



MEC
Consulting Group

ACOUSTIC AIR



Barlestone Road, Newbold Verdon, Leicestershire
Acoustics Assessment
October 2024

Report Ref: 24832-ENV-0401 Rev C

Barlestone Road, Newbold Verdon, Leicestershire

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1.0 INTRODUCTION

1.1 MEC Consulting Group Ltd (MEC) has been commissioned by David Wilson Homes East Midlands (hereafter referred to as 'the Client') to undertake an Acoustics Assessment for a proposed development on Barlestone Road (B582), Newbold Verdon, Leicestershire (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, AVOG³ and BS 4142⁴; 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 BS 4142:2014 +A1:2019 'Methods for rating and assessing industrial and commercial sound.'

2.0 SITE DESCRIPTION

Existing Site

- 2.1 The Site is located to the north of Newbold Verdon village and is bound immediately to the north by Newbold Verdon Equestrian Centre and existing farmland, with Verdon Timber Group Limited further to the north west; to the east by farmland; to the south by Barlestone Road and existing residential receptors; and to the west by Barlestone Road and farmland.
- 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:
- Outline planning application (all matters reserved except vehicular access) for the erection of up to 240 residential dwellings (Use Class C3), retention of the existing accesses off Barlestone Road and the creation of new accesses off Barlestone Road, land safeguarded for a cemetery and a health centre (Use Classes E(e)), public open space and associated infrastructure.*
- 2.4 An indicative masterplan and parameter plan is provided 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 guidance and standards relevant to the assessment are presented 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;
- BS 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*'; and
- Site Allocations and Development Management Policies DPD 2006 - 2026.

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 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.

- 3.8 Whilst ProPG does not define a measurement interval for the assessment of L_{AFmax} levels, research⁵ 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 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.

BS 4142

- 3.21 BS 4142 describes methods for rating and assessing industrial and/or commercial sound and includes, but is not limited to, the assessment of:
- Sound from industrial and manufacturing processes;
 - Sound from fixed installations which comprise mechanical and electrical equipment;
 - Sound from the (un)loading of goods and materials at industrial/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 on or around an industrial and/or commercial site.
- 3.22 The methods described in BS 4142 use outdoor sound levels to assess the likely effects of sound on people who are typically outside residential premises. Although indoor effects can be indicated where the façade composition is known. A summary of the approach set out in BS 4142 is set out below:
- Establish or predict the specific sound level of the source(s) by considering both the ambient (includes the source to be assessed) and residual (excludes the source to be assessed but includes all remaining sources) sound level;
 - Measure the representative background sound levels, typically by measuring close to the receptor location;
 - Rate the specific sound level to account for any distinguishing characteristics (see below);
 - Estimate the impact by subtracting the background sound level from the rating level; and
 - Consider the initial estimate of impact, as determined above, in the context of the noise and its environment.

- 3.23 The specific sound level is rated to account for distinguishing characteristics by using penalties for tonality, impulsivity, intermittency and other sound characteristics. The dominant acoustic characteristic should be applied to avoid large penalties which is in accordance with the Institute of Acoustics response to BS 4142.
- 3.24 The character corrections are flexible according to whether the acoustic character is just perceptible at the noise receptor, or is clearly perceptible or highly perceptible, and range from 0 to 6 dB for tonal noise, 3 to 9 dB for impulsive noise, and 3 dB for other non-tonal/impulsive acoustic characteristics.
- 3.25 An initial estimate of impact of the specific sound is obtained by subtracting the background sound level from the rating level. Typically, the greater the 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;
 - At differences lower than +5 dB a low impact is likely, depending on the context. The lower the rating level is to the measured background sound level, the less likely it is that the specific sound source will have an impact.
- 3.26 The results of the initial assessment should then be considered in light of all pertinent contextual factors.

Site Allocations and Development Management Policies DPD 2006 - 2026

- 3.27 The Site Allocations and Development Management Policies DPD was adopted in July 2016 by Hinckley and Bosworth Borough Council. It contains a set of policies and plans that will guide future planning and development decisions. As such, it identified where development will take place and provides details on how the environment will be protected and enhanced.
- 3.28 The policies identified as being relevant from an acoustics perspective are DM2 'Delivering Renewable Energy and Low Carbon Development' & DM7 'Preventing Pollution and Flooding.'
- 3.29 DM2 states that: *'Particular regard will be had for the landscape sensitivity of the area to which the proposal relates the cumulative impacts of the proposed and existing schemes on this sensitivity.'*
- 3.30 DM7 states, in regard to noise pollution, that: *'National policy seeks to avoid, mitigate and minimise the adverse impacts on health and quality of life arising from new development and where possible, encourages schemes which can contribute to improvements to amenity by using development to mitigate against existing impacts.'*
- 3.31 *'Rural and tranquil areas are more sensitive to disturbance from noise where the ambient noise levels are lower compared to urban areas. National policy specifies that planning policies should identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are valued for their recreational and amenity value for this reason.'*
- 3.32 *'The Borough Council considers natural and semi-natural open spaces... to be areas of tranquillity as they are identified for their recreational, biodiversity and heritage conservation value.'*

4.0 ENVIRONMENTAL SOUND SURVEY

Methodology

- 4.1 An environmental sound survey was undertaken between Friday 8th and Wednesday 13th September 2023. The survey was undertaken in full accordance with the guidance set out in BS 7445⁶.
- 4.2 Sound Level Meters (SLMs) were installed at two locations, as follows:
- Continuous Measurement 1 (CM1): approximately 7m from the carriageway edge of the Barlestone Road; and
 - Continuous Measurement 2 (CM2): adjacent to the Newbold Equestrian Centre and approximately 190m south east of Verdon Timber Group Limited.
- 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 field calibrated before and after the survey using a Class 1 calibrator, with no significant drift in calibration noted.

⁶ BS 7445-1:2003 'Description and measurement of environmental noise, Part 1: Guide to quantities and procedures.'

