Noise Impact Assessment

Blackthorn Farm, Culverstone Green, Gravesham

Esquire Developments Ltd.

Longfield, Kent

Prepared by:

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Basis of Report

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1.0 Introduction

SLR Consulting Ltd (SLR) has been commissioned by Esquire Developments Ltd to undertake a noise impact assessment to support an "*outline application for up to 100 dwellings with all matters reserved except for access from South Street*" (the 'Proposed Development') at Blackthorn Farm, Culverstone Green, Gravesham (the 'Site').

The Site is located at the approximate National Grid Reference (NGR): x563760, y163420 within Gravesham Borough Council's (GBC – the 'Council') administrative area, and is bounded by:

- A collection of residential dwellings and commercial properties to the north, with Heron Hill Lane and agricultural land beyond;
- Round Wood Ancient Woodland (AW) and Wilson's Way to the east with residential dwellings beyond;
- A mixture of residential dwellings and woodland to the south; and
- The A227 South Street to the west, with residential dwellings beyond.

Vehicular access to the Site will be via a new entrance off the A227 South Street to the west.

Whilst reasonable effort has been made to ensure that this report is easy to understand, it is technical in nature. To assist the reader, a glossary of terminology has been included in **Appendix A**.

A statement of the competence of the engineers associated with this assessment constituting an SQA (Suitability Qualified Acoustician) is enclosed in **Section 13.0.**

2.0 Site Description

2.1 Proposed Development

Figure A below details the Proposed Development Site location and surrounding area context.

Figure A: Parameters Plan

Figure B: Indicative Dwelling Massing Plan

3.0 Planning and Noise Guidance

3.1 Noise Policy Statement for England (NPSE)

Inter alia, the NPSE *"seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise".* The aims and this statement apply to all forms of noise including environmental noise, neighbour noise and neighbourhood noise. These noise types are qualified from the NPSE as follows:

- "Environmental noise" includes noise from transportation sources.
- "Neighbour noise" includes noise from inside and outside people's homes; and
- "Neighbourhood noise" which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street.

The Statement sets out the long-term vision of the Government's noise policy, which is to *"promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development."*

It is recognised that the statement expresses the long-term desired policy outcome, whereby using the words of "promote" and "good" recognises that it is not possible to have a single objective noise-based measure that is either mandatory or applicable to all sources of noise in all situations.

The concept of the "effective management of noise" applies to all types of noise and that the solution could be more than simply minimising the noise.

The NPSE provides definitions of health and quality of life as follows:

> *"2.12 The World Health Organisation defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, and recognises the enjoyment of the highest attainable standard of health as one of the fundamental rights of every human being.*
>
> *2.13 It can be argued that quality of life contributes to our standard of health. However, in the NPSE it has been decided to make a distinction between "quality of life" which is a subjective measure that refers to people's emotional, social and physical wellbeing and "health" which refers to physical and mental wellbeing.*
>
> *2.14 It is recognised that noise exposure can cause annoyance and sleep disturbance both of which impact on quality of life. It is also agreed by many experts that annoyance and sleep disturbance can give rise to adverse health effects. The distinction that has been made between 'quality of life' effects and 'health' effects recognises that there is emerging evidence that long term exposure to some types of transport noise can additionally cause an increased risk of direct health effects. The Government intends to keep research on the health effects of long-term exposure to noise under review in accordance with the principles of the NPSE."*

The policy promotes the effective management and control of noise, within the context of Government policy on sustainable development and includes three aims to:

- 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 improvements of health and quality of life.

This Statement adopts established concepts from toxicology that are currently being applied to noise impacts. This concept details effect levels, at which an exposure may be classified into a specific category. The classification categories as detailed within the NPSE are as follows:

- No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;
- Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

The second aim of the NPSE to *"mitigate and minimise adverse impacts on health and quality of life"* refers to the situation where noise impact lies somewhere between the LOAEL and SOAEL. This requires that all reasonable steps are taken to mitigate adverse effects on health and quality of life while accounting for the guiding principles of sustainable development. The NPSE states *"this does not mean that such adverse effects cannot occur".*

In defining the upper limit of SOAEL the NPSE states that *"it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all source of noise in all situations. Consequently, the SOAEL is likely to be different for difference noise sources, for different receptor and at different times…"*. Consequently, values of SOAEL will differ between sources and situations.

3.2 National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) was introduced by The Department for Communities and Local Government in March 2012, with the latest revision dated December 2024 (as amended February 2025).

The NPPF defines the Government's planning policies for England and sets out the framework, within which local authorities must prepare their local and neighbourhood plans, reflecting the needs and priorities of their communities. The Government's stated purpose in producing the NPPF was to streamline policy, so the planning process is less restrictive, to give a more easily understood framework for delivering sustainable development.

Under the heading of Section 15 conserving and enhancing the natural environment, the NPPF states the requirement to prevent unacceptable environmental impacts including noise:

> *"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…"*

Paragraph 198 of the NPPF further provides commentary on noise as follows:

> *"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*[72]
>
> *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…"*
>
> *Foot Note 72 - See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010).*

The NPPF acknowledges that there is a host of existing sources of national and international guidance which can be used, in conjunction with the Framework, to inform the production of Local Plans and decision making.

3.2.1 Agent of Change Principle

The Agent of Change principle has been defined in recent revisions of the NPPF to explain that new development should not result in unreasonable restrictions being placed on existing and established businesses. The onus for mitigation for any new development has been required to lie with the developer, rather than the business.

Paragraph 200 of the NPPF has been noted to state:

> *"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."*

This principle has been deemed necessary to follow for the proposed residential development near to existing commercial sources. The guidance has provided that residential development should be suitably mitigated against commercial uses, to support the coexistence of noise-sensitive and noise-generating uses.

3.3 Planning Practice Guidance – Noise (PPGN)

PPGN provides guidance on how planning can manage potential noise impacts in new development, with interpretation and implementation of planning policy contained in the NPPF and NPSE. This was introduced in 2014 with the most recent version issued in July 2019.

The PPGN noise exposure hierarchy table introduces a new threshold of the NOAEL no observed adverse effect level, being between the NOEL and LOAEL and where the noise has no adverse effect where exposure to it does not cause any change in behaviour, attitude or other physiological response.

The PPGN clearly established whether noise is likely to be a concern, following policy statements and requirements of the NPSE and NPPF with additional categorisation and guidance as follows:

> *"At the lowest extreme, when noise is not perceived to be present, there is by definition no effect. As the noise exposure increases, it will cross the 'no observed effect' level. However, the noise has no adverse effect so long as the exposure does not cause any change in behaviour, attitude or other physiological responses of those affected by it. The noise may slightly affect the acoustic character of an area but not to the extent there is a change in quality of life. If the noise exposure is at this level no specific measures are required to manage the acoustic environment.*
>
> *As the exposure increases further, it crosses the 'lowest observed adverse effect' level boundary above which the noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard. The noise therefore starts to have an adverse effect and consideration needs to be given to mitigating and minimising those effects (taking account of the economic and social benefits being derived from the activity causing the noise).*
>
> *Increasing noise exposure will at some point cause the 'significant observed adverse effect' level boundary to be crossed. Above this level the noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during*

periods when the noise is present. If the exposure is predicted to be above this level the planning process should be used to avoid this effect occurring, for example through the choice of sites at the plan-making stage, or by use of appropriate mitigation such as by altering the design and layout. While such decisions must be made taking account of the economic and social benefit of the activity causing or affected by the noise, it is undesirable for such exposure to be caused.

At the highest extreme, noise exposure would cause extensive and sustained adverse changes in behaviour and / or health without an ability to mitigate the effect of the noise. The impacts on health and quality of life are such that regardless of the benefits of the activity causing the noise, this situation should be avoided."

It is qualified further to the above statements that the word "level" does not necessarily refer to a single value of noise exposure and that several factors may need to be considered to determine what noise would amount to an adverse or significant adverse effect. Specifically stating:

"Although the word 'level' is used here, this does not mean that the effects can only be defined in terms of a single value of noise exposure. In some circumstances adverse effects are defined in terms of a combination of more than one factor such as noise exposure, the number of occurrences of the noise in a given time period, the duration of the noise and the time of day the noise occurs."

PPGN also provides additional guidance in what is required from the agent of change following circumstances described by Paragraph 187 of the NPPF. It states that the agent of change must "define clearly the mitigation being proposed to address any potential significant adverse effects that are identified".

The guidance also provides there are four broad types of mitigation including:

- *"engineering: reducing the noise generated at source and/or containing the noise generated;*
- *layout: where possible, optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening by natural or purpose built barriers, or other buildings;*
- *using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise levels differentiating as appropriate between different times of day, such as evenings and late at night, and;*
- *mitigating the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building."*

Use of toxicology thresholds of NOEL, LOAEL and SOAEL for the assessment of noise impacts is reinforced within PPGN, which includes a noise exposure hierarchy table to define human perception at these effect levels, as titled *"when noise could be a concern"* and shown below in Table A.

