoted as dB(A) or $L_{Aeq}$, $L_{A90}$ etc, according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

**Typical sound levels found in the environment**

| **Sound Level** | **Location** |
|---|---|
| 0 dB(A) | Threshold of hearing |
| 20 to 30 dB(A) | Quiet bedroom at night |
| 30 to 40 dB(A) | Living room during the day |
| 40 to 50 dB(A) | Typical office |
| 50 to 60 dB(A) | Inside a car |
| 60 to 70 dB(A) | Typical high street |
| 70 to 90 dB(A) | Inside a factory |
| 100 to 110 dB(A) | Burglar alarm at 1m away |
| 110 to 130 dB(A) | Jet aircraft taking off |
| 140 dB(A) | Threshold of pain |

| Descriptor | Terminology |
|---|---|
| Sound Pressure | Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure. |
| Sound Pressure Level | The sound level is the sound pressure relative to a standard reference pressure of 20μPa (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 20μPa. |
| 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. |
| $L_{AFmax, T}$ | A noise level index defined as the maximum noise level during the measurement period. $L_{Max}$ is sometimes used for the assessment of discrete loud noises, which may have little effect on the overall $L_{eq}$ noise level but will still affect the noise environment. It is typically 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. |
| $L_{10, T}$ | A noise level index. The noise level exceeded for 10% of the time over the period, *T*. *L*10 can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. |
| Free-Field | Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m. |
| Façade | At a distance of 1m in front of a large sound reflecting object such as a building facade. |
| Fast/Slow Time Weighting | Averaging times used in sound level meters. |
| Octave Band | A range of frequencies whose upper limit is twice the frequency of the lower limit |
| One-third Octave Band | A frequency band in which the upper limit is 21/3 times the frequency of the lower limit. |
| Rating Level | The specific sound level, plus any adjustment for characteristic feature of sound in BS 4142. |
| Specific Sound Level | The A-weighted $L_{eq}$ sound level produced by a sound source during a specified period of time. Commonly known as the sound source under investigation as defined in BS 4142. |
| Typical Maximum Level | The $90^{th}$ percentile maximum event level ($L_{AFmax}$) measured during a period. Used for assessing night-time maximum levels under typical and overheating conditions. |

