



**Phase 4,
Normandy Fields, Hinckley**
Noise Impact Assessment

On behalf of **Bloor Homes Ltd**



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Introduction

1.1 Background

- 1.1.1 Stantec UK Ltd (Stantec) has been commissioned by Bloor Homes Ltd to provide a noise impact assessment report to support a full planning application for a proposed residential development located at Phase 4 of Normandy Fields, Hinckley.
- 1.1.2 An environmental sound survey has been undertaken by Stantec to establish the existing environmental sound levels incident on the proposed development.
- 1.1.3 The results of the environmental sound survey and acoustic modelling have been used to establish façade incident sound levels around the proposed development which form the basis of the noise impact assessment.
- 1.1.4 This report presents the relevant results of the environmental sound surveys, details of our assessment and proposed acoustic specifications for the critical elements of the building façade.
- 1.1.5 An explanation of the acoustic terminology used in this report is included in **Appendix A**.

1.2 Scope of Report

- 1.2.1 The scope of the report is as follows:
- To establish, by means of a detailed daytime and night-time environmental sound survey, the existing environmental sound levels at the site.
 - To propose appropriate external and internal ambient noise level design criteria with respect to external noise ingress for habitable spaces and noise levels in external amenity areas based on the requirements of the Local Planning Authority.
 - To undertake a detailed assessment of the likely airborne noise ingress into habitable spaces and determine the required acoustic performance of the windows, ventilators, external walls and roofs of the building façade in order to achieve the proposed criteria with windows closed.
 - To undertake an assessment of the likely sound levels in external amenity spaces at the proposed development and, if required, propose mitigation measures required to achieve the proposed criteria.
 - To undertake an outline assessment of the likely airborne noise ingress to bedrooms at night, to determine the likelihood of compliance with the noise requirements of Approved Document O.

1.3 Site Description and Location

- 1.3.1 The proposed development (Phase 4) is north east of Triumph Motorcycles Ltd, Dodwells Road, Hinckley site, approximately 1.85 km to the north-west of Hinckley town centre. The site falls within the jurisdiction of Hinckley and Bosworth Borough Council.
- 1.3.2 The site currently consists of open land. The A47 Normandy Way borders the site to the east. The access road to Triumph Motorcycles borders the site to the south. The site is bounded by open land to the west and the residential development on Land North East of Triumph Motorcycles Ltd, Dodwells Road, Hinckley to the north.

1.3.3 The location of the proposed site is detailed in **Figure 1**.

Figure 1: Site Location Plan



Esri Community Maps Contributors, Esri UK, Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc, METI/NASA, USGS, Maxar, Microsoft

Local Authority, Policy, Standards, Guidance and Criteria

2.1 Local Authority Consultation

2.1.1 The Environmental Health Department (EHD) at Hinckley and Bosworth Borough Council (HBBC) was contacted to discuss and agree the proposed survey and assessment methodology. It was agreed that¹:

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- An unattended environmental sound survey would be undertaken for a minimum of 24 hours in three locations at the proposed development, selected to be representative of incident sound levels at the site associated with the surrounding noise sources.
- An assessment of internal noise levels would be undertaken in accordance with guidance contained within BS 8233:2014, WHO Guidelines for Community Noise and ProPG: Planning and Noise.
- An assessment of external noise levels would be undertaken in accordance with guidance contained within BS 8233:2014.

2.2 National Policy

The National Planning Policy Framework

2.2.1 The revised National Planning Policy Framework (NPPF) was published in December 2023. In respect of noise, paragraph 180 states that in relation to conserving and enhancing the natural environment:

“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 ... noise pollution...”

2.2.2 In relation to ground conditions and pollution, paragraph 191 states that:

“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 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...”*

¹ Email correspondence received from Simon Smith, Senior Environmental Health Officer at Hinckley and Bosworth Borough Council, dated 10 May 2023.

- 2.2.3 In relation to the integration of new development with existing premises and community facilities, paragraph 193 states that:

"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."

- 2.2.4 The NPPF indicates that the Noise Policy Statement for England (NPSE) should be used to define the "significant adverse impacts".

Planning Practice Guidance

- 2.2.5 The Planning Practice Guide (PPG) was launched in 2014 (with the latest update being in 2019) and provides additional guidance and interpretation to the Government's strategic policies outlined within the NPPF in a regularly updated, web-based resource.
- 2.2.6 The PPG provides guidance on the effects of noise exposure, relating these to people's perception of noise, and linking them to the no observed effect level (NOEL) and, as exposure increases, the lowest observed adverse effect level (LOAEL) and significant observed adverse effect level (SOAEL).
- 2.2.7 As exposure increases above the LOAEL, the noise begins 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. As the noise exposure increases, it will then at some point cross the SOAEL boundary.
- 2.2.8 Exposure to noise above the LOAEL is described in PPG (Paragraph: 005 Reference ID: 30-005-20190722) as:

"...noise starts to cause small changes in behaviour and/or 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)."

- 2.2.9 Exposure to noise above SOAEL is described as:

"...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."

Noise Policy Statement for England

- 2.2.10 The Noise Policy Statement for England (NPSE) was published in March 2010 and clarifies the underlying principles and aims of existing policy documents that relate to noise. It also sets out the long-term vision of Government noise policy which is: "to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".

2.2.11 The NPSE states that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and its effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

2.2.12 Paragraphs 2.20 and 2.21 define ‘significant adverse’ and ‘adverse’ impacts as applied to noise as follows:

“There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL – No Observed Effect Level

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

LOAEL – Lowest Observed Adverse Effect Level

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

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

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

2.2.13 It is necessary to define the LOAEL and SOAEL for the potential source of noise to relate the potential impact to the aims and requirements of the NPSE.

2.3 Standards

British Standard 8233:2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’

2.3.1 BS 8233:2014 in relation to this development, sets out guideline values in habitable rooms, such as living rooms and bedrooms which should not be exceeded.

2.3.2 The guideline values relate to steady external noise without a specific character, previously termed ‘anonymous noise’. According to the standard, noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate. Examples of noise with a character may include tonal/intermittent plant noise emissions, music playback, and workshop noise. Examples of external steady noise sources may include environmental noise sources such as busy road traffic.