Table A: Planning Practice Guidance Noise Exposure Hierarchy Table

Response	Example of Outcomes	Increasing Effect Level	Action
NOEL – No observed effect level			
Not present	No effect	NOEL	No specific measures required
No observed adverse effect level			
Present and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not	No Observed Adverse Effect	No specific measures required

	such that there is a perceived change in the quality of life.		
LOAEL – Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for sleep disturbance. Affects acoustic character of the area and creates a perceived change in quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
SOAEL – Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

3.4 ProPG Planning and Noise (2017)

ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise, New Residential Development was developed by a working group consisting of representatives from the Association of Noise Consultants (ANC), Institute of Acoustics (IOA), Chartered Institute of Environmental Health (CIEH) and practitioners from a planning and local authority background.

This guidance was made effective in May 2017 to provide a recommended approach to the management of noise within the planning system in England. It has drawn upon legislation, guidance and standards available at the time of publication to reflect the Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF) and Planning Practice Guidance (PPG-Noise) and other authoritative sources of guidance.

ProPG has been noted to advocate two sequential stages covering an 'initial noise risk assessment' at Stage 1 then a 'full assessment' at Stage 2 considering four key elements.

- Element 1 – Good acoustic design process.
- Element 2 – Internal noise level guidelines.
- Element 3 – External amenity area noise assessment.
- Element 4 – Assessment of other relevant issues.

ProPG has provided a summary of internal noise level guidelines as part of Stage 2 assessment requirements. These guidelines values have been derived from British Standard BS 8233:2014 *Guidance on Sound Insulation and Noise Reduction for Buildings* (BS 8233) and *The World Health Organisation Guidelines for Community Noise* (1999).

Table B: ProPG Internal Ambient Noise Levels, dB

Activity	Location	07:00 to 23:00 dB $L_{Aeq,16h}$	23:00 to 07:00 dB $L_{Aeq,8h}$
Resting	Living room	35	-
Dining	Dining room/area	40	-
Sleeping (daytime resting)	Bedroom	35	30 45 dB $L_{Amax(F)}$*
*Not normally exceeded more than 10 times per night.			

3.4.1 Application for Commercial Sources

The scope of ProPG considers new residential development that will be predominantly exposed to airborne noise from transportation sources. In cases where the Site is exposed to noise of an industrial and/or commercial nature, this shall be considered at Stage 1 of the ProPG approach.

ProPG guidance has advocated the methodology of BS 4142[1] in establishing the impact of industrial and/or commercial sound. If rated as lower than adverse subject to context following BS 4142, its contribution may be included in the degree of risk established for the Site. If considered to be dominant, such as being rated at least adverse subject to context following BS 4142, then the ProPG risk assessment should not be applied to the industrial or commercial noise component. In low-risk cases a subjective judgement of dominance has been advocated as sufficient, based on the audibility of the industrial and/or commercial sound.

[1] British Standard BS 4142:2014 +A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound.

The assessment method of ProPG has been applied to the residential development to understand the risks and design requirements to mitigate the proposal from environmental noise sources. Where commercial impacts have been viewed satisfied by the design of the scheme and remain less than adverse including context, then the ProPG Stage 1 risk assessment allows that any commercial impacts may be included within its assessment.

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

3.4.2 Application for Overheating Ventilation

ProPG Stage 2 Element 1 considers internal noise levels guidelines where those criteria of Table B would occur under building ventilation conditions. There is a further need to address if the overheating ventilation strategy impacts on indoor acoustic conditions or if a more-informed strategy is required in the mitigation of overheating.

The AVO Guide[2] was published for application by practitioners when following Stage 2 Element 1 of good acoustic design within ProPG. This extended guidance document has aimed to assist designers to adopt an integrated approach to the acoustic design within the context of the ventilation and thermal comfort requirements.

Overheating has since been regulated by Requirement O1 of the Building Regulations[3] whereby upper noise guidance limits have been advocated at night in an overheating ventilation condition, generally 10 dB higher than those within Table B. Appropriate considerations to achieve these levels has been further advised by industry guidance[4].".

3.5 Local Planning Policy

3.5.1 Gravesend Local Plan Core Strategy (Sept 2014)

3.5.1.1 Policy CS19: Development and Design Principles

"5.15.14 ……New development will be located, designed and constructed to:….avoid adverse environmental impacts from pollution, including noise."

[2] ANC/IOA Acoustic Ventilation and Overheating Residential Design Guide, Version 1.1. Association of Noise Consultants & Institute of Acoustics, January 2020.

[3] The Building Regulations 2010 Requirement O1: Overheating mitigation, 2021 Edition. As applicable to a building notice or full planning application submitted after 15th June 2022.

[4] ANC/IOA Approved Document O Noise Guide, Version 1.1. Association of Noise Consultants & Institute of Acoustics, November 2024.

4.0 Environmental Sound Survey

To establish the prevailing sound climate at the Site, a baseline survey was undertaken over a weekday and weekend period between Friday 16th and Tuesday 20th May 2025.

The period of surveying incorporated weather conditions that were conducive for sound surveying works.

Temperatures ranged from 10 to 20 °C, average wind speeds remained below 5 m/s and there was an absence of any significant rain.

4.1 Equipment and Measurements

Sound pressure level and vibration measurements were carried out using the following equipment listed in Table C, conforming to Class 1 acoustic accuracy for sound level meters and matched calibrators.

The sound level meters were calibrated before the measurements using the handheld acoustic calibrator and the calibration was checked upon completion of the survey. No significant drift was observed with calibration offsets of ≤ 0.4 dB. The calibration chain of equipment has been maintained to traceable national standards, no greater than one year for sound calibrators and two years for sound level meters and seismograph.

Table C: Sound and Vibration Monitoring Equipment

Location	Manufacturer	Type	Description	Serial Number	Certificate Number	Calibration Date
NMP1	CIRRUS	CR:515	Sound Calibrator	95405	CE-REP-10834	9/08/2024
	01dB	Fusion	Sound Level Meter	14939	TR-REP-10842	29/08/2024
	01dB	PRE22	Microphone Pre-Amplifier	2202098		
	G.R.A.S	40CD	½" Condenser Microphone	504890		
NMP2	CIRRUS	CR:515	Sound Calibrator	95405	CE-REP-10834	9/08/2024
	01dB	Fusion	Sound Level Meter	14940	TR-REP-10692	22/01/2024
	01dB	PRE22	Microphone Pre-Amplifier	2202100		
	G.R.A.S	40CD	½" Condenser Microphone	136978		
NMP3	CIRRUS	CR:515	Sound Calibrator	95405	CE-REP-10834	09/08/2024
	01dB	Fusion	Sound Level Meter	11893	TR-REP-10835	12/08/2024
	01dB	PRE22	Microphone Pre-Amplifier	1707012		
	GRAS	40CD	½" Condenser Microphone	332006		

Sound level measurements at Locations NMP 1-3 were viewed to be a directly representative of proposed key site boundaries and key sound sources incident on the site from transport and commercial industrial sources.

Measurements were recorded in free field conditions, as measured in-situ 1.5 m above local ground level.

The monitoring protocol consisted of substantially unattended readings over the survey period, with nominal 1-hour attendances at the start and end of the monitoring periods, covering nominally 5 days.

The following sound level indices have been reported at 15-minute intervals in decibels (dB):

- $L_{Aeq,T}$ – The A-weighted equivalent continuous noise level over the measurement period.
- $L_{A90,T}$ – The A-weighted noise level exceeded for 90% of the mea/surement period.
- $L_{A10,T}$ – The A-weighted noise level exceeded for 10% of the measurement period.
- $L_{Amax(F)}$ – The maximum A-weighted noise level during the measurement period.

Full survey results describing unattended monitoring periods have been provided for the above-listed metrics within **Appendix B**.

Figure B: Monitoring Locations and Site Context

4.2 Sound Climate

The sound climate is controlled toward the site boundaries by road traffic to the western boundary from the A227 as would be expected in the context.

Towards the site interior the sound climate is less significantly controlled by anthropomorphic sound sources with a greater tendency to ecological biophonic sound sources.

Towards the north there is incident noise from commercial and industrial enterprises:

- Hogarth Tyres

And to a lesser extent:

- Paynes Cars.

4.3 Baseline Noise Survey Overview

The single figure free field noise indices recorded have been presented in graphical format within **Appendix B**. The dataset is large, and therefore relevant summary results of the survey have been summarised in Tables E to Table J for the key survey periods.

Table D: Noise Survey Summary-Daytime NMP1

Daytime (07:00 – 23:00) T = 16-hours	**Log Average dB $L_{Aeq,T}$**	**10th Highest dB $L_{Amax(F)}$**	**Median dB $L_{A90,T}$**	**Median dB $L_{A10,T}$**
Friday 16th May; 11:30 - 23:00	55	78	45	56
Saturday 17th May; 07:00 – 23:00	54	79	43	56
Sunday 18th May; 07:00 - 23:00	55	80	41	56
Monday 19th May; 07:00 - 23:00	54	74	44	56
Tuesday 20th May; 07:00 - 11:00	55	69	46	57

Table E: Noise Survey Summary-Night-time NMP1

Night-time (23:00 – 07:00) T = 8-hours	**Log Average dB $L_{Aeq,T}$**	**10th Highest dB $L_{Amax(F)}$***	**Median dB $L_{A90,T}$**	**Median dB $L_{A10,T}$**
Friday 16th May / Saturday 17th May; 23:00 – 07:00	46	63	33	48
Saturday 17th May / Sunday 18th May; 23:00 – 07:00	46	62	29	48
Sunday 18th May / Monday 19th May; 23:00 – 07:00	49	61	24	46
Monday 19th May / Tuesday 20th May; 23:00 – 07:00	49	64	26	46

*Excludes the dawn chorus containing bird song LAFMax after 4.30am common for the time of year. See below.

