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Development Technical
Consultants

ACOUSTIC AIR



Roundwood, Stevenage
Acoustics Assessment
October 2023

Report Ref: 25521-ENV-0402

Roundwood, Stevenage

Acoustics Assessment

October 2023

REPORT REF: 25521-ENV-0402

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1.0 INTRODUCTION

1.1 MEC, has been commissioned by Croudace Homes (hereafter referred to as 'the Client') to undertake an Acoustics Assessment for a proposed residential development on Land at Roundwood, Stevenage (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 ProPG¹, the British Standard BS 8233² and AVOG³;
- Consideration has been given to development generated road traffic noise in accordance with CRTN⁴ and DMRB⁵; 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.

⁴ Calculation of Road Traffic Noise, Department of Transport Welsh Office, 1988.

⁵ Design Manual for Road and Bridges, LA 111, Noise and Vibration, Rev 2, May 2020.

2.0 SITE DESCRIPTION

Existing Site

- 2.1 The Site is bound by arable land to the north; Back Lane to the east and south, with existing residential located on the opposite side of the road; and a small wooded area to the west, with open green field beyond.
- 2.2 An approximate redline boundary is presented in Figure 2.1.

Figure 2.1: Approximate Redline Boundary



Development Proposals

- 2.3 Development proposals comprise the erection of 292 residential dwellings, with associated infrastructure and access via Back Lane and Haybluff Drive.
- 2.4 The proposed site layout 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 most 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*';
- Acoustics Overheating and Ventilation Guide (AVOG) 2020;
- Calculation of Road Traffic Noise 1988;
- TRL Method for Converting the UK Road Traffic Noise Index $L_{A10, 18hr}$ to the EU Noise Indices for Road Noise Mapping; and
- Design Manual for Road and Bridges, LA 111, Noise and Vibration, Rev 2, May 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 4142⁶ 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

⁶ BS 4142:2014 +A1:2019 '*Methods for rating and assessing industrial and commercial sound.*'

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.

- 3.8 Whilst ProPG does not define a measurement interval for the assessment of L_{AFmax} levels, research⁷ 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.

⁷ Paxton et al., Assessing L_{max} for residential development: The AVO Guide Approach, Institute of Acoustics, 2019

AVOG

- 3.16 The AVOG was published by the Association of Noise Consultants (ANC) and The Institute of Acoustics (IOA) in 2020. The guide 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. This is in direct contrast to the fact that residents typically open windows in order to keep a building cool. These opposing requirements are becoming a major issue in the design of buildings, in particular for housing, especially as the aim is to avoid widespread use of mechanical ventilation and cooling systems.
- 3.18 AVOG prescribes a two-level assessment procedure, as follows:
- Level 1 – Site Risk Assessment, based on external free-field noise levels (similar to that of ProPG); and
 - Level 2 – Assessment of Adverse Effect, based on internal ambient noise level and duration.
- 3.19 An AVOG Level 2 assessment gives consideration to internal noise levels on a sliding scale depending on the likelihood and duration of overheating.
- 3.20 This report considers an AVOG Level 1 assessment.

Calculation of Road Traffic Noise

- 3.21 CRTN⁸ sets out standard procedures for calculating noise levels from road traffic. The calculation methods use a number of input variables, including traffic flow volume, average vehicle speed, percentage of heavy-duty vehicles (HDVs), type of road surface, site geometry and the presence of noise barriers or acoustically absorptive ground.
- 3.22 CRTN predicts the $L_{A10, 18hr}$ for any receptor point at a given distance, up to 300m from the road.
- 3.23 CRTN also documents procedures for the measurement of road traffic noise. Three methods of road traffic noise measurement are described, the first entitled 'The Measurement Method', for direct measurement of the $L_{A10, 18hr}$ noise level, the second entitled the 'Shortened Measurement Procedure', for measurement of the $L_{A10, 3hr}$ noise level from which the $L_{A10, 18hr}$ level can be derived and the third entitled 'Comparative Measurements' which is a procedure to establish noise levels from a single road traffic route at various points, provided that the route remains the dominant source.
- 3.24 CRTN states that if the Shortened Measurement Procedure is followed, a correction of -1 dB can be applied to the determined $L_{A10, 3hr}$ noise level to approximate the $L_{A10, 18hr}$ noise level.

⁸ Calculation of Road Traffic Noise, Department of Transport Welsh Office, 1988.