- 4.5 The SLMs were installed in a free field position at a height of 1.5m above local ground level and were set up to capture the following parameters at a minimum: L_{Aeq} , L_{A90} and L_{AFmax} values.
- 4.6 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	1407599	04/09/2024
	Pre-Amplifier	Type 1209	22646	
	Microphone	Type 1225	384571	
	Calibrator	Norsonic 1255	125525494	18/09/2024
CM2	Sound Level Meter	Type NOR140	1407773	27/03/2025
	Pre-Amplifier	Type 1209	23168	
	Microphone	Type 1225	413180	
	Calibrator	Norsonic 1255	125525772	21/11/2024

Meteorological Conditions

- 4.7 During equipment setup on Friday 8th September, weather conditions were hot, dry and cloudy with no measurable wind. During equipment collection on Wednesday 13th September, weather conditions were warm, wet and sunny, with a westerly wind measured at 1.8m/s.
- 4.8 It can therefore be concluded that there were no adverse meteorological conditions that could influence the survey outcome.

Observations

- 4.9 Site observations indicated that at both CM1 and CM2, the dominant source of noise was road traffic using Barlestone Road.
- 4.10 It should be noted that at CM2 any potential commercial noise from the Verton Timber Group to the north west was masked by cars passing along Barlestone Road. When cars were not passing commercial noise was barely audible to the extent that it was not measurable with a sound level meter. Therefore, due to the masked and unmeasurable nature of noise from the timber yard, there was consequently no dominant noise source that would warrant assessment under BS 4142.

Results

- 4.11 Table 4.2 and Table 4.3 provide a summary of measured assessment appropriate sound levels at CM1 and CM2 respectively.
- 4.12 Time history graphs are provided in **Appendix C**.

Table 4.2: Summary of Measured Sound Levels, CM1

Date	Daytime 07:00 – 23:00 L _{Aeq, T} dB	Night-time 23:00 – 07:00 L _{Aeq, 8hr} dB	Typical Maximum Event Level ^(a) L _{AFmax, 2min} dB
Fri 8 th September	65 ^(b)	56	78
Sat 9 th September	64	55	78
Sun 10 th September	63	58	79
Mon 11 th September	65	59	79
Tue 12 th September	66	60	81
Wed 13 th September	67 ^(c)	-	-
(a) Maximum noise level not exceeded more than ten times per night. (b) T = 8hr (c) T = 4hr			

4.13 At CM1, the measured sound levels ranged between 63 – 67 dB for the daytime and 55 – 60 dB for night-time. The loudest daytime sound level of 67 dB (rounding to the nearest whole number for assessment purposes) was measured for a period of 4-hours on Wednesday 13th, therefore, the second highest value of 66 dB will be used for the derived daytime sound level as this was monitored over a full 16-hour period. The derived night-time L_{Aeq, 8hr} was identified as 60 dB measured on 12th September.

4.14 Analysis of the night-time L_{AFmax, 2min} levels shows that the individual events did not exceed 81 dB more than 10 times during the measured night-time period. The audio recordings indicate that the 10th highest level of 81 dB L_{AFmax, 2min} was a result of road traffic using Barlestone Road. Furthermore, audio recordings also showed that all values above 81 dB were caused by vehicle movements. Therefore 81 dB is considered appropriate for the assessment.

Table 4.3: Summary of Measured Sound Levels, CM2

Date	Daytime 07:00 – 23:00 L _{Aeq, T} dB	Night-time 23:00 – 07:00 L _{Aeq, 8hr} dB	Typical Maximum Event Level ^(a) L _{AFmax, 2min} dB
Fri 8 th September	51 ^(b)	44	62
Sat 9 th September	50	41	57
Sun 10 th September	48	45	60
Mon 11 th September	52	43	58
Tue 12 th September	50	44	58
Wed 13 th September	49 ^(c)	-	-
(a) Maximum noise level not exceeded more than ten times per night. (b) T = 8hr (c) T = 4hr			

4.15 As shown in Table 4.3, ambient daytime L_{Aeq, 16hr} sound levels ranged between 48 – 52 dB, and for the night-time L_{Aeq, 8hr} sound levels ranged between 41 – 45 dB. Typical night-time L_{AFmax, 2mins} ranged between 57 – 62 dB.

- 4.16 Noise from music, entertainment and public address systems for speech are specifically noted in paragraph 1.3 of BS 4142 to not fall under the scope of the BS 4142 guidance. However, it is recognised that dwellings located in close proximity to the Newbold Equestrian Centre may be impacted by noise emanating from its operations. As such, further investigation has been undertaken looking at the sound levels over 1-hour periods for noise levels at CM2.
- 4.17 Based on conversations with the Client and analysis of audio recordings, it was understood that an equestrian event occurred on the evening of Friday 8th September, therefore, sound levels have been specifically analysed on that evening. Furthermore, only the daytime sound levels have been analysed as the Newbold Equestrian Centre does not operate at night, which is further verified from listening to audio recordings at CM2. To avoid significant tabulation within the body of the report, the two loudest measured daytime periods for the 8th September are presented in Table 4.4.

