



**Phase 3,
Normandy Fields, Hinckley**
Planning Condition 33 Discharge Report

On behalf of **Bloor Homes East Midlands**



Project Ref: 332511105/100.3 | Rev: 01 | Date: June 2023

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01	June 2023	Update to include assessment of convenience store plant and updated ventilation strategy	DT	PT	MB

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1 Introduction

1.1 Background

- 1.1.1 Stantec (UK) Ltd has been commissioned by Bloor Homes East Midlands to provide a report to support a reserved matters application for the discharge of planning Condition 33 pertaining to Phase 3 of Normandy Fields, Hinckley.
- 1.1.2 The development was granted outline planning permission in May 2018 (planning reference No. 15/00188/OUT). Following the granting of planning permission, Condition 33 imposed on the development requires a scheme for protecting the proposed dwellings from noise associated with road traffic and the proposed convenience store to be submitted to and approved by the Local Authority.
- 1.1.3 An environmental sound survey has been undertaken by Stantec (UK) Ltd, to establish the existing environmental sound levels associated with transportation sources incident on the proposed development.
- 1.1.4 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.
- 1.1.5 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.
- 1.1.6 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 24-hour 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 Condition 33.
 - To undertake a detailed assessment of the likely airborne noise ingress into habitable spaces and determine the required acoustic performance of the critical elements of the building façade to achieve the proposed criteria.
 - To undertake an assessment of the likely sound levels in external amenity spaces at the proposed development and, if required, proposed mitigation measures required to achieve the proposed criteria.
 - To undertake an assessment of the likely noise impact associated with the operation of plant at the nearby convenience store and, if required, proposed mitigation measures required to achieve the proposed criteria.

