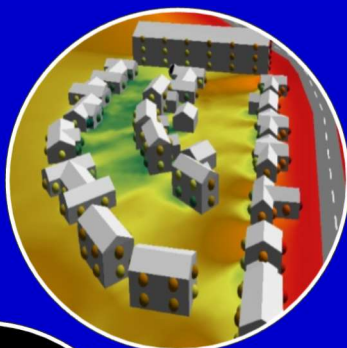




Noise Impact Assessment

Project: Proposed Residential Development

Site: Land at Blacksmiths Lane
Reed
Royston
Hertfordshire

Report Ref: IEC/4242/01/AVH



Noise Impact Assessment

Proposed Residential Development
Land at Blacksmiths Lane, Reed, Royston, Hertfordshire

Prepared For:

The Turney Trust

Report No.:

IEC/4242/01/AVH

Report Prepared By:

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Issue Date:

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Document Review Sheet

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Recommendations given in this report are solely for acoustic purposes. The project manager or architect must ensure that any measures adopted for acoustic purposes comply with other requirements and regulations, including (but not limited to) structural requirements, Standards, building controls, safety and control of fire.

This report has been prepared with all reasonable skill, care and diligence.

Issue Ref.	Date	Description	Author	Checked	Authorised
F1	27.11.2025	Final issue	AVH	AVH	

Competency and Expertise

Consultancy Professional Membership

Independent Environmental Consultancy are full members of the Association of Noise Consultants and a Registered Pre-Completion Test Body for Approved Document E of The Building Regulations.



The Author

The author of this assessment established Independent Environmental Consultancy Limited in 2005 and has over 25 years of experience in the assessment of environmental noise. With a First Class Honours Degree and MSc, the author is a Member of the Institute of Acoustics (MIOA), Institution of Environmental Sciences (MIEnvSci), Institute of Air Quality Management (MIAQM) and Specialist Member of the Faculty of Occupational Hygiene (MFOH(S)).

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- Appendix B: Site Plan indicating Noise Monitoring Locations
- Appendix C: Noise Survey Results
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1.0 Introduction

- 1.1 The Turney Trust are to submit a planning application to North Hertfordshire District Council for a Proposed Development of twenty-one residential dwelling-houses on land at Blacksmiths Lane, Reed.
- 1.2 In response to the Site being affected by traffic using local road network, North Hertfordshire District Council has requested a Noise Impact Assessment (NIA) be provided for the Proposed Development.
- 1.3 At the request of The Turney Trust, Independent Environmental Consultancy Limited have been commissioned to undertake an assessment of noise and provide technical advice, as required, for noise mitigation measures for the Proposed Development.
- 1.4 This study benefits from a noise survey carried out between Monday 6th and Wednesday 8th October 2025.

Aims and Objectives of Assessment

- 1.5 The aim of this assessment is to provide information to determine the likely impact of noise sources on the proposed noise-sensitive receptors. The assessment includes consideration of the following issues:
 - Provides information on the existing daytime and night-time noise levels; and
 - Provides recommendations for any relevant noise mitigation measures necessary to meet appropriate noise guidance and standards.

Sources of Information

- 1.6 The following drawings and documents have been supplied by Chris Anderson Residential Development Land Agent Limited for use in the assessment.

Table 1.1: List of Scheme Reference Documents

Issued By	Drawing/ Document Title	Reference	Revision	Issue Date
Twenty-Nine Architecture	Design & Access Statement	256	P1	28.10.2025
	Proposed Site Plan	PL(90)01	P1	Oct 2025
	Floor Plans & Elevations	PL(21)01-07	P1	Oct 2025
	Proposed Street Scene, Site Sections, Bin Bike Stores	PL(21)08	P1	Oct 2025

- 1.7 Information used in this assessment has been obtained from the following sources:
 - National Planning Policy Framework NPPF (2024) Ministry of Housing, Communities and Local Government.
 - Planning Practice Guidance PPG (2022) Ministry of Housing, Communities and Local Government.
 - Noise Policy Statement for England: NPSE (2010) Department for Environment, Food & Rural Affairs.
 - ProPG: Planning and Noise (2017) Professional Practice Guidance on Planning &

Noise.

- World Health Organisation (1999) - Guidelines for Community Noise.
- British Standard 8233 (2014) Guidance on sound insulation and noise reduction in buildings.
- British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.
- British Standard 7445 (2003) Description and measurement of environmental noise.
- IEMA (2014) Guidelines for Environmental Noise Impact Assessment.
- ISO 9613-2 (2024) Acoustics – Attenuation of sound during propagation outdoors: Engineering method for the prediction of sound pressure levels outdoors.
- Calculation of Road Traffic Noise (CRTN) (Department for Transport, 1998, Calculation of Traffic Road noise).
- Acoustics Ventilation and Overheating: Residential Design Guide (2020) Association of Noise Consultants & Institute of Acoustics.
- Approved Document E of the Building Regulations (2003) Resistance to the passage of sound. HM Stationary Office.
- Approved Document F of the Building Regulations (2021) Volume 1: Dwellings - Means of Ventilation. HM Stationary Office
- Approved Document O of the Building Regulations (2021) Overheating. HM Stationary Office.
- Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O (2022) Association of Noise Consultants. Version 1.
- Heat Pumps (2022) Briefing Note by IOA & CIEH.
- Heat Pumps Professional Advice Note (2022) Briefing Note by IOA & CIEH.

2.0 Site Description

2.1 Introduction

2.1.1 The Site is located on the junction of London Road (A10) and Blacksmiths Lane in Reed.

Figure 2.1: Location of Proposed Residential Development



2.2 General Environs

2.2.1 The main sources affecting the existing noise climate relates to the following:

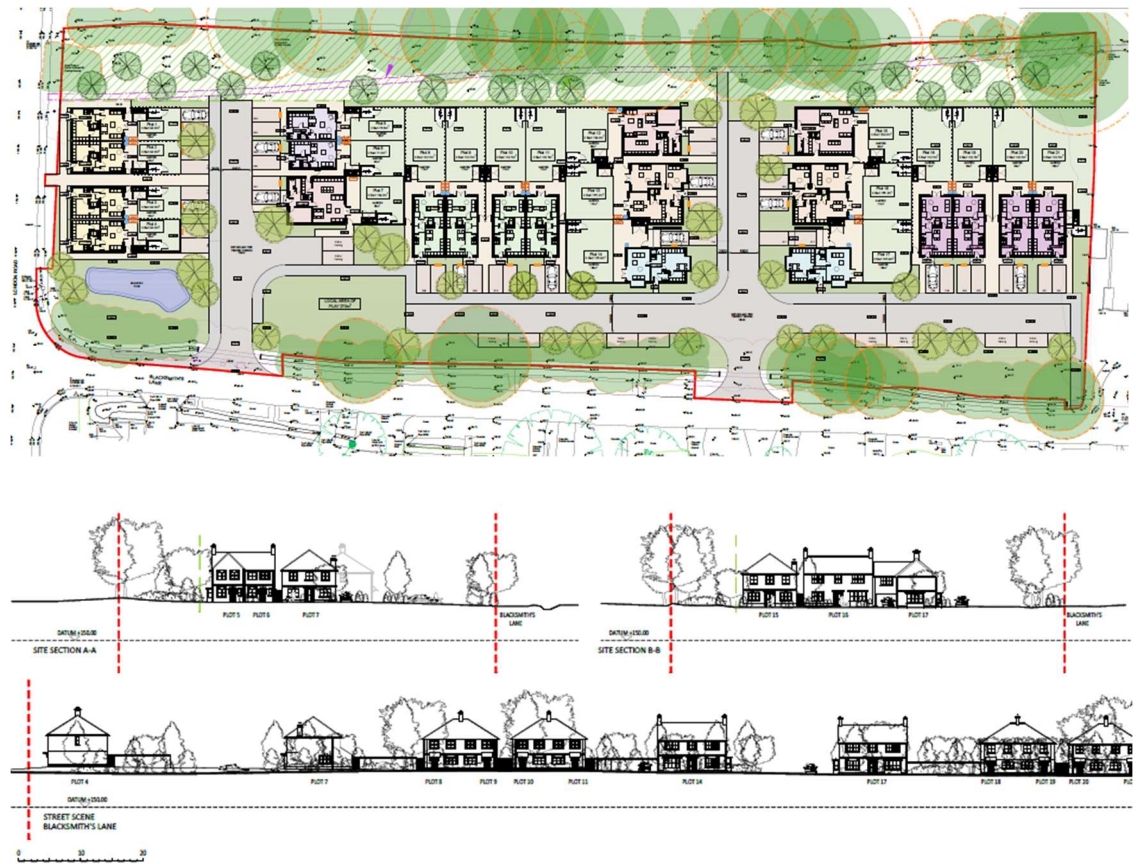
- (i) Traffic using the local road network;
- (ii) Car movements in and out of the commercial premises to the west (café and garage);
- (iii) Sporadic overhead aircraft; and
- (iv) Birdsong.

2.2.2 No noise from the garage or café activities or plant was audible during the survey.

2.3 Development Layout

2.3.1 The layout of the residential development is shown in Figure 2.2, with vehicular access from Blacksmiths Lane.

Figure 2.2: Site Layout Plan



3.0 Noise Criteria

3.1 Legislation, Policy and Guidance

- 3.1.1 planning policy and guidance that relates to the assessment of residential amenity and protection of residents from environmental noise sources.

3.2 National Planning Policy Framework (NPPF): 2024

- 3.2.1 The National Planning Policy Framework (NPPF)¹ was updated in December 2024 and sets out the government's planning policies for England and how these are expected to be applied.

- 3.2.2 In terms of considering noise impact, Chapter 15 of NPPF 'Conserving and enhancing the natural environment' states:

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

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

- 3.2.3 The following section within the NPPF also specifically refers to noise.

"Ground conditions and pollution

198. 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.*

- 3.2.4 The NPPF considers the impact of new development on existing businesses and community facilities stating:

¹ National Planning Policy Framework NPPF, December (2024) Ministry of Housing, Communities and Local Government.

"200. 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."

3.3 Noise Policy Statement for England (NPSE): 2010

3.3.1 The Noise Policy Statement for England (NPSE) was published in March 2010². It specifies the following long-term vision in policy aims: "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."

3.3.2 The NPSE introduced three concepts to the assessment of noise, which includes:
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 Observed 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.

3.3.3 The above categories are however undefined in terms of noise levels and for the SOAEL the NPSE indicates that the noise level will vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research is therefore required to establish what may represent an SOAEL. It is acknowledged in the NPSE that not stating specific SOAEL levels provides policy flexibility until there is further evidence and guidance.

3.3.4 The following commentary is given on the representation of NOEL, LOAEL and SOAEL in relation to existing British Standards/ International guidelines:

NOEL – Inaudibility

LOAEL – The guideline values for community noise in specific environments as set out in Table 1 of the WHO Guidelines for Community Noise 1999 and Table 4 of British Standard 8233: 2014 Guidance on sound insulation and noise reduction in buildings.

3.3.5 The NPSE concludes how the LOAEL and SOAEL relate to the three aims listed in paragraph 3.3.1 above. The initial aim relates to avoiding significant adverse effects on health and quality of life, it then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when:

² Noise Policy Statement for England: NPSE (2010) Department for Environment, Food & Rural Affairs.

"all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development."