Table F: Noise Survey Summary-Daytime NMP2

Daytime (07:00 – 23:00) T = 16-hours	Log Average dB $L_{Aeq,T}$	10th Highest $L_{Amax(F)}$	Median dB $L_{A90,T}$	Median dB $L_{A10,T}$
Friday 16th May; 12:30 - 23:00	48	66	40	49
Saturday 17th May; 07:00 - 23:00	47	69	36	49
Sunday 18th May; 07:00 – 23:00	48	69	36	52
Monday 19th May; 07:00 – 23:00	50	72	37	52
Tuesday 20th May; 07:00 - 11:15	52	72	38	53

Table G: Noise Survey Summary-Night-time NMP2

Night-time (23:00 – 07:00) T = 8-hours	Log Average dB $L_{Aeq,T}$	10th Highest dB $L_{Amax(F)}$	Median dB $L_{A90,T}$	Median dB $L_{A10,T}$
Friday 16th May / Saturday 17th May; 23:00 – 07:00	47	51	33	41
Saturday 17th May / Sunday 18th May; 23:00 – 07:00	47	49	31	41
Sunday 18th May / Monday 19th May; 23:00 – 07:00	48	49	34	50
Monday 19th May / Tuesday 20th May; 23:00 – 07:00	49	48	29	43

*Excludes the dawn chorus containing bird song LAFMax after 4.30am common for the time of year. See below.

Table H: Noise Survey Summary-Daytime NMP3

Source	Measurement Period	Log Average dB $L_{Aeq,T}$
Commercial and Industrial Activity (Predominantly from Hogarth Tyres)	11:30-12:45	54

Night-time maximum noise event levels have been established from the period 23:00 – 07:00, with maxima reviewed in terms of 2-minute dB $L_{Amax(F)}$ values, with the 10th highest reported per a published, statistical approach[5] .

4.4 Background And Residual Sound Level Analysis

SLR have undertaken additional analysis of data captured at NMP1 has been undertake which will be considered as representative of background and residual sound levels at the boundary of proposed dwellings closest to existing industrial commercial noise sources to the north, whilst being not significantly influenced by it directly due to the intervening distance south whilst being similarly distant to transportation (non-commercial) noise sources.

Table I: Noise Survey Summary-Daytime NMP1 Additional Analysis

Measurement Details			Residual sound level dB $L_{Aeq,T}$		Background sound level dB $L_{A90,T}$	
Day Date Range	**Period**	**Time HH:MM**	**Range**	**Typical***	**Range**	**Typical***
Fri 16/05/2025 - Tue 20/05/2025	Day	07:00 - 19:00	49 - 66	53	36 - 49	44
	Evening	19:00 - 23:00	42 - 67	52	22 - 46	41
	Night	23:00 - 07:00	21 - 55	46	20 - 45	24
**Based on modal values occurring within each stated time period*						

For the purposes of specifying a fixed plant and services limit for plant and equipment associated with new build dwellings the dataset from NMP2 is viewed as appropriate, this has been analysed below.

Table J: Noise Survey Summary-Daytime NMP2 Additional Analysis

Measurement Details			Residual sound level dB $L_{Aeq,T}$		Background sound level dB $L_{A90,T}$	
Day Date Range	**Period**	**Time HH:MM**	**Range**	**Typical***	**Range**	**Typical***
Fri 16/05/2025 - Tue 20/05/2025	Day	07:00 - 19:00	40 - 62	48	33 - 44	38
	Evening	19:00 - 23:00	33 - 53	49	21 - 41	36
	Night	23:00 - 07:00	22 - 55	51	19 - 40	36
**Based on modal values occurring within each stated time period*						

4.5 L_{AFMax} Maximum noise levels at Night

With regards to maximum noise level analysis during the night-time, SLR have excluded the dawn chorus (04:00-06:00) from nearby birds given the site location.

As such where there is a clear crescendo of maximum noise level events attributable to birdsong, this has been excluded from assessment.

The sound of birds singing in the morning during spring is a not an environmental noise concern in respect to planning of residential development and would not be considered objectionable or disturbing in context.

[5] Paxton, B. Conlan, N et al. Assessing L_{max} for residential developments: the AVO guide approach. Proceedings of the Institute of Acoustics. Volume 41, Part 1, 2019.

The primary interest of any acoustic design guidance provided would be relative to the control of traffic noise or other anthropogenic (man made) noise sources.

5.0 Agent of Change

5.1 Qualitative Review

The site lies in a predominantly suburban/rural area, commercial and industrial activity in the surround is decidedly limited to:

- Hogarth Tyres
- Payne Cars

Situated to the North of the site on Heron Hill Lane.

5.2 The “Agent of Change” principle

The 'agent of change principle' encapsulates the position that a person or business (ie the agent) introducing a new land use is responsible for managing the impact of that change.

The practical issue that has arisen on occasion is that in circumstances where residents move into an area where noise is emanating from a long-standing commercial operation, this may have resulted in the Local Planning Authority (LPA) imposing additional licensing restrictions on the established licensed and/or permitted business.

NPPF provides guidance on the implementation of an 'agent of change' principle’ to place the responsibility for noise management measures on the incoming 'agent of change' in this instance the developer for which this application is being made.

SLR noted during site review the following commercial enterprises in the surround were regularly noise generating:

- Hogarth Tyres

Most of the noise associated with this business will be related to distribution of waste tyres i.e. HGV activity, and shredding/processing activity, which has the potential for different characteristics to road traffic emanating from the west of the site.

Paynes Cars appears to be a dealership for vehicles rather than a significant commercial workshop of any significant intensity in respect to noise generation. Based on observation and visual inspection during the noise survey visit, the noise climate is expected to remain controlled in this location by the A227 to the west.

It is additionally considered unlikely that the Hogarth Types business warrants further assessment. This is undertaken below.

SLR have undertaken measurements of source noise levels emanating from this condensing unit within the site survey undertaken, from this data for the unit, a BS4142 assessment has been undertaken to the location of the nearest patron bedroom within the proposed development. This is detailed in **Section 5.3**.

5.3 BS4142:2014+2019 A Noise Impact Assessment

The impact of noise from the proposed development on the surrounding environment will depend on several factors, including (but not limited to) the time of day, frequency of occurrence and nature of sound source. Development activities will naturally pose greater noise risk where they have been permitted during noise sensitive periods of the evening and night where the likelihood of annoyance or sleep disturbance increases. Human response to noise depends on sociological factors, attitudes and perceptions which can be difficult to define and account for any individual case.

The recognised methodology for assessment has been taken from BS4142 which includes consideration of sound from fixed plant installations within its scope. The numerical assessment has been provided below for relevant periods of proposed operation, following the definition of specific sound levels.

5.3.1 Hogarth Tyres Activity - Sound Pressure Levels

Based on the results of the noise survey, and specifically the noise measurements undertaken at NMP3 details the operational noise levels for assessment as summarised below in Error! Reference source not f ound..

The specific level at source has been derived via logarithmic subtraction of the residual sound level form the measured source levels (to account for existing traffic noise) at NMP2 where no contribution from Hogarth Tyres was noted to be present.

Table K: Noise Survey Summary-Daytime NMP3

Source	Period	Log Average dB $L_{Aeq,T}$
Commercial and Industrial Activity (Assessed at Hogarth Tyres Property Boundary)	1 hour	54
Residual Sound Pressure level (From NMP2)	See NMP2 Daytime	53
Calculated Specific Level At Commercial Premises Boundary	1 hour	47

Operations have been observed to occur during the daytime (07:00-18:00) where measured and witnessed operational activity noise levels were a worst-case statement of resulting impacts based on measured data, as including shredding activity and vehicle movements.

5.4 Embedded Mitigation

No embedded airborne noise mitigation was evident at site and has been considered for the mechanical plant within this assessment on this basis.

5.5 Specific Sound Level Assessment

A calculation has been undertaken based on ISO:9613:2024 Part 2 *"Acoustics — Attenuation of sound during propagation outdoors".* to derive the predicted incident noise levels because of the condensing unit at the proposed development.

The assessment location has been measured to be similarly adjacent to Site Boundary.

Based on calculation, the predicted specific sound level at the assessment location has been determined as presented in **Table L** giving consideration for reflections and distance attenuation to the nearest potential bedroom window of the proposed development.

Table L: Specific Sound Levels

Assessment Location	Predicted Specific Sound Level dB $L_{Aeq,T}$
Rear Amenity Space to Nearest Proposed Dwelling	47

5.6 BS4142 Assessment

The assessments in **Table M** has been provided in accordance with BS4142 to provide a comparison between the rating sound levels of the proposal against the typical sound levels when the unit is not in operation.