2.3.3 The guideline internal ambient noise levels for dwellings are presented in **Table 2.1**.

Table 2.1: BS 8233 Guideline Internal Ambient Noise Levels for Dwellings

Activity	Location	Internal Ambient Noise Level	
		07:00 to 23:00 hours	23:00 to 07:00 hours
Resting	Living room	35 dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$
*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 source of ventilation that does not compromise the façade insulation or the resulting noise levels.			
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 5dB and reasonable internal conditions still achieved.			
*A selection of the available notes			

2.3.4 The standard also provides advice in relation to sound levels for external noise. It states that:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.

In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate.

Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation.

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

2.4 Guidance

Professional Practice Guidance on Planning and Noise, 2017

- 2.4.1 The Professional Practice Guidance on Planning and Noise (ProPG) provides guidance on a recommended approach to the management of noise within the planning system in England and is limited to new residential development that will be predominantly exposed to airborne noise from transport sources.
- 2.4.2 With respect to internal ambient noise levels in habitable rooms, ProPG recommends that noise levels set out in BS 8233 are used for residential development. However, an additional criterion is proposed by ProPG for night-time L_{Amax} levels as follows:

"[...] In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB $L_{Amax, F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events."

World Health Organisation Guidelines for Community Noise

- 2.4.3 The World Health Organization (WHO) 'Guidelines for Community Noise' details guidance on suitable internal and external sound levels in and around residential properties. The following internal sound levels are recommended by the WHO:
- 35 dB $L_{Aeq,16hours}$ in living rooms during the daytime (07:00 to 23:00 hours); and
 - 30 dB $L_{Aeq,8hours}$ in bedrooms during the night-time (23:00 to 07:00 hours).
- 2.4.4 With respect to maximum sound levels during the night-time, the guidelines state:
- "For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night."*
- 2.4.5 In addition to the above, the guidelines suggest that daytime sound levels of above 50 dB $L_{Aeq,16hours}$ are of 'moderate annoyance' in the community with daytime sound levels above 55 dB $L_{Aeq,16hours}$ of 'serious annoyance'.
- 2.4.6 The above levels are in-line with guidance detailed in BS 8233:2014 and ProPG Planning and Noise.

2.5 Proposed External and Internal Ambient Noise Level Design Criteria

- 2.5.1 **Table 2.2** details the proposed design criteria. Internal noise design criteria are based on the guideline values for internal ambient noise levels in dwellings as detailed in Table 4 of BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'. Design criteria for external amenity areas are based on guidance outlined in Paragraph 7.7.3.2 of BS 8233:2014.

Table 2.2: Internal and External Sound Level Design Criteria

Effect Level	Internal Ambient Noise Levels		Noise Levels in External Amenity Areas
	Daytime (07:00 – 23:00 hours)	Night-Time (23:00 – 07:00 hours)	Daytime (07:00 – 23:00 hours)
LOAEL	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$ 45 dB L_{AFmax} 10-15 times per night	50 dB $L_{Aeq,16h}$ - desirable 55 dB $L_{Aeq,16h}$ – upper limit
SOAEL	50 dB $L_{Aeq,16h}$	45 dB $L_{Aeq,8h}$	65 dB $L_{Aeq,16h}$

Environmental Sound Survey

3.1 Procedure

3.1.1 An unattended environmental sound survey was undertaken between approximately 14:15 hours on Thursday 08 June 2023 and approximately 14:45 hours on Friday 09 June 2023 to determine the existing sound climate at the site in three locations considered representative of transportation noise sources incident on the proposed development.

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3.1.2 The survey was undertaken over a 24-hour period. Measurements were made over 2-minute periods of the L_{Aeq} , L_{A90} and L_{AFMax} sound levels.

3.1.3 The sound level meters were located in environmental cases. The microphones were connected to the meters via an extension cable and fitted with the manufacturer's windshield.

3.1.4 The instrumentation used in the survey (including calibration information) is listed in **Appendix B**.

3.1.5 Field calibrations were performed before and after the measurements with no significant fluctuations recorded (< 0.5 dB). Calibration certificates are available upon request.

3.2 Measurement Locations

3.2.1 Sound measurements were undertaken in three positions at the proposed development, selected to be representative of sound levels incident on the proposed development associated with vehicular movements on the A47 Normandy Way. The measurement locations are detailed in **Figure 2** and detailed in **Table 3.1**.

Figure 2: Environmental Sound Measurement Locations



Esri Community Maps Contributors, Esri UK, Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc, METI/NASA, USGS, Maxar, Microsoft

Table 3.1: Description of Measurement Positions

Position	Description
P1	The microphone was positioned in free field conditions, at a height of 1.5 m above ground level, approximately 14 m to the west of Normandy Way.
P2	The microphone was positioned in free field conditions, at a height of 1.5 m above ground level, approximately 105 m to the west of Normandy Way and approximately 180 m to the northeast of the Triumph Motorcycles building.
P3	The microphone was positioned in free field conditions, at a height of 1.5 m above ground level, approximately 210 m to the west of Normandy Way and approximately 200 m to the northeast of the Triumph Motorcycles building.

3.3 Meteorological Conditions

- 3.3.1 Due to the nature of the unattended survey, it is not possible to accurately comment on the meteorological conditions throughout the entire survey period. However, based on site observations at the beginning and end of the survey period, the weather conditions are detailed in **Table 3.2**.

Table 3.2: Meteorological Conditions

Description	Thursday 08 June 2023	Friday 09 June 2023
Temperature (°C)	18	22
Precipitation (mm)	None	None
Approximate Cloud Cover (%)	5	Clear Sky
Wind Speed (m/s)	5	5
Wind Direction	Northeast	East Northeast

- 3.3.2 A review of publicly available weather data indicated that no precipitation occurred during the survey period. These conditions are therefore considered suitable for obtaining representative sound level measurements.

3.4 Assumptions/Limitations

- 3.4.1 The engineer noticed nothing unusual in terms of the sound climate at the time of the survey. This report refers, within the limitations stated, to the environment of the site in the context of the surrounding area at the time of the inspections. Environmental conditions can vary. No warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

3.5 Environmental Sound Climate

- 3.5.1 Due to the nature of the unattended survey, it is not possible to accurately comment on the dominant noise sources or specific noise events during the entire survey period. However, it was noted that the dominant noise source observed at the beginning and end of the survey period was considered to be vehicular movements on the A47 Normandy Way. The engineer noted that noise associated with the operation of the Triumph Motorcycles site was inaudible at the measurement positions.

