Land East of High Road
High Cross, Hertfordshire

Noise Impact Assessment

November 2023

Client: M Scott Properties Ltd

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Document Control

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Document Approvals

Role	Name	Signature	Date
Preparation	Luke Papini Assistant Acoustic Consultant BA(Hons), MSc	[redacted]	29/11/2023
Approval	Paul Gray Director BSc(Hons), MIOA		29/11/2023

For Information

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Contents

1.0 INTRODUCTION

1.1 Quantum Acoustics Ltd has been commissioned by M Scott Properties Limited to prepare this Noise Assessment which accompanies an outline planning application for the proposed residential development of land east of High Road, High Cross, Ware.

1.2 The application seeks to deliver approximately up to 95 residential dwellings including all associated infrastructure.

1.3 This report presents the results of noise monitoring undertaken at the site and considers the suitability of the site for residential development in the context of national and local planning policy.

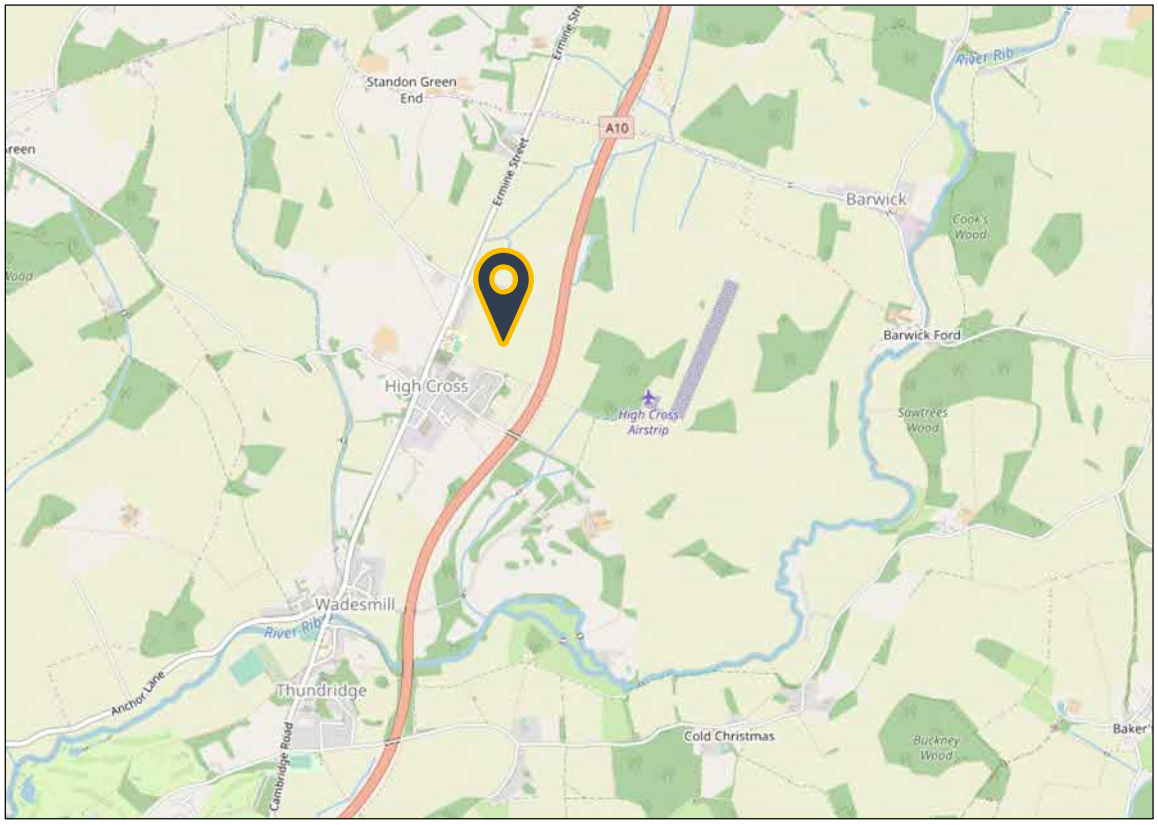
1.4 The approach to assessment and format of this report are aligned with the guidance set out in the ANC/IAO/CIEH publication *"ProPG: Planning and Noise: Professional Practice on Planning and Noise: New Residential Development".* This guidance is directly referenced in the Government's *"Planning Practice Guidance"* on noise. Other industry standard design guidance is also referred to where appropriate.

1.5 A glossary of acoustic terminology is provided at Appendix A to assist with the technical terms and acoustic nomenclature used in this report.

2.0 SITE DESCRIPTION

2.1 The site (Land East of High Road) is located to the north of High Cross, as shown in Figure 2.1 below.

Figure 2.1: Site Plan (OpenStreetMap 2023)



2.2 Directly to the north the is bounded by Sutes Farm. The farmhouse appears to be in residential use, but a number of businesses (including a joinery business, sawmill flooring supplier and scaffold yard) now operate from a number of the farm's former outbuildings. To the northwest the site is bounded by open fields.

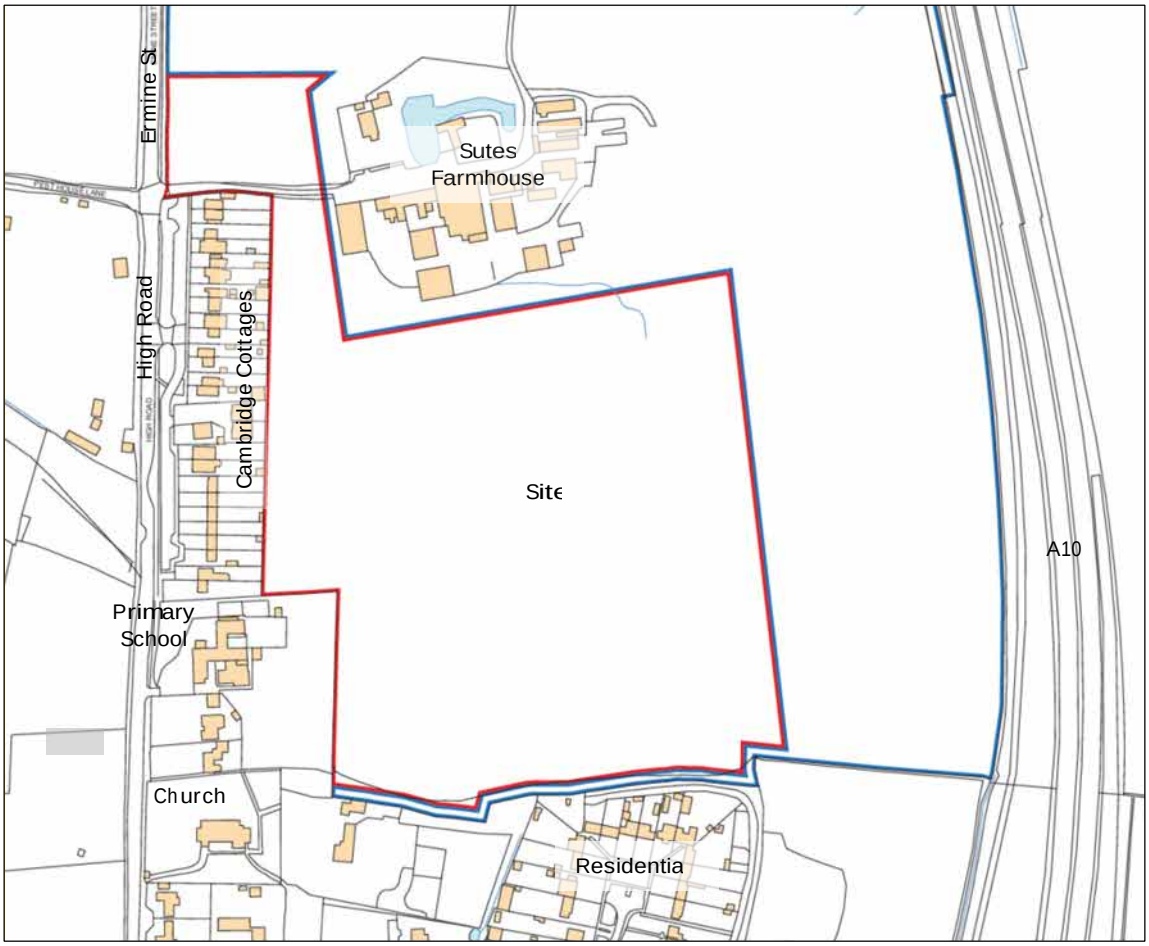
2.3 The eastern boundary of the site is formed with the A10, on the other side of which are open fields and High Cross Airstrip.

2.4 The southern boundary the site adjoins an existing predominantly residential area centred around North Drive and Poplar Close.

2.5 To the west, the site adjoins the rear gardens of existing dwellings (Cambridge Cottages) which front High Road. There is also a primary school (Puller Memorial Church of England School) and a church (St John the Evangelist).

2.6 The location plan of the site showing neighbouring land uses is shown in Figure 2.2 below.

Figure 2.2: Site and Neighbouring Land Uses (Drawing NO: 70-04 Scott Properties)



3.0 PROPOSED DEVELOPMENT

3.1 The proposed redevelopment seeks to create approximately 95 dwellings with associated access from High Road to the west of the site.

3.2 The current concept masterplan for the site is shown below:

Figure 3.1: Preliminary Illustrative Concept Masterplan (Thrive Architects).

4.0 PLANNING CONTEXT AND DESIGN GUIDANCE

4.1 The following legislative background, planning policy context and design guidance is relevant to the development:

Legislation

- The Control of Pollution Act 1974;
- The Environmental Protection Act 1990;
- The Building Regulations 2010 (as amended), including:
  - Approved Document E: Resistance to the Passage of Sound;
  - Approved Document F1: Ventilation
  - Approved Document O: Overheating

National Planning Policy

- Noise Policy Statement for England (2010);
- National Planning Policy Framework (2021); and
- Planning Practice Guidance –Noise (2019).

Local Planning Policy

- The Core Strategy and Policies for Management of Development (2015)

Design Guidance

- BS 4142: 2014 + A1: 2019: *"Methods for rating and assessing industrial noise and commercial sound"*;
- BS 5228-1:2009+A1:2014: *"Code of practice for noise and vibration control on construction and open sites. Noise"*;
- BS 5228-1:2009+A1:2014: *"Code of practice for noise and vibration control on construction and open sites. Vibration"*;
- BS 8233: 2014: *"Guidance on sound insulation and noise reduction for buildings"*.
- *"Guidelines for Community Noise"*: World Health Organisation, 1999 ;
- "Night Noise Guidelines for Europe". World Health Organisation, 2009 ;
- ProPG: Professional Practice Guidance on Planning and Noise: New Residential Development. (2017);
- Acoustics Ventilation and Overheating: Residential Design Guide. Ver. 1.1. (2020); and
- *"Design Manual for Roads and Bridges: LA111 - Noise and Vibration"* (Revision 2). Highways England, May 2020.

4.2 More detailed commentary of the above legislation, planning policy and guidance is presented in Appendix B of this report. Set out below is a brief explanation of key national and local planning policies, which provide the key policy framework for determining whether the

development delivers the Government's overarching policy requirement for sustainable development.

National Planning Policy Framework

4.3 The overarching aim of the planning regime is to ensure the compatibility of land uses. With regard to noise, the National Planning Policy Framework sets out two primary policies which seek to ensure that new noise sensitive development is adequately protected from noise; that that the impact of noise from new noise generating land uses on existing residential uses is minimised and that existing commercial/industrial uses and community facilities do not have unreasonable restrictions imposed on them by new noise sensitive development:

Paragraph 185:

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

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

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

c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.

Paragraph 187:

"*Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.*"

Noise Policy Statement for England

4.4 With regard to 'adverse' impacts and 'significant adverse' impacts, the NPPF directs the reader to the advice contained in DEFRA's *"Noise Policy Statement for England"* (NPSE). This Policy Statement introduces the concept of a *"Significant Observed Adverse Effect Level"* (SOAEL), *"Lowest Observed Adverse Effect Level"* (LOAEL) and "No Observed Effect Level" (NOEL). These are concepts aligned with toxicology outcomes derived from guidance given by the World Health Organisation.

- NOEL –No Observed Effect Level
  This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

- LOAEL –Lowest Observable Adverse Effect Level
  This is the level above which adverse effects on health and quality of life can be detected.

- SOAEL –Significant Observed Adverse Effect Level
  This is the level above which significant adverse effects on health and quality of life occur.

Planning Practice Guidance

4.5 The application of national planning is amplified in the government's "National Planning Practice Guidance" (NPPG). This seeks to help clarify understanding the perception of noise effects, outcomes and actions that should be taken to align decision making with the NPPF. In line with the NPPF concept of basing decision making on the identification of "significant" or "other" impacts on health and quality of life, the NPPG aligns its guidance with the NPSE.