Table 4.4: Summary of Measured $L_{Aeq, T}$ dB at CM2, dB

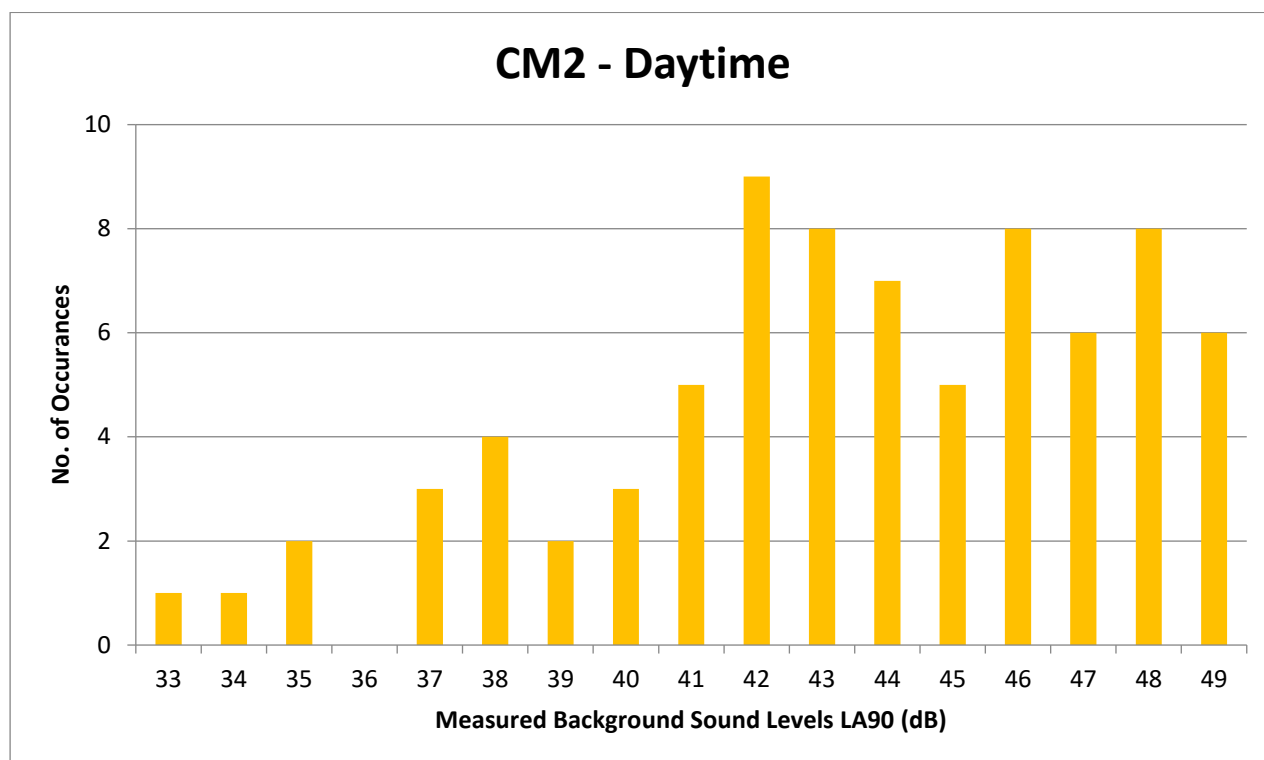
Date	Daytime 07:00 – 23:00	
	Time Period	$L_{Aeq, 1hr}$
September 8 th	19:00 – 20:00	54
	20:00 – 21:00	54

- 4.18 The loudest 1-hour daytime sound level of 54 dB from Table 4.4 has been selected for the purpose of the assessment of the Newbold Verdon Equestrian Centre. During the 1-hour period of 19:00 – 20:00 on Friday 8th September, the PA system was audible on the audio recordings for the whole of the 1-hour period. Therefore, based on this information, no time correction has been applied to the sound level at CM2.
- 4.19 Various point sources were subsequently added to the model in representative locations for the speaker system of the Newbold Verdon Equestrian Centre and calibrated to 54 dB.
- 4.20 Accordingly, the acoustic model has been calculated to include noise from the Newbold Verdon Equestrian Centre within the Daytime $L_{Aeq, 16hr}$ scenario.

Statistical Analysis of L_{A90} Data

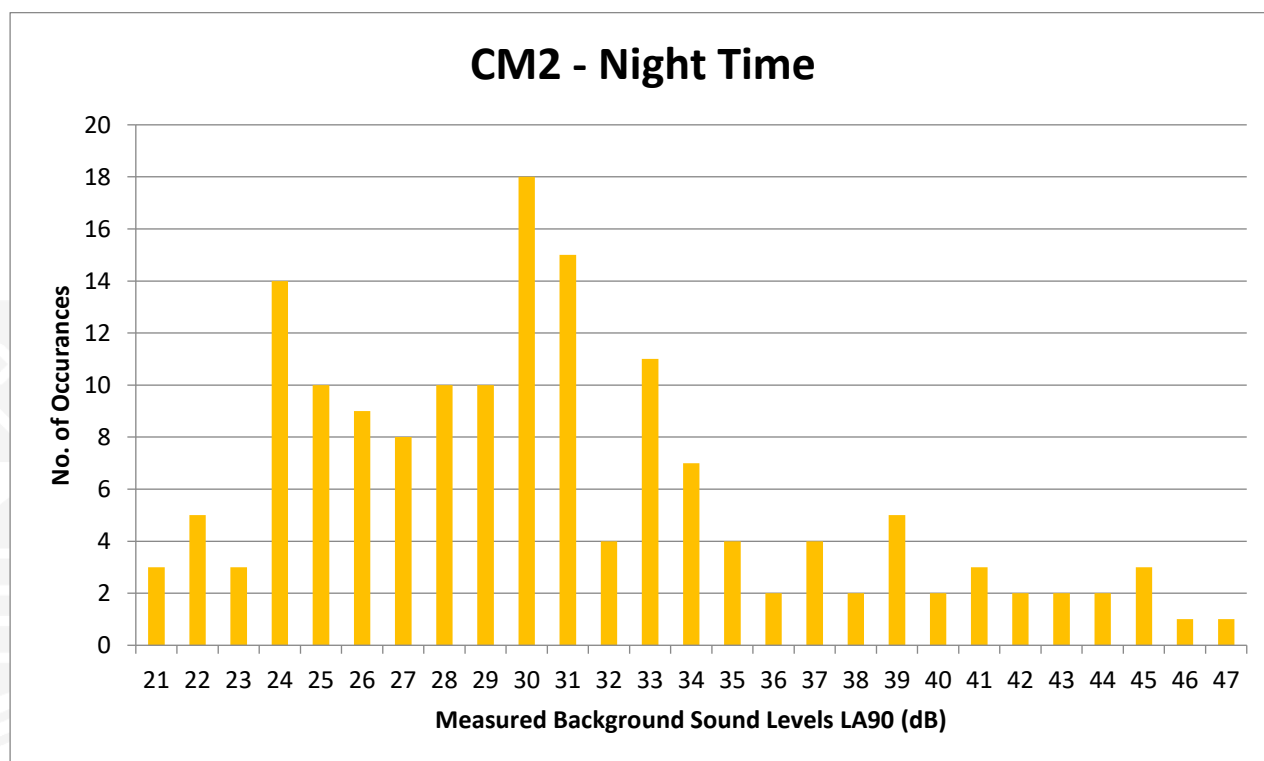
- 4.21 Of the continuous measurement positions, CM2 was used for the determination of the background sound levels for the purpose of the BS 4142 assessment of the proposed community facility. This is due to the fact that this position was located closest to the proposed Nearest Sensitive Receptor (NSR). Therefore, it is considered to provide a more typical scenario to compare against.
- 4.22 Statistical analysis of the measured data during the daytime and night-time at CM2 is presented in Figure 4.3 and Figure 4.4 respectively.