Environmental Sound Survey Results

4.1.1 The results of the survey are presented in the time history graphs in **Appendix C**.

4.1.2 A summary of the survey results is provided in **Table 4.1**.

Table 4.1: Summary of Measured Environmental Sound Survey Results

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Location	Date	Period, T	Measured Sound Level (dB)	
			L _{Aeq,T}	Typical* L _{AFMax}
P1	Thursday 08 to Friday 09 June 2023	Daytime (07:00 – 23:00 hours)	68	-
		Night-time (23:00 – 07:00 hours)	64	80
P2		Daytime (07:00 – 23:00 hours)	55	-
		Night-time (23:00 – 07:00 hours)	50	64
P3		Daytime (07:00 – 23:00 hours)	52	-
		Night-time (23:00 – 07:00 hours)	47	60

* Based on the 10th highest measured L_{AFMax} level.

Assessment of External Sound Levels

5.1 Overview

- 5.1.1 An assessment of the likely sound levels in the proposed external amenity areas has been undertaken to determine whether the criteria outlined in **Table 2.2** are likely to be achieved.

5.2 Calculated Incident Façade Levels

- 5.2.1 Using the results of the environmental sound survey, the data obtained from a topographical survey of the development site and free topographical data, an acoustic model has been produced, using computer software SoundPLAN v9.0. The model considers noise from the surrounding road network.
- 5.2.2 The acoustic model has calculated the propagation of sound across the proposed development in accordance with both 'ISO9613-2:1996 Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation' and The Calculation of Road Traffic Noise (CRTN).
- 5.2.3 The environmental sound survey results were used to verify the model. These have then been used to calculate the likely future incident façade levels across the proposed development, based on the proposed development masterplan.
- 5.2.4 Façade incident sound levels for the proposed development have been calculated based on the results of the acoustic model. Noise contour plots illustrating the calculated external sound levels across the site can be found in **Appendix D**. Daytime levels have been calculated at a height of 1.5 m to represent living room windows and night-time levels have been calculated at a height of 4.0 m to represent bedroom windows.

5.3 Sound Levels in External Sound Levels

- 5.3.1 For the purposes of this assessment, garden fences have generally been assumed to be acoustically transparent and provide no acoustic screening.
- 5.3.2 However, where required to reduce noise levels in private amenity areas, 2.2 m high garden fences which provide acoustic screening have been included within the model and scheme design.
- 5.3.3 The locations of these fences are indicated in pink in **Appendix D.1**. The acoustic specification for the fences can be found in **Appendix E**.
- 5.3.4 Private external amenity areas are to be provided for the proposed dwellings. **Appendix D** illustrates the calculated external noise levels across the site during the daytime period.
- 5.3.5 Calculations indicate that noise levels in the majority of the proposed external amenity areas are likely to fall below 55 dB $L_{Aeq,16hours}$ during the daytime period.
- 5.3.6 Calculations indicate that noise levels in a limited number of plots (nine) located adjacent to the A47 Normandy Way have the potential to exceed 55 dB $L_{Aeq,16hours}$ during the daytime.
- 5.3.7 With reference to BS8233:2014, Paragraph 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 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all

circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.”

- 5.3.8 The use of garden fences which are higher than 2.2 m was not deemed feasible from a design perspective. The development has been designed so as to achieve the lowest practicable noise levels in private external amenity areas and noise levels in these areas are considered to be a compromise between the convenience of living at the proposed development and the proximity of the site to the strategic transport network.

External Noise Break-in Assessment (Windows Closed)

6.1 Overview

- 6.1.1 Analysis of the proposed external building fabric has been undertaken to determine the required acoustic performance of glazing and ventilation elements to achieve the criteria detailed in **Table 2.2** with windows closed. Compliance with the acoustic performance specification detailed herein is expected to result in compliance with the proposed acoustic criteria.

6.2 Ventilation

- 6.2.1 The requirements for building ventilation in new dwellings are detailed in Approved Document F (ADF) and include provision for 'whole dwelling ventilation', 'extract ventilation' and 'purge ventilation', as described below.

Whole Dwelling Ventilation

- 6.2.2 Nominally continuous ventilation of rooms or spaces at a relatively low rate to provide fresh air to the building and dilute, disperse and remove water vapour and pollutants not removed by extract ventilation.

Extract Ventilation

- 6.2.3 The extraction of air where water vapour or pollutants are likely to be released (e.g. bathrooms and kitchens). Fans may be either intermittent or continuous operation.

Purge Ventilation

- 6.2.4 Manually controlled ventilation at a relatively high rate to remove pollutants and/or water vapour (e.g. fumes from painting). Purge ventilation is typically provided by means of openable windows. Due to the temporary nature of purge ventilation, significant noise impacts are not normally expected.

Types of Ventilation System

- 6.2.5 ADF provides three 'template' systems which comply with the ventilation requirements, formed of whole dwelling ventilation and extract ventilation, and can be adopted to demonstrate compliance. These are:
- Natural ventilation (applicable to less airtight dwellings) - incorporating background ventilators and intermittent extract fans.
 - Continuous mechanical extract ventilation - incorporating background ventilators and continuous extract fans.
 - Mechanical ventilation with heat recovery (MVHR) - incorporating continuous ventilation fans.
- 6.2.6 Each system has different noise implications, however in the context of this assessment external noise ingress via the ventilation system is the primary consideration. Generally, for natural ventilation and continuous mechanical extract ventilation, this is via the ventilators and for MVHR this is via the inlet and exhaust grilles within the dwelling associated with the MVHR system.

Selected System

- 6.2.7 It is understood that ventilation to dwellings is to be provided by natural ventilation and intermittent extract fans.

6.3 Internal Sound Levels (External Building Fabric Assessment)

- 6.3.1 The external building fabric analysis has assumed the following:

Room Absorption

- 6.3.2 It has been assumed the bedrooms and living rooms to be acoustically 'soft' with carpets, curtains and other soft furnishings. For the purposes of the analyses we have assumed the average equivalent absorption coefficients detailed in **Table 6.1**.

Table 6.1: Average Equivalent Acoustic Absorption Coefficients

Room	Average Equivalent Acoustic Absorption Coefficient ($\bar{\alpha}$) at Octave-band Centre Frequency (Hz)				
	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
Bedrooms / Living Rooms	0.18	0.25	0.27	0.31	0.32

Proposed External Building Fabric

- 6.3.3 The assessment has been based on a typical brick/block cavity wall external wall build-up. Please note that assessment of internal sound transfer falls outside the scope of this report and should be assessed in detail by the relevant specialists. **Table 6.2** details typical sound reduction indices associated with the assumed external building fabric construction, providing an indicative overall performance of 52 dB R_w .