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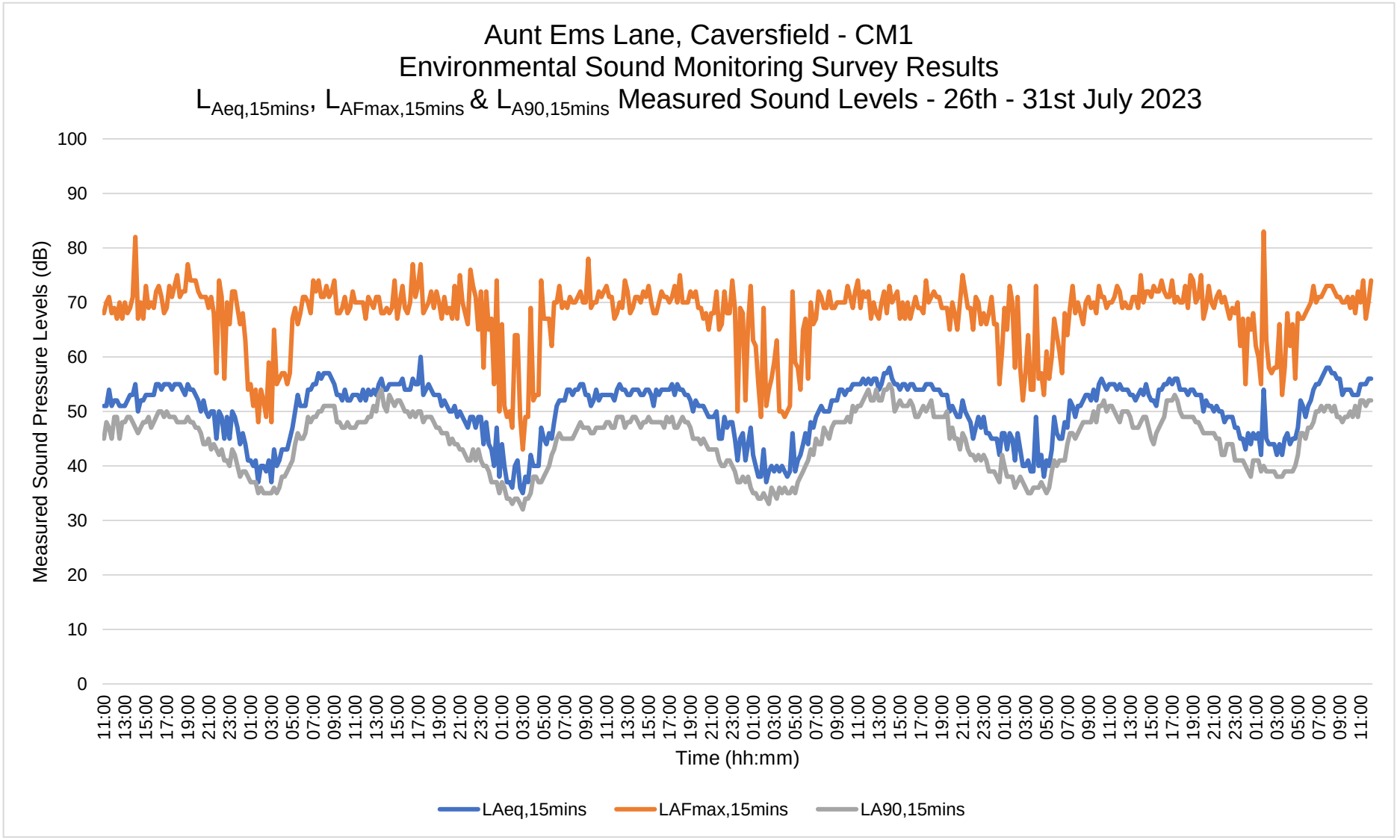
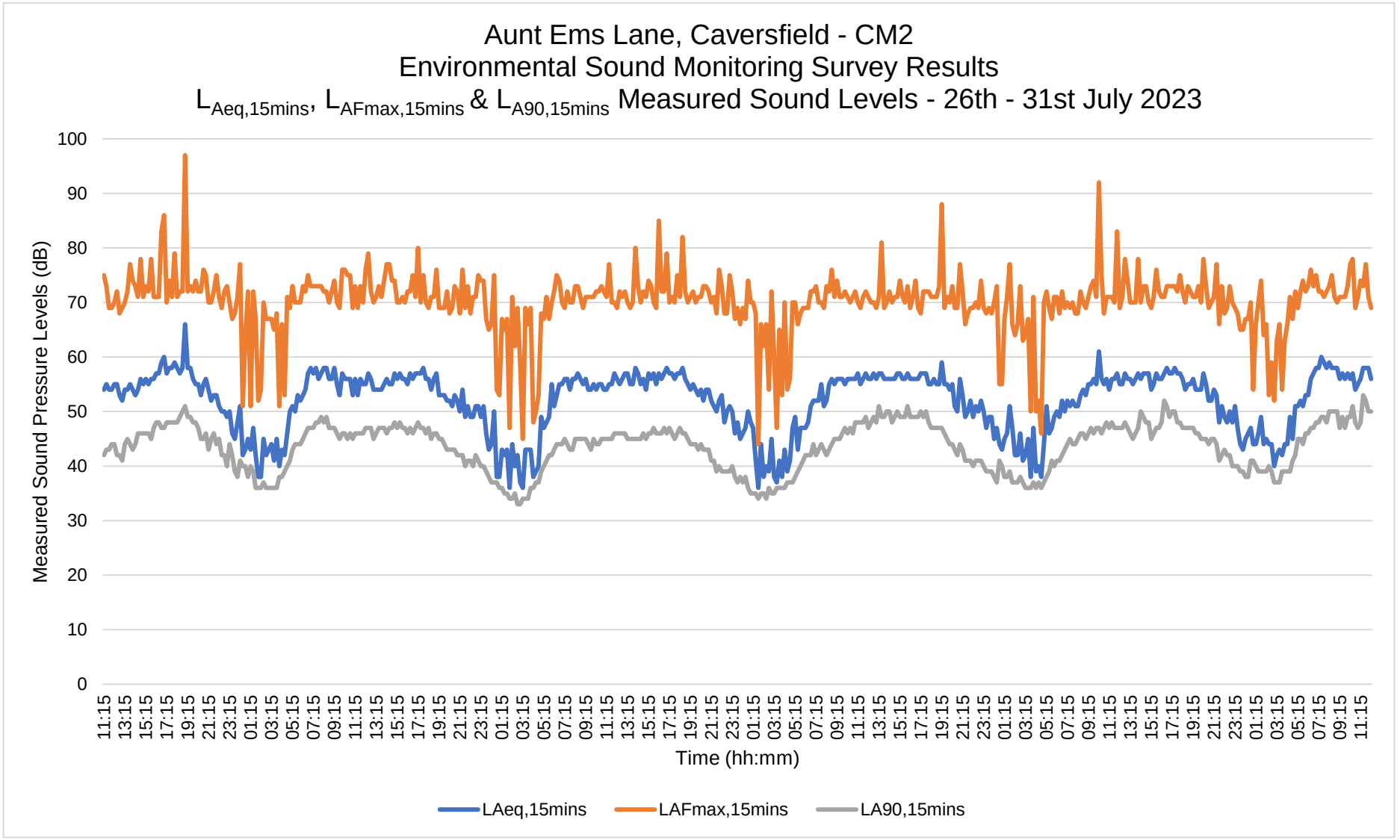
# APPENDICES