- 3.3.6 The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development.
- 3.3.7 The Government is undertaking a review of technical guidance but currently there is no agreed methodology for noise to accompany the NPPF guidance.
- 3.3.8 The Government has recently removed the existing Planning Policy Guidance on noise, which was known as PPG24: 1994. The National Planning Policy Framework, which has recently been published states "109. *The planning system should contribute to and enhance the natural and local environment by:*
- *Preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability;"*

3.4 Planning Practice Guidance (PPG): 2022

- 3.4.1 The Ministry of Housing, Communities & Local Government (formerly the Department for Communities and Local Government) published the final version of the Planning Practice Guidance (PPG) on 06 March 2014. The PPG provides further information with regard new developments which may be sensitive to the prevailing acoustic environment. The main section of PPG was also updated in July 2019 and consultation and pre-decision matters updated in April 2022³.
- 3.4.2 The PPG includes a table summarising the noise exposure hierarchy, based on the likely average response. Under the heading of 'perception' the 'noticeable and not intrusive' assessment of noise is defined as '*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 there is a perceived change in the quality of life*'. The increasing effect level under these conditions is deemed to be 'no observed adverse effect' and no specific measures are required.
- 3.4.3 Full details of the Planning Practice Guidance on effects are provided in Table 3.1.

³ Planning Practice Guidance PPG (2022) Ministry of Housing, Communities and Local Government.

Table 3.1: Noise Exposure Hierarchy

Perception	Example of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable 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			
Noticeable 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. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable 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 Effect	Avoid
Noticeable 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 harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Present

3.4.4 The subjective nature of noise means there is not a simple relationship between noise levels and its effects. Factors to be considered in determining if noise is a concern are identified including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative impacts.

3.5 Professional Practice Guidance on Planning & Noise (ProPG): 2017

3.5.1 The Professional Practice Guidance on Planning and Noise (ProPG) guidance document was released in May 2017⁴ to provide a recommended approach to the management of noise within the planning system in England. The guidance document uses relevant noise legislation, guidance and standards appropriate for assessing residential development sites.

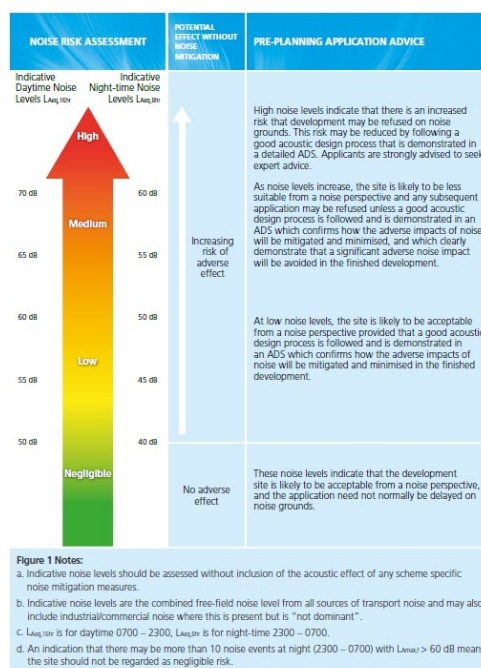
3.5.2 The scope of the guidance is restricted to the consideration of new residential development that will be exposed predominantly to airborne noise from transport sources. In particular, it aims to:

- advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- encourage the process of good acoustic design in and around new residential developments;
- outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- improve understanding of how to determine the extent of potential noise impact and effect; and
- assist the delivery of sustainable development.

3.5.3 In order to fulfil the aims of the ProPG, the guidance sets out “two sequential stages of the overall approach are:

- Stage 1 - an initial noise risk assessment of the proposed development site (see Figure 3.1); and
- Stage 2 – a systematic consideration of four key elements.”

Figure 3.1: ProPG Initial Site Noise Risk Assessment



⁴ ProPG: Planning & Noise (2017) Professional Practice Guidance on Planning & Noise. Working Group from CIEH/IOA/ANC.

3.5.4 Stage 2 of the ProPG recommended approach includes four key elements:

- Element 1 – demonstrating a “Good Acoustic Design Process”;
- Element 2 – observing internal “Noise Level Guidelines”;
- Element 3 – undertaking an “External Amenity Area Noise Assessment”; and
- Element 4 – consideration of “Other Relevant Issues”.

“The approach is underpinned by the preparation and delivery of an Acoustic Design Statement (ADS). An ADS for a site assessed as high risk should be more detailed than for a site assessed as low risk. An ADS should not be necessary for a site assessed as negligible risk.”

3.5.5 In cases where the site is exposed to noise of an industrial and/or commercial nature, the document provides guidance which should be considered at Stage 1 of the ProPG approach.

“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 Guidelines (and if included, this should be clearly stated.

Where industrial or commercial noise is present on the site and is considered to be “dominant” (i.e. where the impact would be rated as adverse or greater (subject to context) if a BS4142:2014 assessment was to be carried out), then the risk assessment should not be applied to the industrial or commercial noise component and regard should be had to the guidance in BS4142:2014. The judgement on whether or not to undertake a BS4142 assessment to determine the dominance should be proportionate to the level of risk. In low risk cases a subjective judgement of dominance, based on audibility, would normally be sufficient.”

3.5.6 The Good Acoustic Design Process with ProPG states the use of fixed unopenable windows should be avoided, as occupants generally prefer to have control over the internal environment, even if resultant acoustic conditions are considered unsatisfactory.

3.5.7 ProPG's Internal Noise Level Guidelines provides additional advice that internal noise level guidelines are generally not applicable under “purge ventilation” conditions as defined by Approved Document F of The Building Regulations, as this is an occasional event (e.g. to remove odour from painting and decorating or from burnt food).

3.5.8 In terms of Internal Noise Level Guidelines, ProPG refers to BS8233: 2014 for recommended noise levels inside sensitive rooms. The following supplementary commentary to BS8233: 2014 is provided:

“Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however, any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the “open” position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded.”

"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 as "unacceptable" by most people, particularly if such levels occur more than 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."

3.6 British Standard 4142: 2014 + A1: 2019 'Methods for rating and assessing industrial and commercial sound'

3.6.1 British Standard BS4142⁵ was revised in 2014 and updated in 2019. The scope of the Standard has been extended to methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

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

3.6.2 The method is based on the difference between the background noise level without the industrial/commercial source and the noise level of the industrial source (specific sound) at the receiver location. The noise is rated for having tonality, impulsivity, intermittency or other distinguishable characteristics that may attract attention. In cases where the noise contains multiple characteristics, the penalties are cumulative.

3.6.3 In the majority of cases, the greater the difference between the rated noise level (specific noise and corrections for character) and background noise level, the greater the magnitude of impact (see Table 3.2).

Table 3.2: Assessment of the Impacts

Difference	Assessment
Around +10 dB or more	Likely to be an indication of a significant adverse impact, depending on the context
Around +5 dB	Likely to be an indication of an adverse impact, depending on the context

3.6.4 In Section 8 of the 1997 version of the Standard "Assessing the noise for complaint purposes" it is stated that an excess above the existing background noise level L_{A90} of up to 5 dB(A) due to noise from fixed plant at a new development is of 'marginal

⁵ British Standard BS4142 (2014)+A1 (2019) 'Methods for rating and assessing industrial and commercial sound' British Standards Institution.

significance'. This has been interpreted, since the introduction of the Standard in 1967, that a 5 dB(A) excess due to new, fixed plant noise source is, in general, acceptable.

- 3.6.5 In terms of establishing the rating level, corrections for the noise character has to be taken into consideration. These include the following factors:

Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

NOTE 2 Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it might be appropriate to apply a single correction. Where both features are likely to affect perception and response, the corrections ought normally to be added in a linear fashion.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

- 3.6.6 The recommended BS 4142 character corrections are presented in Table 3.3.

Table 3.3: Summary of BS4142: 2014+A1: 2019 Corrections

Character	Perceptibility		
	Just Perceptible	Clearly Perceptible	Highly Perceptible
Tonality	+2 dB	+4 dB	+6 dB
Impulsivity	+3 dB	+6 dB	+9 dB
Intermittency	0 dB	+3 dB	+3 dB
Other	0 dB	+3 dB	+3 dB

- 3.6.7 BS4142:2014 acknowledges that where background and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background (particularly at night).
- 3.6.8 The 2014 version of BS4142 (updated in 2019) should not be used in the assessment of conversational and entertainment-related noise. Section 1.3 of the standard specifically states that *"the standard is not intended to be applied to the rating and assessment of sound from:*
- a) recreational activities, including all forms of motorsport;*
 - b) music and other entertainment;*
 - c) shooting grounds;*
 - d) construction and demolition;*
 - e) domestic animals;*
 - f) people;*
 - g) public address systems for speech; and*
 - h) other sources falling within the scopes of other standards or guidance.*

3.7 World Health Organisation Guidelines: 1999 – Guidelines for Community Noise (WHO)

- 3.7.1 The World Health Organisation's (WHO) 'Guidelines for Community Noise'⁶ report for external environmental noise levels states that;

"4.2.7 Annoyance responses

During the daytime, few people are seriously annoyed by activities with L_{Aeq} levels below 55 dB; or moderately annoyed with L_{Aeq} levels below 50 dB. Sound pressure levels during the evening and night should be 5-10 dB lower than during the day..."

- 3.7.2 For night-time noise sources the WHO guidelines recommend a night-time (23.00-07.00) 8-hour noise level of 30 dB L_{Aeq} inside bedrooms (for a reasonably steady noise source) to avoid sleep disturbance.
- 3.7.3 For internal noise levels during the daytime and evening period it is suggested that a noise level of 35 dB $L_{Aeq,16h}$ (07.00-23.00 hours) is achieved to avoid speech intelligibility and moderate annoyance.
- 3.7.4 A summary of the guideline internal noise levels, taken from Table 1 of the WHO guidelines, is given in Table 3.4.

⁶ Guidelines for Community Noise, World Health Organisation (1999).

Table 3.4: Relevant Information from WHO Guidelines

Specific Environment	Critical Health Effect(s)	L_{Aeq} [dB]	Time Base [hours]	$L_{Amax, fast}$ [dB]
Dwelling, indoors	Speech intelligibility & moderate annoyance daytime & evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45
Outdoor living area	To avoid serious annoyance, daytime and evening	55	16	-
Outdoor living area	To avoid minimal moderate annoyance, daytime and evening	50	16	-

3.7.5 An extract from Section 3.4 of 'Guidelines for Community Noise' states that;

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night (Vallet & Vernet 1991), and most studies show an increase in the percentage of awakenings at SEL values of 55-60 dBA (Passchier-Vermeer 1993; Finegold et al. 1994; Pearsons et al. 1995.)"

3.7.6 The extract confirms that some researchers believe that people can be exposed to 10-15 events above 45 dB L_{Amax} and still achieve a good nights sleep, and that as the noise level from an event increases above 45 dB(A) then the risk of sleep disturbance increases. As the WHO tend (not unreasonably) to take a cautious approach, the 45 dB(A) in their Table 4.1 is actually a level below which there is a not a material effect on the quality of sleep.

3.7.7 The World Health Organisation (WHO) Europe has published the WHO Environmental Noise Guidelines for the European Region (2018)⁷. This provides Guidance on outdoor environmental noise levels and the potential effects on human health, supplementing WHO Guidelines (1999).

3.7.8 The Guidelines are based on long-term yearly average day-evening-night (L_{den}) and night (L_{night}) parameters which are primarily intended to aid policy makers.