Table 6.2: Assumed External Wall Sound Reduction Performance

Construction	Sound Reduction Index (R) at Octave-band Centre Frequency (Hz)				
	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
External Wall	41	45	45	54	58
Roof	24	34	40	45	49
Dormer Window Reveal	21	26	33	33	35

- 6.3.4 Our calculations have been based on building and window dimensions obtained from drawings produced by Bloor Homes.

6.4 Glazing and Ventilation Acoustic Specification and Guidance on Construction

- 6.4.1 Glazing specifications have been consolidated so that a minimum number of different specifications are provided. Glazing zones are presented in **Figures F.1** in **Appendix F**.
- 6.4.2 The glazing performance specifications apply to the glazing package as a whole inclusive of glazing, louvres, spandrel panels, framing, opening lights, doors, seal etc. The performance of the glazing system will depend on many factors such as the glazing configuration, size of windows panels, quality of framing, quality of sealing etc.

- 6.4.3 The proposed windows should be tested in accordance with BS EN ISO 10140-2:2021 and the quoted minimum sound reduction specifications should be met by the system as a whole, including frames etc. as appropriate, and not just the glass.
- 6.4.4 For guidance purposes we would suggest that a construction based around the following configurations is likely to prove commensurate with achieving the sound insulation performance specifications detailed within **Appendix G**.

Table 6.3: Glazing and Trickle Ventilator Guidance Constructions

Zone	Area	Glazing Type	Ventilation Type	Guidance Glazing and Ventilator Construction
Zone 1	Living Spaces and Bedrooms	G1	V1	Up-rated acoustic glazing comprising 10 mm glass / 16 mm cavity / 6.4 mm glass with acoustic trickle ventilation.
Zone 2		G2	V2	Conventional double glazing comprising 4 mm glass / 16 mm cavity / 6 mm glass with acoustic trickle ventilation.
Zone 3		G2	V3	Conventional double glazing comprising 4 mm glass / 16 mm cavity / 6 mm glass with trickle ventilation.

- 6.4.5 The guidance construction detailed above is provided for costing purposes only. Selected glazing and ventilation systems should be capable of meeting the performance specifications shown in **Appendix G**, with laboratory test certificates being made available in support of the quoted performance. Glazing proposals which simply reflect the guidance constructions indicated in this report will not, in isolation, be sufficient evidence that a glazing configuration will meet the performance specification.
- 6.4.6 The acoustic specifications will need to be integrated, coordinated and ratified with the design by the principal designer and design team to ensure that all other design interfaces, buildability, workmanship and other requirements are considered.
- 6.4.7 It should be noted that the acoustic specifications are intended to demonstrate the ability of the scheme to comply with planning requirements and are not intended to be used as detailed acoustic design specifications. All acoustic specifications should be reviewed and confirmed during the detailed design stage.
- 6.4.8 Based on the results of the external building fabric assessment, the internal ambient sound levels are likely to meet the proposed criteria during daytime and night-time periods.

External Noise Break-in Assessment (Windows Open)

7.1 Overview

- 7.1.1 Analysis of external sound levels around the development has been undertaken to determine the likelihood of compliance with the noise requirements outlined within Approved Document O Overheating. The purpose of this section of the report is not demonstrate compliance with the requirements, but to determine the likelihood of compliance.

7.2 Assessment Criteria

Approved Document O Overheating

- 7.2.1 Approved Document O of the Building Regulations 2010 Overheating was published in December 2021 and took effect in England on 15 June 2022. It applies to schemes which have not had a planning application submitted prior 15 June 2022, and to schemes which start on site after 15 June 2023.
- 7.2.2 Approved Document O of the Building Regulations 2010 does not form a planning requirement unless conditioned by the Local Planning Authority.
- 7.2.3 Approved Document O gives guidance on how to comply with Part O of the Building Regulations and applies to residential buildings (excluding hotels) only.
- 7.2.4 Requirement O1(1) states that:
- “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.”*
- 7.2.5 Requirement O1(2) states that:
- “In meeting the obligations in paragraph (1) –*
- (a) Account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and*
- (b) Mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it.”*
- 7.2.6 Compliance with Requirement O1(1) can be demonstrated by using the ‘simplified method’ or by ‘dynamic thermal modelling’, as described in Approved Document O.
- 7.2.7 In relation to noise, Paragraphs 3.2 and 3.3 of Approved Document O state:
- “3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).*
- 3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.*

- a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).
- b. 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)."

7.2.8 Based on the above, the 'simplified method' of demonstrating compliance with Requirement O1(1) cannot be relied upon if either of the internal noise criteria are exceeded.

Draft Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O

7.2.9 The draft version of the Guide to Demonstrate Compliance with the Noise Requirements of Approved Document O was jointly published by the Association of Noise Consultants and Institute of Acoustics in July 2022. This guide provides clarity for practitioners and regulators so that assessments can be carried out consistently, and the outcome is repeatable and reliable.

7.2.10 While the requirements of Approved Document O are succinct, there is some ambiguity regarding important details, some of which are addressed within the guide.

7.2.11 The guide makes the following clarifications:

- The noise requirements apply only to bedrooms at night.
- Natural sound sources (e.g. meteorological sounds, sounds from animals and water) should be excluded from contributing to the assessed noise level.

7.2.12 The guidance document provides anticipated level differences through window openings which are necessary to satisfy the 'simplified method' of Approved Document O, based on typical assumptions. For 'high' risk locations (as described as areas in London and Manchester in Approved Document O) this is 4 dB, and for 'medium' risk locations (as described as other areas outside London and Manchester in England and Wales in Approved Document O) this is 9 dB.