4.6 Table 4.1 overleaf summarises this guidance.

Figure 4.1: Noise Exposure Hierarchy Table

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level (NOEL)			
Not present	No effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable hard, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Local Planning Policy

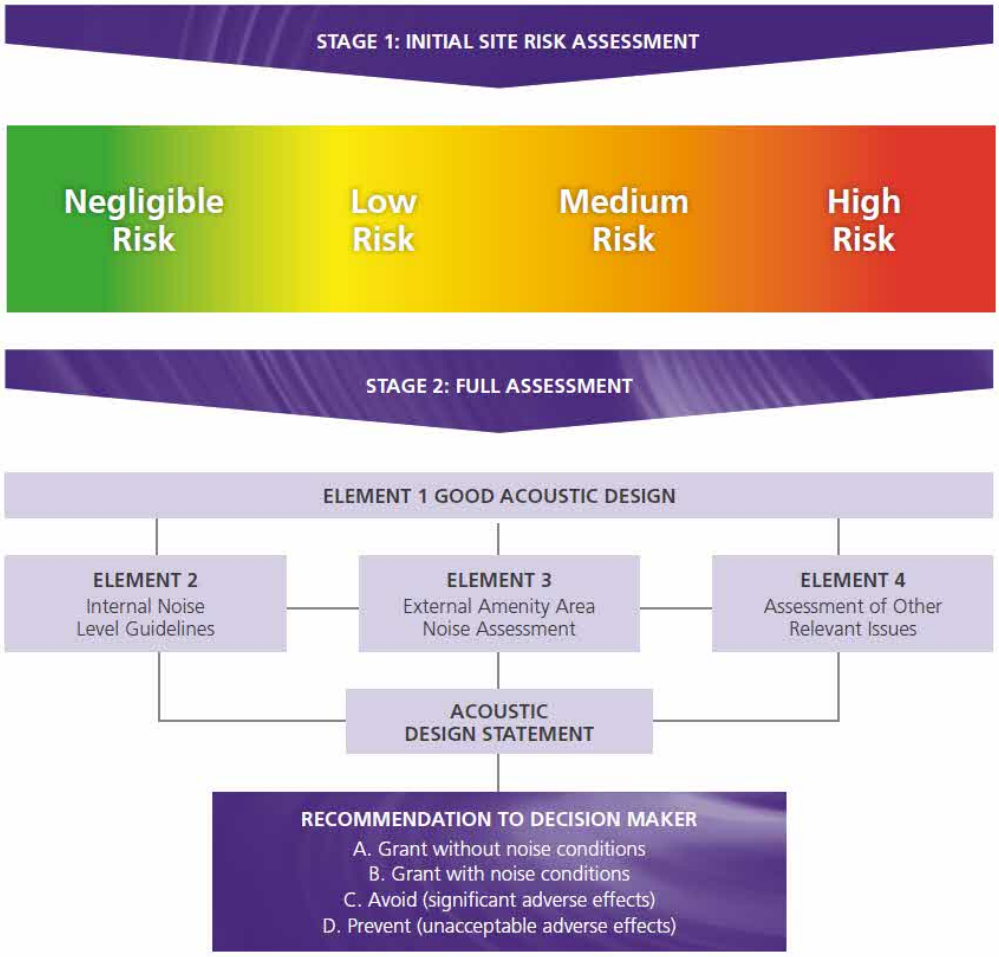
4.7 The key local planning policy relating to noise is “Policy EQ2 –Noise Pollution”. The full detail of this policy and associated explanatory text is set out in Appendix B.

ProPG: Planning and Noise

4.8 As noted earlier, the approach to assessment presented in this report is aligned with the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH) publication *“ProPG: Planning and Noise: Professional Practice Guidance on Planning and Noise: New Residential Development”*. (2017);

4.9 ProPG provides two stages of assessment, the first being an initial site risk assessment and the second being a full assessment, as illustrated in Figure 4.2 below:

Figure 4.2: Summary of ProPG Approach to Assessment



5.0 EXISTING NOISE LEVELS

Automated Noise Monitoring

5.1 An automated environmental noise survey was undertaken from approximately 16:00 hours on Friday 4th August 2023 to approximately 09:00 hours on 8th August 2023.

Measurement Procedure

5.2 Noise monitoring equipment was located at two locations, as shown in Figure 5.1 below:

Figure 5.1: Noise Monitoring Locations

Position	Description
Position 1	On the northern boundary, approximately contiguous with the eastern extent of the proposed residential development area. The measurement microphone was tripod mounted approx. 1.5m above the local ground level.
Position 2	On the northern boundary, adjacent to an existing outbuilding and yard area currently in use as a scaffolders yard. The measurement microphone was tripod mounted at a height of approx. 1.5m above local ground level.

5.3 The sound level analyser located at Position 1 was configured to continuously log "fast" A-weighted sound pressure levels. The data has been post-processed using Convergence Instruments "NSTR-AutoCalc" software to determine 15-minute $L_{Aeq, 15min}$ and L_{Amax} noise metrics. This monitoring location was selected to provide information regarding noise associated with the industrial/commercial uses operating from Sutes Farm (with a primary focus on the scaffold yard)

5.4 The monitoring equipment at Position 2 was configured to record the L_{A90}, L_{Aeq} and $L_{Amax, fast}$ sound pressure level over consecutive 15-minute periods to provide a detailed time history profile showing fluctuations in noise levels. The equipment was also configured to undertake higher resolution logging to assist with the identification and discrimination of noise events. This monitoring location was selected to provide an indication of likely worst case traffic noise levels from the A10 that could be experienced at the eastern boundary of the proposed residential development area.

Equipment

5.5 Details of the equipment used for the survey are summarised below.

Table 5.1: Measurement Instrumentation

Location	Manufacturer	Type	Serial Number
1	Convergence Instruments	NSRT_mk4	ANnerI068V2XlpNQw0JZHD
2	Svantek	971A	121136

5.6 Calibration certificates for the equipment are available upon request.

5.7 Calibration checks on each instrument were carried out prior to and on completion of the survey, with no significant calibration drift observed.

Results

5.8 Detailed time history graphs showing the A-weighted L_{90}, L_{eq} and L_{max} noise levels measured during each consecutive 15-minute period of the survey are attached at Appendix C.

5.9 A summary of the measured daytime ($L_{Aeq,16\ hour}$) and night-time ($L_{Aeq, 8\ hour}$) are presented in the table overleaf. These values represent noise levels from all noise sources (i.e. both transportation noise sources and noise associated with neighbouring industrial/commercial uses):

Table 5.2: Typical Noise Levels

Measurement Location	Calculated Noise Level		
	Daytime Noise Level, $L_{Aeq,16hour}$ (dB)	Night-time Noise Level, $L_{Aeq,8\ hour}$ (dB)	Night-time $L_{Amax,fast}$ (dB)
Position 1	50	44	74
Position 2	49	44	71

Weather

5.10 Weather conditions were mainly dry and with generally light winds, but with some gustier periods. The conditions were therefore deemed generally suitable for the measurement of environmental noise.

Attended Noise Measurements

5.11 Attended noise measurements were undertaking during a site attendance on 8th August. The measurements were made over a four-hour period between 10:00 and 14:00 hours, in general accordance with the '*Shortened Measurement Procedure*' as set out in the Department of Transport's "*Calculation of Road Traffic Noise*"[1].

Measurement Locations

5.12 Noise measurements were undertaken at four locations as shown in Figure 4.2 overleaf.

Equipment

5.13 Details of the equipment used for the survey are summarised below.

Table 5.3: Measurement Instrumentation

Location	Manufacturer	Type	Serial Number
A to D	Svantek	977	36431

5.14 Calibration certificates for the equipment are available upon request.

5.15 A calibration check was carried out prior to use and on completion of the survey, with no significant calibration drift observed.

[1] Department of Transport. (1998) Calculation of Road Traffic Noise (CRTN). HMSO. London.

Figure 5.2: Noise Monitoring Locations

Position	Description
Position A	To the north-eastern boundary of the site. The sound level meter was positioned approx. 8m away from the curb of High Road and mounted on a tripod approximately 1.5m above ground level.
Position B	To the north-western boundary of the site. The sound meter was positioned to the east of the gardens of Cambridge Cottages. The sound level meter was mounted on a tripod approximately 1.5m above ground level.
Position C	Towards the south-western boundary of the site. The sound meter was positioned behind the residential dwellings on Cambridge Cottages and was mounted on a tripod approximately 1.5m above ground level. This measurement location was selected to quantify the noise levels experience at the proposed western building line.
Position D	Towards the south-eastern development area. The sound level meter was mounted on a tripod approximately 1.5m above ground level. This measurement location was selected to quantify the noise levels experience at the proposed eastern building line.

Results

5.16 Detailed time history graphs showing the A-weighted L_{90}, L_{eq} and L_{max} noise levels measured during each consecutive 15-minute period of the survey are attached at Appendix C.

Table 5.4: Attended Noise Survey Results

Measurement Location	Time	Measured Sound Level, dB(A)			
		$L_{A90,15mins}$	$L_{Aeq,15mins}$	$L_{A10,15mins}$	$L_{Amax,fast}$
A	12.00 –13.00	44	67	72	83
	13.00 –14.00	40	66	70	83
	14.00 –15.00	42	65	68	84
B	12.00 –13.00	38	51	50	74
	13.00 –14.00	39	45	49	58
	14.00 –15.00	39	44	45	60
C	12.00 –13.00	41	44	45	60
	13.00 –14.00	41	50	51	70
	14.00 –15.00	38	50	49	71
D	12.00 –13.00	39	43	46	61
	13.00 –14.00	40	46	49	60
	14.00 –15.00	39	43	46	64

5.17 During An automated environmental noise survey was undertaken from approximately 12:00 hours on Thursday 18th May 2023 to approximately 11:30 hours on Friday 19th May 2023.

Data Analysis

5.18 The results of the attended noise survey have been used to estimate the daytime predicted $L_{A10,18hour}$ sound level in accordance with CRTN. These values have then been used to estimate

the daytime ($L_{Aeq,16hour}$) and night-time ($L_{Aeq,8hour}$) sound levels, using the procedures developed by TRL/Casella Stanger for DEFRA[2] .

5.19 Estimated daytime and night-time values are shown in Table 5.5 below.

Table 5.5: Estimated Daytime and Night-time Sound Levels

Measurement Location	Calculated Noise Level	
	Daytime Noise Level, $L_{Aeq,16hour}$ (dB)	Night-time Noise Level, $L_{Aeq,8\ hour}$ (dB)
A	67	57
B	46	40
C	45	39
D	44	38

5.20 The calculated typical daytime and night-time noise levels at all positions are summarized in the table overleaf.: Detailed time history graphs showing the A-weighted L_{90}, L_{eq} and L_{max} noise levels measured during each consecutive 15-minute period of the survey are attached at Appendix C

Discussion

5.21 During site attendance noise levels across the development site were generally dominated by distant traffic noise from the A10, local traffic noise from High Road/Ermine Street, occasionally helicopter flyovers and birdsong.

5.22 Some activity noise associated with the scaffolding yards was also intermittently audible but this was not typically prolonged in duration and was not subjectively judged to be significant in the overall context of the noise climate witnessed during site attendances.

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

6.0 INITIAL SITE NOISE RISK ASSESSMENT

6.1 Noise levels measured/estimated from the automated and attended noise monitoring have been assessed in line with the "Stage 1 Initial Site Noise Risk Assessment" in accordance with ProPG guidance. The purpose of this is to classify the initial (un-mitigated) noise risk of the site, based on noise risk with semantic descriptions ranging from "*negligible*", "*low*", "*medium*" and "*high*".

6.2 For presentation purposes, the results of this assessment have been colour coded in line with ProPG guidance, as shown in Figures 6.1 below and 6.2 overleaf.

Figure 6.1: Daytime Initial Noise Risk Assessment

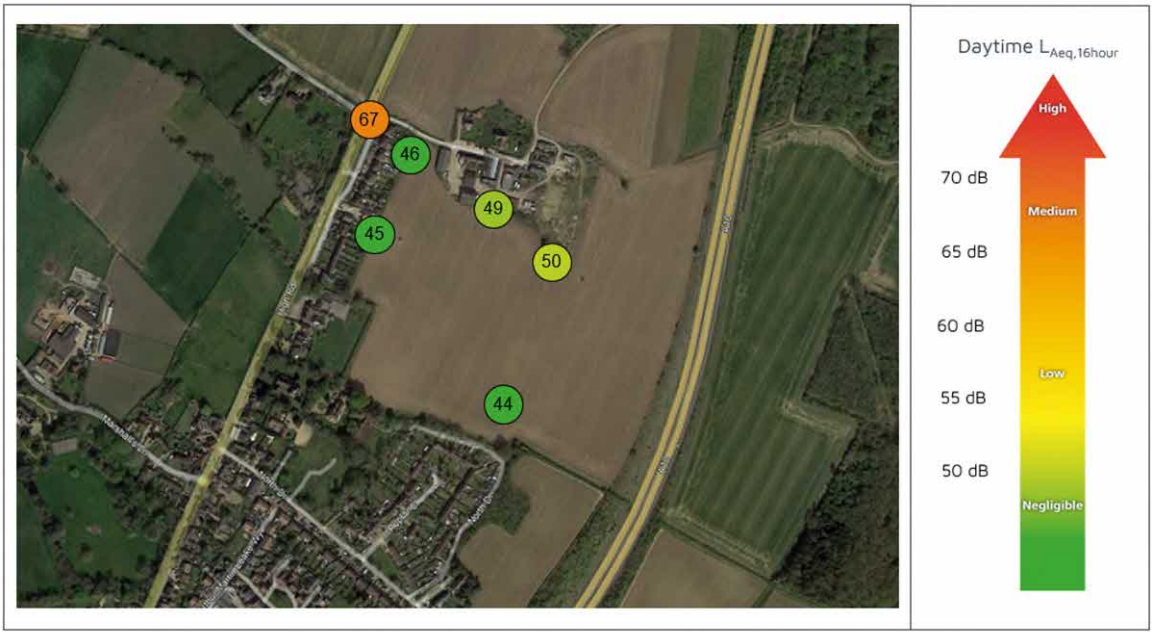
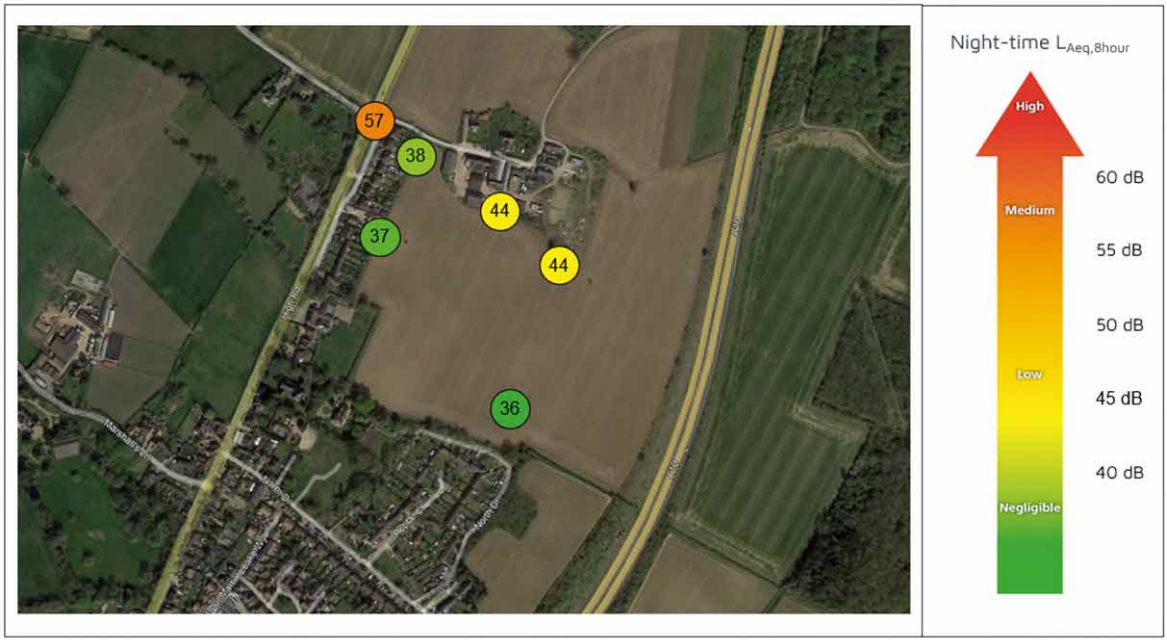


Figure 6.2: Night-time Initial Noise Risk Assessment



6.3 The initial daytime noise risk assessment indicates a “Negligible” to “Low” risk within the site and a “medium” risk for the attended measurement locations directly on High Road.