TRL Method

- 3.25 The 'TRL Method'⁹ presents a procedure for converting $L_{A10, 18hr}$ values to $L_{Aeq, T}$ values suitable for noise mapping and assessment of alternative acoustic standards. For the Site, the correction factors are applicable to non-motorway roads and are presented in Table 3.2.

Table 3.2: $L_{A10, 18hr}$ to $L_{Aeq, T}$ conversions

Time period	Non-motorway conversion
07.00 – 21.00	$L_{day} = 0.95 \times L_{A10, 18hr} + 1.44$
21.00 – 23.00	$L_{evening} = 0.97 \times L_{A10, 18hr} - 2.87$
23.00 – 07.00	$L_{night} = 0.890 \times L_{A10, 18hr} - 3.77$
07.00 – 23.00	$L_{Aeq, 16hr} = 10 \log_{10} ((12 \times (10^{L_{day}/10}) + 4 \times (10^{L_{evening}/10})/16)$

DMRB LA 111 'Noise and vibration'

- 3.26 This document sets out procedures for undertaking the environmental assessment of new road schemes, including the assessment of noise impacts from road traffic. In undertaking a DMRB assessment, the calculation of traffic noise levels uses the methodology contained within the CRTN document as described below.

Table 3.3: Magnitude of Change, Short-Term

Magnitude of Change	Short-Term Noise Change $L_{A10, 18h}$ or L_{night} dB
Major	Greater than or equal to 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	Less than 1.0

Table 3.4: Magnitude of Change, Long-Term

Magnitude of Change	Long-Term Noise Change $L_{A10, 18h}$ or L_{night} dB
Major	Greater than or equal to 10.0
Moderate	5.0 to 9.9
Minor	3.0 to 4.9
Negligible	Less than 3.0

⁹ TRL & Casella Stanger (2006). Method for Converting the UK Road Traffic Noise Index $L_{A10, 18h}$ to the EU Noise Indices for Road Noise Mapping.

4.0 ENVIRONMENTAL SOUND SURVEY

4.1 An environmental sound survey was undertaken between Monday 14th and Tuesday 15th August 2023. The survey was undertaken in full accordance with the guidance set out in BS 7445¹⁰.

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

- Continuous Measurement 1 (CM1): on the eastern boundary, approximately 7.5m from the carriageway edge of Back Lane; and
- Continuous Measurement 2 (CM2): on the southern boundary, approximately 18m from the carriageway edge of Back Lane.

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.

¹⁰ 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	Sound Level Meter	Type NOR140	1407932	26/02/2025
	Pre-Amplifier	Type 1209	23695	
	Microphone	Type 1225	505583	
CM2	Sound Level Meter	Type NOR140	1407599	04/09/2024
	Pre-Amplifier	Type 1209	22646	
	Microphone	Type 1225	384571	
Calibrator		Norsonic 1251	34315	05/03/2024

Meteorological Conditions

- 4.6 During setup of the SLMs, weather conditions were raining, with wet roads and northerly winds of up to 1.6 m/s. On collection, weather conditions were noted to be warm and dry, with northerly winds of up to 1.2 m/s.
- 4.7 The rain and subsequent wet roads during the Monday measurement period will have increased the noise exposure.

Observations

- 4.8 Site notes indicate the dominant source of noise, at all times, to be from road traffic using Back Lane.

Results

- 4.9 Table 4.2 and Table 4.3 provide a summary of measured assessment appropriate sound levels at CM1 and CM2 respectively.
- 4.10 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) $L_{AFmax, 2min}$
Mon 14 th	53 ^(b)	44	70
Tue 15 th	55 ^(c)	-	-
^(a) Maximum noise level not exceeded more than 10 times per night. ^(b) T = 11hr ^(c) T = 5hr			

- 4.11 The calculated daytime and measured night-time $L_{Aeq, T}$ were 54 dB $L_{Aeq, 16hr}$ and 53 dB $L_{Aeq, 16hr}$ respectively (rounding to the nearest whole number for assessment purposes).
- 4.12 At CM1, analysis of the night-time $L_{AFmax, 2min}$ levels shows that the individual events did not exceed 70 dB more than 10 times during the night-time period and, that this value was not exceeded by more than 5 dB.
- 4.13 Nevertheless, further investigation of the audio recordings shows that all values above 70 dB, were caused by vehicle ‘pass-bys’, with no significant low frequency spectral content. Therefore, a value of 70 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) $L_{AFmax, 2min}$
Mon 14 th	48 ^(b)	42	58
Tue 15 th	47 ^(c)	-	-
^(a) Maximum noise level not exceeded more than 10 times per night. ^(b) T = 11hr ^(c) T = 4hr			