## APPENDIX C


Aunt Ems Lane, Caversfield - CM1
Environmental Sound Monitoring Survey Results
$L_{Aeq,15mins}$, $L_{AFmax,15mins}$ & $L_{A90,15mins}$ Measured Sound Levels - 26th - 31st July 2023
Measured Sound Pressure Levels (dB)
100
90
80
70
60
50
40
30
20
10
0
11:00 13:00 15:00 17:00 19:00 21:00 23:00 01:00 03:00 05:00 07:00 09:00 11:00 13:00 15:00 17:00 19:00 21:00 23:00 01:00 03:00 05:00 07:00 09:00 11:00 13:00 15:00 17:00 19:00 21:00 23:00 01:00 03:00 05:00 07:00 09:00 11:00 13:00 15:00 17:00 19:00 21:00 23:00 01:00 03:00 05:00 07:00 09:00 11:00
Time (hh:mm)
LAeq,15mins
LAFmax,15mins
LA90,15mins


Aunt Ems Lane, Caversfield - CM2
Environmental Sound Monitoring Survey Results
$L_{Aeq,15mins}$, $L_{AFmax,15mins}$ & $L_{A90,15mins}$ Measured Sound Levels - 26th - 31st July 2023
Measured Sound Pressure Levels (dB)
100
90
80
70
60
50
40
30
20
10
0
11:15 13:15 15:15 17:15 19:15 21:15 23:15 01:15 03:15 05:15 07:15 09:15 11:15 13:15 15:15 17:15 19:15 21:15 23:15 01:15 03:15 05:15 07:15 09:15 11:15 13:15 15:15 17:15 19:15 21:15 23:15 01:15 03:15 05:15 07:15 09:15 11:15 13:15 15:15 17:15 19:15 21:15 23:15 01:15 03:15 05:15 07:15 09:15 11:15
Time (hh:mm)
LAeq,15mins
LAFmax,15mins
LA90,15mins

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# APPENDICES

## APPENDIX D


NOTES:

1. DO NOT SCALE THIS DRAWING.

KEY

- 0–50dB(A)
- 50–55dB(A)
- 55–60dB(A)
- 60–65dB(A)
- 65–70dB(A)
- 70–75dB(A)
- 75–80dB(A)
- >80dB(A)

| REV: | AMENDMENTS: | DRN: | CHK: | APP: | DATE: |
|---|---|---|---|---|---|
| - | | EW | NF | AB | 06.12.23 |

PROJECT:
LAND WEST OF FRINGFORD ROAD, CAVERSFIELD

DRAWING TITLE:
DAYTIME AMBIENT SOUND LEVELS, LAeq,16hour

CLIENT:
RICHBOROUGH

DRAWING NUMBER:
27877_04_120_01

| REVISION: | SHEET SIZE: | SCALE: |
|---|---|---|
| - | A3 | NTS |

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- 55–60dB(A)
- 60–65dB(A)
- 65–70dB(A)
- 70–75dB(A)
- 75–80dB(A)
- >80dB(A)

| REV: | AMENDMENTS: | DRN: | CHK: | APP: | DATE: |
|---|---|---|---|---|---|
| - | | EW | NF | AB | 06.12.23 |

PROJECT:
LAND WEST OF FRINGFORD ROAD, CAVERSFIELD

DRAWING TITLE:
NIGHT-TIME AMBIENT SOUND LEVELS, LAeq,8hour

CLIENT:
RICHBOROUGH

DRAWING NUMBER:
27877_04_120_02

| REVISION: | SHEET SIZE: | SCALE: |
|---|---|---|
| - | A3 | NTS |

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- 50–55dB(A)
- 55–60dB(A)
- 60–65dB(A)
- 65–70dB(A)
- 70–75dB(A)
- 75–80dB(A)
- >80dB(A)

| REV: | AMENDMENTS: | DRN: | CHK: | APP: | DATE: |
|---|---|---|---|---|---|
| - | | EW | NF | AB | 06.12.23 |

PROJECT:
LAND WEST OF FRINGFORD ROAD, CAVERSFIELD

DRAWING TITLE:
NIGHT-TIME MAXIMUM SOUND LEVELS, LAFmax,T

CLIENT:
RICHBOROUGH

DRAWING NUMBER:
27877_04_120_03

| REVISION: | SHEET SIZE: | SCALE: |
|---|---|---|
| - | A3 | NTS |

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