3.8 British Standard 8233: 2014 (BS8233: 2014)

3.8.1 British Standard 8233:2014 'Guidance on sound insulation and noise reduction of buildings'⁸ offers guidance on suitable internal noise levels for spaces when they are unoccupied.

3.8.2 The suggested design criteria for reasonable listening and resting/sleeping conditions are given in Table 4 of BS8233, and reproduced in Table 3.5.

⁷ The World Health Organisation (WHO) Europe has published the WHO Environmental Noise Guidelines for the European Region (2018).

⁸ British Standard BS 8233 (2014) 'Guidance on sound insulation and noise reduction of buildings' British Standards Institution.

Table 3.5: Relevant Information from BS 8233:2014

Activity	Location	Design Range $L_{Aeq,T}$	
		07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-

3.8.3 BS8233 contains the following relevant guidance in footnotes to the above information:

"Note 4: 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.

Note 5: If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.

Note 7: Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

3.8.4 It can be seen that a design standard should be adopted to ensure internal noise from steady external sources in living rooms should not exceed 35 dB $L_{Aeq,16hour}$.

3.8.5 The design criteria for bedrooms suggests that a noise level not exceeding 35 dB $L_{Aeq,16hour}$ during the daytime (07:00 to 23:00) and 30 dB $L_{Aeq,8hour}$ during the night-time (23:00 to 07:00).

3.8.6 In terms of external areas, BS8233:2014 (Section 7.7.3.2) 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 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However it is also recognised 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."

3.9 Acoustics Ventilation and Overheating: Residential Design Guide (2020) Association of Noise Consultants & Institute of Acoustics

3.9.1 The Association of Noise Consultants (ANC) published the Acoustics Ventilation and Overheating Residential Design Guide in January 2020 (widely known as the 'AVO

guide')⁹, which sets out appropriate ventilation conditions when assessing internal noise levels.

3.9.2 Paragraph 3.9 of the AVO guide states:

"It is suggested here that the desirable internal noise standards within Table 4 of BS 8233:2014 should be achieved when providing adequate ventilation as defined by ADF whole dwelling ventilation. However, it is considered reasonable to allow higher levels of internal ambient noise from transport sources when higher rates of ventilation are required in relation to the overheating condition."

3.9.3 The AVO guide suggests that it is reasonable to allow higher levels of internal ambient noise from transport sources when windows are partially open to mitigate overheating. The AVO guide assumes a reduction of 13 dB for a partially open window.

3.9.4 The AVO guide does not set specific guideline values for what are acceptable higher noise levels in the overheating condition. However, the AVO guide suggests that where internal L_{Aeq} noise levels meet the 'reasonable' values in BS8233: 2014, an adverse effect is unlikely. This equates to external levels of 53 dB $L_{Aeq,16hour}$ during the daytime and 48 dB $L_{Aeq,8hour}$ during the night-time, based on the reduction of 13 dB for a partially open window stated in the AVO guide.

3.9.5 The AVO guide states that where external night-time maximum noise normally exceeds 78 dB L_{AFmax} , which translates to an internal value of 65 dB with the assumed reduction of 13 dB for a partially open window, a Level 2 assessment is recommended. This suggests that where internal maximum noise levels are at or below 65 dB, a Level 2 assessment is not required, and an adverse effect is unlikely. Table 3.3 of the AVO guide suggests that where internal night-time maximum noise levels normally exceed 65 dB, a 'material change in behaviour' is likely.

3.10 Approved Document O of The Building Regulations (2021) Overheating

3.10.1 Approved Document O¹⁰ takes effect on 15 June 2022 for use in England. It does not apply to work subject to a building notice, full plans application or initial notice submitted before that date, provided the work for each building is started before 15 June 2023.

3.10.2 The new Approved Document O: Overheating, aims to reduce the occurrence of high indoor temperatures which has become an increasing issue for residential developments. The main aim of ADO is to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures:

"Requirement

O1 Overheating mitigation

(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)—

⁹ Acoustics Ventilation and Overheating: Residential Design Guide (2020) Association of Noise Consultants & Institute of Acoustics.

¹⁰ Approved Document O of the Building Regulations (2021) Overheating. HM Stationary Office.

- (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."

- 3.10.3 There are two methods of demonstrating compliance with ADO: 1. Simplified method; or 2. Dynamic thermal modelling.
- 3.10.4 The simplified method details maximum glazing areas to limit solar gain and minimum free areas for openings to adequately remove excess heat, based on the overheating risk of the building. The categorisation of overheating risk is general, based on location in either a 'high risk' area (urban and some suburban parts of London) or 'medium risk' area (England excluding high risk parts of London).
- 3.10.5 Consequently, the simplified method and the employed maximum glazing areas and minimum free areas for openings shown in ADO may not accurately consider site-specific conditions. Example considerations may include buildings that are shaded by neighbouring properties, landscapes or structures. Dynamic thermal modelling considers these factors, as well as maximum glazing areas and minimum free areas for openings.
- 3.10.6 Section 3 of ADO provides additional considerations regarding the safety and reasonable enjoyment of the dwelling that must be taken into account when meeting the overheating obligation, including noise.
- 3.10.7 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 23:00 and 07:00 hours).
 - b. 55dB L_{AFmax} , more than 10 times a night (between 23:00 and 07:00 hours)
- 3.10.8 The minimum required free areas for openings in bedrooms included in the 'simplified method' in ADO translate to an acoustic open area that is approximately 5% of the floor area for medium risk sites and approximately 15% of the floor area for high risk sites. Considering typical bedroom dimensions and constructions, this results in an outside-to-inside level difference of 9 dB for medium risk sites and 4 dB for high risk sites.
- 3.10.9 This is different to the outside-to-inside level difference of 13 dB for a window partially open to mitigate overheating stated in the AVO guide, which is stated in the document to be based on acoustic open area that is approximately 2% of the floor area.

3.11 Noise Criterion and Local Authority Consultation Response

- 3.11.1 The assessment will follow ProPG: Planning and Noise (2017) Professional Practice Guidance on Planning & Noise and refer to relevant standards/guidance such as BS8233: 2014 for internal and external noise criterion.
- 3.11.2 The proposed noise criteria for the development is based on guidance from BS 8233:2014 with regards daytime and night-time noise levels within habitable rooms:
- (a) Within Living Rooms and Bedrooms (07:00-23:00 hours): 35 dB(A) $L_{eq,16\text{ hour}}$.
 - (b) Within Bedrooms (23:00-07:00 hours): 30 dB(A) $L_{eq,8\text{ hour}}$.
 - (c) Within Bedrooms (23:00-07:00 hours): 45 dB(A) L_{Amax} .
 - (d) Outdoor living areas (07:00-23:00 hours): ≤ 55 dB $L_{Aeq,16\text{ hour}}$.

4.0 Environmental Noise Survey Methodology

4.1 Introduction

- 4.1.1 This study benefits from a noise survey carried out between Monday 6th and Wednesday 8th October 2025.
- 4.1.2 Datalogging sound level meters were installed adjacent to London Road (A10) and Blacksmiths Lane. The sound level meters logged levels over 15-minute durations.
- 4.1.3 The site measured noise levels adjacent to the A10 and Blacksmiths Lane have been used to validate a road traffic noise model.
- 4.1.4 A subjective assessment of the ambient noise climate was undertaken during the attended periods of the survey. The acoustic environment is dominated by traffic using the local road network, with other audible noise sources sporadic aircraft flyovers, and birdsong.
- 4.1.5 No fixed plant noise sources were identified with the businesses occupying the buildings to the west of the proposed residential development, with only vehicle movements in and out of the car parking observed during the survey.

4.2 Environmental Noise Survey Instrumentation

- 4.2.1 The instrumentation displayed below was used for all measurements undertaken during the site noise survey.

Table 4.1: Details of Instrumentation

Manufacturer	Equipment	Serial No.	Calibration Due Date
Norsonic	Sound Level Meter Type 140	1405420	04.04.2027
Norsonic	Sound Level Meter Type 118	31832	10.06.2025
Norsonic	Acoustic Calibrator Type 1251	34495	04.11.2025

- 4.2.2 The following set-up parameters were used on the sound level meters during noise measurement procedures:

Frequency Weighting: 'A' or Linear (1:1 octave bands)
Measurement Periods: 15 minutes

4.3 Calibration

- 4.3.1 The sound level meters were calibrated with the electronic calibrator prior to the commencement and on the completion of the survey. No significant drift in calibration was observed. The meters used during the survey are a precision grade Type/Class 1.

Calibration Setting: 114 dB @ 1kHz
Meter Setting: Fast Response

4.3.2 According to BS4142: 2014+A1:2019 the calibration of instruments should be as follows:

Section 5.2: "NOTE 1 It is recommended that sound calibrators are calibrated at intervals not exceeding 1 year, conformity of the measuring systems with BS EN 61672-1 is verified at intervals not exceeding 2 years, and the conformity of filters with BS EN 61260 is verified at intervals not exceeding 2 years."

4.4 Measurement Procedure

4.4.1 The noise monitoring locations are described below and displayed in Appendix B:

- Location MP1: Adjacent to London Road A10 (7m from road); and
- Location MP2: Adjacent to Bloacksmiths Lane (5m from road); and

4.4.2 An effective windshield was used to minimise turbulence at the microphone. Monitoring at fixed noise monitoring positions was undertaken at a height of 1.5m above ground level and at least 3.5 metres from the nearest reflecting surface.

4.5 Meteorological Conditions

4.5.1 Meteorological information for the survey period is listed below.

Table 4.2: Summary of meteorological conditions

Date	Description	Wind Speed (ms ⁻¹)	Wind Direction	Temp. (°C)
06.10.2025	Fair	1-3	W/SW	12-18
07.10.2025	Fair	2-3	W/SW	12-15
08.10.2025	Fair	1-3	W/SW	9-13

4.5.2 The noise survey was conducted in climatic conditions suitable for monitoring environmental noise levels in accordance with advice given in BS7445: 2003 'Description and measurement of environmental noise'¹¹.

¹¹ British Standard 7445 (2003) Description and measurement of environmental noise. British Standards Institution, 2003.

5.0 Assessment of Noise Impact

5.1 Introduction

5.1.1 In the context of this assessment, noise is defined as sound that is unwanted by the recipient. The effects of noise on the neighbourhood are varied and complicated, and include such things as interference with speech, communication, disturbance of work, leisure or sleep. A further complicating factor is that in any one neighbourhood some individuals will be more sensitive to noise than others.

5.1.2 A measure that is in general use and is recommended internationally for the description of environmental noise is the equivalent continuous noise level or L_{Aeq} (Equivalent Continuous Sound Pressure Level) parameter.

5.2 Environmental Noise Survey Results

5.2.1 The fixed monitoring location measurement data has been processed to provide daytime (16-hour) and night-time (8-hour) L_{Aeq} values. The results of the survey are summarised in Tables 5.1 to 5.2. The results of the survey are presented fully in graphical form within Appendix C.