- 4.14 The calculated daytime and measured night-time $L_{Aeq, T}$ were 48 dB $L_{Aeq, 16hr}$ and 42 dB $L_{Aeq, 16hr}$ respectively.
- 4.15 At CM2, analysis of the night-time $L_{AFmax, 2min}$ levels shows that the individual events did not exceed 58 dB more than 10 times during the night-time period and, that this value was only exceeded once by at most 5 dB.
- 4.16 Once again, investigation of the audio recordings shows that all values above 58 dB, were caused by vehicle ‘pass-bys’, with no significant low frequency spectral content and therefore, a value of 58 dB $L_{AFmax, 2min}$ is considered appropriate for the assessment.

5.0 ASSESSMENT METHODOLOGY

Traffic Data

- 5.1 Annual Average Weekday Traffic (AAWT) flows and % heavy goods vehicles for Back Lane and the internal link road have been prepared by the scheme's traffic engineers (Transport Planning Associates).
- 5.2 This information is presented in Table 5.1 for a future 2031 design year.

Table 5.1: Annual Average Daily Traffic Flow

Road	Year	AADT	%HGV	Speed kph
Back Lane	2031	1001	0	48
Internal Link Road	2031	1542	0	48

- 5.3 A road's basic noise level (BNL) represents the free-field noise level at a distance of 10m from the carriageway edge based on the traffic flow, the percentage heavy vehicle composition and the average vehicle speeds. The BNL is expressed as an $L_{A10, 18hr}$ value and gives an indication of the noise level expected adjacent to the road.
- 5.4 Using the TRL Method, referenced in Section 3.0, daytime $L_{Aeq, 16hr}$ and night-time $L_{Aeq, 8hr}$ noise levels have been calculated for use in this assessment. It should be noted that the calculations would be applicable to the L_{Aeq} values, i.e., to the total noise exposures values, but would not be applicable to the individual L_{Amax} values, as these are not a function of traffic growth. The calculation steps, and subsequent derived assessment levels, at a distance of 10m from the carriageway edge, are presented in Table 5.2.

Table 5.2: Derived Assessment Levels, dB

Parameter	Back Lane	Internal Link Road
BNL – $L_{A10, 18hr}$	56	58
Daytime Ambient – $L_{Aeq, 16hr}$	54	56
Night-time Ambient – $L_{Aeq, 8hr}$	47	48

Acoustic Modelling

- 5.5 An acoustic model of the Site and environs has been generated in Datakustik CadnaA® modelling software. Noise source emissions have been informed by the highest data sets from the environmental sound survey and/or, the traffic flow information outlined in Sections 4 and 5 respectively.
- 5.6 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 9613-2¹¹.

¹¹ ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.

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

- Digital Terrain Model – Lidar 1m (Environment Agency, downloaded on 4th September 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%

5.8 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.

5.9 For conciseness, this report assesses the most exposed dwelling adjacent to Back Lane (Plot 271) and the new internal link road (Plots 142 – 150), in tabulated format. The remainder of the Site is assessed through sound level contour maps, shown in the various appendices of this report.

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 271	49			44				
Risk Assessment	Negligible			Low				
Plots 142 – 150			56	49				
Risk Assessment			Low					

6.2 Based on the modelled sound levels, the most exposed dwelling overlooking Back Lane falls within the ProPG risk category of ‘Negligible’ during the daytime, for which the guidance states: *“these noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.”*

6.3 The noise exposure increases to a ‘Low’ risk during the night-time for Back Lane, and during both the day and night-time for the internal access road, for which the guidance states that 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 25521_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 the most exposed dwellings overlooking the respective roads.