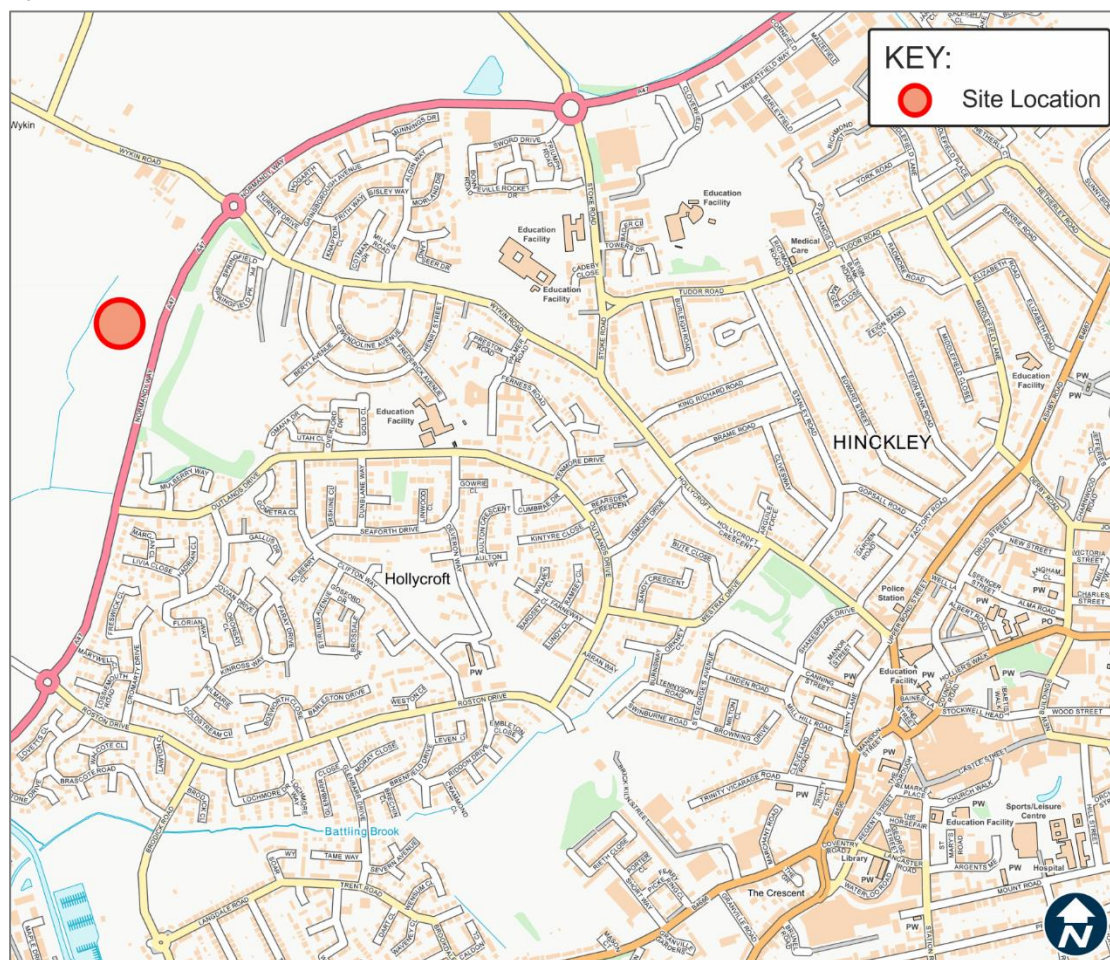
1.3 Site Description and Location

- 1.3.1 The proposed scheme forms part of the wider development at *Land North East of Triumph Motorcycles Ltd, Dodwells Road, Hinckley* and is 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. A site access road borders the site to the south and serves dwellings located at the Hollywood Grange development. The site is surrounded by open land to the north and west.
- 1.3.3 The location of the proposed site is detailed in **Figure 1**.

Figure 1: Site Location Plan



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2 Local Authority, Standards, Guidance and Criteria

2.1 Local Authority

Planning Condition 33 (Planning Ref. 15/00188/OUT)

- 2.1.1 In granting planning permission to the development, Hinckley and Bosworth Borough Council (the Local Planning Authority) has imposed a number of planning conditions. Condition 33 relates to a scheme for protecting the proposed dwellings from noise associated with road traffic and the proposed convenience store.
- 2.1.2 Condition 33, which is addressed within this report is as follows:

“No development shall commence, in any phase, unless and until such time as a scheme for protecting the proposed dwellings and/or school and for that phase from noise associated with road traffic and the proposed convenience retail has been submitted to and approved by the Local Planning Authority; and all works which form part of the scheme shall be completed before any of the permitted dwellings are first occupied.”

2.2 Standards

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

- 2.2.1 BS 8233, in relation to this development, sets out desirable guideline values in habitable rooms, such as living rooms and bedrooms.
- 2.2.2 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.
- 2.2.3 The desirable internal ambient noise levels for dwellings are presented in **Table 2.1**.

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

Activity	Location	Desirable 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			

2.2.4 The Standard also provides advice in relation to desirable 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.”

British Standard 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

2.2.5 BS 4142:2014+A1:2019 describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in the standard use outdoor sound levels to

assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

- 2.2.6 The standard is used to determine the rating levels for sources of sound of an industrial and/or commercial nature and the ambient, background and residual sound levels at outdoor locations. These levels could be used for the purposes of investigating complaints; assessing sound from proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and assessing sound at proposed new dwellings or premises used for residential purposes. However, the determination of noise amounting to a nuisance is beyond the scope of the standard.
- 2.2.7 The standard should not be used to assess sound from the passage of vehicles on public roads and railway systems; recreational activities; music and other entertainment; shooting grounds; construction and demolition; domestic animals; people; public address systems for speech and other sources falling within the scopes of other standards or guidance. The standard cannot be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.
- 2.2.8 The procedure contained in BS 4142 assesses the significance of sound which depends upon the margin by which the rating level of the specific sound sources exceeds the background sound level and the context in which the sound occurs/will occur. It is noted that a BS 4142 assessment is reliant on measuring relevant background sound levels.
- 2.2.9 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level and considering the following:
- Typically, the greater this difference, the greater the magnitude of the impact;
 - A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
 - A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
 - The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.
- 2.2.10 When considering the introduction of a new noise sensitive receptor Section 8.5 states:
- “Measure the background sound at the intended location of any new noise-sensitive receptor(s) in the absence of any specific sound.*
- NOTE Where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it should be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation.”*
- 2.2.11 To consider the context, BS 4142 advises that the following factors should be considered:
- The absolute level of sound.
 - The character and level of the residual sound compared to the character and level of the specific sound; and

- The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions such as:
 - Façade insulation treatment;
 - Ventilation and/or cooling that will reduce the need to have windows open to provide rapid or purge ventilation; and
 - Acoustic screening.

2.3 Guidance

Professional Practice Guidance on Planning and Noise, 2017

- 2.3.1 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.
- 2.3.2 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."