Figure 4.2: Statistical Analysis of Daytime Background Sound Levels $L_{A90, 1hr}$, CM2



4.23 The statistical analysis for daytime at CM2 indicates the prevailing background noise level of 42 dB $L_{A90, 1hr}$.

Figure 4.3: Statistical Analysis of Night-time Background Sound Levels $L_{A90, 15mins}$, CM2



4.24 The statistical analysis for daytime at CM2 indicates the prevailing background noise level of 30 dB $L_{A90, 15mins}$.

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 4.0.
- 5.2 To summarise, the following levels from CM1 have been used to calibrate the 3D acoustic model for purpose of the assessment:
- Daytime, $L_{Aeq, 16hr}$ – 66 dB;
 - Night-time, $L_{Aeq, 8hr}$ – 60 dB; and
 - Night-time, $L_{AFmax, 2min}$ – 81 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 9613-2⁷.
- 5.4 The modelling assumptions and input information for the acoustic model are as follows:
- Digital Terrain Model – Lidar 1m (Environment Agency, downloaded on 1st 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%.
- 5.5 With reference to the noise criteria outlined in Section 3.0, the acoustic model has been used to predict 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.
- 5.6 As plot numbers are currently unavailable, the most exposed proposed receptor to Barlestone Road will be named Plot 'X', whilst the most exposed dwelling to the Newbold Equestrian Centre will be named Plot 'Y'. This is illustrated in the drawings found in **Appendix E**.

⁷ ISO 9613-2 'Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.

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. For conciseness, this report assesses the most exposed dwelling adjacent to Barlestone Road (Plot X) and the Newbold Equestrian Centre (Plot Y). The remainder of the Site is assessed through the sound level contour maps, shown in the various appendices of this report.

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					66			62
Risk Assessment					Medium			High
Plot Y			51					
Risk Assessment			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 Barlestone Road falls within the ProPG risk category of 'Medium' during the day, for which the guidance states a good acoustic design process must be followed which confirms how the adverse impacts of noise will be mitigated and minimised. For the night the most exposed dwelling falls within the risk category of 'High', for which the guidance states the development is at increased risk of being refused on noise grounds unless a good acoustic design process is demonstrated in a detailed acoustic design statement.
- 6.3 The most exposed dwelling to the Newbold Equestrian Centre falls within the ProPG risk category of 'Low' during the daytime, 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 criterion often the most difficult to meet is the BS 8233 outdoor criterion of 55 dB L_{Aeq}, 16hr applicable to private amenity spaces such as gardens.
- 6.5 Based on the acoustic model with the proposed layout in situ, the BS 8233's upper-level criterion of 55 dB L_{Aeq}, 16hr will be satisfied for the majority of plots with standard 1.8m high close boarded timber fences. This is with the exception of a single plot that requires an increased fence height of 2m to achieve the BS 8233 criteria. This is identified on the the daytime L_{Aeq}, 16hr sound level contour map shown on drawing 24832_04_120_01 in **Appendix D**.

Internal Acoustic Criteria

- 6.6 Table 6.2 presents the required external to internal reduction requirements for the most exposed dwellings overlooking Barlestone Road and the Newbold Equestrian Centre.

Table 6.2: Required Façade Performance, dB

Plot	Parameter	External Level	Internal Criteria	Required Reduction ^(a)
X	Daytime Ambient L _{Aeq, 16hr}	66	35	31
	Night-time Ambient L _{Aeq, 8hr}	62	30	32
	Night-time Maximum L _{AFmax, 2min}	82 ^(b)	45	37
Y	Daytime Ambient L _{Aeq, 16hr}	51	35	16
^(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.				

- 6.7 For the most exposed dwellings overlooking Barlestone Road, the results in Table 6.2 show that a sound reduction of approximately 31 dB will be required to achieve the 35 dB L_{Aeq, 16hr} criteria within habitable rooms. Façade performance for bedrooms is driven by the night-time maximum scenario, with a sound reduction of up to 37 dB required to achieve the 45 dB L_{AFmax} criteria.
- 6.8 For dwellings most exposed to the Newbold Equestrian Centre, a reduction of approximately 16 dB will be required to achieve the 35 dB L_{Aeq, 16hr} criteria within habitable rooms. Façade performance for bedrooms has not been analysed as the equestrian centre does not operate during the night-time.

AVOG Level 1 Assessment

- 6.9 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.

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}	66	High	Recommended
	Night-time Ambient L _{Aeq, 8hr}	62	High	Recommended
Y	Daytime Ambient L _{Aeq, 16hr}	51	Low	Optional

- 6.10 The results demonstrate that at the most exposed receptors overlooking Barlestone Road an AVOG Level 2 assessment is recommended, whilst for receptors exposed to the Newbold Equestrian Centre an AVOG Level 2 assessment is considered optional.