Table M: BS4142 Assessment of Condenser Unit Upon Proposed Development

Results	Day Period	Evening Period	Commentary
	07:00-19:00	19:00-23:00	
Residual sound level, dB LAeq,T	53	52	Representative Residual and background sound levels from NMP2 in the absence of operation of the condensing unit. Background sound level derived on the basis of the lowest day and night time period of recorded LA90 5 min at the rear of the development.
Background sound level, dB LA90,T	44	41	
Reference time interval	1-hour	1 hour	
Specific sound level, dB LAeq,T	47	47	As predicted in Table L.
Acoustic feature correction, dB	+3	+3	Activity was observed to be intermittent in nature or impulsive as described in BS4142. No tonal characteristics of shredding equipment was noted. No other acoustic features warranting corrections were noted.
Rating level, dB LAr,Tr	50	50	Specific sound level plus any acoustic feature correction.
Excess of rating over background sound level	+6	+9	Typically, the greater the difference, the greater the magnitude of the impact. A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
Assessment indicates likelihood of *Depending on context	Adverse Impact		Adverse impact predicted. (See context assessment below).
Uncertainty of the assessment	Not significant		

The numerical assessments have highlighted adverse impact at the worst affected amenity spaces within the proposed development, where the rating sound levels have been predicted to lie 6 dB to 9 dB above the representative background sound levels during daytime operation.

In following of the assessment requirements of BS4142, these numerical predictions have been considered in context in **Section 5.6.1** below.

5.6.1 Context

The concept of “context” has been notably emphasised in Section 11 of BS4142 when considering numerical impacts established from applying the standard.

The Hogarths Tyres business has existed for what appears to be a substantial amount of time and is well established. However, SLR have not found direct evidence of permissions relating to the engine driven tyre shredding activity noted. This does not mean permission has not previously been granted for these activities this should be reviewed by the authority to confirm.

SLR also not adjacent dwellings directly west which suggest that habitation adjacent is possible and are not aware of direct complaint from activity related noise at existing dwellings.

Presently garden amenity spaces “back onto” the facility. The site is affected by existing road traffic noise, and the predicted source noise levels remain circa 5 dB below existing residual sound levels when synthetic acoustic correction features are omitted.

Nonetheless the predicted rating level approaches 10 dB above background sound levels, at which point complaints could be expected from new residential (if this remains unmitigated) based upon the guidance on “Agent of Change” provided in the NPPF.

5.6.2 Statement of Uncertainty

Uncertainty has been considered as a limit to the accuracy of any noise assessment, including associated steps of measurement, calculation, or prediction. Factors have been considered to include (but not limited to) the following:

- The inherent accuracy limitation of methodology in Standards and guidance.
- Variability in meteorological conditions.
- The accuracy of sound source input data of a calculation.

It has been a requirement of the assessment standard BS4142 to minimise uncertainty to a level commensurate with the intention of the assessment objective. Measures taken in this assessment to minimise uncertainty have included:

- Baseline sound levels have been measured over a reasonably long period and therefore provide a good indication of representative background and residual sound levels.
- Baseline sound level measurements undertaken in accordance with recognised Standards, using a tall environmental windshield and during acceptable weather conditions e.g. low wind speeds and precipitation.
- A direct measurement location was used to provide a representative basis for background sound levels at the nearest receiver locations.
- Field calibration checks were undertaken before and after measurements to record very low levels of equipment drift.
- The calculations have been conservative as not to under-predict the resulting impacts.

These measures have been considered to reduce uncertainty to a level considered not to have any significance to the outcome of this assessment.

5.6.3 Predicted Noise Impact and Planning

The evaluated noise impacts in this report should be considered mindful of the National Planning Policy Framework and Noise Policy Statement for England that define policy and decision-making requirements for planning and noise.

It has been provided within the assessment above that the NPSE suggests noise levels above the SOAEL should be avoided and that if noise levels fall between the LOAEL and SOAEL all reasonable steps should be taken to minimise and mitigate adverse effects, while considering guiding principles of sustainable development.

The range of noise impacts of have been deemed to fall approaching the SOAEL, and therefore warrant mitigation, ideally at source.

Commensurate measures have therefore been considered to *"mitigate and minimise adverse impacts on health and quality of life"* are detailed below within the technical design of the scheme proposed.

Once mitigated the identified source of noise impact would fall below the LOAEL (Lowest Observed Adverse Effect level).

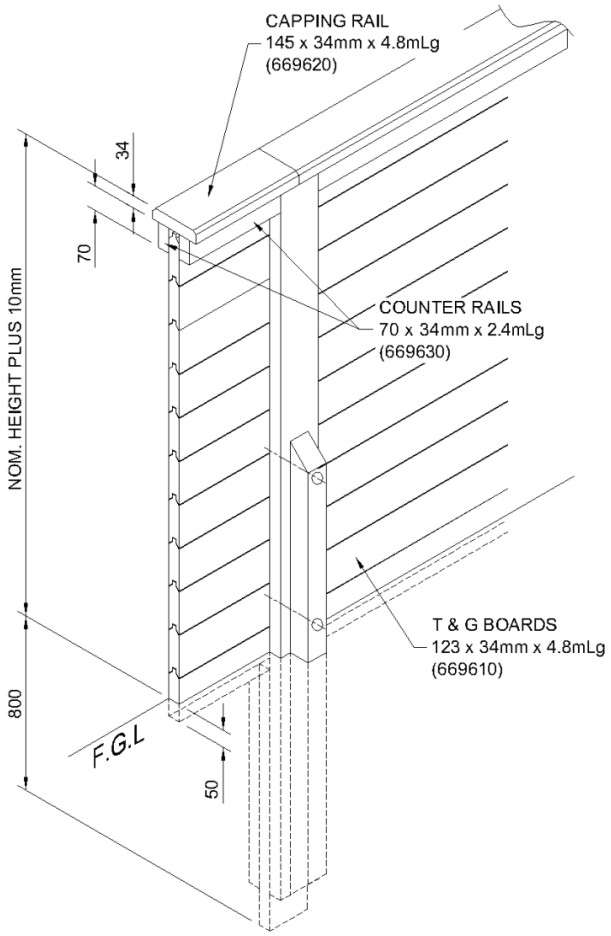
5.7 Mitigation

SLR understand Amenity Spaces for new proposed dwellings will be built up to the northern boundary with Hogarth Tyres.

On this basis physical screening such as acoustic fencing will be warranted to mitigate noise levels on the directly incident future dwellings.

Such an acoustic fence should comprise a minimum 2.5m tall close boarded fencing of 15kg/m^3 mass per area such that commercial activities at ground floor level at Hogarth Tyres are visually and acoustically screened from private amenity spaces adjacent.

Figure C: Typical Enclosure Fence Configuration for Private Amenity Spaces



5.8 Agent of Chage Summary

Based on the findings of this assessment, to protect the existing commercial operations from risk of complaint by the Agent of Change (the proposed residential development) and provide a suitable condition for future residents.

Mitigation measures as specified above should be incorporated to minimise risk of “valid complaint” by new patrons by providing good acoustic design with a view to protecting the existing business in the surround and reducing noise impacts produced to less than adverse in magnitude (less than 5dB above background sound levels).

It is anticipated the proposed acoustic mitigation measures to control road traffic noise levels (which are similar in magnitude) at new dwellings and screening afforded to external amenity spaces (discussed later in this report) will also likely be sufficient such that the agent of change (proposed dwellings) would in all likelihood not constitute a risk to the commercial operations of the adjacent businesses upon any occupation via complaint.

6.0 ProPG Assessment

The assessment method of ProPG has been applied to the development to understand the risks and design requirements to mitigate the proposal from environmental transportation noise sources.

6.1 Stage 1 – Initial Risk Assessment

The environmental survey provided in Section 4.0 of this report has been utilised to inform a baseline noise modelling exercise for the site.

6.2 Noise Model

The sound predictions for the assessment have been undertaken using a proprietary software-based noise model, CadnaA®, which implements the full range of UK calculation methods. The calculation algorithms set out in the Calculation of Road Traffic Noise 1988 (CTRN) have been used and the model assumes:

- A ground absorption factor of 0.5 (mixed ground conditions).
- Relative humidity of 70%.
- Air temperature of 10°C.
- Contour Data to include OS terrain data.
- A reflection factor of 2.

The effects of the existing noise climate impacting the proposed new scheme have been considered for this assessment.

With reference to the criteria set out in this document and the noise modelling inputs and impacts summarised, building evaluation maps have been produced for the daytime and night-time periods.

The scale has been set to be directly comparable with the negligible, low, medium and high risk of adverse effects categories set out within ProPG and has been used to provide a hierarchy of noise mitigation measures required to protect residences from road traffic noise.

The ProPG noise maps have been presented for the daytime and night-time, in Figure D and Figure E respectively. It should also be noted that ProPG does not define specific threshold boundaries for negligible, low, medium, and high noise risk. However, SLR have defined 10 dB delineations with reference to the scale provided in ProPG[6].

It should be noted that the noise maps have been modelled at 1.5 m height above ground during the daytime to represent the height of a ground floor living room window or garden, and 1.5 m above the ground during the night-time to represent the height of a ground floor apartment window should be proposed.