7.2.13 Paragraph 4.1.9 states that if external sound levels exceed the limiting external free-field levels outlined in **Table 7.1** the 'simplified method' cannot be used, and 'dynamic thermal modelling' should be used to demonstrate compliance:

Table 7.1: External Noise Levels Above Which the Simplified Method Cannot be Used

Parameter	High Risk Location	Moderate Risk Location
$L_{Aeq,8hr}$ 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
Note: Several assumptions have been used to determine the outside-to-inside level difference. These are: 2.4 m bedroom height, 0.5s bedroom reverberation time, simple hole in the façade of area sufficient to provide the required equivalent area, no sound transmission other than via the opening. Calculation according to Equation G.1 of BS 8233:2014		

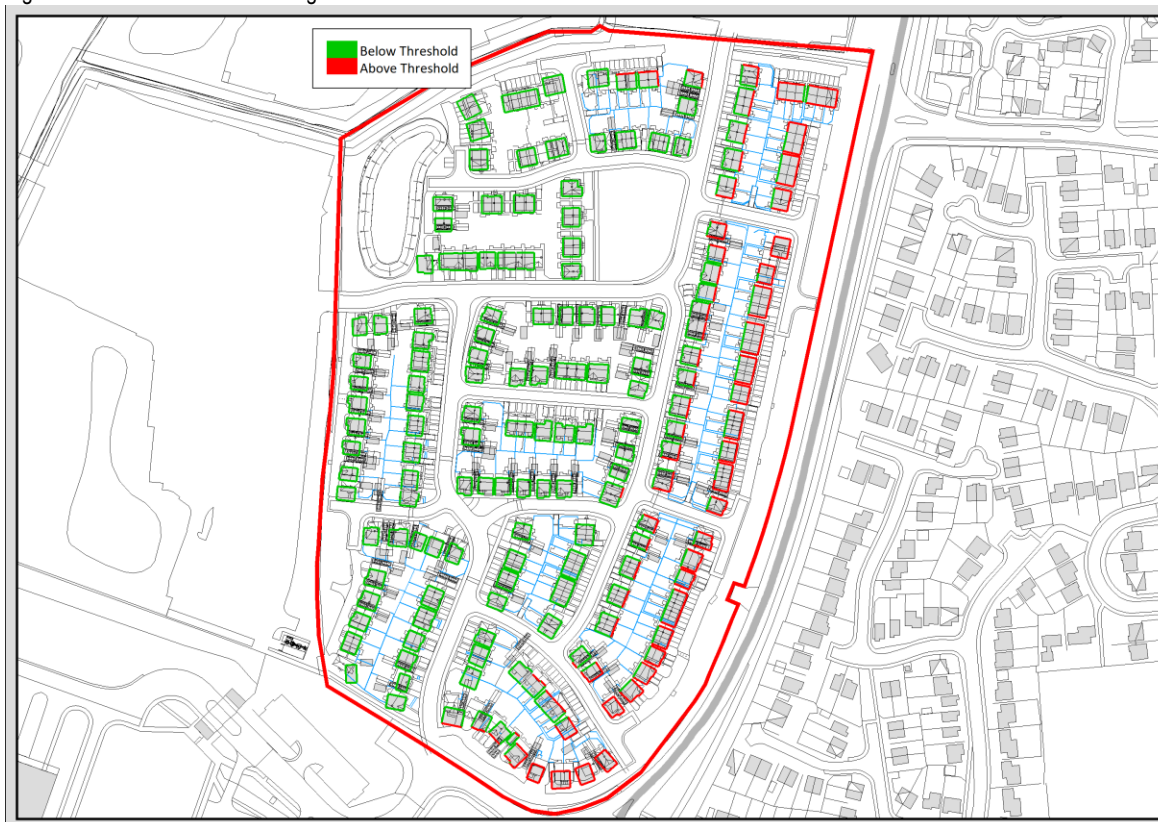
7.2.14 Paragraph 6.1.2 of the guide states:

"Given the uncertainty of measuring noise levels internally and the complexity of remedial work to adapt a completed building to remove excess heat by means other than opening a window, it is recommended that determination of compliance with AD-O is completed pre-construction."

7.3 Assessment

- 7.3.1 Based on the calculated external sound levels presented in **Appendix D** and the proposed development being located within a moderate risk location, **Figure 4** illustrates the façades which are expected to be above/below the guidance external sound levels outlined within the draft Approved Document O guidelines.

Figure 4: Location of Overheating Thresholds



- 7.3.2 Facades outlined in green are likely to be able to utilise openable windows as a means to control overheating.
- 7.3.3 For facades outlined in red, subject to the results of dynamic thermal modelling, it is unlikely that openable windows can be utilised as a means to control overheating and achieve the internal noise level criteria. Therefore, the ventilation strategy may need to consider the use of an attenuated ventilation path or mechanical means by which to remove excess heat.
- 7.3.4 A detailed assessment of external noise intrusion during the overheating condition should be undertaken when the relevant design aspects are available for assessment.

Conclusions

- 8.1.1 Stantec has been commissioned by Bloor Homes Ltd to provide a report to support a full planning application for a proposed residential development located at Phase 4, Normandy Fields, Hinckley.
- 8.1.2 An environmental sound survey has been undertaken by Stantec, to establish the existing environmental sound levels associated with transportation sources incident on the proposed development.
- 8 The results of the environmental sound survey and acoustic modelling have been used to establish façade incident noise levels for the proposed development which form the basis of the noise impact assessment.
- 8.1.3 The results of the environmental sound survey and acoustic modelling have been used to establish façade incident noise levels for the proposed development which form the basis of the noise impact assessment.
- 8.1.4 Assessment criteria have been proposed based on the requirements of the Local Planning Authority and applicable guidance documents.
- 8.1.5 Noise levels in the majority of the proposed external amenity areas associated with operational road traffic noise are likely to fall below 55 dB LAeq,16hours during the daytime period. Calculations indicate that noise levels in plots located immediately adjacent to the A47 Normandy Way have the potential to exceed 55 dB LAeq,16hours during the daytime period.
- 8.1.6 However, based on information outlined within BS 8233:2014, and the highest level of practicable mitigation being implemented in the form of 1.8 m and 2.2 m high acoustic fences, external noise levels in these areas are considered to be a compromise between the convenience of living at the proposed development and the proximity of the site to the strategic transport network.
- 8.1.7 Analysis of the proposed external building fabric has been undertaken in order to determine the acoustic performance of the glazed and ventilation elements. Compliance with the acoustic performance specification detailed herein is expected to result in compliance with the proposed acoustic criteria.
- 8.1.8 The acoustic specifications will need to be integrated, coordinated and ratified with the design by the principal designer and design team to ensure that all other design interfaces, buildability, workmanship and other requirements are considered.
- 8.1.9 An outline assessment of the likelihood of compliance with the requirements of Approved Document O has been undertaken. The results of the assessment indicate that it is unlikely that open windows can be used to mitigate overheating in some areas of the proposed development. A detailed assessment of internal noise levels should be undertaken when the relevant design details are available.
- 8.1.10 It should be noted that the acoustic specifications are to demonstrate the ability of the scheme to comply with planning requirements and are not intended to be used as detailed acoustic design specifications. All acoustic specifications should be reviewed and confirmed during the detailed design stage.