7.0 BS 4142 ASSESSMENT

Community Facility Assessment

- 7.1 At this stage, the design of the community facility land on the Site has not been determined. Therefore, a detailed assessment cannot be undertaken. Nevertheless, some initial advice has been included herein to help ensure the impacts from the community facility are minimised.
- 7.2 The background sound levels to be used for noise control purposes have been defined in Section 4.0. A value of 42 dB L_{A90} is recommended for the control of any operations associated with the community facility during daytime hours (07:00 – 23:00), and a value of 30 dB L_{A90} is recommended during night-time hours (23:00 – 07:00).
- 7.3 The operations would have no impact upon neighbouring dwellings if they produce a Noise Rating Level that does not exceed the L_{A90} background sound level as measured at 3.5 metres from the façade of the nearest noise sensitive premises.
- 7.4 On this basis, the design criterion shall be that the overall Rating Level measured at 3.5 metres from the facade of the nearest dwelling shall not exceed 42 dB for all daytime and evening operations, or 30 dB at night. The Rating Level must allow for any tonal, intermittent, or impulsive characteristics through the addition of appropriate acoustic character corrections as defined by BS 4142.
- 7.5 Use of the above noise limits for the design of the community facility will ensure that its operations do not adversely affect the existing background noise level and do not give rise to adverse impacts under BS 4142.
- 7.6 Some good acoustic design features which could be utilised to minimise impacts could include, but are not limited to, the following:
- Careful consideration of the layout, ensuring screening is provided by the proposed building from the car park;
 - Ensure minimal operations on the eastern boundary;
 - Production of a noise management plan;
 - The use of acoustic fencing located along the eastern boundary; and
 - Where possible, minimise any night-time operations.
- 7.7 This is a matter that can be dealt with by way of a routine planning condition.

8.0 MITIGATION

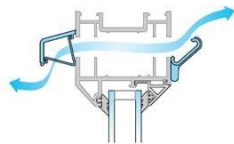
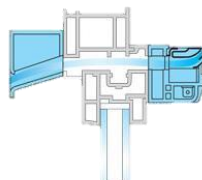
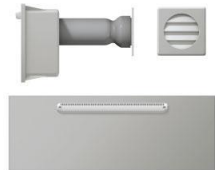
External Sound Levels

- 8.1 In regards to external sound levels, the Site follows a good acoustic design process whereby dwellings provide screening from dominant noise sources to the gardens behind. Subsequently, the Site can achieve the 55 dB external living criteria with standard 1.8m high fencing. Where exceedances are predicted for some of the most exposed gardens it has been demonstrated that the criteria can be met with partially higher fencing of up to 2m which is not considered to be onerous. External amenity areas with increased fence heights can be found in the drawing 24832_04_120_01.

Internal Sound Levels

- 8.2 Acoustic modelling has demonstrated potential façade sound levels and, in accordance with BS 8233 and ProPG sound reduction performance requirements of the façade have been determined.
- 8.3 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.
- 8.4 Drawing on the above, and the acoustic modelling undertaken, Table 8.1 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.
- 8.5 This table should be read in conjunction with the drawings in **Appendix E**, which shows corresponding colour coded mitigation references. For each reference in Table 8.1, the sound reduction performance requirements, in octave band and weighted reduction format, are presented in **Appendix F**.

Table 8.1: Suggested Internal Mitigation Measures

Mitigation Ref.	Example Glazing Solution	Example Whole Dwelling Ventilation Solution (AD-F)
Ref. A	4mm pane 12mm air space 4mm pane Approx. $R_w + C_{tr} = 27$ dB	<u>Standard Non-Acoustic Trickle Vent</u> Slots typically located in the window frame.  Approx. $D_{n,e,w} + C_{tr} = 32$ 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. $D_{n,e,w} + C_{tr} = 36$ dB
Ref. C	9mm pane 12mm air space 10mm pane Approx. $R_w + C_{tr} = 37$ dB	<u>Acoustically Rated Through Wall Trickle Vent</u> Through wall trickle vent with torturous airpath. 
Ref. D	8.8mm laminated pane 20mm air space 16.8mm laminated pane Approx. $R_w + C_{tr} = 44$ dB	Approx. $D_{n,e,w} + C_{tr} = 42$ dB

Glazing and Ventilation Summary

- 8.6 For the avoidance of doubt, each reference is summarised below, and the required glazing and ventilation specifications are identified in **Appendix F**. All bedrooms should follow the mitigation specifications in drawing reference 24832_04_120_04 and all other habitable rooms should follow the mitigation specifications in drawing reference 24832_04_120_05.

Reference A

- Glazing – 27 dB $R_w + C_{tr}$ (typically 4mm-12mm-4mm);
- Whole-Dwelling Ventilation – 32 dB $D_{n,e,w} + C_{tr}$ (typically a direct airpath trickle vent);

Reference B

- Glazing – 33 dB $R_w + C_{tr}$ (typically 8mm-12mm-10mm);
- Whole-Dwelling Ventilation – 36 dB $D_{n,e,w} + C_{tr}$ (typically an acoustically rated trickle vent);

Reference C

- Glazing – 37 dB $R_w + C_{tr}$ (typically 9mm-12mm-10mm);
- Whole-Dwelling Ventilation – 42 dB $D_{n,e,w} + C_{tr}$ (typically an acoustically rated through wall vent).

Reference D

- Glazing – 44 dB $R_w + C_{tr}$ (typically 8.8mm-20mm-16.8mm);
- Whole-Dwelling Ventilation – 42 dB $D_{n,e,w} + C_{tr}$ (typically an acoustically rated through wall vent).