Table 6.2: Required Façade Performance, dB

Plot	Parameter	External Level	Internal Criteria	Required Reduction ^(a)
271	Daytime Ambient L _{Aeq, 16hr}	49	35	14
	Night-time Ambient L _{Aeq, 8hr}	44	30	14
	Night-time Maximum L _{AFmax, 2min}	67 ^(b)	45	21
142 – 150 ^(c)	Daytime Ambient L _{Aeq, 16hr}	56	35	21
	Night-time Ambient L _{Aeq, 8hr}	49	30	19
^(a) External to internal reduction to achieve BS 8233 and ProPG criteria. ^(b) Modelled maximum noise level not exceeded more than 10 times per night, based upon measured data at CM1. ^(c) No night-time maximum assessment is applicable due to the use of traffic flow data				

- 6.6 For the most exposed dwelling overlooking Back Lane, 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 the most exposed dwelling overlooking the internal link road, the results in Table 6.1 show that a sound reduction of approximately 21 dB will be required to achieve the 35 dB L_{Aeq, 16hour} criteria within habitable rooms during the daytime, with a sound reduction of up to 19 dB required to achieve the 30 dB L_{Aeq, 8hour} 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-F¹².
- 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.

¹² 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?
271	Daytime Ambient L _{Aeq} , 16hr	49	Negligible	Not Required
	Night-time Ambient L _{Aeq} , 8hr	44	Negligible	Not Required
	Night-time Maximum L _{AFmax} , 2min	67	Internal Level < 65 dB No further consideration required.	
142 – 150	Daytime Ambient L _{Aeq} , 16hr	56	Low	Optional
	Night-time Ambient L _{Aeq} , 8hr	49	Low	Optional
(a) Internal level calculated based upon an external to internal reduction of 13 dB provided by an open window to combat overheating as outlined in AVOG.				

- 6.11 The results demonstrate that at the most exposed receptor overlooking Back Lane, an AVOG Level 2 assessment is not required, due to the negligible levels of noise.
- 6.12 For the most exposed receptors overlooking the internal link road, an AVOG level 2 assessment is optional, however, given the low levels of noise, no further consideration to overheating will be given.
- 6.13 Nevertheless, 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-O¹³, the mitigation schedule may be subject to change at Building Control stage based upon the outcome of any Dynamic Thermal Modelling assessment.
- 6.14 However, 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.

Traffic Generated by Development

- 6.15 AAWT flows for local roads without and with development traffic have been obtained from Transport Planning Associates, and the flows and average speeds are presented in **Appendix E**.
- 6.16 A road's BNL represents the free-field noise level at a distance of 10m from the carriageway edge based on the traffic flow, the percentage heavy vehicle composition and the average vehicle speeds. Where other factors such as screening or distance between buildings and the road remain constant between each situation under consideration, the difference between the BNLs reflects the actual noise change at any receptor adjacent to the road. Therefore, calculation of the BNLs will provide an indication of the noise level changes due to traffic flow changes associated with the development.
- 6.17 The calculated BNLs and noise change are also presented in **Appendix E**. With the exception of Mendip Way and Haybluff Drive, the noise changes due to development traffic associated with the Site are 0.3 dB or less for all receptors adjacent to local roads, which amounts to negligible impacts in both the short and long-term using the DMRB significance criteria presented in Table 3.3 and Table 3.4.

¹³ The Building Regulations 2010, Overheating, Approved Document 'O'.

- 6.18 For existing receptors along Mendip Way, the noise change due to development traffic is 1.8 dB, which would represent a 'Minor' impact in the short term, and a 'Negligible' impact in the long term.
- 6.19 For existing receptors adjacent to Haybluff Drive, the noise change due to development traffic is 4.9 dB, which would represent a 'Moderate' impact in the short term, and a 'Minor' impact in the long term.
- 6.20 It should be noted that whilst a moderate impact is predicted during the short-term for receptors adjacent to Haybluff Drive, the derived day and night-time $L_{Aeq, T}$ of 57 dB $L_{Aeq, 16hr}$ and 50 dB $L_{Aeq, 8hr}$ are similar to those predicted adjacent to the internal link road, where the only forms of mitigation required would be those installed as standard across all residential developments, i.e., standard thermal double glazing accompanied by direct airpath window mounted trickle ventilators.

7.0 MITIGATION

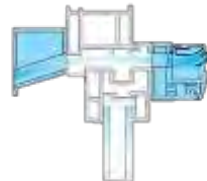
External Sound Levels

- 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 respective roads 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.
- 7.5 This table should be read in conjunction with the drawings in **Appendix F** whereby drawing 25521_04_120_04 demonstrates the required reduction for bedrooms and drawing 25521_04_120_05 demonstrates the required reduction for all other habitable rooms.
- 7.6 In the absence of Maximum Event Levels associated with the new internal link road, L_{Amax} events for Back Lane have been used as a surrogate, and applied to the new internal link road to inform a robust mitigation strategy.
- 7.7 For each reference in Table 7.1, the sound reduction performance requirements, in octave band and weighted reduction format, are presented in **Appendix G**.