Appendix A Acoustic Terminology

Parameter	Description
Acoustic Environment	Sound at the receiver from all sound sources as modified by the environment.
Ambient Sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. Comprises of the residual sound and the specific sound when present.
Ambient Sound Level ($L_a = L_{Aeq,T}$)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
A-Weighted Decibel (dBA)	A decibel level that has been corrected for the A-Weighting curve.
A-Weighting	Octave band and 1/3 octave band filters that correlate to the response of the human hearing system to sound pressure levels at different frequencies.
Background Sound	The level of sound measured in the absence of extraneous noise sources.
Background Sound Level ($L_{A90,T}$)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using a fast time-weighting and quoted to the nearest whole number of decibels.
Decibel (dB)	A logarithmic unit used to describe the ratio between the measured level and a reference level of 0 dB. The ratio can be sound pressure, intensity or power. The reference value for sound pressure is 20 μ Pa and for sound power is 1 μ W.
Equivalent Continuous A-Weighted Sound Pressure Level ($L_{Aeq,T}$)	Value of the time-averaged A-weighted sound pressure level, in decibels (dB), of a continuous steady sound for the duration of the specified time interval, T.
Façade Level	The sound pressure level at a distance of 1 metre from the façade
Fast Time Weighted	The speed at which the instrument responds to changes in amplitude of the measured signal. The response time of a fast time-weighted instrument is 0.125 seconds.
Free-Field Level	The sound pressure level measured away from any reflective surfaces.
Frequency (f)	The number of cycles of pressure fluctuations within a given period of time. Measured in Hertz.
Hertz (Hz)	The unit of frequency or pitch of a sound. One hertz is equal to one cycle per second.
$L_{10,T}$	The noise level exceeded for 10 % for a given time interval, T. Generally used to describe traffic noise.
L_{Amax}	The maximum A-weighted level measured during a given time period.
Octave Band	Band of frequencies where the upper limit of the band is twice the frequency of the lower limit. E.g., the 1000 Hz band contains noise energy at all frequencies from 707 to 1414 Hz.
Percentile Level ($L_{AN,T}$)	The A-Weighted Sound Pressure Level which is exceeded for N% of the specified time interval. E.g., the $L_{A90,1hour}$ is the A-weighted sound level exceeded for 90% of 1 hour/
Reference Time Interval (T)	Specified interval over which the specific sound level is determined.
Sound Pressure	The difference between the pressure caused by a sound wave and the ambient pressure of the medium the sound wave is passing through. Measured in Pascals.

Sound Pressure Level (L_p)	The logarithm of the ratio of a given sound pressure (p) to the reference sound pressure (p_0). The reference value for sound pressure is 20 μPa. Defined as: $L_p = 20 \log \left(\frac{p}{p_0} \right)$
Sound Sources	Sounds generated by nature or human activity.