9.0 CONCLUSIONS

- 9.1 MEC has been commissioned by David Wilson Homes East Midlands, to undertake an Acoustics Assessment for a proposed development on Barlestone Road, Newbold Verdon, Leicestershire.
- 9.2 Assessment of the residential uses has 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.
- 9.3 Acoustic modelling has demonstrated that BS 8233's upper-level criterion of 55 dB L_{Aeq} , will be satisfied at all garden locations on the Site provide the mitigation recommendations outlined in this report are followed.
- 9.4 With regards to internal acoustic conditions across the Site, the majority of habitable rooms across the Site will satisfy the relevant criteria 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. Those dwellings most exposed to Barlestone Road will benefit from up rated thermal double glazing and through wall ventilators.
- 9.5 A BS 4142 assessment has been conducted and noise limits based on the measured daytime and night-time background sound levels have been set in order to minimise any impacts on the nearest proposed receptors. As part of this process, a number of mitigation options have been included for the proposed community facility which should be considered throughout the design process.
- 9.6 With regard to residential dwellings, and considering the planning guidance outlined in AVOG, an open window acoustics strategy is permissible during periods of overheating for the majority of the Site except for those most exposed to Barlestone Road. Initial investigations into the AVOG Level 1 assessment indicates that further investigations will be required into overheating.
- 9.7 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



KEY

- SITE BOUNDARY
- INDICATIVE PUBLIC OPEN SPACE
- RETAINED EXISTING VEGETATION
- INDICATIVE PROPOSED TREES AND PLANTING
- INDICATIVE BUILT FORM
- CORRECTED VIEWPOINT 5 (DRAFT REGULATION 16 NEIGHBOURHOOD PLAN)
- INDICATIVE SWALES
- EXISTING BYWAY OPEN TO ALL TRAFFIC
- UNCLASSIFIED ADOPTED ROAD
- EXISTING FOOTPATH
- POTENTIAL PEDESTRIAN CYCLE CONNECTION
- RETAINED VEHICULAR ACCESS ROUTE TO EQUESTRIAN CENTRE/ PROPOSED ACCESS TO CEMETERY
- PROPOSED PEDESTRIAN ACCESS POINT
- RETAINED PROW ACCESS POINTS
- PRIMARY VEHICULAR ACCESS POINT
- EXISTING BARLESTONE ROAD CROSSING POINTS
- NEW BARLESTONE ROAD CROSSING POINTS
- INDICATIVE FOUL PUMPING STATION
- AGRICULTURAL ACCESS
- PRIVATE DRIVE ACCESS TO (EXISTING) WILLOWBROOK COTTAGE
- DRAINAGE OUTFALL

BARLESTONE ROAD, NEWBOLD VERDON – INDICATIVE MASTERPLAN



Issue:

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KEY



SITE BOUNDARY



PROPOSED OPEN SPACE
including sustainable urban drainage basins



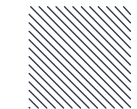
PROPOSED DEVELOPMENT PARCELS
including roads/ footpaths/ infrastructure



LOCATION OF PROPOSED LAND
SET ASIDE FOR CEMETERY



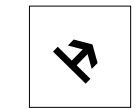
SAFEGUARDED COMMUNITY
FACILITY LAND



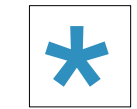
INDICATIVE AREA REQUIRED FOR
INTERNAL ACCESS ROADS
not within the residential land use



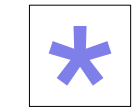
INDICATIVE AREA REQUIRED FOR
PROPOSED ACCESS ROADS
not within the residential land use



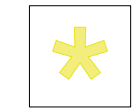
PRIMARY VEHICULAR
ACCESS POINT



LOCATION OF INDICATIVE
PROPOSED BASINS



LOCATION OF EXISTING WATER
FEATURE



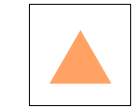
AGRICULTURAL ACCESS



PRIVATE DRIVE ACCESS TO (EXISTING)
WILLOWBROOK COTTAGE



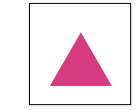
PROPOSED INDICATIVE AREA OF PLAY



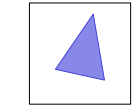
PROPOSED ACCESS TO CEMETERY



PROPOSED PEDESTRIAN/ CYCLE
ACCESS



RETAINED PROW ACCESS POINTS



DRAINAGE OUTFALL

*All features and areas shown to a
tolerance of 10m

BARLESTONE ROAD, NEWBOLD VERDON – PARAMETER PLAN

PEGASUS
GROUP



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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 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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APPENDICES