6.4 The initial night-time noise risk assessment also indicates a “Negligible” to “Low” risk within the site.

6.5 For *“negligible”* risk sites, ProPG 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.*

6.6 For *“low”* sites, the ProPG states:

> *“At low noise levels, the site it likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts on noise will be mitigated and minimised in the finished development.”*

6.7 For *“medium”* risk sites, ProPG states:

> *“As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADFS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impacts will be avoided in the finished development.”*

6.8 It Is therefore concluded that, the measured noise levels demonstrate the site should be acceptable for residential development from a noise perspective, provided a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.

6.9 A Stage 2 detailed assessment (for Elements 1 to 4) is presented in the following sections.

7.0 ELEMENT 1: GOOD ACOUSTIC DESIGN

General

7.1 ProPG references a preferred hierarchy of strategies that represent a “good acoustic design process”. These include the following:

- Reducing noise “at source” and or relocating the noise source;
- Providing “buffer” zones to maximise the spatial separation between noise source and receiver locations;
- Reducing noise propagation across the site by introducing acoustic screening (e.g. barriers, earth bunds, etc.)
- Optimise the acoustic screening provided by the proposed development by creating “barrier” blocks to reduce the noise propagation across the site and may assist in protecting external amenity areas;
- Optimising the orientation and internal layout of buildings to help minimise the noise exposure of noise sensitive rooms (for example, by positioning non-habitable rooms on elevations with a greater noise risk and noise sensitive rooms on quieter elevations);
- Designing the building envelope to mitigate noise intrusion; and
- Designing an appropriate strategy for minimising noise intrusion under all building ventilation modes (including the control of summertime overheating).

Mitigation

7.2 As noted previously, noise levels characterising the site are dominated by distant traffic noise from the A10, local traffic noise from High Road. Clearly, such noise sources cannot be “removed” or “relocated”. Furthermore, any scope to provide “at source” mitigation (through the use of “low noise” road surface or a reduction of speed limit of the roads) would therefore fall beyond the gift of the developer. As such, there are no practicable options for providing “at source” noise control.

7.3 Since sound decays naturally with distance, the noise exposure of proposed dwellings can be reduced by locating the dwellings as far as practicable from the noise source. The outline masterplan for the site embeds this principle, creating an extensive buffer zone to the A10, whilst the existing dwellings on High Road create an inherent buffer to local road movements, as illustrated in Figure 7.1 overleaf.

Figure 7.1: Use of Buffer Zones to A10 and High Road

7.4 The concept masterplan also provides for an extensive buffer zone along the northern boundary of the site, as shown in Figure 7.2 overleaf.

Figure 7.2: Creation of Buffer Zone to Sutes Farm Outbuildings

7.5 The concept masterplan for the site also introduces opportunities to orient buildings such that their front elevations facing towards the roads and commercial / industrial uses . This will help optimise options for locating noise sensitive rooms on screened elevations and the inherent massing of building will also assist in protecting external amenity areas.

7.6 The planning application accompanied by this Noise Assessment is an outline application. As such, the detailed design of the proposed dwellings will be subject to the approval of Reserved Matters and any specific planning conditions the LPA consider are necessary to deliver appropriate development. The use of such controls can ensure that appropriate mitigation (e.g. appropriate sound insulation and means of ventilation/overheating control) will be implemented within the scheme design proposals, the following sections review how the potentially conflicting requirements of acoustics, ventilation and overheating can be satisfactorily controlled for the proposed development.

Conclusions

7.7 It is concluded that the proposed master planning for the site follows a good acoustic design process and can embed mitigation to help minimise noise impacts, in line with the spirit of ProPG, the NPPF, NPSE, NPPG and local planning policy.

8.0 ELEMENT 2 - INDOOR AMBIENT NOISE LEVELS

Internal Acoustic Design Recommendations for Dwellings

8.1 Figure 2 in the ProPG outlines the following internal acoustic design recommendations for dwellings:

Table 8.1: ProPG Indoor Ambient Noise Level Design Guidance

Activity	Location	Daytime (07.00 to 23.00 hours)	Night-time (23.00 to 07.00 hours)
Resting	Living Room	35dB $L_{Aeq,16hour}$	--
Dining	Dining Room/Area	40dB $L_{Aeq,16hour}$	--
Sleeping	Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$ 45 dB $L_{Amax,F}$ (Note 4)

Sound Insulation Requirements for Façades

8.2 The required level of sound insulation for a building's façade to achieve the above design targets is determined by:

- The noise levels affecting specific areas of the façade, with higher insulation needed for units facing noisy sources like roads.
- The sound insulation properties of building elements, such as windows in masonry walls.
- The proportion of different building elements; larger façades require more insulation.
- The acoustics of the receiving room, with harder (reverberant) rooms needing more insulation.

Noise Levels

8.3 The results of the noise monitoring indicates that noise levels within the site (i.e. excluding the measurement location on High Road which is outside of the site) range from 44 –50 dB $L_{Aeq,16hour}$ (daytime) and 36 –44 dB $L_{Aeq,8hour}$ (night-time).

Outline Sound Reduction Performance Considerations

8.4 The proposed development will, as a matter of course, need to include the use of thermal double glazing (to comply with Approved Document L1 of the Building Regulations 2010, as amended). Standard thermal double glazing will typically offer a sound reduction performance of 29 dB R_w. An appropriate scheme of ventilation will also need to be provided to comply with the *"whole-house"* ventilation requirements of Approved Document F1 of the Building Regulations 2010, as amended.

8.5 A *"standard"* trickle ventilator will typically provide a sound reduction performance of around $D_{n,ew}$ 32dB. However, proprietary "acoustic" ventilators are available offering a sound reduction performance of up to around 41 dB, with higher performances achievable with *"through the wall"* type ventilators. Mechanical, ADF compliant ventilation solutions (such as MVHR) are also capable of providing intrinsically high levels of acoustic protection.

8.6 It therefore follows that even the "worst case" noise levels characterising the site (i.e. a worst-case daytime sound level of 50 dB $L_{Aeq, 16hour}$ and night-time level of 44dB $L_{Aeq, 8hour}$ should be readily controllable through the detailed specification of the external fabric of the proposed development and proposed ventilation strategies. The detailed design of window and ventilators can be directly controlled by the LPA, either through the Reserved Matters approval process, or the use of a planning condition requiring the submission and approval of the finalised design proposals,

8.7 It is therefore concluded that the proposed development can readily designed to deliver acceptable indoor noise levels for future residents.

Purge Ventilation

8.8 Approved Document F1 of the Building Regulations 2010 (with amendments) mandates that residential properties must offer adequate "purge" ventilation. Typically, this requirement is met by allowing occupants to open windows, even in scenarios where doing so may temporarily raise ambient noise levels.

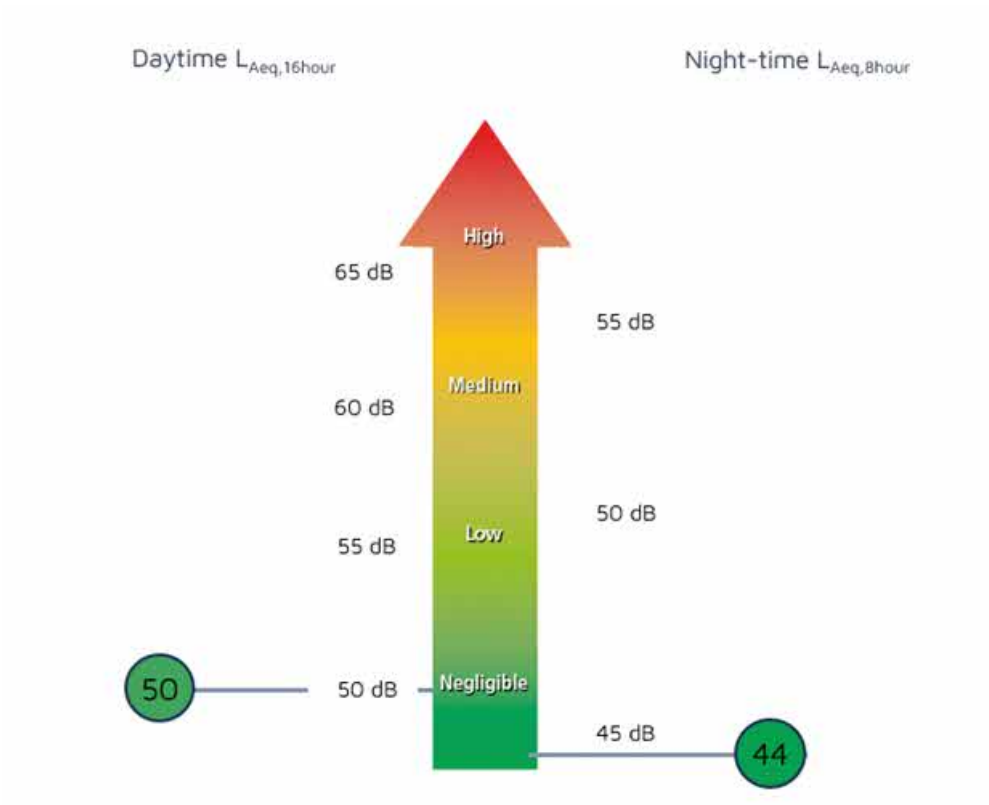
8.9 Given that any increase in noise levels will arise as a result of occupant choice and by its nature, purge ventilation, is only required for a limited duration, it is concluded any temporary increase in noise levels to deliver purge ventilation in accordance with Approved Document F1 is acceptable and compatible with the guidance of ProPG, BS 8233:2014 and ADF.

Thermal Comfort

8.10 The proposed dwellings will also need to implement appropriate strategies to address any potential for the building overheating during the summer. From a sustainability point of view, the preferred means of providing thermal control of the properties is through the use of openable windows to provide passive, ventilative cooling. It is, however, simple to appreciate that future occupants will experience increased noise intrusion when windows are open.

8.11 An AVOG "Level 1" assessment (Figure 8.1 below) has therefore been undertaken to assess the potential noise risk of the site based on the "worst case" noise levels measured during the survey.

Figure 8.1: ProPG Indoor Ambient Noise Level Design Guidance



8.12 This initial Stage 1 assessment indicates a "*negligible*" noise risk for both the daytime and night-time periods.

8.13 In light of the above, it should be acceptable for the proposed dwellings to rely on the use of openable windows to provide thermal control without any adverse acoustic impact.

8.14 The control of overheating in bedrooms is a matter now statutorily controlled by Approved Document O of the Building Regulations and therefore controls outside of the planning system exist to ensure that the potentially conflicting requirements of acoustics and overheating are fully addressed, as a matter of course. The initial assessment outlined above provides a clear indication that compliance with ADO should be readily achievable without any additional strategy for the removal of heat other than openable windows.

Conclusions

8.15 It is concluded that the proposed development can readily designed to deliver acceptable indoor noise levels for future residents, for all modes of ventilation.

9.0 ELEMENT 3: EXTERNAL AMENITY AREA NOISE LEVELS

9.1 As set out in Section 4 of this report a noise level of 50 dB $L_{Aeq,16hour}$ is a desirable target for noise in external amenity areas, with 55 dB $L_{Aeq,16hour}$ suggested as an upper target in ProPG / 8233:2014.

9.2 As noted previously, noise monitoring at the site indicates a “worst case” daytime noise level of 50 dB $L_{Aeq,16hour}$. It follows that even without additional mitigation, daytime noise levels characterising the site will enable the delivery of external amenity areas to the properties in lien with ProPG / BS 8233 recommendations.

9.3 In practice, noise levels in external amenity areas will be additionally protected by the inherent massing of the proposed development and additional acoustic screening delivered by standard boundary fencing treatments.

9.4 It is therefore concluded that the outline scheme design proposal implements appropriate good acoustic design measures that should readily control noise levels within all private gardens within the ProPG stated aspirational design target of 55 dB $L_{Aeq,16hr}$.

10.0 ELEMENT 4: OTHER CONSIDERATIONS

Planning Policy Compliance

10.1 The conclusions of the Elements 1 to 3 show that the development implements “good acoustic design” and both internal and external noise levels can be adequately controlled in line with ProPG guidance.