Table 5.1: Daytime noise levels at monitoring locations

Ref.	Date	Time Period (hh:mm)	Statistical Parameters (dB)			
			$L_{Aeq,16h}$	$L_{A10,16h}$	$L_{A90,16h}$	$L_{Amax,15mins}$
MP1	07.10.2025	07:00-23:00	66.0	69.4	45.0	76.4-90.2
MP2	07.10.2025	07:00-23:00	55.5	56.6	46.5	64.4-83.6

Table 5.2: Night-time noise levels at monitoring locations

Ref.	Commencement Date	Time Period (hh:mm)	Statistical Parameters (dB)			
			$L_{Aeq,8h}$	$L_{A10,8h}$	$L_{A90,8h}$	$L_{Amax,15mins}$
MP1	06.10.2025	23:00-07:00	61.0	52.4	31.1	73.6-87.9
MP1	07.10.2025	23:00-07:00	60.6	52.4	29.7	45.2-82.9
MP2	06.10.2025	23:00-07:00	51.2	51.5	34.0	54.3-74.5
MP2	07.10.2025	23:00-07:00	50.2	51.2	34.7	56.6-74.7

5.2.2 The results of the survey show that the daytime $L_{Aeq,16hour}$ at the monitoring location adjacent to London Road (A10) was 66.0 dB. The night-time $L_{Aeq,8hour}$ free-field noise level at the same position ranged between 60.6 and 61.0 dB.

5.2.3 In terms of maximum instantaneous noise levels during this night-time period, measurements ranged between 45.2 and 87.9 dB $L_{Amax,15mins}$.

5.2.4 The daytime $L_{Aeq,16hour}$ measured adjacent to Blacksmiths Lane was 55.5 dB. The night-time $L_{Aeq,8hour}$ free-field noise level at the same location was between 50.2 and 51.2 dB.

5.2.5 In terms of maximum instantaneous noise levels during the night-time periods, measurements ranged between 54.3 and 74.7 dB $L_{Amax,15mins}$.

5.2.6 Maximum instantaneous noise levels should not regularly exceed 45 dB L_{Amax} (as recommended in BS8233) within bedrooms. It should be noted that this criteria is derived from Section 3.4 of 'Guidelines for Community Noise' which states that;

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night (Vallet & Vernet 1991)..."

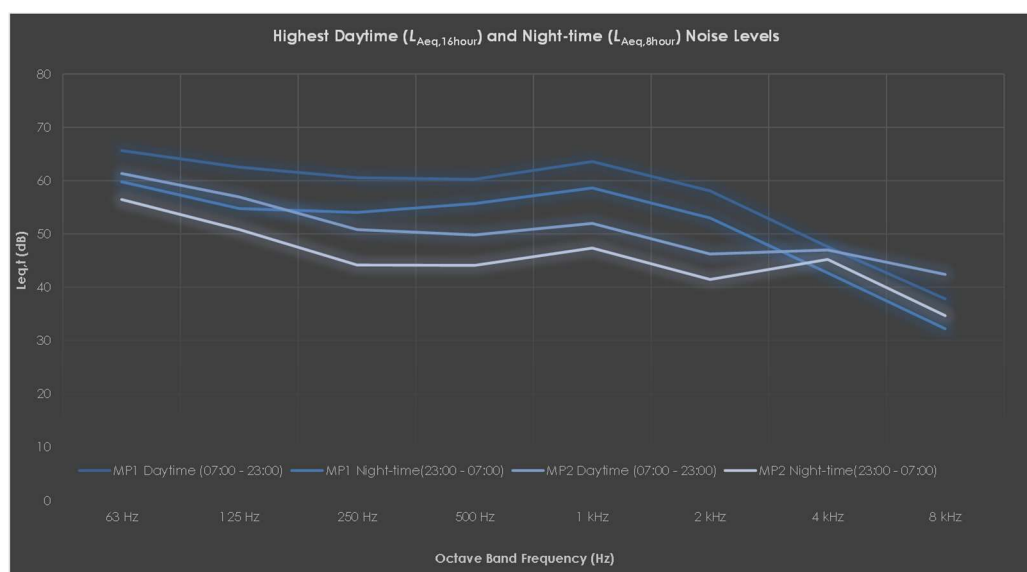
5.2.7 Typical noise levels measured at the two monitoring locations are shown in Table 5.3.

Table 5.3: Typical Noise Levels at Monitoring Locations

Monitoring Location Ref.	Daytime (07:00-23:00) $L_{Aeq,16hour}$ dB	Night-Time (23:00-07:00) $L_{Aeq,8hour}$ dB	Night-Time (23:00-07:00) 10 th Highest $L_{Amax,fast}$ dB Event
MP1	66.0	60.6-61.0	81.0-81.2
MP2	55.5	50.2-51.2	69.6-70.0

5.2.8 Octave band frequency characteristics of the highest daytime and night-time noise levels measured at the monitoring locations are presented in Figure 5.1.

Figure 5.1: 1:1 octave band frequency analysis of highest daytime and night-time noise levels



5.3 Initial Site Noise Risk Assessment

5.3.1 The highest daytime ambient noise level measured at a location representative of the housing development was 67 dB $L_{Aeq,16hour}$, with an associated night-time $L_{Aeq,8hour}$ of 62 dB (based on supplied site layout).

5.3.2 According to the ProPG initial site risk assessment rating, the development site is considered 'medium to high risk'.

Table 5.4: Noise Risk Assessment

Noise Risk Assessment	ProPG Commentary
Medium	<i>"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 ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development".</i>
High	<i>"High noise levels indicate that there is an increased risk the development may be refused on noise grounds. The risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice."</i>

5.3.3 Consequently, there is an increased risk the development may be refused on noise grounds. The risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS.

5.3.4 With respect to the L_{Amax} during the night-time period, ProPG states that *"the initial site noise risk assessment should include the consideration of the individual noise events when the external $L_{Amax,F}$ exceeds 60 dB. A site should not be regarded as negligible risk if the $L_{Amax,F}$ exceeds, or is likely to exceed 60 dB more than 10 times a night. A site should be regarded as high risk if the $L_{Amax,F}$ exceeds, or is likely to exceed 80 dB more than 20 times a night."* In this case, no adjustment to the risk assessment is required.

5.3.5 It is important that the assessment of noise risk at a residential development site is not the basis for the eventual recommendation to the decision maker. Where the ProPG Stage 1 assessment indicates that the site is at low, medium or high risk of adverse noise effects, a ProPG Stage 2 assessment should be carried out.

5.3.6 In summary, a full Stage 2 assessment is required to show how the risk is to be reduced by following a good acoustic design process that is demonstrated in a detailed ADS.

5.4 Road Traffic Noise Assessment

5.4.1 The road traffic noise survey results obtained from the monitoring locations have been used to validate a noise model of the residential development. The CadnaA noise model is based on the Department of Transport Calculation of Road Traffic Noise (CRTN) and ISO 9613 -2 (2024) noise propagation methodology.

5.4.2 For noise prediction calculations, the ground absorption coefficient has been set to '0.5' representing 'mixed' ground. The temperature was set to 10 °C, with relative humidity to 70%.

5.4.3 The noise model considers noise levels horizontally and vertically across the site and includes screening provided by intervening structures, as well as first order reflections from buildings.

5.4.4 The predicted daytime road traffic noise levels across the site based on the scheme layout are presented in Figure 5.2. Noise levels are taken to be 1.5m above ground level and without any mitigation measures incorporated within the design.

Figure 5.2: CadnaA Daytime Road Traffic Noise Prediction Map – $L_{Aeq,16hour}$ dB



5.4.5 Night-time noise levels have also been considered within Figure 5.3, with two-storey dwellings assumed and modelled at a receptor height of 4m above ground level to represent first floor bedrooms.

Figure 5.3: CadnaA Night-time Road Traffic Noise Prediction Map – $L_{Aeq,8hour}$ dB



5.4.6 The World Health Organisation (WHO) Guidelines recommend that noise levels within gardens and external living areas should not exceed 55 dB $L_{Aeq,16hour}$ in order to avoid serious annoyance during the daytime and evening.

5.4.7 This accords with the guidance criteria for external noise given in Section 7.7.3.2 of BS8233 for amenity areas, with a desirable external level not exceeding 50 dB $L_{Aeq,T}$ and an upper guideline value of 55 dB $L_{Aeq,T}$ for noisier environments.

5.4.8 BS8233: 2014 also provides the following commentary on external noise levels:

"These guideline values may not be achievable in all circumstances where 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."

5.4.9 BS8233:2014 states that the resulting noise levels are never a reason for refusal, if levels are designed to be as low as practicable. However, policy guidance should be followed to ensure the amenity can be enjoyed as intended.

5.4.10 Noise levels within the rear gardens of Plots 1-4 would exceed the upper design target of 55 dB $L_{Aeq,16hour}$, with predicted noise levels of 57-59 dB $L_{Aeq,16hour}$. Therefore, we would propose a minimum 1.8m high acoustic fence for these plots, which will effectively screen road traffic noise levels ≤ 55 dB $L_{Aeq,16hour}$. Figure 5.4 shows the mitigation provided by the acoustic fencing to the plots.

Figure 5.4: CadnaA Daytime Road Traffic Noise Prediction Map – $L_{Aeq,16hour}$ dB



5.4.11 Predicted noise levels within all other rear gardens are < 55 dB $L_{Aeq,16hour}$. Predictions do not take into account standard close-boarded fences as it cannot be demonstrated that the construction complies with the requirements of ISO 9613-2: 2024.

5.4.12 Generally, the main considerations when designing a noise barrier are as follows:

- The closer the noise barrier is to the noise source, the more effective the barrier;
- The lower the height of the receptor position (outdoor area, room elevation), the more effective the barrier;
- The taller the barrier, the greater the noise reduction;
- Barriers are more effective when the site slopes away from the source;
- Wider barriers tend to be more effective – barriers should ideally extend far beyond the ends of the site area (The overall effectiveness of a barrier for noise control is normally determined by the noise diffracted over the top of the barrier, or around the ends, rather than by the amount of noise passing through it);
- The fence should comprise close fitting overlapping boards, such that the whole is impervious with no gaps or cracks between the boards. The design should ensure that gaps and cracks do not occur as the fence weathers. Any holes or discontinuities in a barrier wall will significantly reduce its noise reduction ability; and
- Material used should have a suitable surface density, e.g. the barrier should have a surface density of at least 10kg/m².

5.4.13 An open window will generally provide 13 dB(A) sound reduction¹². The results of the site survey and subsequent modelling confirm that internal noise levels meeting BS8233: 2014 and WHO Guidelines would not be achieved for habitable rooms of the plots closest to the A10 and Blacksmiths Lane.

5.4.14 In order for the Site to be suitable for residential development, a good acoustic design process must be demonstrated in a detailed Acoustic Design Statement (ADS) and is presented in Section 6.0. The general principles will include:

- Using separation distances between noise sources and receptors;
- Utilising the existing topography and existing structures;
- Incorporating noise barrier as part of the scheme¹³;
- Considering the site layout to reduce noise levels to sensitive amenity areas/rooms across the site;
- Using orientation of buildings to reduce noise exposure of sensitive rooms (quiet façade principle); and
- Designing building envelope to mitigate noise ingress.

5.5 Air Source Heat Pumps

5.5.1 Each residential unit will be served by an individual air source heat pump (ASHP), although no details are currently available.

5.5.2 The periods of use will be controlled by the residents of the dwelling. It can be assumed that during winter there will be periods when the air source heat pumps will be operational 24 hours a day.

5.5.3 Plant sound emissions from the ASHPs may need to be assessed beyond the site boundary using BS4142: 2014+A1: 2019. BS4142: 2014+A1: 2019 states that “A representative level ought to account for the range of background sound levels and not automatically assumed to be either the minimum or modal value”.

¹² AVO Guide (2020) Acoustics Ventilation and Overheating: Residential Design Guide, Association of Noise Consultants & Institute of Acoustics.