Acoustics, Ventilation and Overheating: Residential Design Guide

- 2.3.3 Acoustics Ventilation and Overheating: Residential Design Guide (AVO) was published in January 2020 by the Association of Noise Consultants (ANC). The AVO guide identifies an approach to acoustic assessments for new residential development that takes due regard of the interdependence of provisions for acoustics, ventilation and overheating.
- 2.3.4 Indoor environmental quality is dependent on several factors including air quality, thermal comfort and acoustic comfort. To provide sufficient levels of ventilation and mitigate overheating it may be necessary to rely on façade openings (e.g. openable windows) that allow noise into dwellings or provide mechanical ventilation systems that generate noise which could cause a noise impact to occupants. This may lead occupants to close windows or turn off the ventilation system, which could, in turn, result in an underventilated dwelling or overheating.
- 2.3.5 The AVO guidance is limited to residential developments which are predominantly affected by transport noise sources and it is not necessarily appropriate to apply the guidance to other types of noise.
- 2.3.6 The AVO guide details a two-stage assessment procedure to assist in the understanding of how acoustics, ventilation and overheating are related on a given site and therefore inform the building design to mitigate and reduce the interrelated issue of acoustics, ventilation and overheating. The assessment procedure is summarised below.
- 2.3.7 It should be noted that where internal ambient noise limits are discussed in the following sections, these relate to internal ambient noise levels under the overheating condition. Internal ambient noise levels during the 'normal' operation should typically be designed in accordance with the relevant guidance in BS 8233:2014

Level 1 Assessment – Site Risk Assessment

- 2.3.8 A Level 1 assessment is a site risk assessment based on external (free-field) noise levels and the assumption that opening windows are the primary means of mitigating overheating. Areas of sites which are exposed to higher noise levels are considered to be at higher risk. External noise levels and risk levels are not 'fixed' limits although **Table 2.2** provides a visual guide to noise levels during the daytime (07:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) periods and the related risk.

Table 2.2: AVO Level 1 Guidance on Risk Assessment - Overheating

Daytime $L_{Aeq,16hour*}$ (07:00–23:00)	50 dB	55 dB	60 dB	65 dB
Risk Category	Negligible	Low	Medium	High
Night-time $L_{Aeq,8hour}$ (23:00–07:00)	45 dB	50 dB		55 dB
Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect Increasing risk of adverse impact				
Level 2 assessment not required		Level 2 assessment optional		Level 2 assessment recommended

- 2.3.9 The AVO guide advises that individual maximum noise events at night (between 23:00 and 07:00 hours) during the overheating condition should not normally exceed 65 dB $L_{Amax,f}$ within bedrooms. This is equivalent to an external free-field sound level of 78 dB $L_{Amax,f}$ assuming a partially open window provides a sound level difference of 13 dB from outside to inside.
- 2.3.10 **Table 2.2** indicates that areas of sites exposed to higher noise levels and therefore in higher risk categories should be reviewed in more detail and that a subsequent Level 2 assessment may be required.

Level 2 Assessment – Internal Ambient Noise Level Assessment

- 2.3.11 Where indicated by a Level 1 assessment, the AVO guide recommends that a Level 2 assessment is carried out, which requires a more detailed assessment of internal ambient noise levels.
- 2.3.12 Unlike a Level 1 assessment based on external noise levels, a Level 2 assessment of internal noise levels takes into consideration acoustic mitigation which may be incorporated as part of the building's façade (e.g. balconies with acoustic soffit lining, acoustically lined plenum windows, acoustic louvre openings) to reduce the resultant internal noise levels during the overheating condition.
- 2.3.13 In considering the likely noise impact during the overheating condition, AVO advises that it is necessary to consider two factors:
- The number of hours/days during which the overheating condition is expected to occur; and
 - The resultant noise level during the overheating condition.

2.4 Proposed External and Internal Ambient Noise Level Design Criteria

2.4.1 **Table 2.3** details the proposed design criteria for road traffic noise and noise associated with the use of the convenience store. Noise design criteria for road traffic 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'. The road noise design criteria for external amenity areas are based on guidance outlined in Paragraph 7.7.3.2 of BS 8233:2014.

2.4.2 With respect to delivery noise associated with the convenience store, paragraph 7.7.1 of BS 8233:2014 states:

"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."

2.4.3 Therefore, based on guidance provided within BS 8233:2014, internal and external sound level criteria associated with deliveries to the convenience store have been determined based on levels that are 5 dB below those outlined in Table 4 of BS 8233:2014, and over a 1-hour reference period, rather than a 16-hour (daytime) and 8-hour (night-time) period. The assessment is undertaken based on background ventilation being provided by open trickle ventilators.