[6] Page 09 ProPG Stage 1 Figure 1 Initial Site Noise Risk Assessment

Table N: ProPG Noise Risk Hierarchy

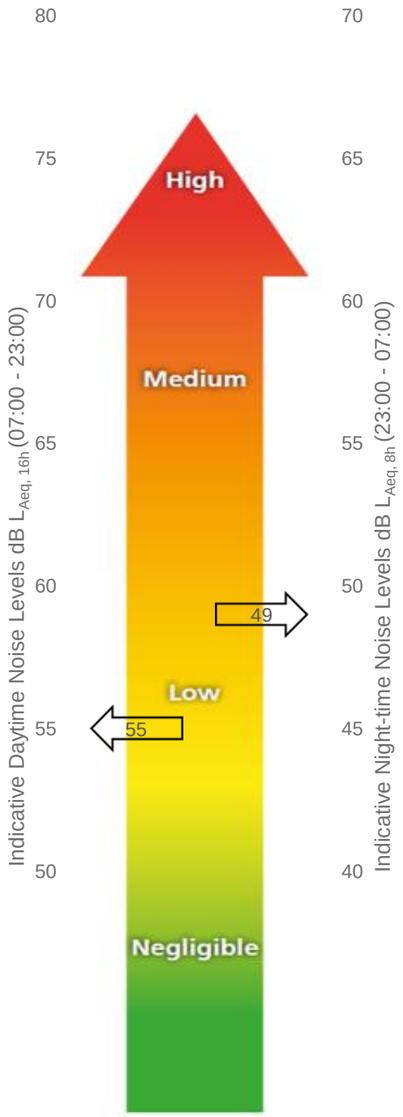
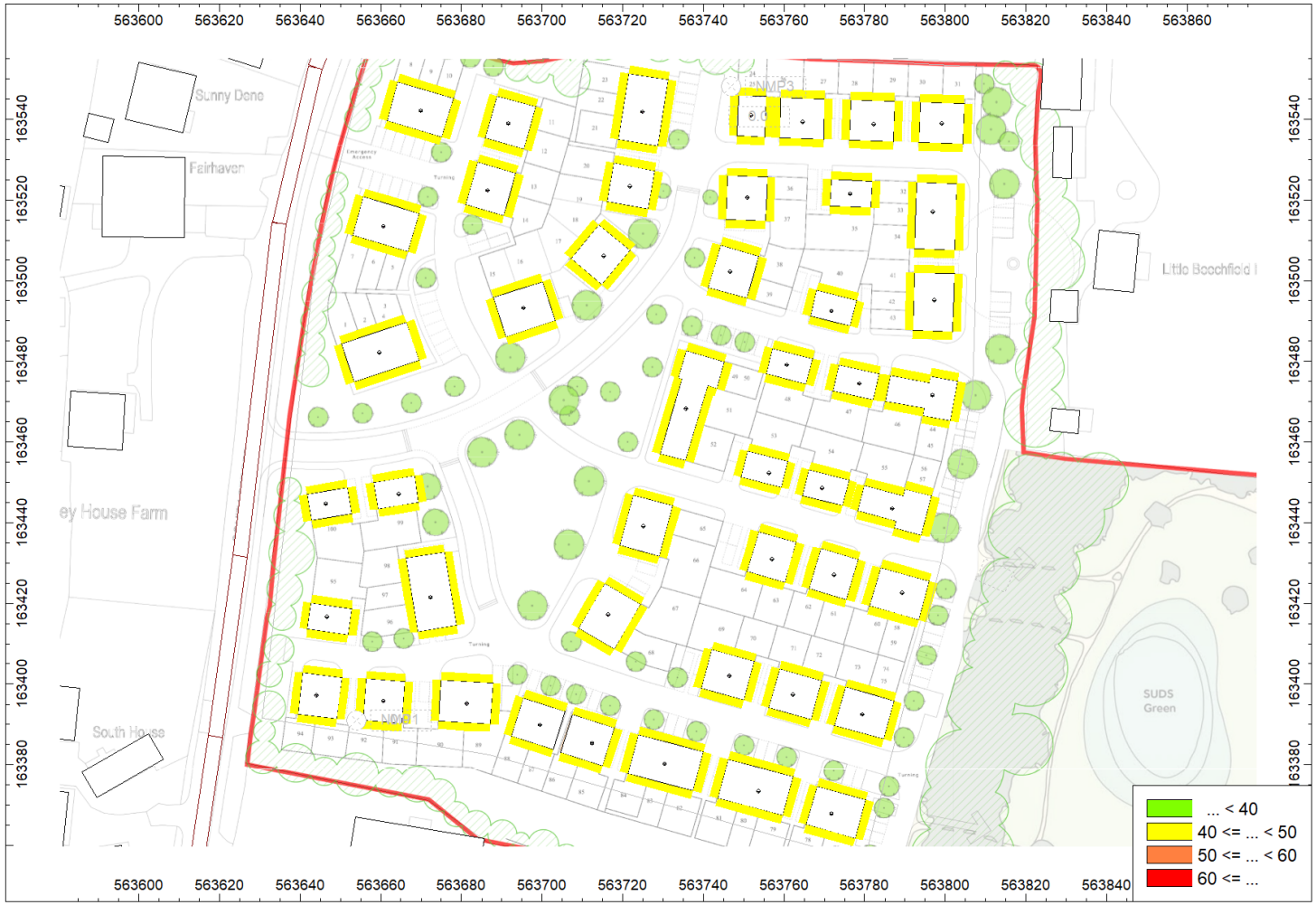
ProPG Noise Risk Assessment	Potential Effect Without Noise Mitigation	Pre-Planning Application Advice
	Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed acoustic design statement (ADS). Applicants are strongly advised to seek expert advice. 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. At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
	No adverse effect	These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds.
Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is “not dominant”. An indication that there may be more than 10 noise events at night (23:00 – 07:00) with $L_{Amax(F)}$ > 60 dB means the site should not be regarded as negligible risk.		

Figure D: Prediction of Road Noise Levels – Day $L_{Aeq,16h}$

Figure E: Prediction of Road Traffic Noise Levels – Night $L_{Aeq,8h}$



The initial site noise risk assessment has been categorised as below.

The most prevalent environment noise source across the site was noted from transportation sources, particularly road and rail traffic.

The initial Site noise risk assessment has been categorised in the worst-case for transportation noise sources only.

Where these areas of the site fall into low noise risk, ProPG States:

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

It is thus clear that noise levels range largely dependent on distance to key transportation sources.

Generally, transportation noise levels across the wider site are not a limitation on potential residential use, **provided** a supportive ADS (Acoustic Design Statement) is provided, and industrial and commercial noise levels incident at the north of the site are mitigated.

A scheme of considered acoustic design is required commensurate to the context.

It has been considered that the remainder of this document constitutes an ADS statement which has been produced by an SQA (suitably qualified acoustician) suitable for promotion of the proposed development site.

6.3 Stage 2 – Preliminary Recommendations

Transport noise modelling assumptions have been validated by measurement; the masterplan development process should include the below considerations to optimise the site master planning exercises in any assessment undertaken in accordance with ProPG Stage 2 within a formal ADS when submitted to support a planning application.

6.3.1 Good Acoustic Design Process

ProPG has stated it is imperative for acoustic design to be considered at an early stage of the development control process, to avoid unreasonable acoustic conditions and prevent those which are unacceptable.

The main requirements for Good Acoustic Design have been explained relative to transport sources incident on the site. However, some indicative measures may also be particularly relevant and useful to control of industrial and commercial noise source ingress into the site if later found to be a significant contribution to the existing noise climate.

6.3.1.1 Barriers, Bunds, Terrace Barrier Blocks

Barriers have been advised to the north of the site to mitigate commercial and industrial noise impacts.

Amenity space mitigation from transportation noise is discussed elsewhere in this report.

6.3.1.2 Standoff distances

These are viewed to be opportunities for creating substantial standoff of distance value for acoustic mitigation purposes in those areas identified as having a noise climate more influenced by commercial sources to the north.

This would be subject to input from the design team.

SUDs, other drainage features, and communal amenity space (which are less sensitive acoustically) could be afforded to those areas deemed less acoustically suitable for dwellings towards key noise sources in the vicinity i.e. toward the north of the site boundaries with commercial and industrial noise sources.

6.3.1.3 Topography

There are not any specific topographical benefits presently.

6.3.1.4 Plot Orientation

Orientation has been viewed primarily useful to afford best optimisation to sensitive rooms within houses which are generally on external elevations.