¹³ ProPG: Planning & Noise (2017) Professional Practice Guidance on Planning & Noise. Working Group from CIEH/IOA/ANC. Supplementary Document 2 Good Acoustic Design.

- 5.5.4 The lowest of the mean and modal values has been used to establish a typical and representative background sound level for the future BS4142: 2014+A1: 2019 assessment.
- 5.5.5 BS4142: 2014+A1: 2019 states that where the 'rating' level ($L_{Ar,Tr}$) does not exceed the measured background sound level the resultant impact would be low. Where the 'rating' level is less than 5 dB above the background sound level, the plant sound emissions would be below an adverse impact.
- 5.5.6 Table 5.5 shows the results of the baseline noise survey.

Table 5.5: Representative Background Sound Levels

Location Ref.	Time Period (hh:mm)	Average Background Sound Level L_{A90} dB	Representative ¹ L_{A90} dB
Nearest noise-sensitive receptor (NSR)	Daytime 07:00-23:00	45	45
	Night-time 23:00-07:00	30	24

Note: The representative L_{A90} is based on the lowest of the mean or modal values from the two monitoring locations.

- 5.5.7 The operational plant rating sound level from the development should not exceed the typical background sound level in order to have a 'low impact' according to BS4142: 2014+A1: 2019.
- 5.5.8 The following plant sound emission limits are recommended and are based on a position 1m from the façade of the noise sensitive properties due to the cumulative operation of the fixed plant.

Table 5.6: Plant Sound Emission Limits at nearest Noise-Sensitive Receptors based on BS4142: 2014+A1: 2019

Time Period	Plant Sound Emission Limits (dB)
Any day 07:00 – 23:00	45 $L_{Ar,Tr}$
Any night 23:00 – 07:00	24 $L_{Ar,Tr}$ [35 $L_{Ar,Tr}$]

Note: [] A noise limit of 35 dB (as a rating level, L_{Ar}) provides alignment with BS4142 where background and rating levels are low.

- 5.5.9 Given the development consists of dwelling-houses, ASHPs can be positioned well away from the neighbouring property and should not have an adverse impact. We recommend that the IOA/CIEH documents¹⁴¹⁵ relating to ASHPs are used in the selection process for plant and installation locations.

¹⁴ Heat Pumps (2022) Briefing Note by IOA & CIEH.

¹⁵ Heat Pumps Professional Advice Note (2022) Briefing Note by IOA & CIEH.

6.0 Acoustic Design Statement

6.1 Introduction

6.1.1 The Initial Site Noise Risk Assessment indicates that the proposed residential development site is considered 'medium to high risk'. It is important that the assessment of noise risk at a residential development site is not the basis for the eventual recommendation to the decision maker. Where the ProPG Stage 1 assessment indicates that the site is at low, medium or high risk of adverse noise effects, a ProPG Stage 2 assessment should be carried out.

6.1.2 The risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS.

6.2 Element 1: Good Acoustic Design Process

6.2.1 In order for the Site to be suitable for residential development a good acoustic design process must be demonstrated in an Acoustic Design Statement (ADS). The general principles to be considered for a scheme may include:

- Using separation distances between noise sources and receptors;
- Exploring feasibility of relocating or reducing noise levels from dominant sources;
- Utilising the existing topography and existing structures;
- Incorporating noise barrier as part of the scheme;
- Considering the site layout to reduce noise levels to sensitive amenity areas/rooms across the site;
- Using orientation of buildings to reduce noise exposure of sensitive rooms (quiet façade principle); and
- Designing building envelope to mitigate noise ingress.

6.2.2 Generally, the main considerations when designing a noise barrier are as follows:

- The closer the noise barrier is to the noise source, the more effective the barrier;
- The lower the height of the receptor position (outdoor area, room elevation), the more effective the barrier;
- The taller the barrier, the greater the noise reduction;
- Barriers are more effective when the site slopes away from the source;
- Wider barriers tend to be more effective – barriers should ideally extend far beyond the ends of the site area (The overall effectiveness of a barrier for noise control is normally determined by the noise diffracted over the top of the barrier, or around the ends, rather than by the amount of noise passing through it);
- The fence should comprise close fitting overlapping boards, such that the whole is impervious with no gaps or cracks between the boards. The design should ensure that gaps and cracks do not occur as the fence weathers. Any holes or discontinuities in a barrier wall will significantly reduce its noise reduction ability;
- Material used should have a suitable surface density, e.g. a high performance barrier must have a surface density of at least 20kg/m², although a barrier of only 10kg/m² would still be largely effective.

6.2.3 Based on the current layout, Plots 1-4 will need to include a 1.8m high acoustic fence to protect rear gardens.

- 6.2.4 The positioning of rooms within a development can be used as an effective means of reducing noise to sensitive rooms. The 'quiet façade' principle should be applied to the proposed dwellings. This is the positioning of sensitive habitable rooms on the façade facing away from the dominant noise source.
- 6.2.5 Figure 6.1 is repeated from 'Sound Control for Homes'¹⁶ and shows practical implementation of the 'quiet façade' principle, with kitchens, bathrooms, etc on the 'noisy' façade and using small windows for any habitable rooms on this elevation.

Figure 6.1: Example of quiet façade principle



- 6.2.6 As much as practicable, we recommend that the habitable rooms are located on the rear elevations of the dwellings, with the kitchen/bathrooms on the 'noisy' façade. We would also recommend that glazing areas are kept small on any habitable rooms which are facing or partly facing London Road (A10).
- 6.2.7 The Good Acoustic Design Process with ProPG states the use of fixed unopenable windows should be avoided, as occupants generally prefer to have control over the internal environment, even if resultant acoustic conditions are considered unsatisfactory.
- 6.2.8 ProPG's Internal Noise Level Guidelines provides additional advice that internal noise level guidelines are generally not applicable under "purge ventilation" conditions as defined by Approved Document F of The Building Regulations, as this is an occasional event (e.g. to remove odour from painting and decorating or from burnt food).
- 6.2.9 The positioning of rooms within a development can be used as an effective means of reducing noise to sensitive rooms. The 'quiet façade' principle should be applied, which is the positioning of sensitive habitable rooms on the façade facing away from the dominant noise source.

6.3 Element 2: Internal Noise Level Guidelines

- 6.3.1 Windows and standard ventilation units are typically the weakest elements of a building façade in terms of sound insulation. The overall effectiveness of the building envelope will be reduced further by opening windows to provide ventilation (open windows will typically provide 13 dBA sound reduction).

¹⁶ BRE and CIRIA (1993) Sound Control for Homes. BRE Report 238, CIRIA Report 127.

- 6.3.2 We have calculated that with windows open, internal noise within many of the habitable rooms during the daytime and night-time will exceed internal noise targets, even with a 5 dB uplift in terms of BS8233 criterion for open windows, which is considered acceptable based on the advice contained with BS8233: 2014, ProPG and the AVO Guide.
- 6.3.3 A further series of calculation routines have been undertaken using the methodology contained in BS 8233:2014 (G.2) with windows closed. In terms of ventilation, a Mechanical Ventilation with Heat Recovery (MVHR) system should be used for Plots 1-4. For all other plots we have assumed natural ventilation with background ventilators and intermittent extract fans (known as the Natural Ventilation system, formerly ventilation system 1).
- 6.3.4 Surface areas of façade elements and room volumes are based on the drawings listed in Table 1.1. **Calculations will need to be repeated by an acoustic consultant at the detailed design stage.**
- 6.3.5 Glazing and ventilation specifications necessary to achieve acceptable internal noise levels have been included within the prediction routines.
- 6.3.6 Calculation routines are based on a standard brick/block cavity external wall construction achieving a sound reduction of at least 53 dB R_w .

Table 6.1: Overview of building elements

Example Specification	Glazing Configuration	Ventilation	Roof/Ceiling
All Bedrooms facing or partly facing London Road (A10) Plots 1-4	6mm glass-16mm cavity-8.8mm Pilkington Optiphon glass 41 dB R_w 35 dB R_w+C_{tr}	MVHR plant noise to not exceed NR25 daytime and NR15 night-time	2 x 12.5mm layers of plasterboard (sealed and skimmed) to ceiling joists with minimum 100mm insulation above (min. 10 kg/m ³). Felt liner with 14mm roof tile system
All other Habitable Rooms facing or partly facing London Road (A10) Plots 1-4	6mm glass-16mm cavity-6mm glass 33 dB R_w 28 dB R_w+C_{tr}	MVHR plant noise to not exceed NR25 daytime and NR15 night-time	
Bedroom 2, Plots 5 & 6 – Bedrooms 1 & 2, Plot 7	6mm glass-16mm cavity-6mm glass 33 dB R_w 28 dB R_w+C_{tr}	Greenwood EAQ42W Trickle Vent 42 dB $D_{n,ew}$	1 x 12.5mm layers of plasterboard (sealed and skimmed) to ceiling joists with minimum 100mm insulation above (min. 10 kg/m ³). Felt liner with 14mm roof tile system
All other habitable rooms	6mm glass-16mm cavity-6mm glass 33 dB R_w 28 dB R_w+C_{tr}	Titon SFX V25 Vent + SF418 Canopy	

[Note: Cumulative noise level from external noise ingress and MVHR plant will need to be considered at the detailed design stage].

- 6.3.7 Example calculated noise levels within the habitable rooms based on the survey results and subsequent road traffic noise modelling are displayed in Table 6.2.

Table 6.2: Calculated internal noise levels of habitable rooms

Habitable Room	Calculated Internal Noise Levels			
	Daytime (07:00-23:00)	Criterion	Night-time (23:00-07:00)	Criterion
Bedroom 3, Plot 1	27 dB $L_{Aeq,16hour}$	35 dB $L_{Aeq,16hour}$	22 dB $L_{Aeq,8hour}$ 44 dB $L_{Amax,8hour}$	30 dB $L_{Aeq,8hour}$ 45 dB $L_{Amax,8hour}$
Bedroom 2, Plot 5	28 dB $L_{Aeq,16hour}$	35 dB $L_{Aeq,16hour}$	23 dB $L_{Aeq,8hour}$ 36 dB $L_{Amax,8hour}$	30 dB $L_{Aeq,8hour}$ 45 dB $L_{Amax,8hour}$
Living Room, Plot 5	31 dB $L_{Aeq,16hour}$	35 dB $L_{Aeq,16hour}$	-	-
Bedroom 1, Plot 7	28 dB $L_{Aeq,16hour}$	35 dB $L_{Aeq,16hour}$	23 dB $L_{Aeq,8hour}$ 36 dB $L_{Amax,8hour}$	30 dB $L_{Aeq,8hour}$ 45 dB $L_{Amax,8hour}$

Example Design Specifications for Noise-Sensitive Rooms

- 6.3.8 It is important that all principal building elements are tested in accordance with BS EN ISO 10140-2:2010 (or equivalent) and that the quoted minimum sound reduction specifications are met by the panels and windows, including frames, seals, etc.

Glazing

- 6.3.9 In order to mitigate external noise levels to habitable rooms, the glazing system shown in Table 6.3 should be used as a minimum.