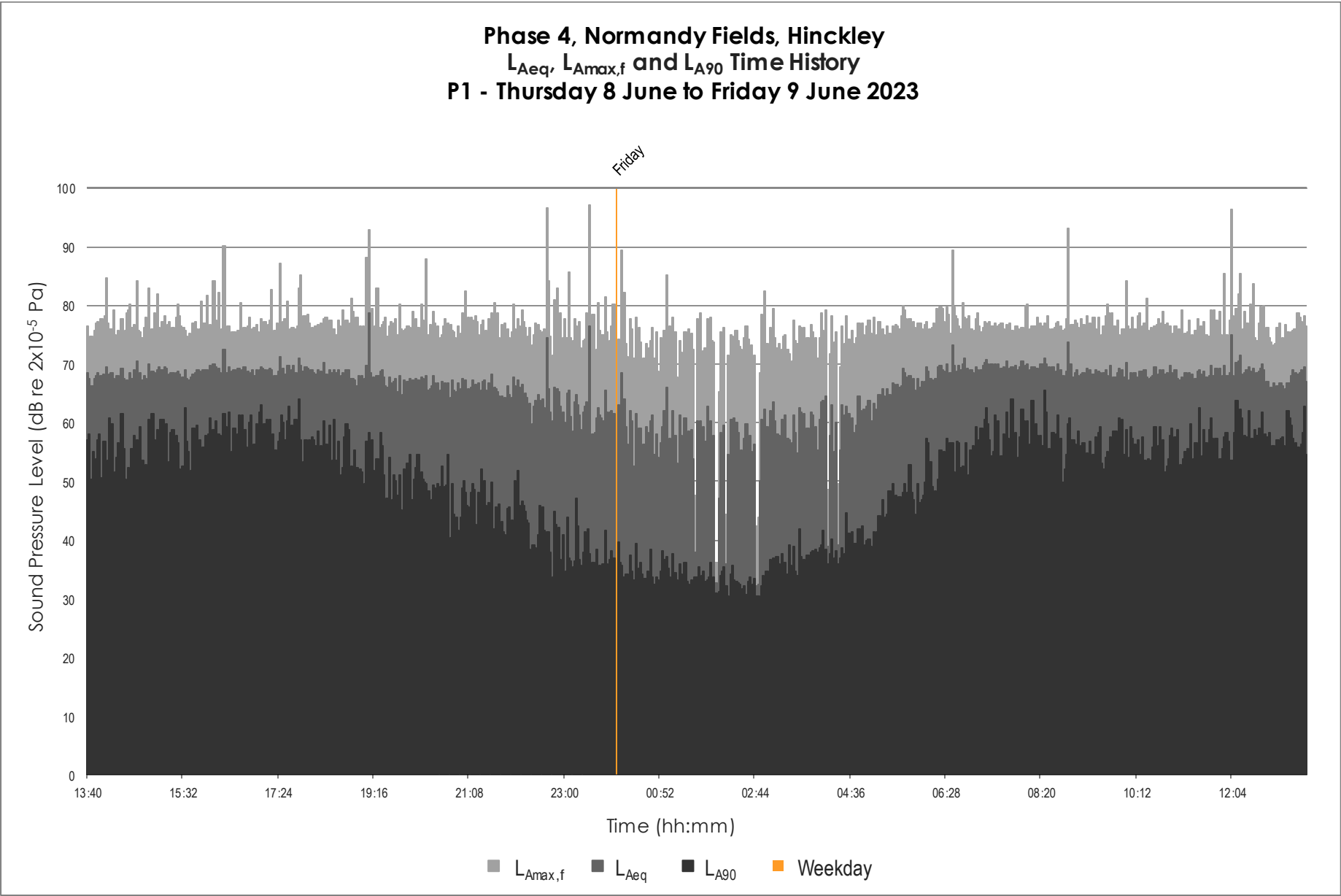
Appendix B Instrumentation

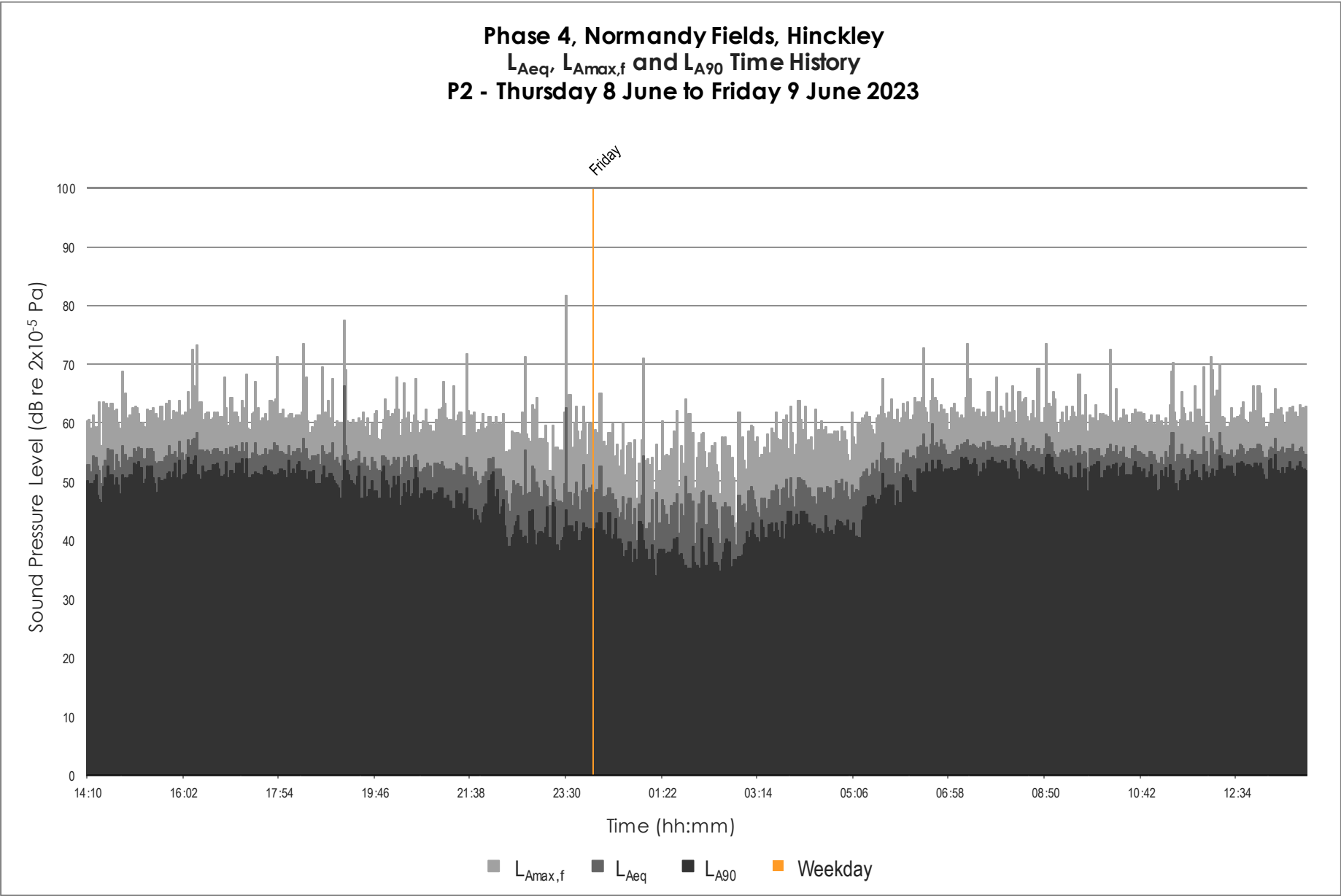
B.1.1 The instrumentation used in the survey is listed in **Table B.1**.