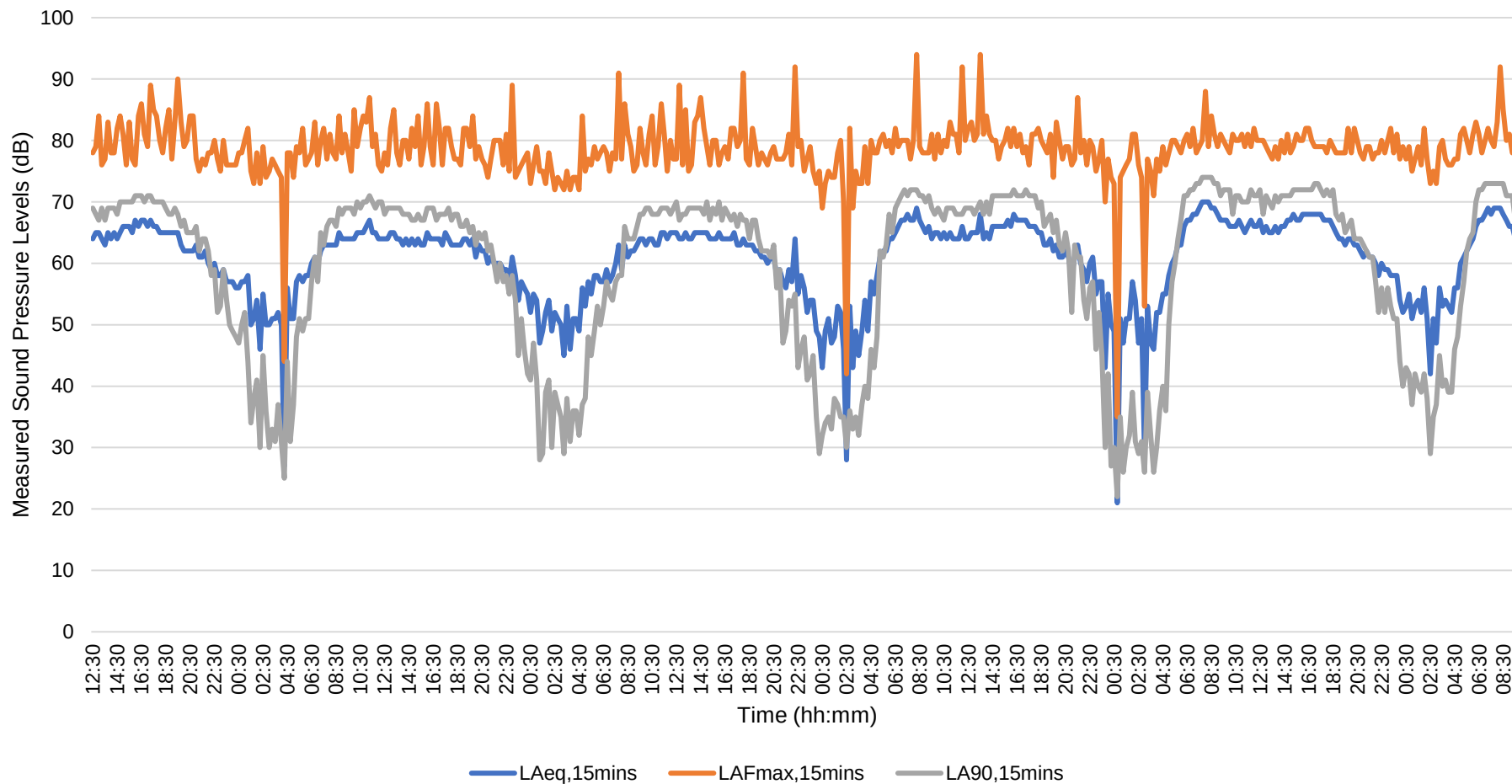


APPENDIX C

Barlestone Road (B582), Newbold Verdon, Leicestershire - CM1

Environmental Sound Monitoring Survey Results

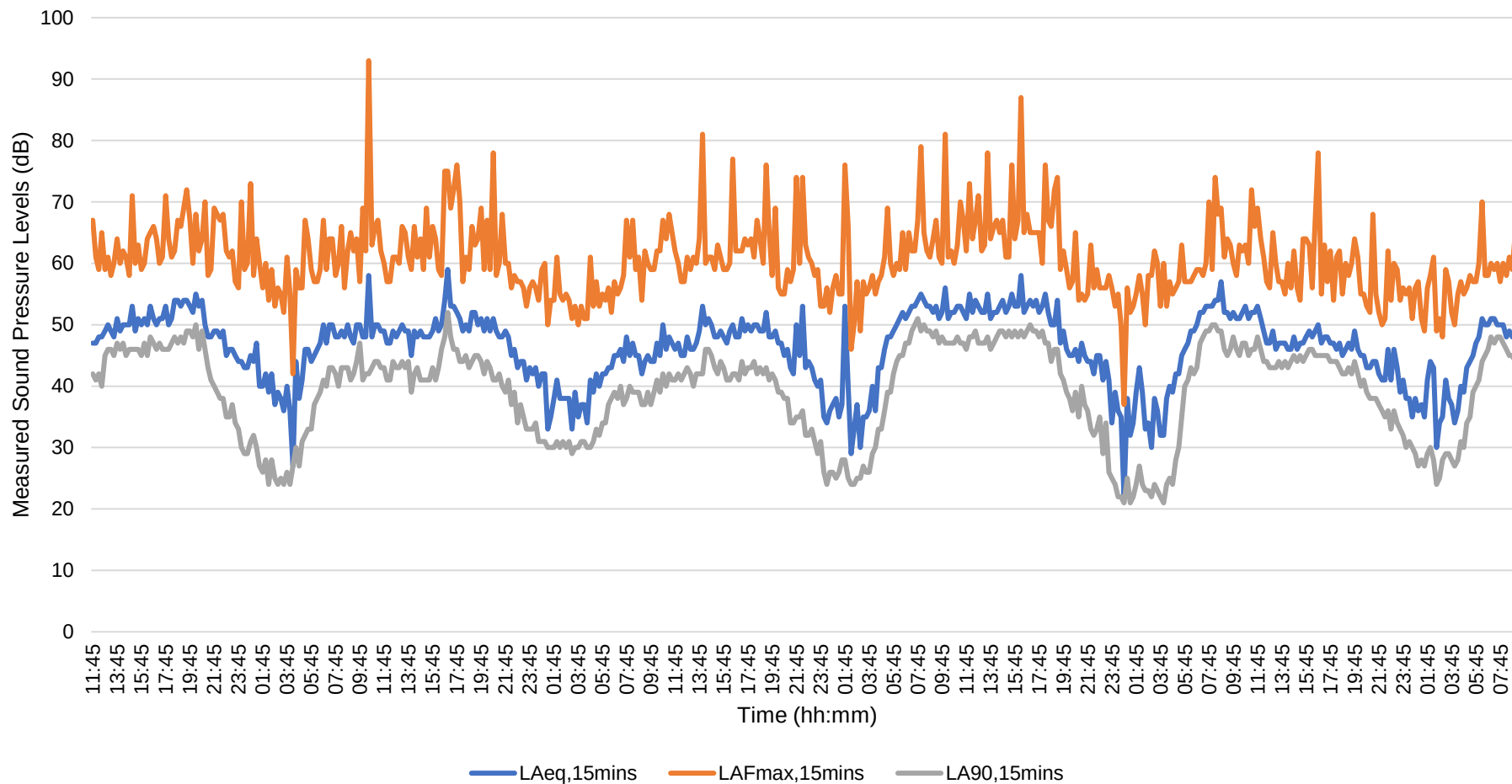
$L_{Aeq,15mins}$, $L_{AFmax,15mins}$ & $L_{A90,15mins}$ Measured Sound Levels - 8th - 13th September 2023



Barlestone Road (B582), Newbold Verdon, Leicestershire - CM2

Environmental Sound Monitoring Survey Results

$L_{Aeq,15mins}$, $L_{AFmax,15mins}$ & $L_{A90,15mins}$ Measured Sound Levels - 8th - 13th September 2023





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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)

2m Acoustic Fencing

B	Updated Layout	UN	HJ	AB	09.10.24
A	Updated Layout	EW	HJ	AB	20.03.24
-		EW	HJ	AB	03.02.24
REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
PROJECT: BARLESTONE ROAD (B582), NEWBOLD VERDON, LEICESTERSHIRE					
DRAWING TITLE: DAYTIME AMBIENT SOUND LEVELS, LAeq,16hour					
CLIENT: DAVID WILSON HOMES EAST MIDLANDS					
DRAWING NUMBER: 24832_04_120_01					
REVISION: B		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.			