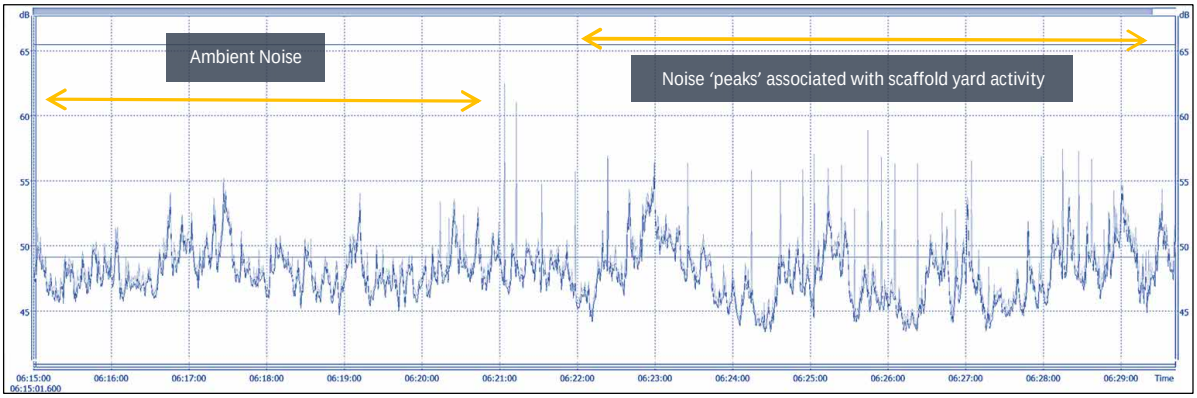
10.2 The proposed scheme does not rely on any specific acoustic mitigation and should not therefore create a risk of any unintended adverse consequences for future residents the proposed development is therefore considered to comply fully with relevant national and local planning policy.

Compatibility With Neighbouring Land

10.3 As noted earlier, the proposed development is located to the south of Sutes Farm, the outbuildings of which have a variety of existing commercial/industrial uses. Whilst noise from such uses was not intermittently audible during site attendances, such noise was not considered to be dominant in the overall context of the site and the ProPG Stage 1 and Stage 2 have therefore been based on the total, cumulative noise levels from all sources.

10.4 Notwithstanding this, additional scrutiny of the automated noise monitoring data has been undertaken to determine if there were other time periods that may include an increased level of noise generation from the existing uses. Figure 10.1 below shows an extract time history profile, which shows the presence of early morning (06.00 to 07.00 hours) activity associated with the scaffolding yard - characterised by occasional intermittent noise peaks, as illustrated in the time history extract below.

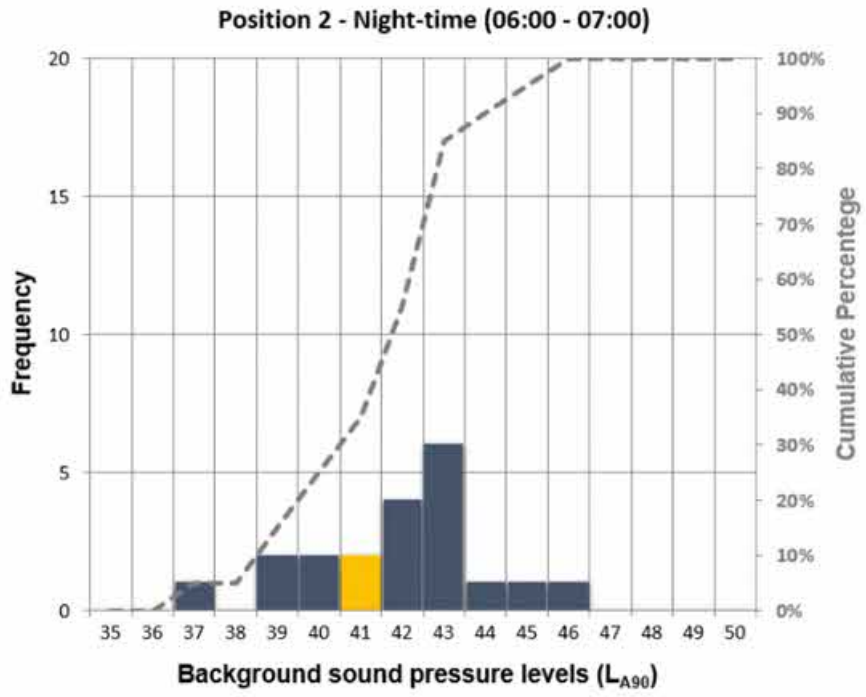
Figure 10.1: Extract Time History Profile of Scaffold Yard Activity



10.5 The time history extract shown above represents a “worst case” period based on a review of the available 5-day dataset). A more detailed analysis of the time history indicates gives a specific noise level of scaffold yard noise of 32dB $L_{Aeq,15mins}$.

10.6 The automated noise monitoring data has also been further reviewed to determine the typical background noise levels that would otherwise exist at this time of the observed activity. Figure 10.2 below shows a statistical analysis from which a typical background sound level of 41dB $L_{A90,15mins}$ has been determined.

Figure 10.2: Statistical Analysis of Background Noise Levels



10.7 Based on the above, an initial assessment of scaffolding activity noise has been undertaken, which is summarised in Table 10.1 overleaf. In order to account for the impulsivity of the observed noise, a penalty correction of +6dB (i.e. clearly perceptible impulsivity) has been applied to determine the rated noise level.

Table 10.1: Initial BS 4142 Assessment of Scaffold Yard Noise

Location	Specific Noise Level, $L_{Aeq,15mins}$	Character correction, dB	Rated Noise Level $L_{Ar,\ 15mins}$	Background Noise Level, $L_{A90,15mins}$	Difference between Rated and Background Noise Level, dB	Assessment Outcome
Northern boundary of proposed residential development area overlooking scaffold yard	32dB	+6	38dB	41dB	-3	Low impact (No Observed Adverse Effect)

10.8 The above assessment provides reassurance that whilst noise from existing industrial units is present on an intermittent basis, this should not have an adverse impact on the amenity of the proposed dwellings. To further support that conclusion, reference can be made to paragraph 2.41 of ProPG which provides additional commentary of how industrial/commercial noise should be taken into account in the ProPG assessment process and states:

> *"In the special case where industrial and/or commercial noise is present on the site but is " not dominant" (i.e. where the impact would be rated as lower than adverse (subject to context) if a BS4142:2014 assessment was to be carried out), its contribution may be included in the noise level used to establish the degree of risk in Stage 1 and may also be included in the consideration of Stage 2 Element 2 Internal Noise Level Guidelines (and if included, this should be clearly stated)."*

10.9 To assist in interpreting the above, a BS 4142 conclusion of an "adverse" implies that the rating level would be around 5dB above the typical background noise level. As seen in Table 10.2, an initial BS 4142 assessment gives the rated sound level as being 3dB below background –which would mean the sound is 8dB lower than a threshold indicating an "adverse" effect. As such, it is reasonable to conclude that whilst industrial noise is present, it is not dominant and that including such noise in the ProPG Stage 1 and Stage 2 assessments is appropriate. This has been clearly declared earlier in this report, as required by ProPG.

10.10 A corollary of the above conclusion is that existing businesses would not have a significant adverse effect on future dwellings and does not therefore create any "any agent of change" obligation for additional mitigation to be introduced. In that regard, the proposed development is considered to fully comply with paragraph 187 of the NPPF.

10.11 Whilst the above conclusion stands in its own right, it is also considered material to note that there are existing dwellings in similar of closer proximity to the scaffold yard (and other businesses on Sutes Farm), as shown in Figure 10.3 below.

Figure 10.3: Agent of Change Context

10.1 It can therefore be reasonably concluded that future residents of the site should not experience “nuisance” levels of noise, without the potential for such noise causing greater nuisance to existing residents in the locality. As such, there should be no material risk of these existing business having unreasonable restrictions placed on them as result of the proposed development.

Recommendation to Decision Maker

10.2 Section 3 of ProPG identifies that following the Stage 1 and 2 guidance will lead to one of four possible recommendations from the noise practitioner to the decision maker:

A. Planning consent may be granted without any need for noise conditions;

B. Planning consent may be granted subject to the inclusion of suitable noise conditions;

C. Planning consent should be refused on noise grounds in order to avoid significant adverse effects (“avoid”); or

D. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects (“prevent”).

10.3 The ProPG Stage 1 assessment demonstrates that the Site has a “negligible” to “low” noise risk. The Stage 2 assessments confirm that good acoustic design is implemented within the outline scheme proposals and that additional mitigation will be implemented as a matter of course during the detailed design stage of the development (e.g. to comply with the statutory requirements of the Building Regulations). The proposed development is not therefore reliant on any additional mitigation not already embedded within the concept scheme masterplan. As such, the appropriate recommendation to the decision maker is that:

“Planning consent may be granted without any need for noise conditions”

11.0 CONCUSIONS

11.1 Quantum Acoustics has undertaken an environmental noise survey to establish the existing noise levels. The noise survey concluded that the site is dominated by traffic noise from the A10 and local traffic movements on High Road/Ermine Street. Industrial noise is also intermittently present, however, such noise is not dominant.

11.2 The potential risk of the site has been assessed in with national and local planning policies and guidance and ProPG Stage 1 and Stage 2 assessments have been undertaken.

11.3 The Stage 1 assessment concludes that the site has a “negligible” to “low” noise risk.

11.4 The Stage 2 assessment demonstrates:

- The scheme follows a good acoustic design process to mitigate noise levels;
- The proposed development can be designed to deliver appropriate internal noise levels for all modes of ventilation;
- The proposed development embeds appropriate design strategies for providing access to good quality external amenity space for future residents;
- The development does not require specific mitigation and should not create any unintended adverse consequences for future residents the proposed development; and
- The proposed development does not raise any agent of change concerns in relation to existing neighbouring business or community use facilities.

11.5 In light of the above, it is concluded that the proposed development complied fully with noise related national and local planning policies.

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APPENDIX A

Glossary of Acoustic Terminology

General

Vibrations in the air, water or other media cause pressure variations in the surrounding air. These pressure changes are perceived by the human ear as "sound".

Measurement Units

Given the huge range of pressure fluctuations detectable or tolerated by the human ear, sound is quantified on a logarithmic scale with values expressed in "decibels". Values are based on a reference sound pressure level of 20µPa, thus a sound pressure of 20µPa would equate to 0dB and a pressure of 200Pa would equate to 140dB.

Frequency

The number of cycles or vibrations per second, measured in Hertz (Hz). Higher frequencies are perceived as higher-pitched. Noise audible to the human ear typically covers a frequency range of 20Hz to 20,000Hz.

A-Weighting

The human ear is typically more sensitive to sound in towards the middle of the audible range and less sensitive to lower and higher and frequencies. In order to take account of these differences, a frequency weighting is often applied to the sound measurement which adjusts the measurement value to reflect the way the human ear will perceive the sound. The use of "A-weighting" therefore gives a measure of subjective "loudness". A-weighted sound levels are expressed in dB(A).

Comparison of Sound Levels

The subjective perception of sound is illustrated by reference to various relatable noise sources below:

Sound Pressure Level, dB(A)	Typical Noise Source
160	Space rocket taking off
140	Military jet taking off (at 30m)
100	Dancefloor of nightclub
90	Heavy goods vehicle driving past
80	Busy urban road
70	Vacuum cleaner
60	Busy office
55	Normal speech at 1m
40	Whispered conversation at 2m
30	Bedroom at night (BS 8233: 2014)
20	Remote country location
0	Threshold of hearing

Variation of Sound with Time

The magnitude of most sounds varies with time. Environmental noise is normally measured with a "fast" time weighting which best replicates the way sound fluctuations are perceived.

Acoustic Terminology

A number of noise metrics are routinely used to assist in characterising a noise environment. These include:

L_{90} is the noise levels that is exceeded for 90% of the measurement period. It reflects the quiet periods during that time and is often referred to as the "background noise level". It is often used as a basis for setting noise emission criteria. The A-weighted value over time period (T) is written as LA90,T.

Leq is the level of a notional continuous sound that would deliver the same sound energy as the actual fluctuating sound over the measurement period. This may be thought of as the "average" level during the measurement period. The A-weighted value over time period (T) is written as LA90,T.

L_{max} is the maximum noise level during the measurement period. For environmental noise purposes, L_{max} values are normally measured with a "fast" time response. The A-weighted value is then reported as $L_{Amax,fast}$ (or $L_{Amax,F}$)

Addition of Sound Levels

The use of a logarithmic scale does not allow the simple arithmetic addition of sound levels – they need to be added logarithmically. This means that two noise sources, each generating a sound level of 50dB(A) will generate a combined sound level of 53dB(A) – not 100dB(A),

Subjective Perception of Sound Level Changes

Subjectively, the human ear:

Cannot perceive a sound level change of less than 3dB(A);

Will perceive a sound level change of 4-5dB(A) as "noticeable";

Will perceive a sound level change of 10dB(A) as a doubling (or halving) of loudness

Sound Insulation

The sound insulation performance of building constructions can be described using a number of metrics:

R_w is the "weighted sound reduction index" and is an intrinsic measure of the sound reduction capabilities of a construction measured in an acoustics laboratory.

D_w is the "weighted sound level difference". This is a measured of the in-situ performance of a construction, as installed in a building.

$D_{nT,w} + C_{tr}$ is a weighted sound level difference to which further corrections (standardisation and the addition of "$+C_{tr}$" correction). This descriptor forms the basis of the airborne sound insulation performance requirements of Approved Document E of the Building Regulations 2010 (as amended).

$L'_{nT,w}$ is the standardised impact sound pressure level and forms the basis of the impact sound insulation performance requirements of Approved Document E of the Building Regulations 2010 (as amended).

Reverberation Time

This is the time taken for sound in a room to decay by 60dB. Reverberation times are lower in smaller rooms with lots of soft furnishings, and longer in large rooms with hard finishes.

Noise Rating Level

As an alternative to expressing a sound level in dB(A), noise from some sources (e.g. building services system) are quantified in terms of a Noise Rating (NR) level. This is achieved by comparing the frequency content of the sound against a series or curves defined in Annex A of BS 8233: 2014.