Table 2.3: Internal and External Sound Level Design Criteria

Location	Road Traffic Noise		Convenience Store
	Daytime (07:00 – 23:00 hours)	Night-Time (23:00 – 07:00 hours)	1 Hour (Daytime)
Internal Noise Levels – Living Rooms	35 dB LAeq,16hour	N/A	30 dB LAeq,1hour
Internal Noise Levels - Bedrooms	N/A	30 dB LAeq,8hour 45 dB LA _F Max *	25 dB LAeq,1hour 40 dB LA _F Max
External Amenity Areas	55 dB LAeq,16hour	N/A	50 dB LAeq,1hour

* Based on the 10th highest LA_FMax value.

3 Environmental Sound Survey

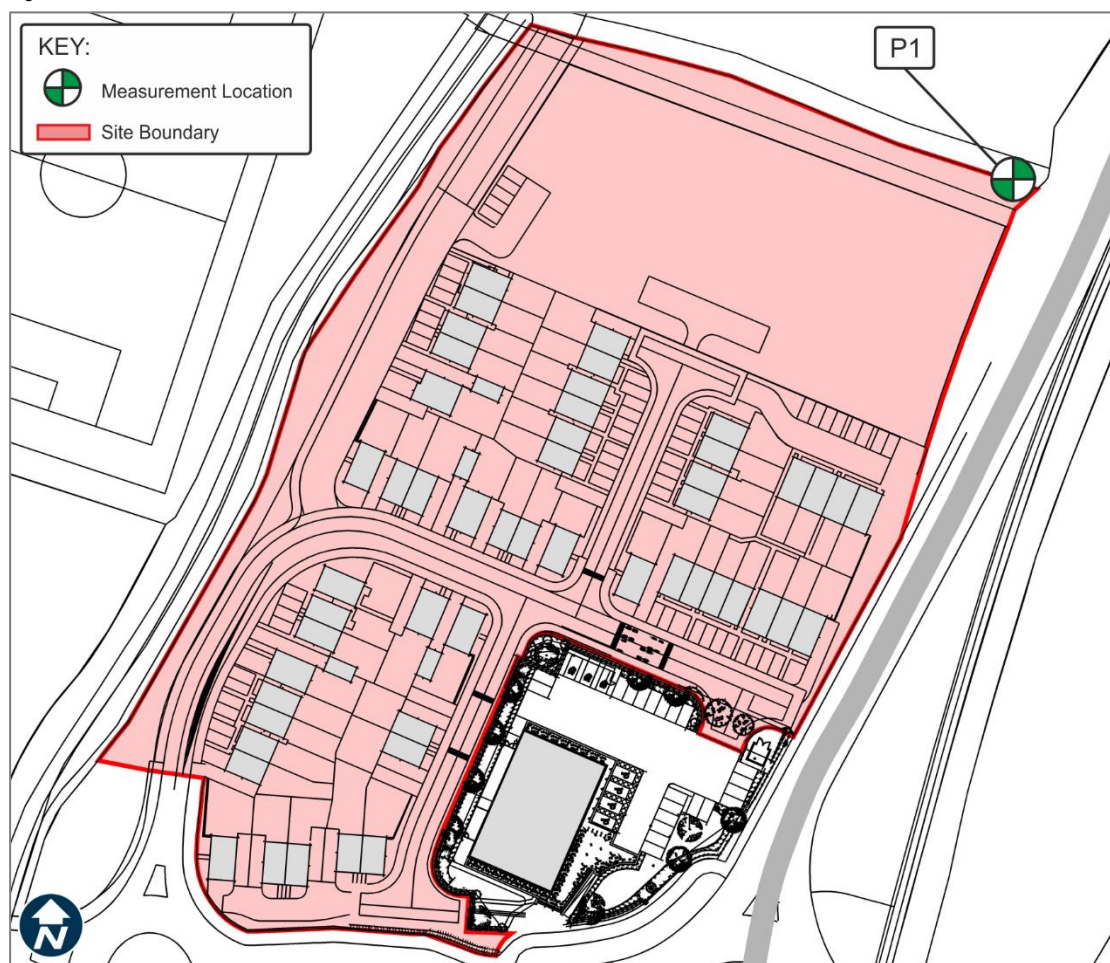
3.1 Procedure

- 3.1.1 An unattended environmental sound survey was undertaken between approximately 14:15 hours on Thursday 30 June 2022 and approximately 14:45 hours on Friday 1 July 2022 to determine the existing sound climate at the site in a location considered representative of transportation noise sources incident on, and background sound levels experienced at, the proposed development.
- 3.1.2 The survey was undertaken over a 24-hour period. Measurements were made over 15-minute periods of the L_{Aeq} , L_{A90} and L_{AFMax} sound levels.
- 3.1.3 The sound level meter was located in an environmental case. The microphone was connected to the meter 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 a single position 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 location is detailed in **Figure 2**.