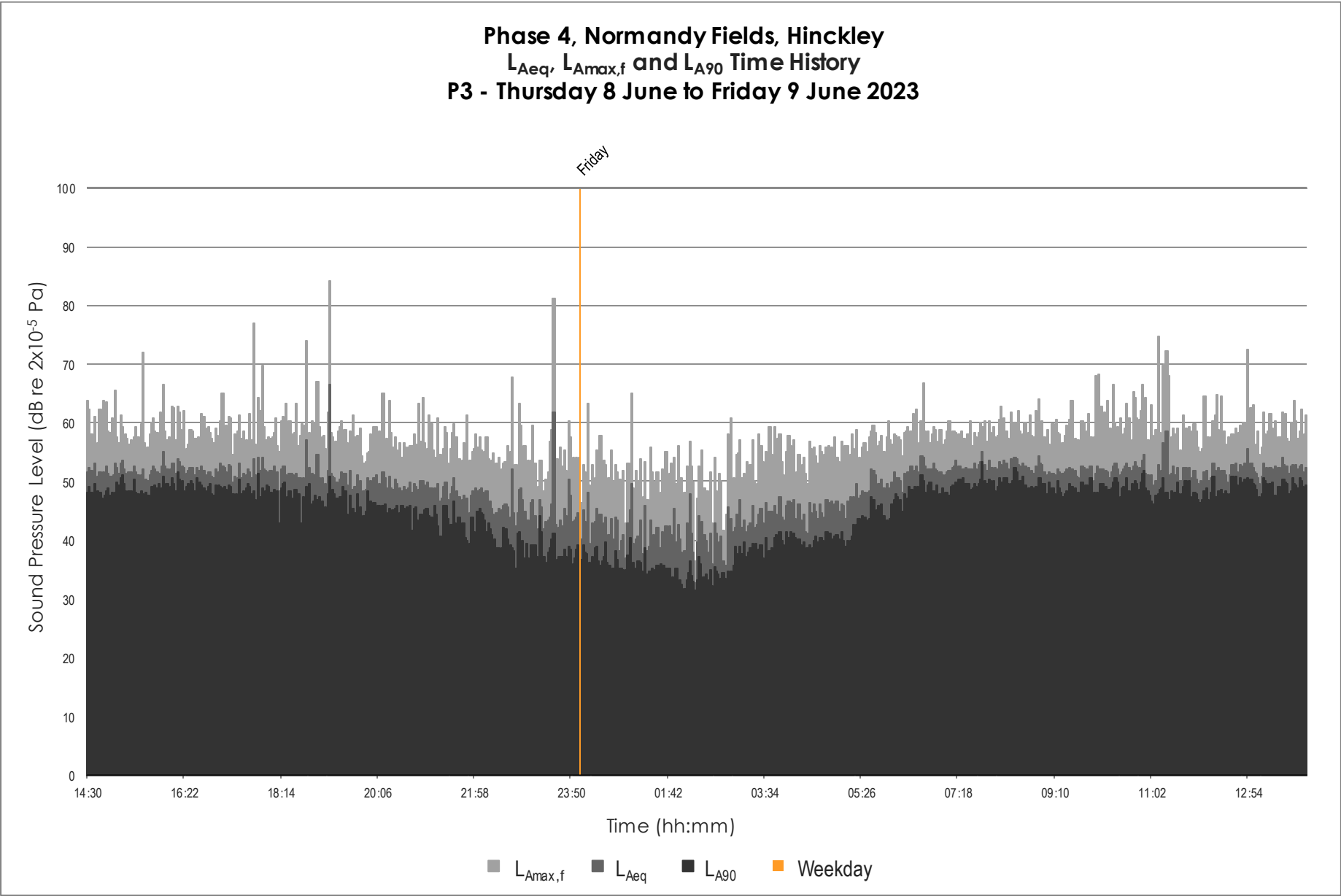
Table B.1: Instrumentation

Description	Manufacturer	Type	Serial Number	Laboratory Calibration Date
Sound Level Meter	Rion	NL-52	542901	10/01/2022
½" Pre- Polarised microphone		UC-59	06478	
Pre-amplifier		NH-25	42929	
Sound Level Meter	Rion	NL-52	1043457	12/01/2023
½" Pre- Polarised microphone		UC-59	07232	
Pre-amplifier		NH-25	43486	
Sound Level Meter	Rion	NL-52	542902	23/06/2022
½" Pre- Polarised microphone		UC-59	07374	
Pre-amplifier		NH-25	43580	
Sound Calibrator	Rion	NC-74	34746691	15/08/2022

Appendix C Sound Time History Graphs







Appendix D Noise Contour Plots

Figure D.1: Calculated Daytime External Sound Levels, dB L_{Aeq,16hours}



Figure D.2: Calculated Night-Time External Sound Levels, dB L_{Aeq,8hours}



Figure D.3: Calculated Night-Time External Sound Levels, dB LAFMax



Appendix E Barrier Specification

E.1 Overview

- E.1.1 With respect to acoustic attenuation, garden fences can be constructed from a range of materials, including timber, masonry, concrete, cementitious wood wool or wood shaving panels, metals, plastics and recycled materials that meet the requirements for sound insulation, sound absorption, durability and structural integrity. However, timber is most common material used in these applications.
- E.1.2 The mechanical performance and stability requirements will need to be confirmed by the appropriate technical specialists.

E.2 Garden Fencing

- E.2.1 Acoustic screening shall extend up to a minimum height as specified in **Figure D.1** of this report.

Airborne Sound Insulation

- E.2.2 The screen shall be imperforate (solid) and have a minimum mass per unit area of at least 10 kg/m² over the specified life of the barrier.
- E.2.3 Joints between panels should be well sealed to prevent leakage through the barrier. Timber panels and planks should incorporate due allowance for expansion and shrinkage of the timber by including a rebated overlap or tongue and groove joint between boards, or an external batten to cover movement gaps. The overlap should not be less than 25% of the board width to prevent significant leakage. Where materials are stable and significant movement between panels would not occur, the gaps between panels should be sealed with a resilient gasket.

Appendix F Façade Zone Map

Figure F.1: Façade Zone Map



Appendix G External Building Fabric Acoustic Performance Specification

G.1 General

- G.1.1 The project criteria are expressed in terms of an overall A-weighted dB sound level. Alternative frequency specific performance levels may therefore be acceptable subject to confirmation from Stantec.
- G.1.2 Fully detailed test reports from independent acoustic test authorities shall be supplied. All test reports shall be in English or, a full English translation.
- G.1.3 Test data should include the 1/3 octave band results from 100 Hz to 3150 Hz inclusive, together with the corresponding octave band results from 125 Hz to 4000 Hz inclusive.
- G.1.4 As a result of wind or other atmospheric effects, external building elements should not give rise to rattling, creaking or whistling.

G.2 Glazing Sound Insulation Performance

- G.2.1 The complete glazing system (including frames, joints, seals, spandrel panels and opening lights and trickle vents (as appropriate) shall achieve the following minimum sound reduction indices when tested in accordance with BS EN ISO 10140-2:2021.

Glazing Type	Minimum Sound Reduction Index R value (dB) at Octave Band Frequency (Hz)					R _w *
	125	250	500	1k	2k	
G1	27	29	36	41	42	39
G2	19	22	25	33	33	30

*The overall R_w figure is provided for guidance purposes only. The octave-band specification should be referred to in order to check compliance with the requirements.

G.3 Trickle Ventilator Sound Insulation Performance

- G.3.1 Trickle ventilators should achieve the following minimum element normalised level differences when tested in accordance with BS EN 10140-2:2021.

Ventilator Type	Minimum Normalised Element Difference (D _{n,e}) Value (dB) at Octave Band Centre Frequency (Hz) for Single Ventilator					D _{n,e,w} *
	125	250	500	1k	2k	
V1	33	35	39	44	48	43
V2	33	34	34	35	39	36
V3	26	27	28	30	30	30

*The overall D_{n,e,w} figure is provided for guidance purposes only. The octave-band specification should be referred to in order to check compliance with the requirements.

- G.3.2 It should be noted that the acoustic specification for trickle ventilators is based on a single ventilator within the room providing an equivalent area of 8000 mm². If the total equivalent area provided by the trickle ventilator/s is different to this, or the acoustic performance for a given

trickle ventilator is provided based on a different equivalent area, then the specification of the ventilator/s should be correctly adjusted.

- G.3.3 Please refer to a suitably qualified acoustician to determine the appropriate performance correction.