File Location: R:\24832\inclosure\Acoustics_2023\04_120_01\24832_04_120_01.dwg
Printed: 09.10.2024



NOTES:

1. DO NOT SCALE THIS DRAWING.

KEY

[Light Blue Box]	0–50dB(A)
[Green Box]	50–55dB(A)
[Yellow Box]	55–60dB(A)
[Orange Box]	60–65dB(A)
[Pink Box]	65–70dB(A)
[Red Box]	70–75dB(A)
[Purple Box]	75–80dB(A)
[Dark Blue Box]	>80dB(A)

[Pink Line] 2m Acoustic Fencing

B	Updated Layout	DN	HJ	AS	09.10.24
A	Updated Layout	EW	HJ	AS	20.03.24
-		EW	HJ	AS	06.02.24
REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:
PROJECT: BARLESTONE ROAD (B582), NEWBOLD VERDON, LEICESTERSHIRE					
DRAWING TITLE: NIGHT-TIME AMBIENT SOUND LEVELS, LAeq,8hour					
CLIENT: DAVID WILSON HOMES EAST MIDLANDS					
DRAWING NUMBER: 24832_04_120_02					
REVISION: B	SHEET SIZE: A3		SCALE: NTS		
STATUS: FOR INFORMATION					
M-EC ACOUSTIC AIR			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.		

File Location: R:\24832\inclosure\Acoustics\2023\04_120_02_Night.dwg
Printed: 09.10.2024



NOTES:

1. DO NOT SCALE THIS DRAWING.

KEY

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

2m Acoustic Fencing

B	Updated Layout	DN	HJ	AS	09.10.24
A	Updated Layout	EW	HJ	AS	20.03.24
-		EW	HJ	AS	03.02.24
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DRAWING TITLE: NIGHT-TIME MAXIMUM SOUND LEVELS, LAFmax,T					
CLIENT: DAVID WILSON HOMES EAST MIDLANDS					
DRAWING NUMBER: 24832_04_120_03					
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B	A3		NTS		
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File Location: R:\24832\Calculations\Acoustics_2023\04_120_03_NightTime.dwg
Printed: 09.10.2024



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APPENDICES



APPENDIX E



NOTES:

- DO NOT SCALE THIS DRAWING.
- Please refer to report reference 24832-ENV-0401 for the details on the proposed glazing and ventilation references.

KEY

Ref. A

Ref. B

Ref. C

Ref. D

B	Updated Layout	UN	HJ	AS	09.10.24
A	Updated Layout	EW	HJ	AS	20.03.24
-		EW	HJ	AS	06.02.24
REV.	AMENDMENTS	DRN	CHK	APP	DATE

PROJECT:

BARLESTONE ROAD (B582),
NEWBOLD VERDON,
LEICESTERSHIRE

DRAWING TITLE:

MITIGATION REFERENCE FOR
HABITABLE BEDROOMS

CLIENT:

DAVID WILSON HOMES
EAST MIDLANDS

DRAWING NUMBER:

24832_04_120_04

REVISION:	SHEET SIZE:	SCALE:
B	A3	NTS

STATUS:

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File Location: R:\24832\24832_04_120_04\Mitigation Reference.dwg
Printed: 09.10.2024



NOTES:

- DO NOT SCALE THIS DRAWING.
- Please refer to report reference 24832-ENV-0401 for the details on the proposed glazing and ventilation references.

KEY

Ref. A

Ref. B

Ref. C

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A	Updated Layout	EW	HJ	AS	20.03.24
-		EW	HJ	AS	06.02.24
REV:	AMENDMENTS:	DRN:	CHK:	APP:	DATE:

PROJECT:

BARLESTONE ROAD (B582),
NEWBOLD VERDON,
LEICESTERSHIRE

DRAWING TITLE:

MITIGATION REFERENCE FOR ALL
OTHER HABITABLE ROOMS
(NON-BEDROOMS)

CLIENT:

DAVID WILSON HOMES
EAST MIDLANDS

DRAWING NUMBER:

24832_04_120_05

REVISION:	SHEET SIZE:	SCALE:
B	A3	NTS

STATUS:

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File Location: R:\24832\Calculations\Acoustics_2023\05_DWG\24832_04_120_05_Mitig_Robzone.dwg
Printed: 09.10.2024



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APPENDICES



APPENDIX F

Reference A 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
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. The background ventilation requirements can be found in standard window mounted non-acoustic trickle ventilators.								

Reference B 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	29	27	35	37	36	45	36	-3
Ventilation (Trickle)	39	38	30	46	42	40	39	-3
The glazing reduction requirements can typically be found in a configuration of 8/12/10 The background ventilation requirements can be found in window mounted acoustically rated trickle ventilators								

Reference C 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	30	30	39	44	48	51	42	-5
Ventilation (Trickle)	43	37	38	46	57	66	45	-3
The glazing reduction requirements can typically be found in a configuration of 9/12/10. The background ventilation requirements can be found in acoustic through wall ventilation.								

Reference D 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	31	41	48	53	58	67	50	-6
Ventilation (Trickle)	43	37	38	46	57	66	45	-3
The glazing reduction requirements can typically be found in a configuration of 4/12/4 The background ventilation requirements can be found in acoustic through wall ventilation.								

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



CIVIL ENGINEERING



TRANSPORT



FLOOD RISK & DRAINAGE



STRUCTURES



GEO-ENVIRONMENTAL



ACOUSTIC AIR



UTILITIES



GEOMATICS



LIGHTING



EXPERT WITNESS



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