Figure 2: Environmental Sound Measurement Location



3.2.2 The microphone was positioned in free field conditions, at a height of 2 m above ground level on an extending pole, approximately 11 m to the west of the A47 Normandy Way.

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 3.1**.

Table 3.1: Meteorological Conditions

Description	Thursday 30 June 2022	Friday 01 July 2022
Temperature (°C)	20	19
Precipitation (mm)	None	None
Approximate Cloud Cover (%)	95	80
Wind Speed (m/s)	1	1
Wind Direction	E	ENE

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.

3.6 Environmental Sound Survey Results

- 3.6.1 A summary of the survey results is detailed in **Table 3.2**. The full results of the unattended sound survey are presented in the time history graph in **Appendix C**.

Table 3.2: Summary of Unattended Environmental Sound Survey Results

Location	Period, T	Measured Sound Level (dB)		
		$L_{Aeq,T}$	Minimum $L_{A90,15minutes}$	Typical L_{AFMax}^*
P1	Daytime (07:00 – 23:00 hours)	61	39	-
	Night-time (23:00 – 07:00 hours)	55	32	74

* Based on the average of the 10th highest measured L_{AFmax} level.

4 Internal and External Noise Level Assessment

4.1 Overview

- 4.1.1 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.
- 4.1.2 Analysis of the proposed external building fabric has also been undertaken to determine the required acoustic performance of glazing elements to achieve the criteria detailed in **Table 2.2**. Compliance with the acoustic performance specification detailed herein is expected to result in compliance with the proposed acoustic criteria.

4.2 Calculated Incident Façade Levels

- 4.2.1 Using the results of the environmental sound survey, the data obtained from a topographical survey of the development site and free topographical data, a computer acoustic model has been produced, using computer software SoundPLAN v8.2. The model considers noise from the surrounding road network and noise associated with deliveries at the proposed convenience store.
- 4.2.2 The computer 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).
- 4.2.3 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.
- 4.2.4 Noise levels associated with deliveries to the proposed convenience store have been calculated and time averaged based on a single delivery occurring within a one-hour period. Sound levels associated with deliveries include activities such as the unloading/loading of goods, operation of tail lifts and reversing alarms.
- 4.2.5 **Table 4.1** outlines the source sound levels used to calculate façade incident levels associated with the proposed convenience store at the proposed residential receptors.

Table 4.1: Delivery and Vehicle Movement Source Sound Levels

Description	Parameter	Sound Pressure Level (dB) at Octave Band Centre Frequency (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Convenience Store Deliveries	dB $L_{eq,1hour}$ at 4 m	58	62	63	69	68	67	63	55	73
	dB L_{AFMax} at 4 m	75	80	80	86	85	85	81	73	91
Convenience Store Delivery Vehicle Arriving/Departing	dB $L_{Aeq,1hour}$ at 1 m	57	51	49	51	55	51	46	40	58
	dB L_{AFMax} at 1 m	92	86	84	86	90	86	81	75	93

- 4.2.6 Façade incident levels have been calculated based on the use of garden fences as indicated in **Appendix E**. The acoustic specification for close boarded garden fences can be found in

Appendix F. These have been included within the computer acoustic model. It is assumed that the proposed 2.2 m high brick wall is constructed with no gaps.

- 4.2.7 Incident façade levels for the proposed development have been calculated based on the results of the computer 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. Sound levels associated with deliveries have been calculated at a height of 4.0 m.

4.3 Sound Levels in External Sound Levels

- 4.3.1 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.

Road Traffic Noise

- 4.3.2 Calculations indicate that noise levels in the majority of the proposed external amenity areas associated with operational road traffic noise are likely to fall below 55 dB $L_{Aeq,16hours}$ 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 $L_{Aeq,16hours}$ during the daytime period but is likely to achieve or fall below 55 dB $L_{Aeq,16hours}$ in some areas of these spaces.

- 4.3.3 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.”

- 4.3.4 Based on the above, 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.

Convenience Store Deliveries

- 4.3.5 Calculations indicate that noise levels in the proposed external amenity areas associated with deliveries to the proposed convenience store are likely to be 50 dB $L_{Aeq,1hour}$ or below.