6.3.1.5 Internal layout

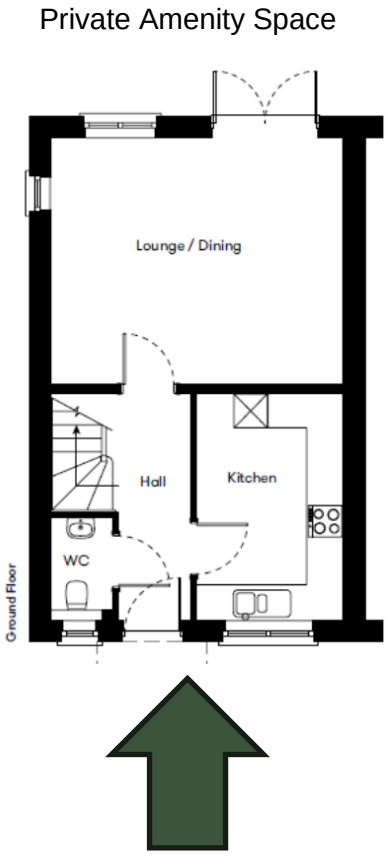
It has been acknowledged that 'good acoustic design' generally requires facing less-sensitive rooms (i.e., kitchens and bathrooms) towards the dominant incident noise sources. However, this is not always achievable.

Nonetheless in key apartments or dwelling houses adjacent or close to transport links, it is preferred that bedrooms are not positioned to be orientated on the highest noise exposed façade, and window areas along this façade should be reduced relative to other less noise exposed orientations.

Amenity spaces should also be orientated away from transportation or other noise sources

Consideration should next be given to acoustic design of building fabric, glazing and ventilation associated with apartments, as well as assessment of noise levels in any private amenity spaces associated with the development.

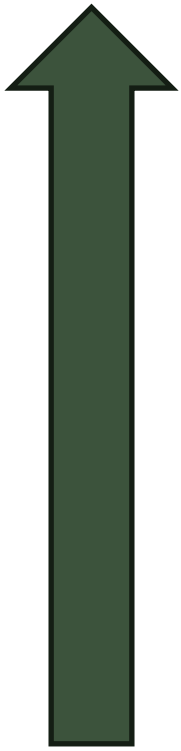
Figure F: Dwelling Internal Layout Optimization



6.3.1.6 Hierarchy of Mitigation

The table below outlines a summary hierarchy of the order of implementation for acoustic mitigation measures in the context of residential master planning.

Table O: Summary of mitigation – Implementation Hierarchy

Order of Preference	Mitigating Measure	Summary Measure
Highest  Lowest	Investigate feasibility of reducing existing noise levels and relocating existing noise sources.	Reduce at source
	Maximise spatial separation between noise source(s) and receiver(s).	Attenuate through the propagation path
	Use existing structures and land topography to screen the proposed development from existing and significant source(s) of noise.	
	Incorporate new structures (such as noise barriers) into the scheme to cause a physical interruption between the significant noise source(s) and receiver(s). This also includes the placement of less-noise sensitive buildings closer to the noise source(s) where possible in the scheme.	
	Use the proposed layout of the scheme to reduce noise propagation across the site.	Mitigate at the receiver
	Use the orientation of noise-sensitive buildings to reduce the noise exposure of noise-sensitive rooms (e.g. bedrooms and living rooms) by facing them away from the significant source(s) of noise.	
	Use the acoustic design of the building to mitigate noise to acceptable levels inside, through façade design and insulation.	

7.0 Building Evaluation

ProPG has provided a summary of internal noise level guidelines as part of Stage 2 assessment that have been replicated in Table B of this assessment. The method adopted to achieve suitable internal noise level guidelines has been based upon information contained within the recent ANC publication, The AVO Guide. This has provided an approach as to how the competing aspects of thermal and acoustic comfort can be managed and has been written to reflect the requirements of ProPG and overarching planning requirements.

Given the initial and worst-case site risk assessment, it has been considered commensurate to judge suitable façade components in terms of glazing and ventilation components, where calculations have been carried out in single figure decibel values.

This preliminary assessment assumes traditional cavity masonry façade constructions typically achieving or exceeding a sound insulation performance of 55dB R_w.

The range of whole dwelling ventilation strategies for development has been taken from The Building Regulations 2010 Approved Document F Volume 1: Dwellings Requirement F1: Means of Ventilation (2021 edition) (ADF). An outline appraisal for suitability has been provided using Table B2 of the AVO Guide.

Table P: Outline Appraisal of Different Ventilation Strategies – All dwellings and elevations

Ventilation strategy according to ADF	Typical windows and vent	Higher acoustic performance windows and vent
Intermittent extract fans	X	✓
Passive stack ventilation	X	✓
Continuous mechanical extract (CMEV)	✓	✓
Continuous mechanical supply and extract with heat recovery (MVHR)	✓	✓

It should be considered as part of good acoustic design that minimising the quantity of penetrations through a building façade should be favoured in higher noise level areas. An intermittent mechanical extract ventilation strategy has been outwardly assumed for the development in context to limited site-wide, external noise risk.

For any mechanical ventilation system, and for any MVHR system (if preferred), the ventilation routes should face away from the incident noise source as far as possible. This provision would reduce noise travelling into the habitable room via the ductwork. Where this is not possible the intake and exhaust ducts should incorporate appropriate attenuation to control intrusive noise to meet the criteria in Table B.

The following specifications in Table Q have been based on calculations to the detailed method in section G2.1 of BS 8233 (equivalent to the method in BS EN 12354-3). With reference to night time noise modelling presented in Figure E which represents the period of worst case noise exposure.

An adaptation term has been provided for all specifications following the method ISO 717-1:2020. This has included a comparison between the normalised, A-weighted sound spectrum for day and night against the adaptation curves for C_{tr}. The relevant spectrum adaptation term C_{tr} has been confirmed by visual comparison as relevant to the measured road traffic spectra, as otherwise listed suitable within Table A1 of ISO 717-1.

The general development location requirements for each glazing and ventilation acoustic requirement have been presented in Figure G.

Figure G: Glazing Location Plan

Table Q: Minimum Specifications for Windows and Ventilators

Model Devised Noise Exposure Level Category *	Daytime External Noise Level, dB $L_{Aeq,\ 16\ hour}$ (07:00-23:00)	Night-Time External Noise Level, dB $L_{Aeq\ 8\ hour}$ (23:00 - 07:00)	10th Highest Maximum Noise Level (2 min) at Night dB L_{AFmax}	Glazing And Trickle Vent Performance Requirement	Suitable Background Ventilation Modes and Performance Requirements	
					Preliminary Overheating Control Design Guidance	
					Suitable Modes and Description	Ventilator $D_{ne,w}+C_{tr}$ (If applicable)
Low	≤55 (59)*[2]	≤45	≤65	28 dB $R_w + C_{tr}$ Thermal Double Glazing	Reasonable (BS8233:2014 +5dB) internal acoustic conditions will be achieved with windows partially open for background ventilation assuming 15dB insertion loss for a partially open window. Good (BS8233:2014) internal acoustic conditions will be achieved with windows closed, and provision of acoustic trickle vents, WHV or MVHR for background ventilation. The acosutic requirements of Approved Document O can be achieved from the outset via the simplified method.	32dB $D_{n,e.w} + C_{tr}$ Nominal Acoustic Trickle vent

* This specification has relied upon no greater than 1 No. ventilators per habitable room.

*[2] Where industrial noise is present to the north.

8.0 Approved Document O (Overheating)

8.1 Residential Ventilation Additional Considerations (Overheating & Purge)

The outline proposals above are suitable to achieve internal noise levels from BS8233:2014, ProPG and WHO Guidance

However, it will occasionally be necessary to open windows to provide additional ventilation for purge (e.g. short term extraction of fumes or odours) or to cool an overheating room. There is no need to apply limits to noise ingress during purge ventilation as this is usually done for a short duration and can often be planned not to coincide with times when the occupants may wish to maintain low internal noise levels.

It may also be desirable to open windows to provide cooling during the hotter months of the year. Occupants should not have to choose between unacceptably high internal noise levels or uncomfortable internal temperatures.

8.2 ADO Site Review

For moderate overheating risk sites outside of central London and Manchester, the latest guidance regarding ADO from the IOA and ANC (Institute of Acoustics, and Association of Noise Consultants) respectively, indicates that the insertion loss for an open window in the overheating condition would be 10dB.

On this basis provided night time external ambient noise levels do not exceed 50dBA $L_{Aeq,\ 8\ hour}$ at night, and the 10th highest night time maximum noise levels do not exceed 65dB $L_{AF\ Max}$ at the dwelling curtilage then the internal ambient noise level requirement of ADO will be met.

Based on the captured survey data and noise models accounting for dwelling standoff distances to dwellings the internal noise level requirement of ADO will not be exceeded at any dwelling.

It is shown that ambient average night time noise levels do not exceed 45dBA $L_{Aeq,\ 8\ hour}$ at any building curtilage.

Furthermore, upon review of maximum noise level events at night, and accounting for standoff distances from designed into the scheme, it is calculated that the 10th highest maximum event noise levels external to dwellings will be no more than 65dB L_{AFMax}, during the night thus maximum noise levels inside dwellings will therefore be no more than 55dB L_{AFMax} with windows open when achieving an insertion loss of 10dB thus also complying with the requirements of Approved Document O for maximum night time noise level events from the outset.

9.0 External Amenity Noise Level Assessment

9.1 Amenity Overview

According to BS8233 and ProPG, private amenity spaces i.e. gardens, should have an area within them such that daytime noise levels are below the lower guideline value of ≤ 50 dB $L_{Aeq,16h}$ to provide a suitably protected, quiet and tranquil outdoor space, and not exceed an upper limit of 55dB $L_{Aeq,16h}$.