Table 6.3: Acoustic performance of glazing system

Glazing Configuration (to be read in conjunction with Table 6.1)	Sound Reduction Index – SRI (dB)							R_w (dB)	$R_w + C_{tr}$ (dB)
	Octave band c.f. – Hz								
	63	125	250	500	1k	2k	4k		
6mm glass-16mm cavity- 8.8mm Pilkington Optiphon glass	21	25	27	38	48	47	55	41	35
6mm glass-16mm cavity- 6mm glass	21	21	20	30	39	35	44	33	28

Ventilation

- 6.3.10 Ventilation systems will need to be checked against the requirements of Approved Document F of the Building Regulations¹⁷. It recognises that in noisy environments, it may be appropriate to use either acoustically attenuated background ventilators or mechanical ventilation, depending on the level of noise and any planning conditions.
- 6.3.11 Under the new 2021 Part F Approved Document the minimum required area for background ventilators is now taken over a room by room basis. These are simplified per room amounts;

¹⁷ Approved Document F of the Building Regulations (2021) Volume 1: Dwellings - Means of Ventilation.

- For dwelling with multiple floors:
Habitable rooms and kitchens: 8000mm² EA
Bathrooms: 4000mm² EA
Sanitary Accommodation/Utility Room: No minimum

- For single storey dwellings (e.g flats):
Habitable rooms and kitchens: 10000mm² EA
Bathrooms: 4000mm² EA
Sanitary Accommodation/Utility Room: No minimum

There are some sub-rules:

- Seek expert advice should the dwelling have a single exposed façade, or at least 70% of its openings on same façade, or the kitchen has no windows or façade for vents.
- If kitchen and living room not separate, at least 3 vents of same EA as for habitable rooms should be provided in that space.
- Total number of vents in habitable rooms and kitchen should be at least 5, or 4 if one bedroom property.
- If a bathroom has no window or external façade through which a ventilator can be installed, the minimum equivalent area specified should be added to the ventilator sizes specified in other rooms.

6.3.12 This guidance is only suitable for less airtight dwellings. These are dwellings that will aim to have a design air permeability of greater than 5 m³/(h.m²).

6.3.13 Acoustically treated background ventilation may be considered by the design team for the habitable rooms at the development and must meet the minimum performance detailed in Table 6.4.

Table 6.4: Acoustic performance of ventilation systems

Ventilation Type (to be read in conjunction with Table 6.1)	Element normalised level difference - $D_{n,e}$ (dB)							$D_{n,ew}$ (dB)
	Octave band c.f. – Hz							
	63	125	250	500	1k	2k	4k	
Type A Titon SFX V25 Vent + SF418 Canopy (or equivalent)	32.9	35.9	37.6	36.3	31.8	36.8	40.4	35
(Type B) Greenwood EAQ42W Trickle Vent (or equivalent)	37.8	40.8	41.9	37.4	44.0	45.9	40.9	42

Note: The specification assumes no more than four ventilators will be installed per room for Type A and three per room for Type B. The specification should be increased by a factor of $10\log(N)$ should N ventilators be required per room. The acoustic performance of the ventilation units are based on them being in the 'open' position.

6.3.14 MVHR and MEV systems could be specified as an alternative to achieve acceptable noise levels. Part F states that the average A-weighted sound pressure level for a ventilator operating under normal conditions and not at boost rates should not exceed the following guidance limits.

Table 6.5: MVHR/MEV Noise Criteria in Part F of The Building Regulations

Room	Noise Limit ($L_{Aeq,T}$) dB
Bedrooms and living rooms when a continuous mechanical ventilation system is running on its minimum low rate	30
Less sensitive rooms such as kitchens and bathrooms when a continuous operation system is running at the minimum high rate or an intermittent operation system is running	45

6.3.15 Approved Document F of the Building Regulations requires 4 air changes per hour for the short-term removal of pollutants, smells, etc.

Overheating

6.3.16 The Acoustics Ventilation and Overheating: Residential Design Guide (AVO Guide, 2020) has been prepared with contributions from members of the ANC's AVO Group and committee members.

6.3.17 The AVO Guide *"is intended for the consideration of new residential development that will be exposed to:*

- *Predominantly to airborne sound from transport sources; and*
- *Sound from mechanical services that are serving the dwelling in question."*

6.3.18 The AVO Guide details a two-level noise assessment procedure for consideration of the overheating condition. Level 1 assumes that overheating will be mitigated through use of a partially open window (assumed to be 13 dB level difference between outside and inside) and consists of a Site Risk Assessment based on external free-field noise levels.

Table 6.6: Guidance for Level 1 Site Risk Assessment of noise from transportation noise sources relating to overheating condition (taken from Table 3-2 of AVO Guide)

Risk category for Level 1 assessment ^(Note 1)	Potential Effect without Mitigation	Recommendation for Level 2 assessment
$L_{Aeq,1hr}$ during 07:00 - 23:00 $L_{Aeq,8hr}$ during 23:00 - 07:00 High Medium Low Negligible	Increasing risk of adverse effect Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Recommended Optional Not required

- Note 1** The noise levels suggested assume a steady road traffic noise source but may be adapted for other types of transport. All levels are external free-field noise levels.
- Note 2** The values presented in this table should not be regarded as fixed thresholds and reference can also be made to relevant dose-response relationships, [15, 17].
- Note 3** A decision must be made regarding the appropriate averaging period to use. The averaging period should reflect the nature of the noise source, the occupancy profile and times at which overheating might be likely to occur. Further guidance can be found within the 2014 IEMA Guidelines [28].
- Note 4** Refer also to references [15, 17, 28, 29] for further guidance regarding individual noise events. Where 78dB LAFmax is normally exceeded during the night-time period (23:00-07:00), a Level 2 assessment is recommended.
- Note 5** The risk of an adverse effect occurring will also depend on how frequently and for what duration the overheating condition occurs. Refer to Figure 3-2.
- Note 6** To evaluate the risk category for a dwelling, all three aspects of external noise exposure (i.e. daytime, night-time and individual noise events) should be evaluated. The highest risk category for any of the three aspects applies.

- 6.3.19 Where a site is 'High' or 'Medium' risk, it is recommended that a Level 2 assessment is undertaken. A Level 2 assessment includes consideration of provisions for mitigating overheating, whilst considering how frequently and for what duration the overheating condition is likely to occur, based on internal ambient noise levels.
- 6.3.20 It is considered that a Level 1 assessment is appropriate for a planning application to highlight the likely risk associated with a site, whilst a Level 2 assessment may be undertaken at a later stage in the design process, if deemed necessary.
- 6.3.21 The AVO guide seeks to determine the level of risk associated with overheating in a new development based on the existing noise climate. Using the above maximum external noise levels, the AVO risk categories are detailed in Table 6.7.

Table 6.7: AVO Level 1 Risk Assessment

Daytime (07:00 to 23:00)	Night-time (23:00 to 07:00)	Risk Category	Mitigation
≥ 63 dB $L_{Aeq,16hour}$	≥ 55 dB $L_{Aeq,8hour}$	High Risk	Level 2 assessment recommended. Unopenable windows has implications for overheating strategy
54 - 62 dB $L_{Aeq,16hour}$	49 - 54 dB $L_{Aeq,8hour}$	Low/ Medium Risk	Level 2 assessment optional
≤ 53 dB $L_{Aeq,16hour}$	≤ 48 dB $L_{Aeq,8hour}$	Negligible Risk	None required – openable windows suitable

- 6.3.22 Road traffic Noise levels at the proposed dwellings closest to the A10 (Plots 1-4) are predicted to be ≥ 63 dB $L_{Aeq,16hour}$ during the daytime and ≥ 55 dB $L_{Aeq,8hour}$ the night-time. Where the L_{AMax} noise levels do not normally exceed 78 dB during the night-time, a Level 2 assessment is optional. Typical road traffic L_{AMax} noise levels have been measured and are predicted to be well above 78 dB at the nearest dwellings based on the existing layout. Consequently, the Site is considered to be 'high risk' and unopenable windows has implications for the overheating strategy.
- 6.3.23 The rest of the Site is considered to be 'negligible to medium risk'.
- 6.3.24 ADO of the Building Regulations (2021) states that windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:
- 40dB $L_{Aeq,T}$, averaged over 8 hours (between 23:00 and 07:00 hours).
 - 55dB L_{AFmax} , more than 10 times a night (between 23:00 and 07:00 hours).
- 6.3.25 ADO implies that the following limiting external free-field levels above which external noise precludes the use of the simplified method, and dynamic thermal modelling should be used to demonstrate compliance¹⁸.

¹⁸ Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O (2022) Association of Noise Consultants. Version 1.

Table 6.8: External noise levels above which the simplified method cannot be used

Parameter	High Risk Location	Moderate Risk Location
$L_{Aeq,8h}$, averaged over 8 hours (between 11pm and 7am)	44 dB	49 dB
L_{AFmax} , more than 10 times a night (between 11pm and 7am)	59 dB	64 dB

6.3.26 Road traffic noise levels from the A10 have been measured and are predicted to be > 49 dB $L_{Aeq,8h}$ and >64 dB L_{AFmax} between 11pm and 7am according to the 'Moderate Risk Location' criterion shown in Table 6.8.

6.3.27 As night-time noise levels exceed the stated criterion between 11pm and 7am, it will be necessary to carry out dynamic thermal modelling in a TM 59 assessment¹⁹ to demonstrate that the adopted ventilation strategy for the dwellings will not result in overheating during the summer months when the windows remain closed.

6.3.28 The required ventilation rate to avoid overheating should not be as high as the requirement for purge ventilation. Approved Document F of the Building Regulations requires 4 air changes per hour for the short-term removal of pollutants, smells, etc. Openable windows are acceptable for short-term purge ventilation provided overheating is prevented.

6.4 Element 3: External Amenity Area Noise Assessment

6.4.1 The World Health Organisation (WHO) Guidelines recommend that noise levels within gardens and external living areas should not exceed 55 dB $L_{Aeq,16hour}$ in order to avoid serious annoyance during the daytime and evening.

6.4.2 This accords with the guidance criteria for external noise given in Section 7.7.3.2 of BS8233 for amenity areas, with a desirable external level not exceeding 50 dB $L_{Aeq,T}$ and an upper guideline value of 55 dB $L_{Aeq,T}$ for noisier environments.

6.4.3 BS8233: 2014 also provides the following commentary on external noise levels:

"These guideline values may not be achievable in all circumstances where 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."

6.4.4 BS8233:2014 states that the resulting noise levels are never a reason for refusal, if levels are designed to be as low as practicable. However, policy guidance should be followed to ensure the amenity can be enjoyed as intended.

6.4.5 The results of the site survey show that the daytime $L_{Aeq,16hour}$ noise levels within the proposed gardens of Plots 1-4 would exceed 55 dB $L_{Aeq,16hour}$. Therefore, a minimum 1.8m high acoustic fence is proposed for the gardens of these plots.

¹⁹ TM59 (2017) Design methodology for the assessment of overheating risk in homes, published by the Chartered Institution of Building Services Engineers (CIBSE).

- 6.4.6 With the implementation of the proposed 1.8m high acoustic fence, the design target of ≤ 55 dB $L_{Aeq,16\text{hour}}$ will be met.
- 6.4.7 When considering criterion for gardens and outdoor living areas it is important to take into account the feasibility of meeting these standards. A review of health effect-based noise assessment methods reported the following²⁰:

"Perhaps the main weaknesses of WHO-inspired document is that they fail to consider the practicality of actually being able to achieve any of the stated guideline values...We know from the most recent national survey [at that time] that around 56% of the population are exposed to daytime noise levels exceeding 55 dB L_{Aeq} and that around 65% are exposed to night-time noise levels exceeding 45 dB L_{Aeq} (as measured outside the house). ... The percentages exposed above the WHO guideline values could not be significantly reduced without drastic action to virtually eliminate road traffic noise and other forms of transportation noise from the vicinity of houses. The social and economic consequences of such action would be likely to be far greater than any environmental advantages of reducing the proportion of the population annoyed by noise. In addition, there is no evidence that anything other than a small minority of the population exposed at such noise levels find them to be particularly onerous in the context of their daily lives."