Table 7.1: Suggested Internal Mitigation Measures

Mitigation Ref.	Example Glazing Solution	Example Whole-Dwelling Ventilation Solution (AD-F)
Ref. A	4mm glass panel 12mm air gap 4mm glass panel Approx. 27 dB $R_w + C_{tr}$	<u>Standard Non-Acoustic Trickle Vent</u> Direct airpath trickle vent located in the top of the window frame  Approx. $D_{ne, w} + C_{tr} = 32$ dB
Ref. B	8mm pane 12mm air space 10mm pane Approx. $R_w + C_{tr} = 33$ dB	<u>Acoustically Rated Trickle Vent</u> Slots typically located in the window frame with more torturous path and acoustic lining  Approx. $D_{ne, w} + C_{tr} = 36$ dB

Glazing and Ventilation Summary

- 7.8 For the avoidance of doubt, each reference is summarised below, and the required glazing and ventilation specifications are identified in **Appendix G**. All bedrooms should follow the mitigation specifications in drawing reference 25521_04_120_04 and all other habitable rooms should follow the mitigation specifications in drawing reference 25521_04_120_05.

Reference A

Glazing – 27 dB $R_w + C_{tr}$ (typically 4mm-12mm-4mm);

Whole-Dwelling Ventilation – 32 dB $D_{ne, w} + C_{tr}$ (typically a direct airpath trickle vent);

Whole-Dwelling Ventilation – 36 dB $D_{ne, w} + C_{tr}$ (typically a direct airpath trickle vent);

Reference B

Glazing – 33 dB $R_w + C_{tr}$ (typically 8mm-12mm-10mm);

Whole-Dwelling Ventilation – 36 dB $D_{ne, w} + C_{tr}$ (typically a direct airpath trickle vent);

8.0 CONCLUSIONS

- 8.1 MEC, has been commissioned by Croudace Homes to undertake an Acoustics Assessment for a proposed residential development on Land at Roundwood, Stevenage.
- 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, embedded façade mitigation measures have been suggested in order to achieve internal noise level criteria in line with BS 8233, ProPG and AVOG which, for the whole Site, can be satisfied through appropriate thermal double glazing coupled with either direct airpath window mounted trickle ventilators, or acoustically attenuated 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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APPENDIX A



KEY

Site Boundary

A	29.09.23	Planning Submission	JW	PA
Rev	Date	Revision Details	Dr	Ch

London: 76 Great Suffolk Street
London, SE1 0BL
Sussex: T 0207 928 2773 E london@ecearchitecture.com

Bristol:

ECE Architecture
www.ecearchitecture.com

Client's Name
Croudace Homes

Job Title
**Roundwood, Stevenage
DES - 946**

Drawing Title
Proposed Site Layout

Scale
1:1000 @ A1 / 1:2000 @ A3

metres

20406080100

Drawn	Checked	Date
JW	PA	July '23

Job No	Drawing No	Rev
7303	PL-01	A

Status

APPROVAL

CAD Plot date: 2/10/2023 - 16:31:21

7303 - site layout.dwg



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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 s_1 and s_2 is given by $20 \log_{10} (s_1 / s_2)$. 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 $2^{1/3}$ 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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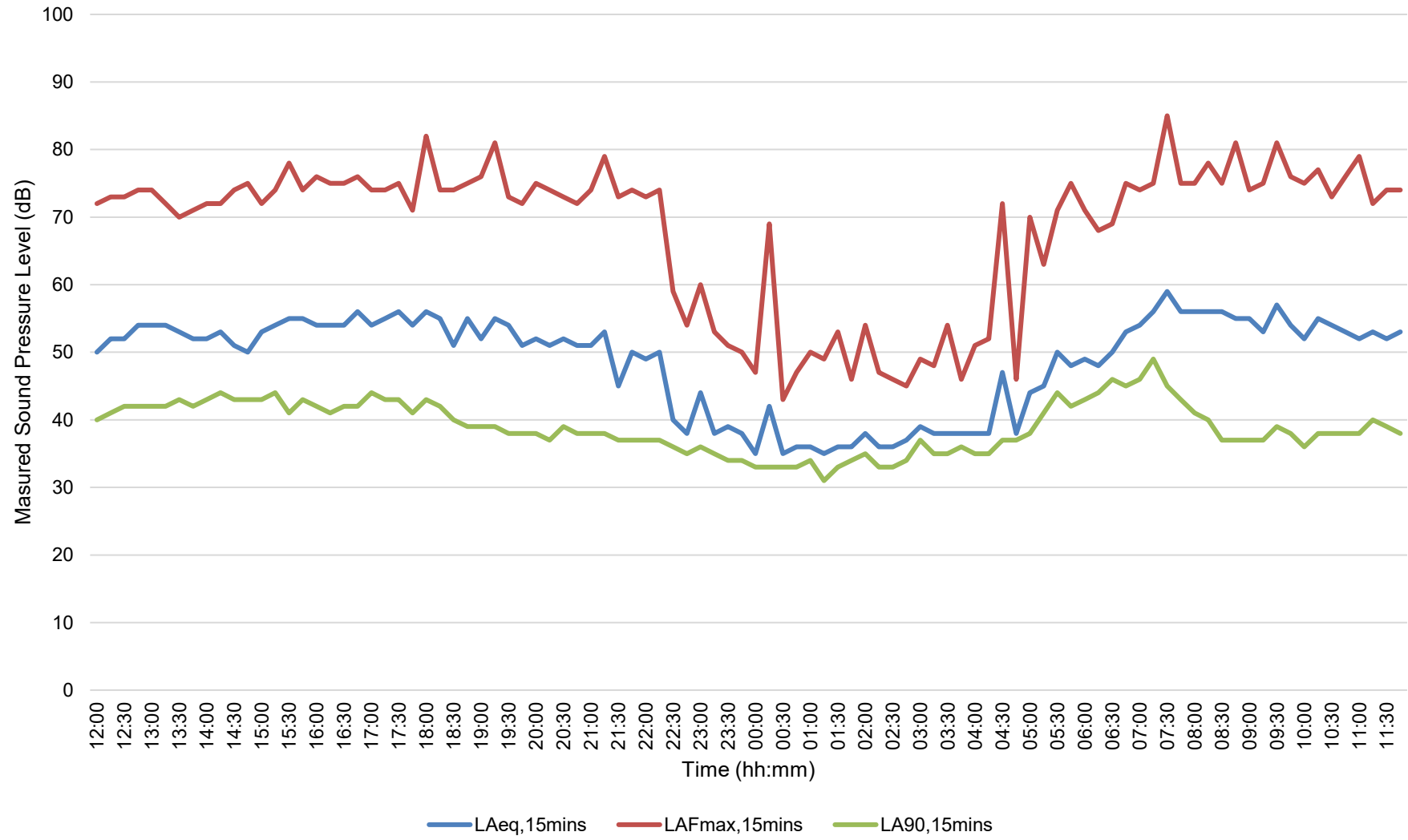
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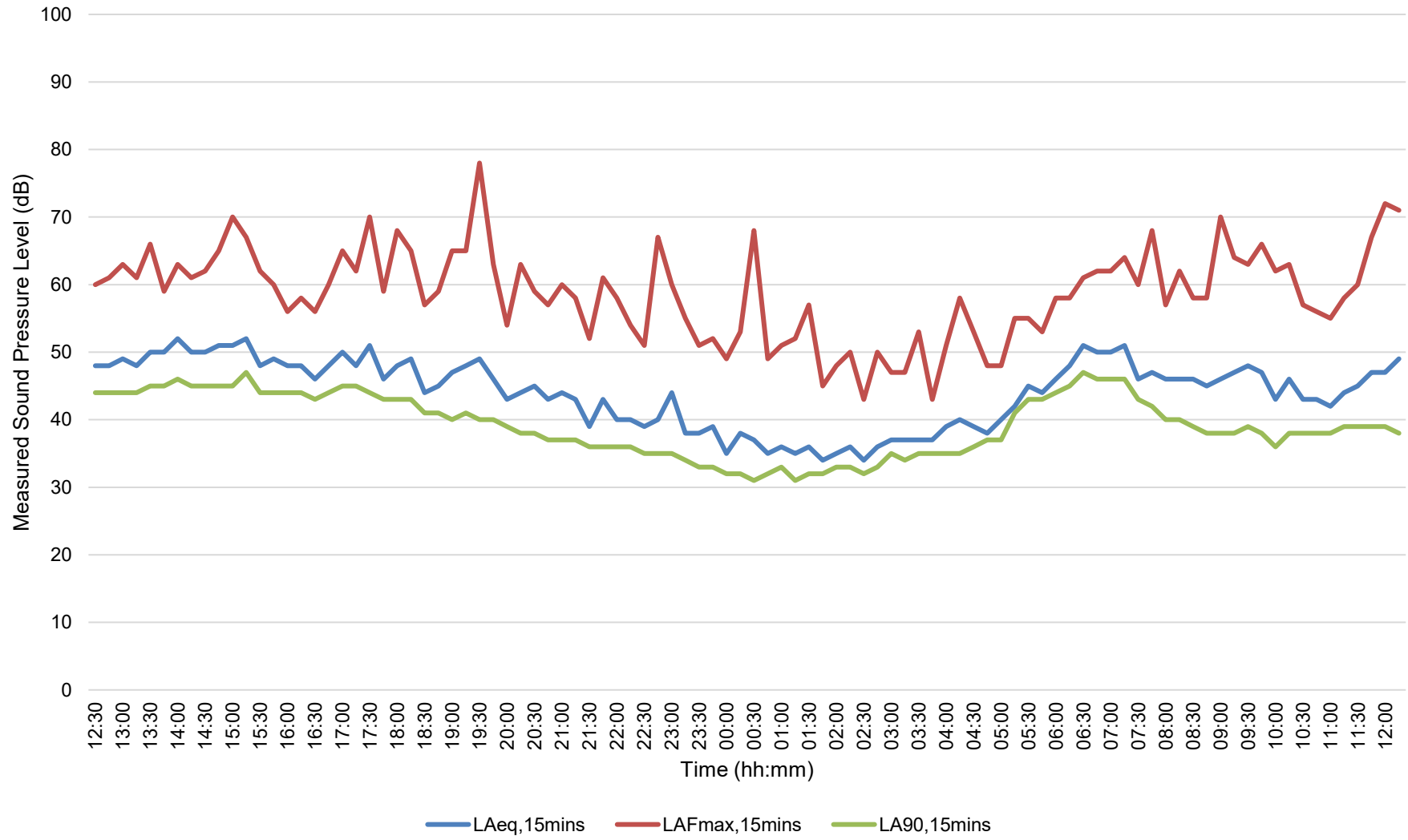