However, it is not necessarily essential for an entire garden to achieve this, nor is it often practical in environments with relatively high prevailing noise levels to do so.

As such, it is normally considered reasonable to provide mitigation measures to protect external amenity where external noise levels would otherwise exceed 50-55 dB $L_{Aeq,16h}$ on the basis that part of the garden will achieve these levels.

Figure H presents the unmitigated scenario it is evident that most private amenity spaces will achieve < 55 dB $L_{Aeq,16h}$ by the nature of the proposed layout affording significant screening into the site interior.

Figure H: Unmitigated Private Amenity Spaces

However acoustic boundary fencing has been identified as part of the Agent of Change assessment as warranted, particularly for gardens to the north and northwest facing onto the rear of Hogarth Tyres, once implemented the proposed development would then be considered to provide suitable outdoor amenity space within this development towards the lower range of ProPG guidance ≈ 50 $L_{Aeq,16h}$.

Figure I present the mitigated scenario where key private amenity spaces are concerned as identified in the Agent of Change assessment.

Figure I: Mitigated Private Amenity Spaces

In its simplest form, the indicated acoustic fence would need to be 2.5 m tall of imperforate form and at least 15 kg/m^2 mass per area as typically achieved with a 20 mm close-boarded timber for those dwellings with boundaries orientated towards the north.

The acoustic boundary fence would need to be maintained for the lifetime of the development in the areas located in light blue.

Other amenity fences not specifically indicated in the figure above can be of a reduced fairly standard 1.8-2.0m 10kg/m^2 surface configuration and whilst not specifically required will provide useful visual and acoustic screening.

10.0 Mechanical Plant and Services Atmospheric Design Noise Limits

10.1 Overview-Plant and Services Provision

The proposed development apartments may incorporate building services plant which can potentially vent to external locations or have externally located plant items.

These can produce audible noise and may require noise control measures (and potentially vibration control dependent on location).

Therefore, to protect existing sensitive receptors in the vicinity the below noise design limits should be adhered to for residential plant and services servicing houses and apartment, (such as air source heat pumps (ASHP), Mechanical Ventilation and Heat Recovery (MVHR) or Mechanical Extract Ventilation (MEV).

Based upon review of the survey data captured, survey location NMP2 is indicated as having typically lower modal dB $L_{A90,T}$ background sound levels these are summarised in the table below.

Table R: Typical Background Sound Levels

Period	Modal dB $L_{A90,T}$
Daytime 07:00-23:00	38
Night-time 23:00-07:00	36

It is therefore proposed to control daytime building plant and services emissions as per the table below across the site to protect residential amenity at the nearest existing dwelling outside the proposed development site.

10.2 Plant and Services Design Limits-Existing Dwellings

Table S: Derived BS4142 Plant and Services Design Noise Limits

Period	Proposed External $L_{Ar,Tr}$ dB BS4142 Design Criterion
Daytime 07:00-23:00	38
Night-time 23:00-07:00	36

Therefore, based on the guidance provided, if plant and services were designed to the above design rating level limit would constitute a “Low Impact” when assessed in accordance with BS4142 on the basis that:

> *“The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background level, this is an indication that the specific sound source will have a low impact, depending on the context“*

It is also reasonable to establish limits for plant and services associated with the development to the new dwellings proposed.

On this basis consideration is given to the internal ambient noise level limits from BS8233:2014 of 35 dB and 30 dB $L_{Aeq,T}$ day and night respectively. Generally, receptors will be internal to existing apartments particularly at night.

Assuming the worst case of an open window for background ventilation at existing apartments provides an insertion loss of 13dB, provided new noise sources are at least 5 dB below these levels internally impacts can be expected to be low in magnitude as experienced at sensitive receptors and in amenity areas external to dwellings.

On this basis the below limits have been suggested.

10.3 Plant and Services Design Limits-New Apartments

It is therefore proposed to control daytime building plant and services emissions as per the table below across the site to protect residential amenity at the nearest new apartment to plant locations.

Table T: Derived New Plant and Services Noise Limits

Period	Proposed External $L_{Ar,Tr}$ dB BS4142 Design Criterion	Resultant Internal Noise Level in Proposed Apartment dB $L_{Aeq,T}$	Exceedance of BS8233:2014 Internal Ambient Noise Level Criterion dB	Impact Assessment
Daytime 07:00-23:00	43	30	-5	Low Impact
Night-time 23:00-07:00	38	25	-5	Low Impact

Therefore, based on the guidance provided, if plant and services were designed to the above design rating level limit would constitute a “Low Impact” when assessed in accordance with BS4142 and considering BS8233:2014. The external design rating level limits above are ‘free-field’ levels at any height above ground.

It applies to the overall cumulative operation of building services plant associated with the scheme without any specific tone or character. It must be considered that the above represents a cumulative rating level limit and therefore individual items of plant should be designed to provide sufficient margin below this for the cumulative level from all simultaneously operational plant to not exceed the above.

If the plant noise will contain specific tones or intermittent character, then further penalties should be applied as per the guidance in BS4142 during assessment.

11.0 Site Related Road Traffic Noise Assessment

When transport modelling data associated with future proposals emerges, detailed assessment of traffic noise impact on the adjacent network associated with the proposed development will be warranted.

It is considered that any potential noise impacts related to road traffic Increases because of the development would be negligible and < 1 dB to remain of imperceptible difference where traffic on the adjacent road network could not increase by 25% because of the development.

This is however subject to further assessment at the appropriate time.

12.0 Conclusion

SLR has undertaken a noise impact assessment to support an "*outline application for up to 100 dwellings with all matters reserved except for access from South Street"* at Blackthorn Farm, Culverstone Green, Gravesham.

A preliminary qualitative review of potential Agent of Change commercial and industrial noise risk assessment has been undertaken, which would therefore indicate the proposed development has some potential to lead to complaints from future occupants in the context, and that specific mitigation is required which has been identified and recommended for implementation.

Stage 1 assessment in accordance with ProPG has provided that the site is influenced by road traffic noise.

The initial site noise risk assessment has been categorised in the worst case as 'low risk' at the site boundary on the future occupants of the new noise sensitive development, with much of the interior of the site falling into "low" noise risk.

Stage 2 assessment in accordance with ProPG has reviewed a good acoustic design process, internal ambient noise levels, external amenity areas and other matters.

Commensurate design specifications have been established considering current industry guidance. It has been realised that suitable internal and external amenity standards can be readily achieved by the scheme.

On the basis that design guidance within this report has been adopted it follows that any significant adverse noise impacts will be avoided in the finished development as to accord with overarching national and local planning requirements for new residential development.

A recommendation is made to the decision make that planning consent may be granted subject to the inclusion of suitable noise conditions.

13.0 Closure

The assessment has required a suitable level of technical ability and has been undertaken by a Suitably Qualified Person (SQP). An individual with all the following credentials has been considered a SQP for this assessment:

- Has a minimum of three years' verifiable experience (within the last five years) of providing noise impact assessments in planning. Such experience has clearly demonstrated a practical understanding of factors affecting acoustics in relation to the proposed development use and in the built environment in general, including acting in an advisory capacity to provide recommendations and design advice in planning, and;
- Holds a recognised acoustic qualification and membership of an appropriate professional body. The primary professional body for acoustics in the UK is the Institute of Acoustics.

This assessment has been led and managed by a SQP as defined above.

Where some elements of the assessment (e.g. measurements) have been carried out by an acoustician who does not meet the requirements above, this has been undertaken with the direct guidance and supervision of a SQP who has reviewed, agreed and overseen the measurement methodology and any results obtained.

The SQP confirms that the relevant measurements and calculations:

- Represent good industry practice in accordance with available guidance.
- Are appropriate given the development being assessed and scope of works proposed.
- Avoid invalid, biased and exaggerated claims.

The checker and author of this document confirm that they both comply with the definition of a SQP defined in this Section.

Regards,

SLR Consulting Limited

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Appendix A Glossary of Terminology

Noise Impact Assessment

Blackthorn Farm, Culverstone Green, Gravesham

SLR Project No.: 416.066019.00001

2 June 2025

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table A-1: Sound Levels Commonly Found in the Environment

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

Acoustic Terminology

dB (decibel) — The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (of 20 µPa).

dB(A) — A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

$L_{Aeq, T}$ — $L_{Aeq, T}$ is defined as the notional steady sound level which, over a stated period T, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

$L_{A10, T}$ & L_{A90} — If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L10 is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L90 is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L10 index to describe traffic noise.

$L_{Amax(F)}$ — $L_{Amax(F)}$ is the maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.