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APPENDIX B

Planning Context and Design Guidance

B.1 LEGISLATION

The Control of Pollution Act 1974

B.1.1 Section 60 and 61 of the Control of Pollution Act 1974 provide the principle legislative framework relating to noise and vibration associated with demolition and construction activities.

B.1.2 Section 60 of the Act give Local Authorities the power to serve a notice on a person carrying out, or planning to carry out, works in order to control any adverse noise and vibration effects from such work. Such a notice can provide for a number of controls on the works, including the specification of machinery that is (or is not) to be used; the operational hours during which works can be undertaken and/or impose noise and vibration limits with which the works must comply. The contravention of a Section 60 Notice, without reasonable excuse, is an offence.

B.1.3 Section 61 of the Act enable s contractor (or developer) to apply to a Local Authority of the "prior consent" of works. Once a Consent has been granted, the works may proceed and the Local Authority are not able to pursue action under Section 60 of the Act (subject to the contractor's compliance with the terms of the Consent). A Consent does not, however, prevent the possibility of alternative nuisance action under Section 82 of the Environmental Protection Act or common law (in the event that individuals consider such works constitute noise nuisance).

B.1.4 Section 72 of the Act defines "best practicable means" (BPM) and recommends that works are undertaken in accordance with BPM. The demonstration of BPM can be demonstrated through adherence to a code of practice approved under Section 71 of the Act. A current Code of Practice used for controlling construction noise and vibration are BS 5228-1: 2009+A1: 2014: "Code of practice for noise and vibration control of construction and open sites – Part 1: Noise" and BS 5228-2: 2009+A1: 2014: "Code of practice for noise and vibration control of construction and open sites – Part 2: Vibration"

The Environmental Protection Act 1990

B.1.5 Part III of the Environmental Protection Act (EPA) provides powers to local authorities to deal with "statutory" nuisances, including noise. The Act adopts common law nuisance principles but provides power to local authorities to determine whether a nuisance exists and powers to take enforcement action.

B.1.6 Where a complaint of a statutory nuisance is made to it by a person living within its area, Section 79(1) of the EPA imposes a duty on local authorities "to take such steps as are reasonably practicable to investigate the complaint".

B.1.7 Section 80(1) states:

> "*Subject to subsection 2A, where that where a local authority is satisfied that a statutory nuisance exists, or is likely to occur or recur, in the area of the authority, the local authority shall serve a notice ("an abatement notice") imposing all or any or the following requirements-*
>
> - *requiring the abatement of the nuisance or prohibiting or restricting its occurrence or recurrence;*
> - *requiring the execution of such works, and the taking of such other steps, as may be necessary for any of those purposes*

B.1.8 Subsection 2A allows the local authority to defer the service of an abatement notice and *"take such other steps as it thinks appropriate for the purpose of persuading the appropriate person to abate the nuisance or prohibit or restrict its occurrence or recurrence*". This taking of such other steps is, however, limited to a time period of seven days. The local authority is obliged to serve an abatement notice if it is clear within or at the end of the time period that other steps will not be effective in securing the abatement of the nuisance.

B.1.9 Section 82 allows persons aggrieved by statutory nuisance to take proceedings in the magistrate's court to seek abatement of an alleged nuisance. Section 82(2) gives power to the magistrate's court, where it is satisfied that the alleged nuisance exists (or is likely to recur on the same premises), to serve a noise abatement order for either of both of the following purposes:

> *(a) requiring the defendant to abate the nuisance, within a time specified in the order and the execute any works necessary for that purpose; or prohibiting or restricting its occurrence or recurrence;*
>
> *(b) prohibiting a recurrence of the nuisance, and requiring the defendant or defender, within a time specified in the order to execute any works necessary to prevent the recurrence.*

Approved Document E: The Building Regulations 2010 (as amended)

B.1.10 Approved Document E (ADE) of the Building Regulations 2010 (as amended) provides guidance on the resistance to the passage of sound in domestic buildings and in schools.

B.1.11 Requirement E1 of the Regulations requires:

> "*Dwelling-houses, flats and rooms for residential purposes shall be designed and constructed in such a way that they provide reasonable resistance to sound from* other parts of the same building and from adjoining buildings."

B.1.12 In Section 0, the Regulations state:

> "*In the Secretary of State's view the normal way of satisfying Requirement E1 will be to build separating walls, separating floors, and stairs that have a separating function, together with the associated flanking construction, in such a way that they achieve the sound insulation values shown in Tables 0.1a..*".

B.1.13 Table 0.1a gives the following requirements for separating walls and floors for "new build dwellings":

Structure	Airborne Sound Insulation $D_{nT,w} + C_{tr}$ (dB) (Minimum Values)	Impact Sound Insulation $L'_{nT,w} + C_{tr}$ (dB) (Maximum Values)
Walls	45	-
Floors	45	62

B.1.14 ADE, however, also cautions that:

> "*A higher standard of sound insulation may be required between spaces used for normal domestic purposes and communal or non-domestic purposes. In these situations the appropriate level of sound insulation will depend on the noise generated in the communal or non-domestic space. Specialist advice may be needed to establish if a higher standard of sound insulation is required and, if so, to determine the appropriate level."*

B.1.15 Requirement E2 of ADE requires that (a) internal walls between a bedroom or a room containing a water closet, and other room, and (b) internal floors provide a reasonable resistance to sound. To achieve the above, Table 0.2 of ADE indicates that walls/floors should be selected to provide a minimum airborne sound insulation performance value of R_w 40dB.

B.1.16 Requirement E3 of ADE requires that common internal parts of residential buildings "shall be designed and constructed in such a way as to prevent more reverberation around the common parts than is reasonable". In essence, this requirement requires that finishes within corridors and circulations space provide adequate acoustic absorption.

B.1.17 Section 7 of ADE permits the use of two methodologies for ensuring adequate acoustic absorption is provided:

Method A – which requires that an area equal to or greater than the floor area of the circulation space is covered by a finish having at least a "Class C" sound absorption.

Method B – which requires that entrance halls provide a minimum of 0.20m² total absorption per cubic metre of space and a minimum of 0.25m² total absorption per cubic metre of space for corridors and hallways.

B.1.18 Requirement E4 of ADE requires that:

"Each room or other space in a school building shall be designed and constructed in such a way that it has the acoustics conditions and the insulation against disturbance by noise appropriate to its intended use".

The normal way of satisfying Requirement E4 will be to meet the values for sound insulation, reverberation time and internal ambient noise which are given in Building Bulletin 93 "Acoustic Design for Schools: Performance Standards".

Approved Document F1: The Building Regulations 2010 (as amended)

B.1.19 As of 15 June 2022, the Building Regulations (Amendment) (England) Regulations 2021 introduced:

Approved Document F: Volume 1 (applies to dwellings)

Approved Document F: Volume 2 (applies to buildings other than dwellings)

B.1.20 Approved Document F1 includes the following guidance in relation to noise:

"…Although there is no requirement to undertake noise testing, achieving the levels in the following guidance would ensure good acoustic conditions. The average A-weighted sound pressure level for a ventilator operating under normal conditions and not at boost rates should not exceed both of the following:

a. 30dB $L_{Aeq,T}$ for noise-sensitive rooms (e.g. bedrooms and living rooms) when a continuous mechanical ventilation system is running on its minimum low rate.*

b. 45dB $L_{Aeq,T}$ in less noise-sensitive rooms (e.g. kitchens and bathrooms) when a continuous operation system is running at the minimum high rate or an intermittent operation system is running.*

B.1.21 ADF1 also makes specific reference to BS 8233: 2014: *"Guidance on Sound Insulation and Noise Reduction for Buildings".*

Approved Document O: The Building Regulations 2010 (as amended)

B.1.22 Requirement O1 of Approved Document O (ADO) of the Building Regulations is due take effect from 15 June 2022 requires:

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

B.1.23 With regard to the reasonable enjoyment of the residence, paragraphs 3.2 to 3.3 of ADO require night-time noise to be taken into consideration:

> *3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).*
>
> 3.3 *Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits. a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am). b. 55dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)*

B.1.24 ADO makes specific reference to the Association of Noise Consultant's publication "Acoustics, Ventilation and Overheating: Residential Design Guide" (2020).

B.2 NATIONAL PLANNING POLICY AND GUIDANCE

National Planning Policy Framework (2021)

B.2.1 Current governmental guidance for the determination of planning applications is given in the "National Planning Policy Framework" (NPPF), published in July 2021.

B.2.2 Paragraph 174 of the NPPF advises:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *…. e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.*

B.2.3 With specific regard to noise, paragraph 185 of the NPPF states:

> *"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> a) *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
>
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
>
> *c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

B.2.4 Paragraph 187 of the NPPF draw specific attention to the need to ensure that new development is compatible with existing businesses and community facilities and introduces and "agent of change" principle:

> *"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of*

development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."

B.2.5 With regard to 'adverse' impacts and 'significant adverse' impacts, the NPPF directs the reader to the advice contained in DEFRA's "*Noise Policy Statement for England*" (NPSE).

Noise Policy Statement for England (2010)

B.2.6 The Noise Policy Statement for England (NPSE) was published in March 2010. The NPSE is the primary statement of noise policy for England and applies to all forms of noise other than occupational noise. The NPSE sets out the long-term vision of Government noise policy which is to:

"*Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.*"

"*Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

B.2.7 The Explanatory Note to the NPSE introduces guidance to assist in defining the adverse impacts:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

B.2.8 These categories are further discussed in the Planning Practice Guidance section below.

B.2.9 The NPSE acknowledges that it is not possible to have a single objective noise level-based measure that is mandatory and applicable to all sources of noise in all situations.

Planning Practice Guidance

B.2.10 The government's Planning Practice Guidance is a web-based resource and provide advice on various issues, including noise (https://www.gov.uk/guidance/noise--2). The advice (March 2014, latest update July 2019) states in the context of considering when noise is relevant to planning, "noise needs to be considered when new development may create additional noise or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced)."

B.2.11 The PPPG include more explanation of the effect level categories noted above, as summarised in the table below.

Noise Exposure Hierarchy Table

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level (NOEL)			
Not present	No effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but no such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activitie during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable hard, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

B.2.12 Paragraph 009 (Ref. ID 30-009-20190722) of PPG provides the following guidance about how the risk of conflict between new development and existing businesses of facilities be addressed:

> "*Development proposed in the vicinity of existing businesses, community facilities or other activities may need to put suitable mitigation measures in place to avoid those activities having a significant adverse effect on residents or users of the proposed scheme.*
>
> *In these circumstances the applicant (or 'agent of change') will need to clearly identify the effects of existing businesses that may cause a nuisance (including noise, but also dust, odours, vibration and other sources of pollution) and the likelihood that they could have a significant adverse effect on new residents/users. In doing so, the agent of change will need to take into account not only the current actvities [sic] that may cause a nuisance, but also those activities that businesses or other facilities are permitted to carry out, even if they are not occurring at the time of the application being made.*
>
> *The agent of change will also need to define clearly the mitigation being proposed to address any potential significant adverse effects that are identified. Adopting this approach may not prevent all complaints from the new residents/users about noise or other effects, but can help to achieve a satisfactory living or working environment, and help to mitigate the risk of a statutory nuisance being found if the ne development is used as designed (for example, keeping windows closed and using alternative ventilation systems when the noise or other effects are occurring)".*

B.2.13 Paragraph 010 (Ref. ID 30-010-20190722) provides the following guidance about how planning can address the adverse effects of noise sources, including where the 'agent of change' needs to put mitigation in place:

> "*This will depend on the type of development being considered the type of noise involved and the nature of the proposed location. In general, for developments that are likely to generate noise, there are 4 broad types of mitigation:*
>
> > *engineering: reducing the noise generated at source and/or containing the noise generated;*
> >
> > *layout: where possible, optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening by natural or purpose-built barriers, or other buildings;*

using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise levels differentiating as appropriate between different times of day, such as evenings and late at night, and;

mitigating the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building.

For noise sensitive developments, mitigation measures can include avoiding noisy locations in the first place; designing the development to reduce the impact of noise from adjoining activities or the local environment; incorporating noise barriers; and optimising the sound insulation provided by the building envelope. It may also be possible to work with the owners/operators of existing businesses or other activities in the vicinity, to explore whether potential adverse effects could be mitigated at source. Where this is the case, it may be necessary to ensure that these source-control measures are in place prior to the occupation / operation of the new development. Where multiple development sites would benefit from such source control measures, developers are encouraged to work collaboratively to spread this cost. Examples of source control measures could include increased sound proofing on a building (e.g. a music venue) or enclosing an outdoor activity (e.g. waste sorting) within a building to contain emissions.

Care should be taken when considering mitigation to ensure the envisaged measures do not make for an unsatisfactory development."

B.2.14 Paragraph 011 (Ref. ID 30-011-20190722) provides the following additional guidance about how adverse noise impacts may be off-set:

"*Noise impacts may be partially offset if residents have access to one or more of:*

a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling;

a relatively quiet external amenity space for their sole use, (e.g. a garden or balcony). Although the existence of a garden or balcony is generally desirable, the intended benefits will be reduced if this area is exposed to noise levels that result in significant adverse effects;

a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings; and/or

a relatively quiet, protected, external publically accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minute walking distance).”

B.3 LOCAL PLANNING POLICY

B.3.1 The “*East Herts District Plan*” (adopted October 2018) includes the following policies relevant to noise.

Policy DES4 – Design of Development

“*All development proposals, including extensions to existing buildings, must be of a high standard of design and layout to reflect and promote local distinctiveness. Proposals will be expected to:*

…

(c) Avoid significant detrimental impacts on the amenity of occupiers of neighbouring properties and land, and ensure that their environments are not harmed by noise and disturbance or by inadequate daylight, privacy or overshadowing;

…”

Policy EQ2 – Noise Pollution

“*I. Development should be designed and operated in a way that minimises the direct and cumulative impact of noise on the surrounding environment. Particular consideration should be given to the proximity of noise sensitive uses, and in particular, the potential impact of development on human health.*

II. Applications should be supported by a Noise Assessment in line with the Council's Noise Assessment Planning Guidance Document.