APPENDIX C

Roundwood, North East Stevenage - CM1
Environmental Sound Monitoring Survey Results
 $L_{Aeq,15mins}$, $L_{AFmax,15mins}$ & $L_{A90,15mins}$ - 14th - 15th August 2023



Roundwood, North East Stevenage - CM2
Environmental Sound Monitoring Survey Results
 $L_{Aeq,15mins}$, $L_{AFmax,15mins}$ & $L_{A90,15mins}$ - 14th - 15th August 2023





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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:	EW	NF	AB	13.10.23
		DRN	CHK	APP	DATE:

PROJECT: ROUNDWOOD, NORTH EAST STEVENAGE

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

CLIENT: CROUDACE HOMES

DRAWING NUMBER: 25521_04_120_01

REVISION:	SHEET SIZE:	SCALE:
-	A3	NTS

STATUS: FOR INFORMATION

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

REV.	AMENDMENTS:	EW	NF	AB	13.10.23
		DRN	CHK	APP	DATE:

PROJECT: ROUNDWOOD, NORTH EAST STEVENAGE

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

CLIENT: CROUDACE HOMES

DRAWING NUMBER: 25521_04_120_02

REVISION:	SHEET SIZE:	SCALE:
-	A3	NTS

STATUS: FOR INFORMATION

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

REV:	AMENDMENTS:	EW	NF	AB	13.10.23
REV:	AMENDMENTS:	DRN	CHK	APP:	DATE:
PROJECT: ROUNDWOOD, NORTH EAST STEVENAGE					
DRAWING TITLE: NIGHT-TIME MAXIMUM SOUND LEVELS, LAFmax,T					
CLIENT: CROUDACE HOMES					
DRAWING NUMBER: 25521_04_120_03					
REVISION: -	SHEET SIZE: A3		SCALE: NTS		
STATUS: FOR INFORMATION					
			Telephone: 01530 264 753 Email: group@m-ec.co.uk Website: www.m-ec.co.uk ORDNANCE SURVEY © CROWN COPYRIGHT 2015. ALL RIGHTS RESERVED. LICENCE NUMBER 100055865.		