Appendix B Survey Graphical Summary Results

Noise Impact Assessment

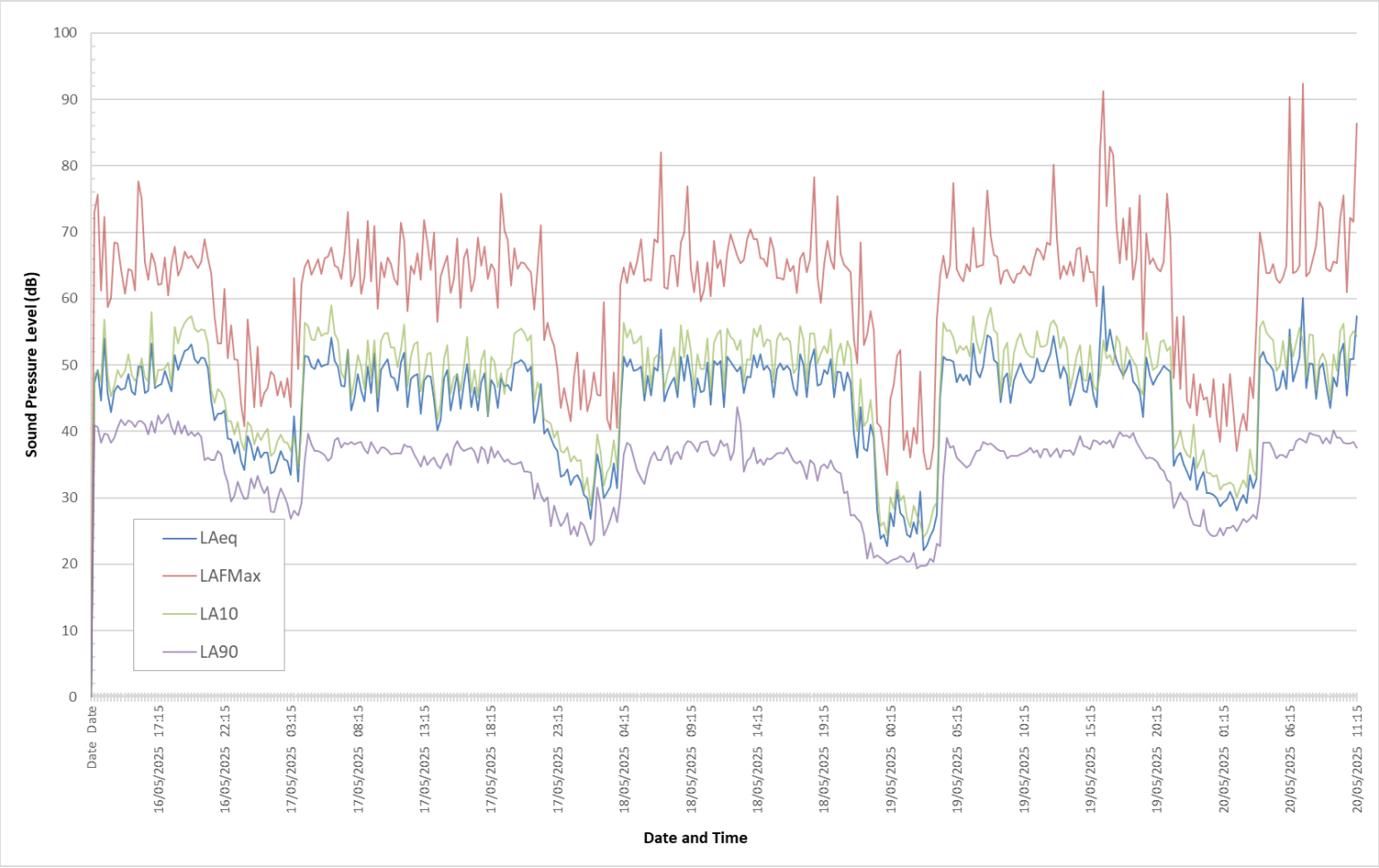
Blackthorn Farm, Culverstone Green, Gravesham

SLR Project No.: 416.066019.00001

2 June 2025

Figure C - 1: Time History Graph – Location NMP1, dB

Figure C - 2: Time History Graph – Location NMP2, dB



Appendix C Overheating Control Additional Guidance

Noise Impact Assessment

Blackthorn Farm, Culverstone Green, Gravesham

SLR Project No.: 416.066019.00001

2 June 2025

Acceptable Strategies for Reducing Overheating Risk

Limiting solar gains

Solar gains in summer should be limited by any of the following means.

Fixed shading devices, comprising any of the following

i. i. Shutters.

ii. External blinds.

iii. Overhangs.

iv. Awnings.

Glazing design, involving any of the following solutions.

i. Size.

ii. Orientation.

iii. g-value.

iv. Depth of the window reveal.

Building design

– for example, the placement of balconies.

Shading provided by adjacent permanent buildings, structures or landscaping.

Although internal blinds and curtains provide some reduction in solar gains, they should not be taken into account when considering whether requirement O1 of ADO has been met.

Foliage, such as tree cover, can provide some reduction in solar gains.

However, it should not be taken into account when considering whether requirement O1 of ADO has been met.

NOTE: Examples of solar shading and their effectiveness are provided in the Building Research Establishment's BR 364 Solar Shading of Buildings

Removing Excess Heat

Excess heat should be removed from the residential building by any of the following means in order of hierarchy (likely controlled by noise risk)

a. Opening windows (the effectiveness of this method is improved by cross-ventilation).

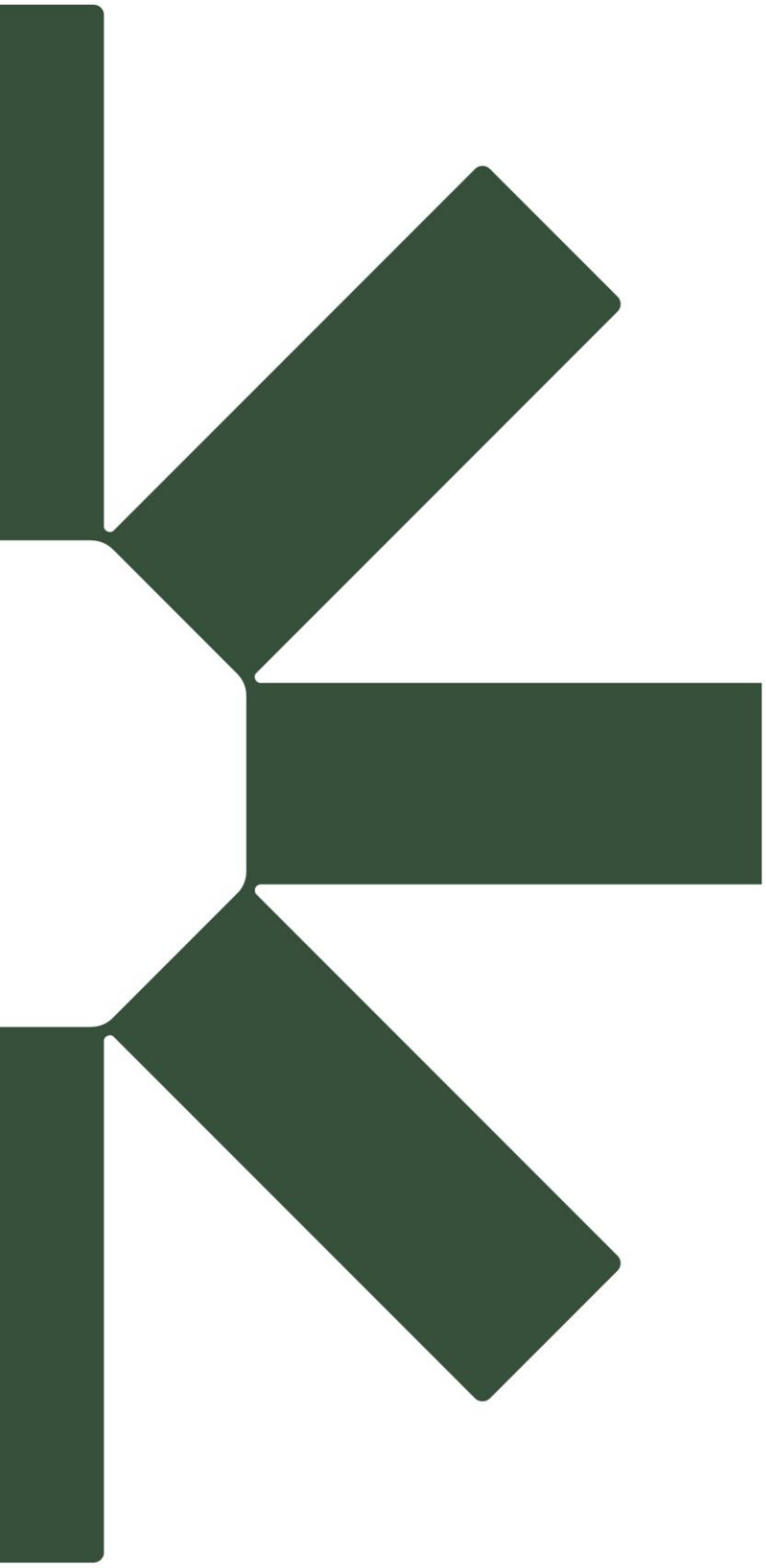
b. Ventilation louvres in external walls.

c. A mechanical ventilation system.

d. A mechanical cooling system

The building should be constructed to meet requirement O1 of ADO using passive means as far as reasonably practicable.

It should be demonstrated to the building control body that all practicable passive means of limiting unwanted solar gains and removing excess heat have been used first before adopting mechanical cooling.



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