III. Noise sensitive development should be located away from existing noise generating sources or programmed developments where possible to prevent prejudicing the continued existing operations. The use of design, layout, landscaping tools and construction methods should be employed to reduce the impact of surrounding noise sources.”

B.3.2 Policy EQ2 makes reference to “*the Council's Noise Assessment Planning Guidance Document*”. This document is also referenced in paragraph 24.3.5 of the Local Plan, advising:

> *"The Council is preparing a Noise Assessment Planning Guidance Document to provide advice for applicants of noise generating and noise sensitive developments. It will also set out criteria for the preparation of such assessments as part of the application process."*

B.3.3 A note in the Local Plan also directs the reader to www.eastherts.gov.uk/envhealth for a copy of this document. At the time of drafting this report, this document does not appear to be available on EHDC's website.

B.3.4 EHDC published a *"Sustainability Supplementary Planning Document"* (SPD) in ????. The SPD makes various references to noise, cross referencing policy EQ2 of the Local Plan and recommending that new developments comply with the requirements of BS 8233 and World Health Organisation. Also, that the potential impact of industrial/commercial noise sources is assessed in line with BS 4142. These standards and guidance are discussed in the following section. The Noise Pollution section of the SPD concludes by stating:

> *"This SPD does not address noise issues any further because more detailed noise guidance will be available for applicants in due course. Hertfordshire noise guidance is being developed jointly by a number of Hertfordshire local authorities."*

B.4 BRITISH STANDARDS AND OTHER GUIDACNE

BS 4142: 2014 + A1: 2019

B4.1 BS 4142:2014 + A1: 2019: *"Methods for Rating and Assessing Commercial and Industrial Sound"* provide a rating and assessment methodology for assessing the potential adverse impact of commercial and commercial noise sources on neighbouring dwellings.

B4.2 The assessment procedure initially compares the **'Rating Level'** of the source with the **'Background Noise Level'** when the source is not present.

B4.3 The **'Rating Level'** (L_{Ar}) referred to is the specific noise level of the noise source under investigation (in terms of the L_{Aeq} noise index), to which corrections are applied if the noise has certain audible characteristics. The table below summarises the corrections to be applied based on a subjective assessment of noise source characteristics.

BS4142 Character Corrections

Character Correction				
Feature / Perception	Tonality	Impulsivity	Intermittency	Other Acoustic Characteristics
Just perceptible	+2dB	+3dB	+3dB When the specific sound has identifiable on/off conditions that are readily distinctive	+3dB
Clearly perceptible	+4dB	+6dB		
Highly perceptible	+6dB	+9dB		

B4.4 The '**Background Noise Level**' (L_{A90}) represents the noise level that is exceeded for 90% of the stated measurement period. For assessment purposes, the background noise level needs to be determined without the noise source under investigation operating.

B4.5 The time of operation needs to be taken into account. During the day (normally taken to be 07.00 to 23.00 hours) a one-hour measurement period is considered appropriate. During the night (normally taken to be 23.00 – 07.00 hours) a 15-minute time period is normally used.

B4.6 The following guidance is then offered based on the outcome of this initial assessment:

> *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
>
> *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
>
> *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context*

B4.7 Aligning the above guidance with national planning policy objectives:

> An assessment level 10 dB(A) above the background level might be considered to be a "*Significant Observed Adverse Effect Level*" (SOAEL).

An assessment level that does not exceed the background level might be considered to be a *"Lowest Observed Adverse Effect Level"* (LOAEL).

B4.8 Notwithstanding the above, BS 4142 importantly notes that any initial estimate of a noise impact should be modified to account for its "context". Such considerations include:

The absolute level of the sound - the magnitude of the overall impact might be greater for an acoustic environment where the residual sound level is high than for an acoustic environment where the residual sound level is low. Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.

The character and level of the residual sound compared to the character and level of the specific sound.

The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions.

B4.9 In addition to the above, the guidance set out in the Note accompanying section 8.5 of the standard is also relevant where new noise sensitive receptors are being introduced adjacent to existing commercial or commercial sources of noise. The note states:

"Where a new noise-sensitive receptor is introduced and there is extant commercial and/or commercial sound, it ought to be recognized that the commercial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise- sensitive receptor and the extent of required noise mitigation."

BS 5228-1:2009 + A1:2014 & BS 5228-2:2009 + A1: 2014

B4.10 BS 5228-1:2009 + A1: 2014 *"Code of practice for noise and vibration control on construction and open sites. Noise"* refers to the need for the protection against noise of persons living and working in the vicinity of, and those working on, construction sites.

B4.11 Part 2 of BS 5228 provides gives recommendations for basic methods of vibration control relating to construction and open sites, where work activities/operations generate significant vibration levels, including industry-specific guidance.

B4.12 The standard also provides guidance concerning methods of measuring vibration and assessing its effects on the environment. In order to assist in assessing the likelihood of an adverse vibration impact from a site, the standard also includes an extensive database of measured vibration levels from certain construction activities (predominantly piling) and empirical prediction methodologies for estimating ground borne vibration from mechanised construction activities.

B4.13 Guidance to assist with assessing the significance of the effect of such noise is presented in Annex B of the standard.

B4.14 The potential effect of vibration on occupants within buildings can be assessed based on the guidance of Annex B of BS 5228-2, as set out in the Table below:

Magnitude of Effect – Construction Vibration: Human Comfort

Peak Particle Velocity (PPV)	Impact	Magnitude of Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible
0.3 mm/s	Vibration might be just perceptible in residential environments	Minor
1.0 mm/s	It is likely that vibration of this level in residentia environments will cause complaint but can be tolerated if prior warning and explanation has been given to residents.	Medium
10mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.	Major

B4.15 With regard to buildings, vibration can potentially cause cosmetic damage and in the extreme, structural damage. Criteria for a significant vibration effect have therefore been aligned with guidance for cosmetic damage set out in BS 5228-2. Such criteria should safeguard building from structural damage, whilst vibration below the threshold can be considered to be negligible since there would not be no effect. Recommended values are presented in the Table overleaf:

Magnitude of Effect – Construction Vibration: Human Comfort

Type of Building	Peak Particle Velocity (PPV) in Frequency Range of 4Hz to 15Hz	Peak Particle Velocity (PPV) in Frequency Range of above 15Hz
Reinforced or framed structures Industrial and heavy commercial buildings	50mm/s at 4Hz and above	
Unreinforced or light framed buildings Residential or light commercial buildings	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above

BS 8233: 2014

B4.16 BS 8233: 2014 "Sound Insulation and Noise Reduction for Buildings" offers the following design guidance for indoor ambient noise levels within dwellings:

Indoor Ambient Noise Level Recommendations

Activity	Location	Daytime (07.00 to 23.00 hours)	Night-time (23.00 to 07.00 hours)
Resting	Living Room	35dB $L_{Aeq,16hour}$	--
Dining	Dining Room/Area	40dB $L_{Aeq,16hour}$	--
Sleeping	Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$

B4.17 A note accompanying the above Table states:

> *"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values."*

B4.18 Despite identifying that maximum values 'may' be set, guidance values for differing types of noise/frequency of events is not given. It can, however, be noted that the recommendations

of BS8233 are aligned with guidance set out in the World Health Organisation's "Guidelines for Community Noise", which is discussed later.

B4.19 A further note to the above Table indicates that where "development is considered necessary or desirable", the above guideline values can be relaxed by 5dB and "reasonable" internal conditions still be achieved.

B4.20 With regard to external amenity spaces, Section 7.7.3.2 of BS 8233: 2014 states:

> *"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However , it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.*

"Guidelines for Community Noise" (World Health Organisation, 1999)

B4.21 The criteria outlined in this document provide a summary of research regarding the effects of noise on the community. Section 2 of the Guidelines presents a general discussion regarding the types of noise affecting communities and their measurement. The guidelines promote the use of the LAeq,T noise index. However, where there are distinct events to the noise, such as with aircraft or railway noise, the guidelines recommend that measures of the individual events should be obtained (using, for example, LAmax or LAE), in addition to LAeq,T measurements.

B4.22 The guidelines identify three critical effects of noise on dwellings – speech interference, annoyance and sleep disturbance.

B4.23 With regard to 'speech interference", section 4.2 of the Guidelines identifies that:

> *"Speech in relaxed conversation is 100% intelligible in background noise levels of about 35dB(A) and can be understood fairly well in background levels of 45dB(A).*
>
> *Speech with more vocal effort can be understood when the background sound pressure level is about 65dB(A)."*

B4.24 With regard to 'annoyance', section 3.8 of the Guidelines states:

> "*Annoyance in populations exposed to environmental noise varies not only with the acoustical characteristics of the noise (source, exposure), but also with many non-acoustical factors of social, psychological, or economic nature. These factors include fear associated with the noise source, conviction that the noise could be reduced by third parties, individual noise sensitivity, the degree to which an individual feels able to control the noise (coping strategies) and whether the noise originates from important economic activity."*

B4.25 Section 4.2.7 of the Guidelines further states that:

> "*The annoyance response to noise is affected by several factors, including the equivalent sound pressure level and the highest sound pressure level of the noise, the number of such events, and the time of day. Methods for combining these effects have been extensively studied. The results are not inconsistent with the simple, physically based energy equivalent energy theory, which is represented by the L_{Aeq} noise index.*
>
> *……*
>
> *During the daytime, few people are seriously annoyed by activities with L_{Aeq} levels below 55dB; or moderately annoyed with L_{Aeq} levels below 50dB*".

B4.26 With regard to 'sleep disturbance', Section 3.4 of the guidelines states:

> "*If negative effects on sleep are to be avoided the equivalent sound pressure level should not exceed 30dB(A) indoors for continuous noise. If the noise is not continuous, sleep disturbance correlates best with L_{Amax} and effects have been observed at 45dB or less. This is particularly true if the background noise level is low. Noise events exceeding 45dB(A) should therefore be limited if possible. For sensitive people an even lower limit would be preferred. It should be noted that it should be possible to sleep with a bedroom window slightly open (a reduction of outside to inside of 15dB). To prevent sleep disturbance, one should thus consider the equivalent sound pressure level and the number and level of sound events. Mitigation targeted to the first part of the night is believed to be effective for the ability to fall asleep*".

B4.27 In section 4.3.1, the above guidelines are presented in terms of external noise levels incident on buildings:

> "*At night, sound pressure levels at the outside facades of the living spaces should not exceed 45dB LAeq and 60dB L_{Amax}, so that people may sleep with windows open*".

B4.28 With regard to the frequency of noise events, the WHO guidelines imply that indicated values should not be exceeded more than 10-15 time per night.

"Night Noise Guidelines for Europe" (World Health Organisation, 2009)

B4.29 This guidance presents the findings of further research regarding the potential significance of night-time noise impacts. The guidance provides the following advice relating to potential night-time noise impacts:

> "*Below the level of 30 dB $L_{night,outside}$, no effects on sleep are observed except for a slight increase in the frequency of body movements during sleep due to night noise. There is no sufficient evidence that the biological effects observed at the level below 40 dB $L_{night,outside}$ are harmful to health. However, adverse health effects are observed at the level above 40 dB $L_{night,outside}$, such as self-reported sleep disturbance, environmental insomnia, and increased use of somnifacient drugs and sedatives.*
>
> *Therefore, 40 dB $L_{night,outside}$ is equivalent to the lowest observed adverse effect level (LOAEL) for night noise. Above 55 dB the cardiovascular effects become the major public health concern, which are likely to be less dependent on the nature of the noise…."*

ProPG: Professional Practice Guidance on Planning and Noise: New Residential Development. (2017)

B4.30 ProPG: Planning & Noise is co-authored by the Chartered Institute of Environmental Health (CIEH), Institute of Acoustics (IOA) and Association of Noise Consultants (ANC) and seeks to consolidate and standardise existing industry best practice in order to expedite the planning process with regard to the consideration of noise.

B4.31 ProPG promotes a two-stage methodology for the acoustic assessment of a proposed residential development. Stage 1 involves an "*Initial Site Risk Assessment*", to identify the likely risk of adverse effects from noise, were no subsequent mitigation to be included as part of the development proposal.

B4.32 It is important to note that the initial 'Stage 1' assessment at a proposed residential development is not the basis for the eventual recommendation to the decision maker. It is intended to highlight the importance of good acoustic design within a scheme. For example, a site with a high risk of adverse effect without noise mitigation may not necessarily be unsuitable for development; however, the importance of good acoustic design provided by experts would be critical at such a site, with a detailed acoustic design statement provided.

B4.33 ProPG states that a site which displays a low risk of adverse effect without noise mitigation is more likely to be acceptable from a noise perspective, provided that a good acoustic design process is followed, and sites with no risk of adverse effect need not normally be delayed on noise grounds.