Project 13.10.2023 File Location: T:\M-EC Job Book\25521\Acoustic\05 DWG\25521_04_120_03 NightMap.dwg



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APPENDIX E

Traffic Data and Traffic Noise Levels

Assessment of LA10 18-hour basic noise levels at 10m from road											
Link	Road	2031 total forecast base			2031 total forecast			BNL18hr			
		%HGV	kph	AAWT	%HGV	kph	AAWT	%Change	Base	With dev	Change
1	Great Ashby Way	0.4	48	12706	0.4	48	13504	6.3	67.3	67.6	0.3
2	Mendip Way	0.0	48	1751	0.0	48	2643	50.9	58.5	60.3	1.8
3	Haybluff Drive	0.0	48	665	0.0	48	2066	210.7	54.3	59.2	4.9
4	Back Lane	0.5	40	952	0.0	40	1001	5.1	55.2	55.2	0
5	A1072 Martins Way	2.1	64	26604	2.1	64	27101	1.9	72.8	72.9	0.1
6	A602 East of A1	2.6	64	48383	2.6	64	48880	1	75.6	75.6	0
7	A602 West of A1	2.1	64	35475	2.1	64	35965	1.4	74.1	74.1	0



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APPENDIX F



NOTES:

- DO NOT SCALE THIS DRAWING.
- Please refer to report reference 25521-ENV-0401 for the details on the proposed glazing and ventilation references.

KEY

Ref. A

Ref. B

REV.	AMENDMENTS:	EW	NF	AB	13.10.23
		DRN	CHK	APP	DATE:
PROJECT: ROUNDWOOD, NORTH EAST STEVENAGE					
DRAWING TITLE: MITIGATION REFERENCE FOR HABITABLE BEDROOMS					
CLIENT: CROUDACE HOMES					
DRAWING NUMBER: 25521_04_120_04					
REVISION:	SHEET SIZE:	SCALE:			
-	A3	NTS			
STATUS: FOR INFORMATION					
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Printed: 16.10.2023



- NOTES:
1. DO NOT SCALE THIS DRAWING.
 2. Please refer to report reference 25521-ENV-0401 for the details on the proposed glazing and ventilation references.

KEY

Ref. A

REV.	AMENDMENTS:	EW	NF	AB	13.10.23
REV.	AMENDMENTS:	DRN	CHK	APP.	DATE:
PROJECT: ROUNDWOOD, NORTH EAST STEVENAGE					
DRAWING TITLE: MITIGATION REFERENCE FOR ALL OTHER HABITABLE ROOMS (NON-BEDROOMS)					
CLIENT: CROUDACE HOMES					
DRAWING NUMBER: 25521_04_120_05					
REVISION: -	SHEET SIZE: A3	SCALE: NTS			
STATUS: FOR INFORMATION					
		Telephone: 01530 264 753 Email: group@m-ec.co.uk Website: www.m-ec.co.uk ORDNANCE SURVEY © CROWN COPYRIGHT 2015. ALL RIGHTS RESERVED. LICENCE NUMBER 100055865.			

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Printed: 16.10.2023



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APPENDIX G

Reference A Performance Requirements

Façade Element	Sound Insulation Performance Requirements (dB) in Octave Band Centre Frequencies (Hz)						$R_w / D_{ne,w}$ (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
The glazing reduction requirements can typically be found in a configuration of 4/12/4, where the information is presented in terms of the thickness of one pane of glass in mm, followed by the size of the air gap in mm, followed by the thickness of the second pane of glass in mm.								

Reference B Performance Requirements

Façade Element	Sound Insulation Performance Requirements (dB) in Octave Band Centre Frequencies (Hz)						$R_w / D_{ne,w}$ (dB)	C_{tr} (dB)
	125	250	500	1k	2k	4k		
Glazing	29	27	35	37	36	45	36	-3
Ventilation (Trickle)	40	38	30	49	52	48	40	-4
The glazing reduction requirements can typically be found in a configuration of 4/12/4								

Minimum performance requirements for overheating ventilation only applicable if passive ventilation is used. If mechanical ventilation is chosen, please refer to the main body of the acoustics report for suitable noise limits.

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 $D_{ne,w} + C_{tr}$ should be adhered to at a minimum.



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