- 6.4.8 The environmental noise levels suggested are useful in considering potential annoyance but may be considered more 'aspirational' rather than for determining a level above which significant adverse effects on health and quality of life occur (SOEL).

6.5 Element 4: Assessment of Other Relevant Issues

- 6.5.1 In terms of considering noise impact, Chapter 15 of NPPF 'Conserving and enhancing the natural environment' states:

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

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

- 6.5.2 The following section within the NPPF also specifically refers to noise.

"Ground conditions and pollution

- 198. 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:*

²⁰ Health effect-based noise assessment methods: a review and feasibility study (1998) Porter, N D, Flindell, I H, Berry, B F. NPL Report CMAM 16, September 1998.

- e) *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;*
- f) *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*
- g) *limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

6.5.3 The NPPF considers the impact of new development on existing businesses and community facilities stating:

“200. 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.”

6.5.4 There were no significant noise sources associated with the existing commercial units located to the west of the proposed residential development. Taking into consideration paragraph 200 of the NPPF and the ‘agent of change’, the businesses would be able to continue to operate without unreasonable restrictions placed on them as a result of the development.

7.0 Conclusions

- 7.1 A noise survey has been undertaken to establish daytime and night-time noise levels at the Proposed Development. Monitoring of environmental noise levels was carried between Monday 6th and Wednesday 8th October 2025.
- 7.2 The acoustic environment at the Site is dominated by traffic using the local road network. The initial noise risk assessment has shown that the Site is considered 'medium to high risk' according to ProPG:2017. The risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS.
- 7.3 Internal Noise Level Guidelines according to British Standard 8233:2014 can be met with the implementation of the façade insulation scheme detailed in Section 6.0 of the report.
- 7.4 Noise criterion for external living areas (rear gardens) according to British Standard 8233:2014 can be met with the implementation of acoustic fencing detailed in Section 6.0 of the report.
- 7.6 With the recommendations fully implemented, it is considered that an appropriate and reasonable level of protection against noise for future occupants of the dwellings can be achieved for the Proposed Development and planning permission can be granted with suitably worded planning conditions.

Appendices

Appendix A

A.0 NOISE PERCEPTION AND TERMINOLOGY

A.1 Terminology

- A.1.1 Between the quietest audible sound and the loudest tolerable sound there is a million to one ratio in sound pressure (measured in pascals, Pa). Because of this wide range a noise level scale based on logarithms is used in noise measurement called the decibel (dB) scale. Audibility of sound covers a range of approximately 0 to 140 dB.
- A.1.2 The human ear system does not respond uniformly to sound across the detectable frequency range and consequently instrumentation used to measure noise is weighted to represent the performance of the ear. This is known as the 'A weighting' and annotated as dB(A).
- A.1.3 The following lists the sound pressure level in dB(A) for common situations.

Table A.1: Noise Levels for Common Situations

Typical Noise Level dB(A)	Example
0	Threshold of hearing
30	Rural area at night, still air
40	Public library Refrigerator humming at 2m
50	Quiet office, no machinery Boiling kettle at 0.5m
60	Normal conversation
70	Telephone ringing at 2m Vacuum cleaner at 3m
80	General factory noise level Heavy goods vehicle from pavement
90	Powered lawnmower, operator's ear
100	Pneumatic drill at 5m
120	Discotheque - 1m in front of loudspeaker
140	Threshold of pain

- A.1.4 The noise level at a measurement point is rarely steady, even in rural areas, and varies over a range dependent upon the effects of local noise sources. Close to a busy motorway, the noise level may vary over a range of 5 dB(A), whereas in a suburban area this may increase up to 40 dB(A) and more due to the multitude of noise sources in such areas (cars, dogs, aircraft etc.) and their variable operation. Furthermore, the range of night-time noise levels will often be smaller and the levels significantly reduced compared to daytime levels. When considering environmental noise, it is necessary to

consider how to quantify the existing noise (the ambient noise) to account for these second to second variations.

- A.1.5 A parameter that is widely accepted as reflecting human perception of the ambient noise is the background noise level, L_{A90} . This is the noise level exceeded for 90% of the measurement period and generally reflects the noise level in the lulls between individual noise events. Over a 1-hour period the L_{A90} will be the noise level exceeded for 54 minutes.
- A.1.6 The equivalent continuous A-weighted sound pressure level, L_{Aeq} , is the single number that represents the total sound energy measured over that period. The L_{Aeq} is the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period. It is commonly used to express the energy level from individual sources that vary in level over their operational cycle.
- A.1.7 The $L_{Amax,fast}$ measurement parameter is the maximum instantaneous sound pressure level attained during the measurement period (30 seconds, 15 minutes etc.), measured on the 'fast' response setting of the sound level meter. It is generally used when assessing likelihood of night-time sleep disturbance.
- A.1.8 The $L_{Amax,slow}$ measurement parameter is again the maximum instantaneous sound pressure level attained during the measurement period but with the sound level meter on the 'slow' response setting. PPG24 states that where individual noise events regularly exceed 82 dB L_{Amax} (S time weighting) several times in any hour during the night time period then the site should be treated as being in Noise Exposure Category C (described in detail later).
- A.1.9 The R_w is a single number rating used to describe the sound insulation of building elements. Traditional masonry walls will achieve no less than 48 dB R_w , single glazed windows approximately 25 dB R_w . The figure is mostly used when calculating noise transmission through building elements.
- A.1.10 The apparent sound reduction index (R') is a field measurement which attempts to measure the sound reduction index of a material on a real completed construction (e.g. a wall between two offices, houses or cinema auditoria). It is unable to isolate or allow for the result of alternate sound transmission routes and therefore will generally produce a lower result than the laboratory measured value.
- A.1.11 Human subjects, under laboratory conditions, are generally capable of noticing changes in steady levels of 1 dB(A). However, in the general environment changes of around 3 dB(A) can be detected. It is generally accepted that a change of 10 dB(A) in an overall, steady noise level is perceived to the human ear as a doubling (or halving) of loudness. (These findings do not necessarily apply to transient or non-steady noise sources such as changes in noise due to changes in road traffic flow, or intermittent noise sources).

A.2 Perception - Frequency

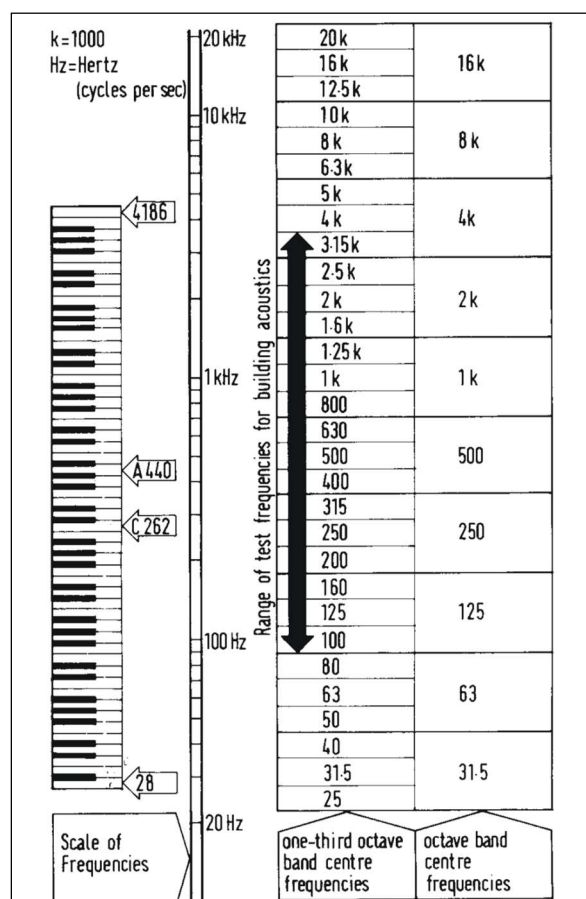
- A.2.1 Frequency is the rate at which the air particles vibrate. The more rapid the vibrations, the higher the frequency and perceived pitch. Frequency is measured in Hertz (Hz).
- A.2.2 A young person with average hearing can generally detect sounds in the range 20 Hz to 20,000 Hz (20 kHz). Figure 3.1 below illustrates the range of frequencies, for example, the lowest note on a full scale piano, 'A', has a fundamental at 28 Hz, and the highest,

'G', a fundamental at 4186 Hz (there will be higher order harmonics). Human speech is predominantly in the range 250 Hz - 3000 Hz.

A.2.3 The musical term 'octave' is the interval between the first and eighth note in a scale and represents a doubling of frequency. A series of octave and one-third octave bands have been derived, as shown in the Figure below, and these are commonly used in noise measurements where it is necessary to describe not only the level of the source noise but also the frequency content. The frequency content of a noise source can be useful for identifying acoustic features such as a whine, hiss or screech.

A.2.4 In most instances it is necessary only to specify and use the overall A-weighted noise values, for example when assessing noise from fixed plant (pumps, motors, refrigeration plant etc.), road traffic and general industrial sources. However, in certain circumstances it is necessary to consider the contribution to the overall A-weighted noise level in individual octave frequency bands, such as when assessing architectural acoustics or noise from amplified music events.