B4.34 The categorisation of potential risk is presented in Figure 1 of the guidance which is reproduced below:

ProPG Stage 1 Initial Risk Assessment

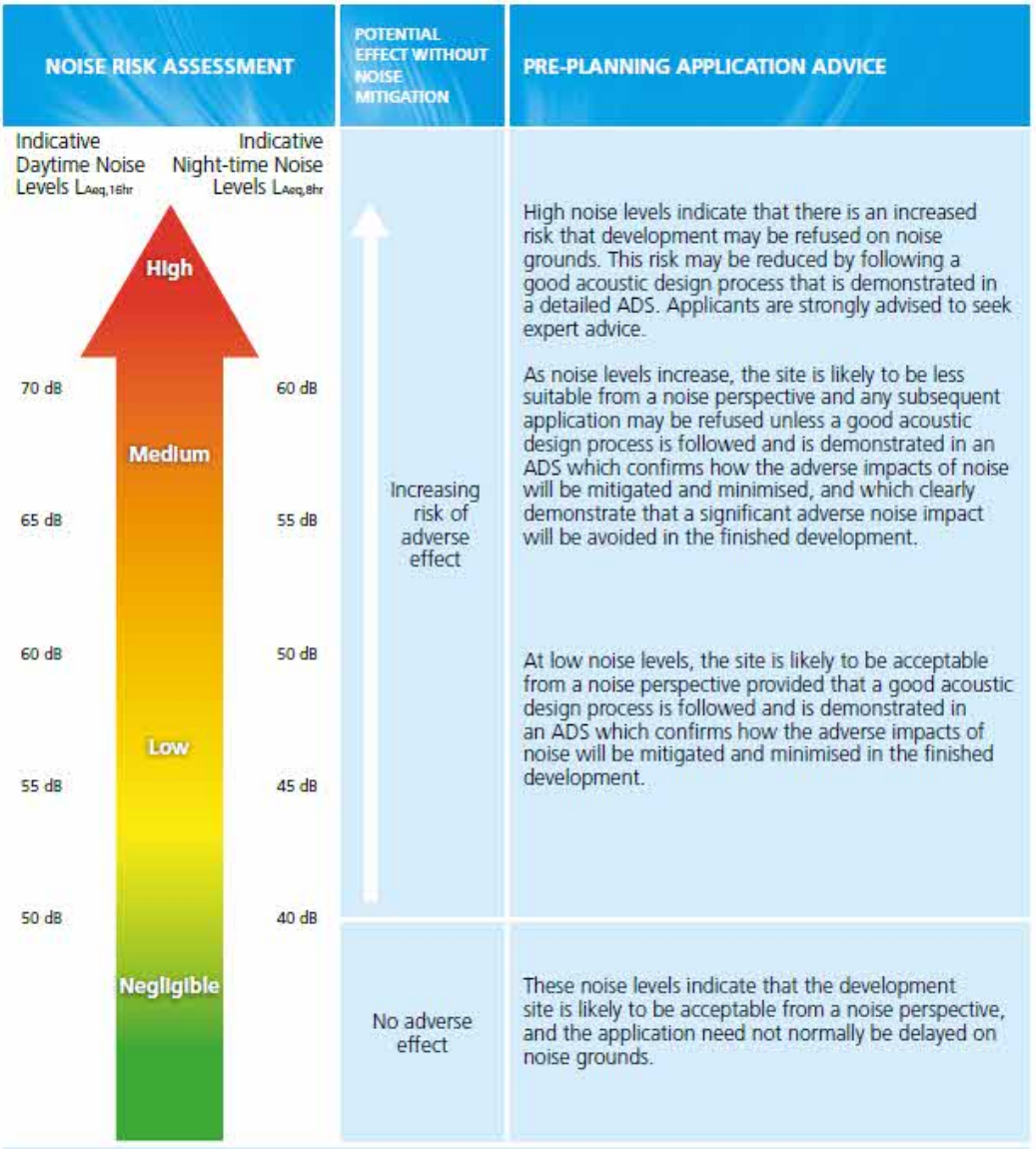


Figure 1 Notes:

a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.

b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".

c. $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.

d. An indication that there may be more than 10 noise events at night (2300 – 0700) with L_{AmaxF} > 60 dB means the site should not be regarded as negligible risk.

Figure 1. Stage 1– Initial Site Noise Risk Assessment

B4.35 Stage 2 of the ProPG guidance provides a systematic consideration of key "elements" of acoustic design.

Element 1 – Good Acoustic Design Process

B4.36 ProPG states that a good acoustic design process is an implicit part of achieving the requirements of government noise policy, as set out in the NPSE and NPPF, and outlined in Supplementary Document 1 of the ProPG.

B4.37 However, it is also stated that good acoustic design does not simply constitute compliance with recommended internal and external criteria, if the solution adversely affects living conditions within the spaces, and hence the quality of life of the inhabitants. The guidance encourages development to consider all possibilities for mitigation including but not limited to:

Checking the feasibility of relocating, or reducing noise levels from relevant sources;

Considering options for planning the site or building layout;

Considering the orientation of proposed building(s);

Selecting construction types and methods for meeting building performance requirements;

Assessing the viability of alternative solutions;

Assessing external amenity area noise;

Examining the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc.

Element 2 – Internal Noise Level Guidelines

B4.38 ProPG considers the guidance provided within BS 8233:2014 to be suitable for the assessment of internal noise levels. However, the ProPG provides additional commentary. The following table reproduces the internal ambient criteria provided within Figure 2 of ProPG. The guidance from BS 8233:2014 is displayed in black, with additional comments and criteria from ProPG in blue:

ProPG Indoor Ambient Noise Level Recommendations

Activity	Location	Daytime (07.00 to 23.00 hours)	Night-time (23.00 to 07.00 hours)
Resting	Living Room	35dB $L_{Aeq,16hour}$	--
Dining	Dining Room/Area	40dB $L_{Aeq,16hour}$	--
Sleeping	Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$ 45 dB $L_{Amax,F}$ (Note 4)

B4.39 Note 4 states:

> "*Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g., bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement o acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events (see Appendix A [which advocates reference to available dose-response relationships appropriate for the types of noise source being considered]).*

B4.40 Additional guidance in Note 7 states:

> "*Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded "unacceptable" by most people, particularly if such levels occur more tha occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form (see Section 3.D [which*

states that if certain criteria are fulfilled the noise practitioner should recommend refusal on noise grounds alone, regardless of any case for the development]).”

Element 3 – External Amenity Area Noise Assessment

B4.41 With regard to external amenity spaces, ProPG references the guidance provided within BS 8322:3014, section 6 which states:

“*The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB* $L_{Aeq,16h}$”

B4.42 The standard continues:

“*These guideline values may not be achievable in all circumstances wher development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited.”*

B4.43 ProPG also references guidance within the PPG on noise, which states:

“*If external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended*”.

B4.44 It is highlighted within ProPG that both BS 8233:2014 and the PPG on noise require a decision to be made as to whether or not external amenity areas are intrinsically important to the required design. However, it is noted that the PPG also states that noise impacts may be partially offset if the residents of affected dwellings are provided, through the design of the development or the planning process, with access to alternative spaces.

Element 4 – Assessment of Other Relevant Issues

B4.45 This section of the guidance relates to all other relevant issues and seeks to build upon relevant national and local planning and noise policies. Examples are provided including, but not limited to, the following:

Compliance with relevant national and local policy

Magnitude and extent of compliance with ProPG

Likely occupants of the development

Acoustic design v unintended adverse consequences

Acoustic design v wider planning objectives

Other issues specific to the site may be added by the LPA, where relevant.

B4.46 ProPG clarifies that the Stage 1 and Stage 2 guidance is primarily intended for sites that are primarily exposed to airborne noise from transport sources. The guidance can, however, (subject to certain caveats) be used to inform the acoustic design of sites that have a mixed noise environment (including sites were industrial or commercial use may be present, but 'not dominant'. Where industrial or commercial is a dominant feature of a site, ProPG recommends that the assessment of noise effects and development of mitigation is undertaken in accordance with BS 4142: 2014. (As noted earlier, the current version of this standard is BS 4142: 2014 + A1: 2019).

B4.47 ProPG recommends that the results of the Stage 1 and Stage 2 assessment are presented in an *"Acoustic Design Statement".* The guidance further recommends that this statement concludes with a recommendation to the decision maker, i.e.:

A. Planning consent may be granted without any need for noise conditions;

B. Planning consent may be granted subject to the inclusion of suitable noise conditions;

C. Planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or

D. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent").

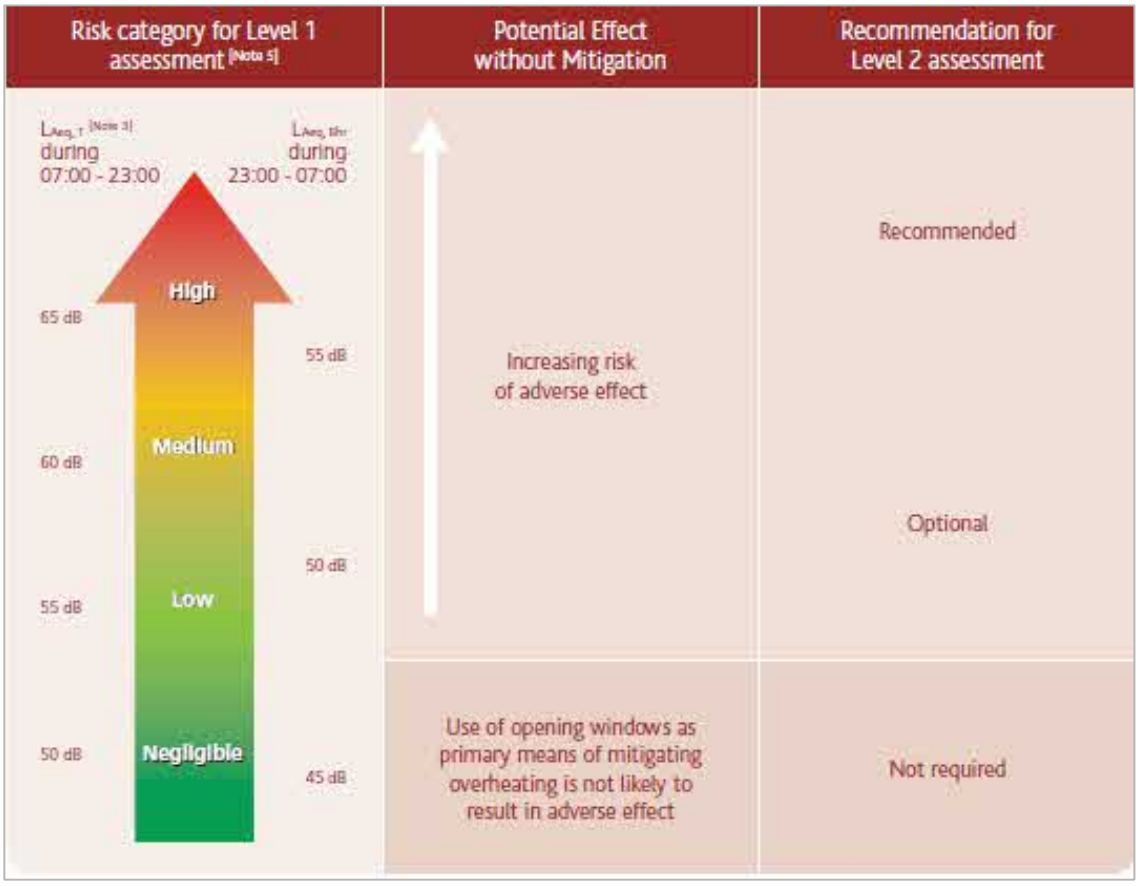
Acoustics, Ventilation and Overheating Guide, AVO 2020

B4.48 "Acoustics Ventilation and Overheating: Residential Design Guide" (January 2020) aims to assist designers to adopt an integrated approach to the acoustic design of a development, with due regard to the provision of ventilation and thermal comfort requirements.

B4.49 The design guide promotes a two-level assessment procedure for assessing the ingress of environmental noise into a development.

B4.50 The first level is a site risk assessment based on external noise levels and the assumption that opening windows are the primary means of mitigating overheating. The guidance is reproduced overleaf:

AVOG Stage 1 Assessment Guidance



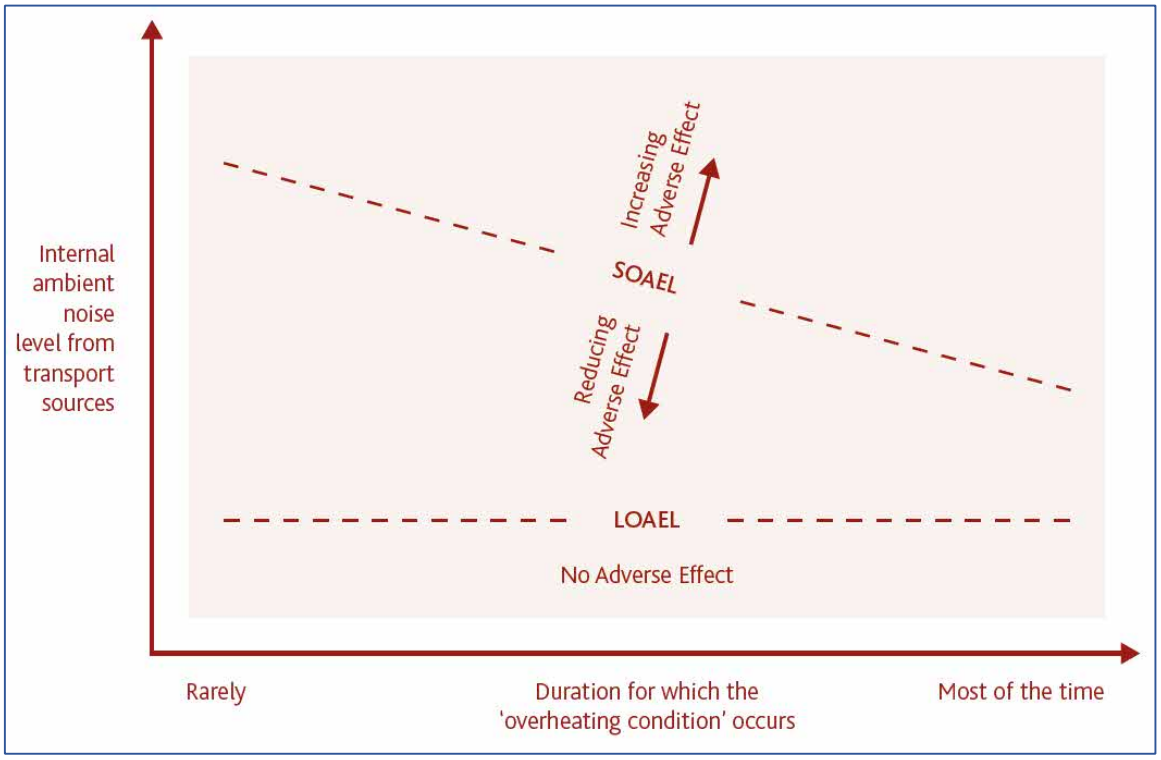
B4.51 A Level 2 assessment considers the potential for adverse effects on occupants based in internal ambient noise level, as reproduced overleaf.