4.4 Ventilation

- 4.4.1 The requirements for building ventilation in dwellings are detailed in Approved Document F (ADF) and include provision for ‘whole dwelling ventilation’, ‘extract ventilation’ and ‘purge ventilation’.

- Whole Dwelling Ventilation - Nominally continuous ventilation of rooms or spaces at a relatively low rate to dilute and remove pollutants not removed by operation of extract ventilation or purge ventilation.
- Extract Ventilation - The removal of air directly to the outside. May be provided by passive or mechanical means.

- Purge Ventilation - Manually controlled ventilation at a relatively high rate to rapidly dilute pollutants and/or water vapour. 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.
- 4.4.2 ADF provides four 'template' systems which comply with the ventilation requirement for new dwellings and can be adopted to demonstrate compliance. These are:
- System 1: Background ventilators and intermittent extract fans.
 - System 2: Background ventilators and passive stack ventilation.
 - System 3: Continuous Mechanical Extract (MEV) with trickle ventilators providing inlet air; and
 - System 4: Continuous Mechanical Supply and Extract with Heat Recovery (MVHR).
- 4.4.3 Each system has different noise implications, however in the context of this assessment noise ingress via the ventilation system is the primary concern. Generally, for Systems 1-3 this is via the ventilators and for System 4 (MVHR) this is via the inlet and exhaust grilles within the dwelling associated with the MVHR system.
- 4.4.4 Based on information provided to us by the developer, it is understood that ventilation to dwellings is to be provided by trickle ventilators providing inlet air in habitable rooms (i.e. System 1) within some areas of the development, and in other areas of the development, ventilation is to be provided by air bricks and tile vents within the roof, in combination with a continuous mechanical extract system (i.e. System 3).
- 4.4.5 The areas of the development where Type 1 and Type 3 ventilation will be implemented is indicated in **Appendix G**.

4.5 Internal Sound Levels (External Building Fabric Assessment, Windows Closed)

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

Room Absorption

- 4.5.2 We have assumed the bedrooms and living rooms to be acoustically 'soft' with carpets, curtains and other soft furnishings. For the purposes of our analysis, we have assumed the average equivalent absorption coefficients detailed in **Table 4.2**.

Table 4.2: Average Equivalent Acoustic Absorption Coefficients

Room	Average Equivalent Acoustic Absorption Coefficient ($\bar{\alpha}$) at Octave-Band Centre Frequency (Hz)					
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
Bedrooms / Living Rooms	0.10	0.18	0.25	0.27	0.31	0.32

Proposed External Building Fabric

- 4.5.1 Based on the information provide to us by the developer, we have based our assessment on a typical brick/block cavity external wall build-up. The assessment is also based on a tiled/slatted roof with a plasterboard ceiling and insulation. Rooms within roof voids have been assessed based on a tiled/slatted roof with a plasterboard ceiling.

- 4.5.2 Please note that assessment of internal sound transfer between dwellings falls outside the scope of this report and should be assessed in detail by the relevant specialists. **Table 4.3** details typical sound reduction indices associated with the assumed external building fabric construction.

Table 4.3: Assumed External Wall and Roof 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

- 4.5.3 Our calculations have been based on building and window dimensions obtained from drawings provided by Bloor Homes East Midlands.

4.6 Glazing and Ventilation Acoustic Specification and Guidance on Construction

- 4.6.1 Glazing specifications have been consolidated so that a minimum number of different specifications are provided.
- 4.6.2 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.
- 4.6.3 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.
- 4.6.4 The location of the considered façade zones is presented in **Appendix G**.
- 4.6.5 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 H**.

Table 4.4: Glazing and Trickle Ventilator Guidance Constructions

Zone	Area	Glazing Type	Ventilation Type	Guidance Glazing and Ventilator Construction
1	Living Spaces and Bedrooms	G1	System 3	Up-rated acoustic glazing comprising 10 mm glass / 16 mm cavity / 6.4 mm glass with air bricks and tile vents
2		G2	System 1 (V1)	Conventional double glazing comprising 4 mm glass / 16 mm cavity / 4 mm glass with trickle ventilators
3		G2	System 3	Conventional double glazing comprising 4 mm glass / 16 mm cavity / 4 mm glass with air bricks and tile vents

- 4.6.6 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 H**, 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.

- 4.6.7 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.
- 4.6.8 Based on the results of the external building fabric assessment, the internal ambient sound levels are likely to achieve the proposed criteria for operational road traffic noise and noise associated with deliveries to the proposed convenience store outlined in **Table 2.2** during daytime and night-time periods.