Figure A.1: 1/1 Octave and 1/3 Octave Frequency Bands



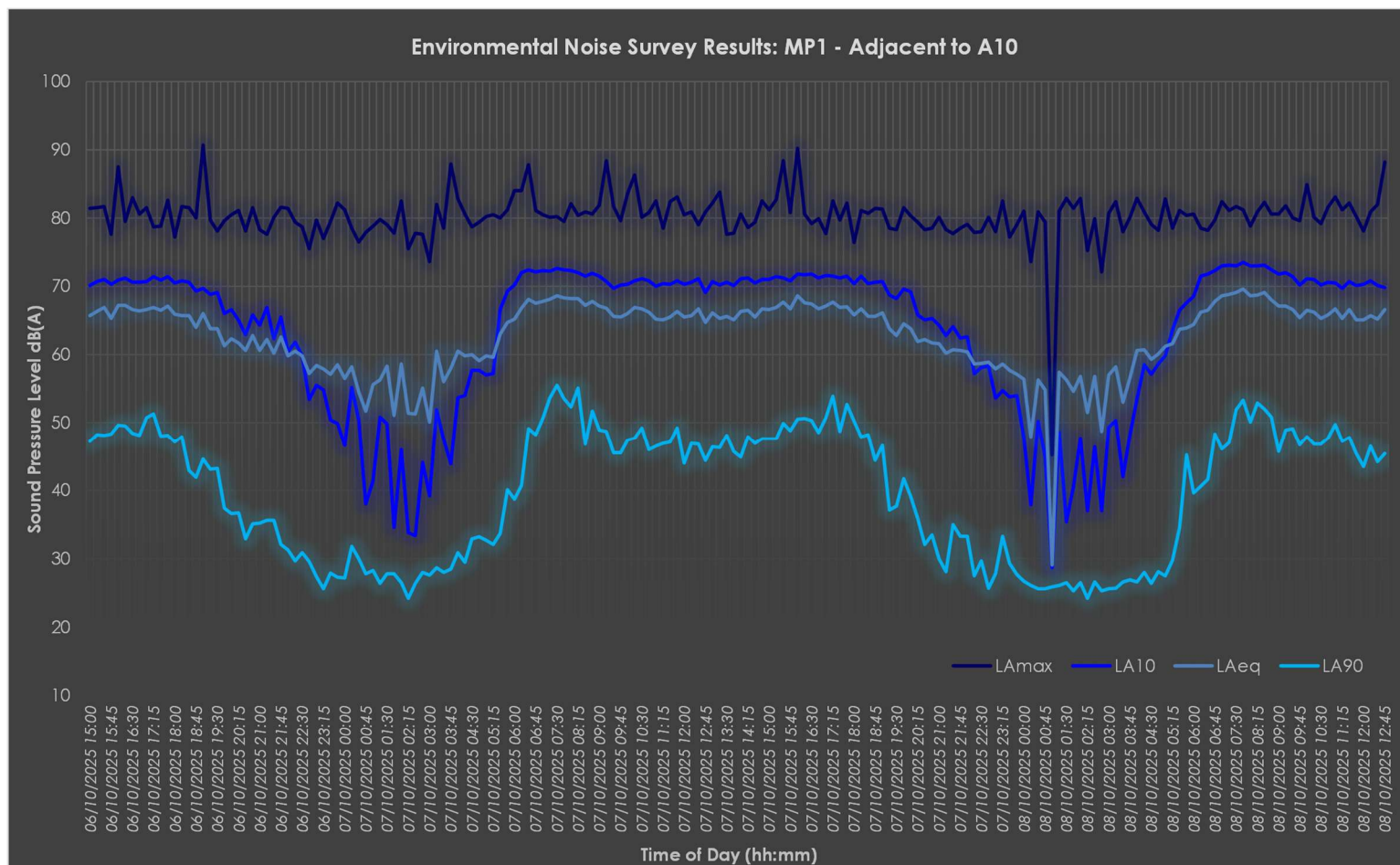
Appendix B

Site Plan Indicating Noise Monitoring Locations



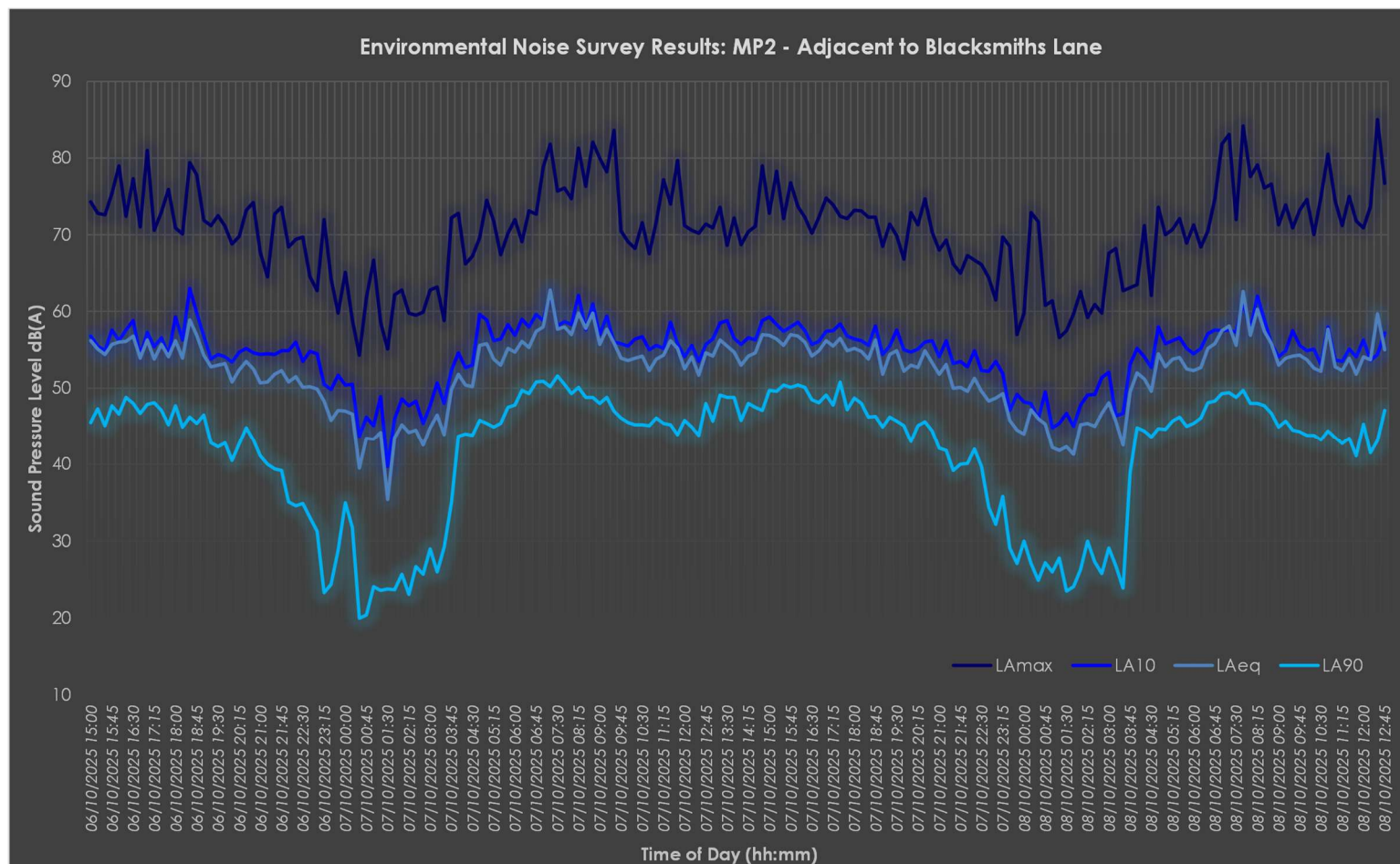
Appendix C.1

Environmental Noise Survey Results Monitoring Position 1: Adjacent to London Road (A10)



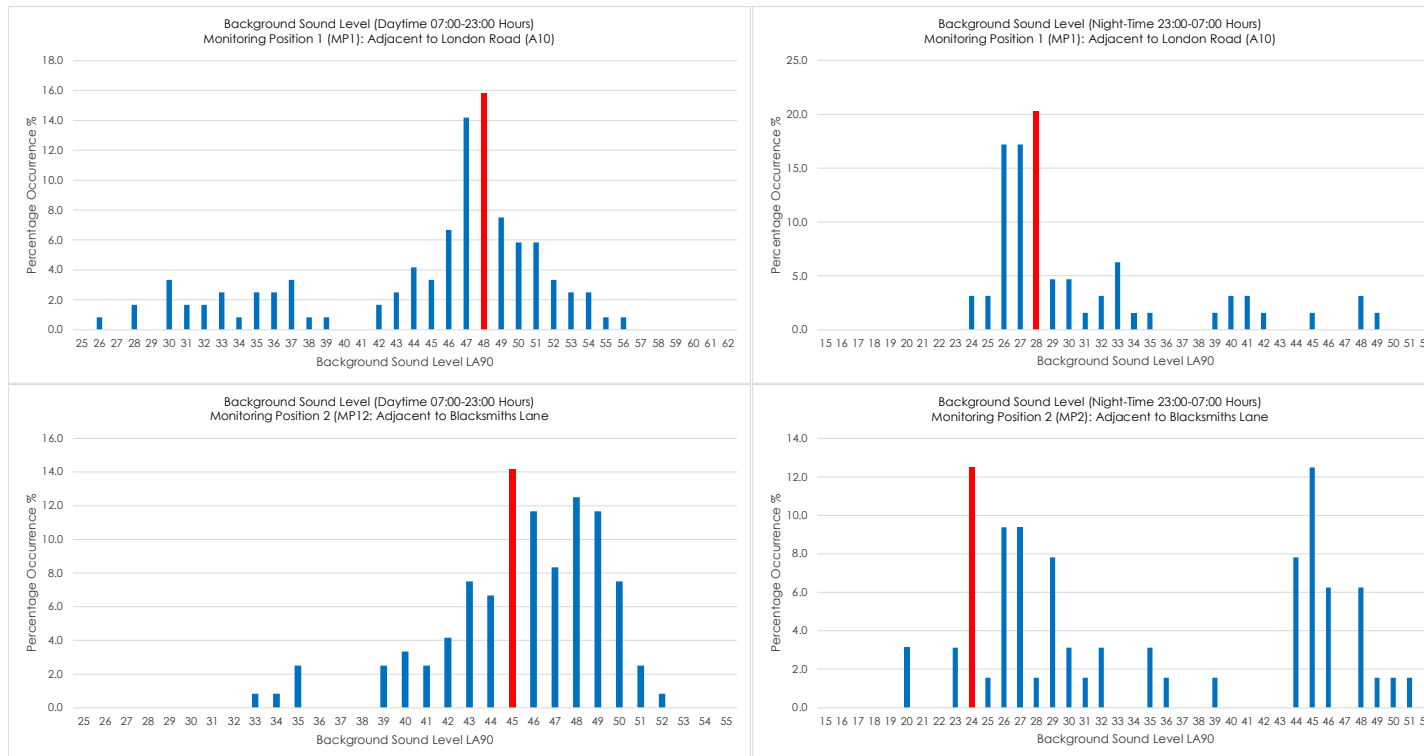
Appendix C.2

Environmental Noise Survey Results Monitoring Position 2: Adjacent to Blacksmiths Lane



Appendix C.3

Environmental Noise Survey Results Analysis of Background Sound Levels



Appendix D

Example Façade Insulation Scheme (see Section 6.0 ADS for full requirements) – All calculations are based on standard room volumes and surface areas from BS8233: 2014

Bedrooms facing or partly facing A10 (Plots 1-4)

Glazing = 6mm glass-16mm cavity-6.8mm Optiphon glass 41 dB R_w 35 dB R_w+C_{tr}
Ventilation = MVHR (plant noise to not exceed NR25 daytime and NR15 night-time)

Living Rooms and Bedrooms NOT facing or partly facing A10 (Plots 1-4)

Glazing = 6mm glass-16mm cavity-6mm glass 33 dB R_w 28 dB R_w+C_{tr}
Ventilation = MVHR (plant noise to not exceed NR25 daytime and NR15 night-time)

Bedroom 2, Plots 5 & 6 – Bedrooms 1 & 2, Plot 7

Glazing = 6mm glass-16mm cavity-6mm glass 33 dB R_w 28 dB R_w+C_{tr}
Ventilation = Greenwood EAQ42W Trickle Vent 42 dB $D_{n,ew}$

All Other Habitable Rooms

Glazing = 6mm glass-16mm cavity-6mm glass 33 dB R_w 28 dB R_w+C_{tr}
Ventilation = Tifton SFX V25 Vent + SF418 Canopy Trickle Vent 35 dB $D_{n,ew}$

Sample Specification for Acoustic Fence (1.8m)

The fence should comprise close fitting overlapping boards, such that the whole is impervious with no gaps or cracks between the boards. The design should ensure that gaps and cracks do not occur as the fence weathers. The fence should be sealed to the ground at its base.

The surface weight of the fence should be at least 10 Kg/m². The effects of wind loading must be taken into account in the design of the fence and its supports. The requirements for overall durability and wind loading are normally more demanding than the surface weight requirement for noise control.

The overall effectiveness of a barrier for noise control is normally determined by the noise diffracted over the top of the barrier, or around the ends, rather than by the amount of noise passing through it.





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