AVOG Stage 1 Assessment Guidance

Internal ambient noise level [Note 2]			Examples of Outcomes [Note 5]	
$L_{Aeq,T}$ [Note 3] during 07:00 – 23:00 [Note 6]	$L_{Aeq,8h}$ during 23:00 – 07:00	Individual noise events during 23:00 – 07:00 [Note 4]		
> 50 dB	> 42 dB	Normally exceeds 65 dB $L_{AF,max}$	Noise causes a material change in behaviour e.g. having to keep windows closed most of the time	Avoiding certain activities during periods of intrusion. Having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.
			Increasing likelihood of impact on reliable speech communication during the day or sleep disturbance at night	At higher noise levels, more significant behavioural change is expected and may only be considered suitable if occurring for limited periods. As noise levels increase, small behaviour changes are expected e.g. turning up the volume on the television; speaking a little more loudly; having to close windows for certain activities, for example ones which require a high level of concentration. Potential for some reported sleep disturbance. Affects the acoustic environment inside the dwelling such that there is a perceived change in quality of life. At lower noise levels, limited behavioural change is expected unless conditions are prevalent for most of the time. [Note 8]
≤ 35 dB	≤ 30 dB	Do not normally exceed $L_{AF,max}$ 45 dB more than 10 times a night	Noise can be heard, but does not cause any change in behaviour	Noise can be heard, but does not cause any change in behaviour, attitude, or other physiological response[Note 9]. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

B4.52 In addition to noise magnitude, the Level 2 assessment also needs to estimate how frequently and for what duration the overheating occurs. Put simply, a lower level of noise intrusion may be acceptable for a greater duration, whereas high levels of noise intrusion may only need to be experienced for a brief period of time for an adverse effect to occur. This inter-relationship between noise magnitude and duration of exposure is illustrated overleaf.

Combined Effect of Noise Magnitude and Duration of Exposure



B4.53 If the overheating assessment indicates that a significant noise effect is likely, consideration needs to be given to alternative strategies for controlling overheating. In addition to consideration of such matters as the thermal efficiency of the building fabric, use of shading, etc, additional strategies may include:

Additional passive ventilative cooling;

Additional fan assisted passive ventilative cooling;

Boosted ventilation from an existing mechanical ventilation system (e.g. MVHR);

Additional mechanical ventilation;

Introduction of a "peak lopping" cooling module to an existing MVHR system; and/or

Comfort cooling (air conditioning).

B4.54 Where alternative strategies are used, consideration should be given to both:

The potential "break-in" of external noise through any alternative system, with additional atmospheric side attenuation provided as necessary; and

The noise levels generated by any system, e.g. the ductborne transmission of fan noise and any aerodynamic noise generated by increased airflows.

B4.55 AVOG provides the following recommendations for noise control.

AVOG Recommended Indoor Ambient Noise Levels (General Ventilation)

Ventilation condition	Possible system or design solution	Desirable internal ambient noise levels from mechanical services
ADF – Whole Dwelling Ventilation	System 3: Continuous mechanical extract (MEV), minimum low ventilation rates System 4: Continuous mechanical supply and extract with heat recovery (MVHR), minimum low ventilation rates	Bedrooms ≤ L_{Aeq} 26 or 30 dB [Note 1] Living Rooms ≤ L_{Aeq} 30 dB
ADF – Extract Ventilation	System 1: Intermittent extract fans System 3: Continuous mechanical extract (MEV), minimum high ventilation rates System 4: Continuous mechanical supply and extract with heat recovery (MVHR), minimum high ventilation rates	Bedrooms ≤ L_{Aeq} 26 or 30 dB Living / Dining Rooms ≤ L_{Aeq} 35 dB Bathroom / WC / Kitchen ≤ L_{Aeq} 45 dB
ADF – Purge Ventilation	Manually controlled fan exchanging a minimum 4 air changes per hour	No desirable noise levels are currently proposed based on the lack of evidence of acceptable noise levels when providing purge ventilation for the purpose of rapidly diluting indoor pollutants.

AVOG Recommended Indoor Ambient Noise Levels (Overheating Condition)

Possible system or design solution	Desirable upper internal ambient noise levels from mechanical services
Ventilative cooling or Comfort cooling	Bedrooms L_{Aeq} 30 (± 5) dB Living / Dining Rooms L_{Aeq} 35 (± 5) dB

Design Manual for Roads and Bridges: LA111 - Noise and Vibration

B4.56 The "*Design Manual for Roads and Bridges: LA111 – Noise and Vibration*", Revision 2 (2020) published by Highways England sets out the requirements for assessing and reporting the effects of noise from highway projects. The guidance may also be an appropriate reference point for assessing the potential noise impacts of developments which may result in the introduction of additional vehicular traffic to existing or new roads.

B4.57 Magnitudes of "short term" and "long term" change are summarised in the tables overleaf.

Magnitude of Change in Traffic Noise Level: Short Term

Short Term Magnitude	Short Term Noise Change (dB $L_{A10,18hour}$)
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

Magnitude of Change in Traffic Noise Level: Long Term

Long Term Magnitude	Long Term Noise Change (dB $L_{A10,18hour}$)
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

B4.58 The following guidance is also given in relation to the potential noise impacts of construction traffic.

Magnitude of Impact	Increase in Basic Noise Level of Closest Public Road Used for Construction Traffic (dB $L_{A10,18hour}$)
Major	Greater than or equal to 5.0
Moderate	Great than 3.0 and less than 5.0
Minor	Greater than 1.0 and less than 3.0
Negligible	Less than 1.0

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APPENDIX C

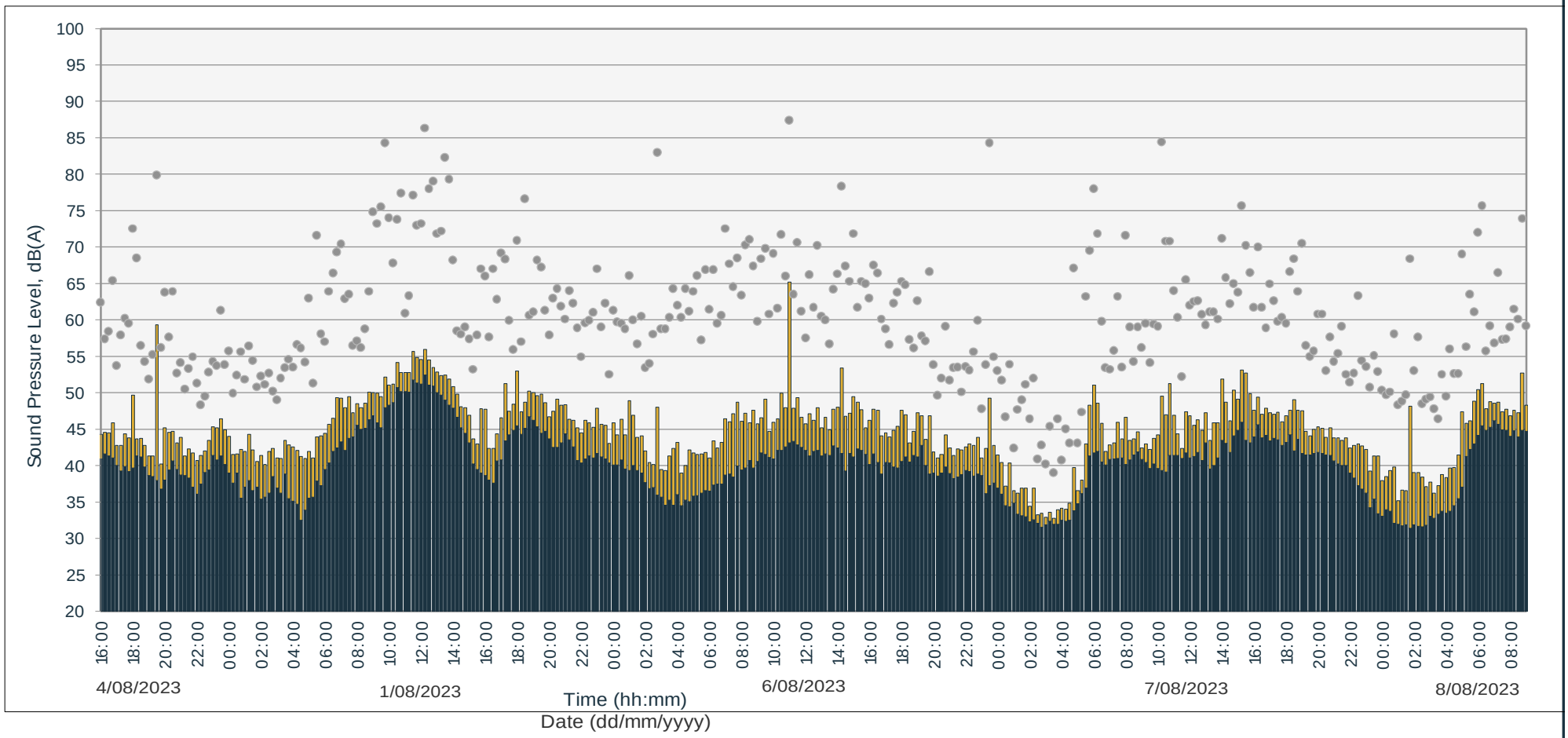
Noise Survey Results

Time History Graph 1

Project: Land East of High Road, High Cross

Measurement Location: Position 1 - North Site Boundary (Adjacent to Sutes Farm Outbuildings)

Survey Period: 4 August 2023 to 8 August 2023



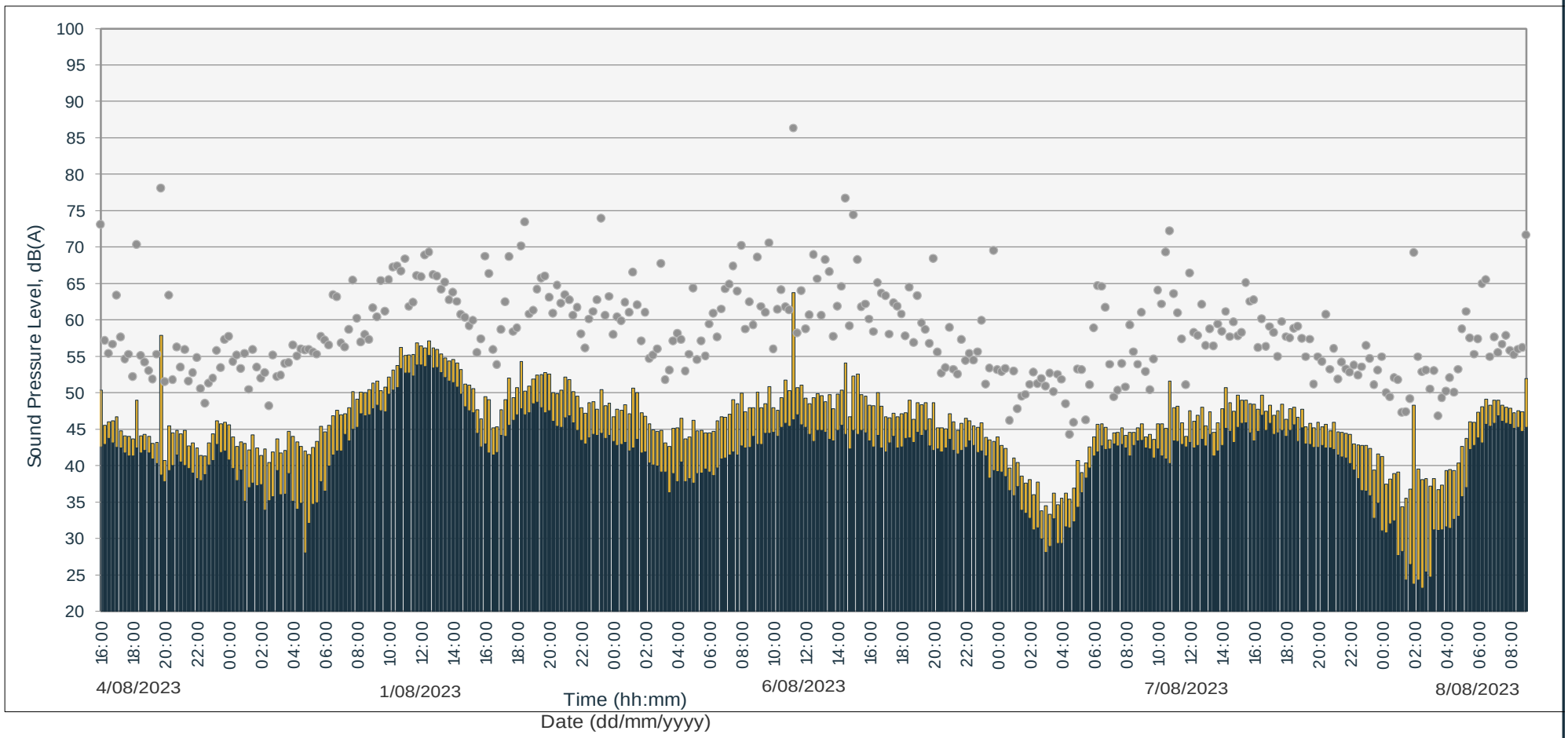
Key: $L_{A90,15mins}$ $L_{Aeq,15mins}$ $L_{Amax,fast}$

Time History Graph 2

Project: Land East of High Road, High Cross

Measurement Location: Position 2 - North East Site Boundary

Survey Period: 4 August 2023 to 8 August 2023



Key: $L_{A90,15mins}$ $L_{Aeq,15mins}$ $L_{Amax,fast}$

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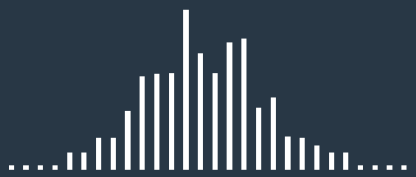

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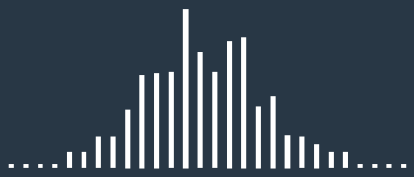

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