4.7 Internal Sound Levels (Windows Open)

- 4.7.1 The results of an overheating assessment have been provided by Bloor Homes. The results of the assessment indicate that the overheating risk is 'not significant' for properties utilising the Type 1 ventilation system (i.e. trickle ventilators) and 'slight' for properties utilising the Type 3 ventilation system (i.e. continuous mechanical extract ventilation). A summary of the assessment outcomes is provided in **Appendix G**.
- 4.7.2 Based on these outcomes, it is anticipated that occupants would be unlikely to need to open their windows to mitigate against overheating. As such, an assessment of resultant internal noise levels with windows open is not necessary based on guidance within the AVO guide.

5 Convenience Store Plant Noise Assessment

5.1 Overview

5.1.1 A number of plant items are to be installed at the proposed convenience store and an assessment has been undertaken to determine the impact of noise associated with the operation of the plant on the nearby noise-sensitive receptors.

5.1.2 The assessment is based on the documents listed in **Table 5.1**:

Table 5.1: Referenced Documents

Document Reference	Name	Revision
HCD A0 00 DR	New Local Centre, Normandy Way Hinckley Proposed Site Plan	P25

5.2 Proposed Equipment

5.2.1 Details of the proposed plant at the convenience store are presented in **Table 5.2**.

Table 5.2: Plant Details

Plant	Reference	Make/Model/Duty	Location
Freezer Coldroom	Condenser 1	J&E Hall International / JEHS-0300-B2-L-3 / 2700 m ³ /h	Proposed Refuse and Plant Area
Chiller Coldroom	Condenser 2	J&E Hall International / JEHS-0113-B1-M-1 / 1250 m ³ /h	Proposed Refuse and Plant Area
DA Pack	Condenser 3	N/A	Proposed Refuse and Plant Area

5.3 Description of Plant Operation

5.3.1 Due to the nature of the operation of the convenience store, it is understood that all items of plant have the potential to operate simultaneously at any time within a 24-hour period, 7 days a week.

5.4 Plant Noise Data

5.4.1 The manufacturers' noise data for the proposed plant is presented in **Table 5.3**.

Table 5.3: Plant Noise Data

Reference	Parameter	Sound Level (dB) at Octave-band Centre Frequency (Hz)							dBA
		125	250	500	1 k	2 k	4 k	8 k	
Condenser 1	L _p at 1 m	50	54	52	46	42	35	35	53
Condenser 2	L _p at 1 m	55	51	45	40	37	28	27	48
Condenser 3	L _p at 10 m	N/A	N/A	N/A	N/A	N/A	N/A	N/A	30

5.5 Assessment Criteria

- 5.5.1 Based on the criteria outlined in **Section 2** and the results of the environmental sound survey, cumulative plant noise emissions should be compliant with the criteria outlined in **Table 5.4**.
- 5.5.2 Following the construction of the proposed development, background sound levels across the site are likely to be lower than those measured at the site due to noise from the surrounding road network being screened as a result of future buildings at the site. Therefore, the assessment criteria have been based on a level that is equal to the minimum measured background sound level at Position P1, when determined at 1 metre from the façade (in free field condition) at the nearest noise-sensitive receptors.

Table 5.4: Plant Noise Emissions Assessment Criteria

Period	Cumulative Plant Noise Emission Limiting Rating Level $L_{Ar,Tr}$ (dB)
Daytime hours (07:00 – 23:00)	39
Night-time Hours (23:00 – 07:00)	32

- 5.5.3 Compliance with the proposed limits is likely to ensure that noise associated with the operation of the plant at the proposed convenience store is of a level that is *'having a low impact, depending on the context'*.

5.6 Noise Sensitive Receptors

- 5.6.1 The assessment has been undertaken at the nearest proposed residential dwelling to the convenience store. This is considered to be the worst-case located receptor. The location of the nearest noise-sensitive receptor is indicated in **Figure 3** and described in **Table 5.5**.

Figure 3: Nearest Noise Sensitive Receptor



Courtesy of Hadfield Cawkwell Davidson

Table 5.5: Noise Sensitive Receptors

Receptor	Description
1	Nearest proposed residential dwelling located at Phase 3 of Normandy Fields, Hinckley

- 5.6.2 The assessment of noise associated with the operation of the proposed condenser units has been undertaken at Receptor 1.

5.7 Calculation Methodology

- 5.7.1 The calculation procedure for determining the noise rating level at the identified receptors takes into account the following:

- iii. Directivity (where applicable);
- iv. Reverberant conditions (where applicable); and
- v. Distance attenuation.

- 5.7.2 Based on the proposed site plan, the plant and refuse area at the convenience store is to be enclosed by a 1.8 m high solid and imperforate acoustic timber fence, with a minimum mass per unit area of 10 kg/m². This has been considered within the assessment of convenience store plant at the assessment receptor.

- 5.7.3 The assessment is based on the plant being located at ground level.

5.8 Resultant Specific Sound Level

- 5.8.1 The specific sound level has been calculated at the nearest noise-sensitive receptor and is summarised in **Table 5.6**.

Table 5.6: Calculated Specific Sound Level at Receptor 1

Receptor	Calculated Specific Sound Level $L_{Aeq,Tr}$ (dB)
1	29

5.9 BS 4142 Noise Rating Corrections

- 5.9.1 For sources that are considered to emit noise that is tonal, impulsive or intermittent, corrections should be applied and included within the calculations (maximum of +6 dB for tonality, +9 dB for impulsivity and +3 dB for intermittency).
- 5.9.2 Based on the sound emission data outlined in **Table 5.3**, the proposed plant is not considered to emit noise that is tonal. Furthermore, the plant is not considered to operate impulsively.
- 5.9.3 It is considered unlikely that the plant will operate intermittently within the 15-minute assessment period. However, in order to provide a worst-case assessment and to account for any potential intermittency, a 3 dB correction has been applied.

5.10 Assessment Results

- 5.10.1 Based on the calculated specific sound levels and applicable feature corrections, the noise rating levels have been calculated at the nearest noise-sensitive receptors and presented in **Table 5.7**.

Table 5.7: Calculated Noise Rating Level at Receptor 1

Receptor	Assessment Criteria, $L_{Ar,Tr}$ (dB)	Calculated Noise Rating Level, $L_{Ar,Tr}$ (dB)
1	32	32

- 5.10.2 The results of the assessment indicate that noise associated with the operation of the convenience store plant at the proposed development is likely to achieve the plant noise emissions assessment criteria. Therefore, it is considered that no additional mitigation is required.

6 Conclusions

- 6.1.1 Stantec (UK) Ltd has been commissioned by Bloor Homes East Midlands to provide a report to support a reserved matters application for the discharge of planning Condition 33 pertaining to Phase 3 of Normandy Fields, Hinckley.
- 6.1.2 The development was granted outline planning permission in May 2018 (Planning Reference No. 15/00188/OUT). Following the granting of planning permission, Condition 33 imposed on the development requires a scheme for protecting the proposed dwellings from noise associated with road traffic and the proposed convenience store to be submitted to and approved by the Local Authority.
- 6.1.3 An environmental sound survey has been undertaken by Stantec (UK) Ltd, to establish the existing environmental sound levels associated with transportation sources incident on the proposed development.
- 6.1.4 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.
- 6.1.5 Assessment criteria have been proposed based on guideline values for internal ambient noise levels in dwellings and the design criteria for external noise outlined in BS 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'.
- 6.1.6 Noise levels in the majority of the proposed external amenity areas associated with operational road traffic noise are likely to fall below 55 dB $L_{Aeq,16hours}$ 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 $L_{Aeq,16hours}$ during the daytime period but is likely to achieve or fall below 55 dB $L_{Aeq,16hours}$ in some areas of these spaces.
- 6.1.7 However, based on information outlined within BS8233:2014, 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.
- 6.1.8 Calculations indicate that noise levels in the proposed external amenity areas associated with deliveries to the proposed convenience store are likely to be 50 dB $L_{Aeq,1hour}$ or below.
- 6.1.9 Analysis of the proposed external building fabric has been undertaken 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.
- 6.1.10 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.
- 6.1.11 Consideration has been given to overheating within dwellings, based on the overheating risk being 'slight' or 'not significant'. As such, an assessment of resultant internal noise levels with windows open is not necessary based on guidance within the AVO guide.
- 6.1.12 An assessment has been undertaken to determine the impact of noise associated with the operation of the plant at the proposed development. The results of the assessment indicate that noise associated with the operation of the convenience store plant at the proposed development is likely to achieve the plant noise emissions assessment criteria. Therefore, it is considered that no additional mitigation is required.

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 ρ 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.

Parameter	Description
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 μ Pa. Defined as: $L_p = 20 \log \left(\frac{p}{p_0} \right)$
Sound Sources	Sounds generated by nature or human activity.

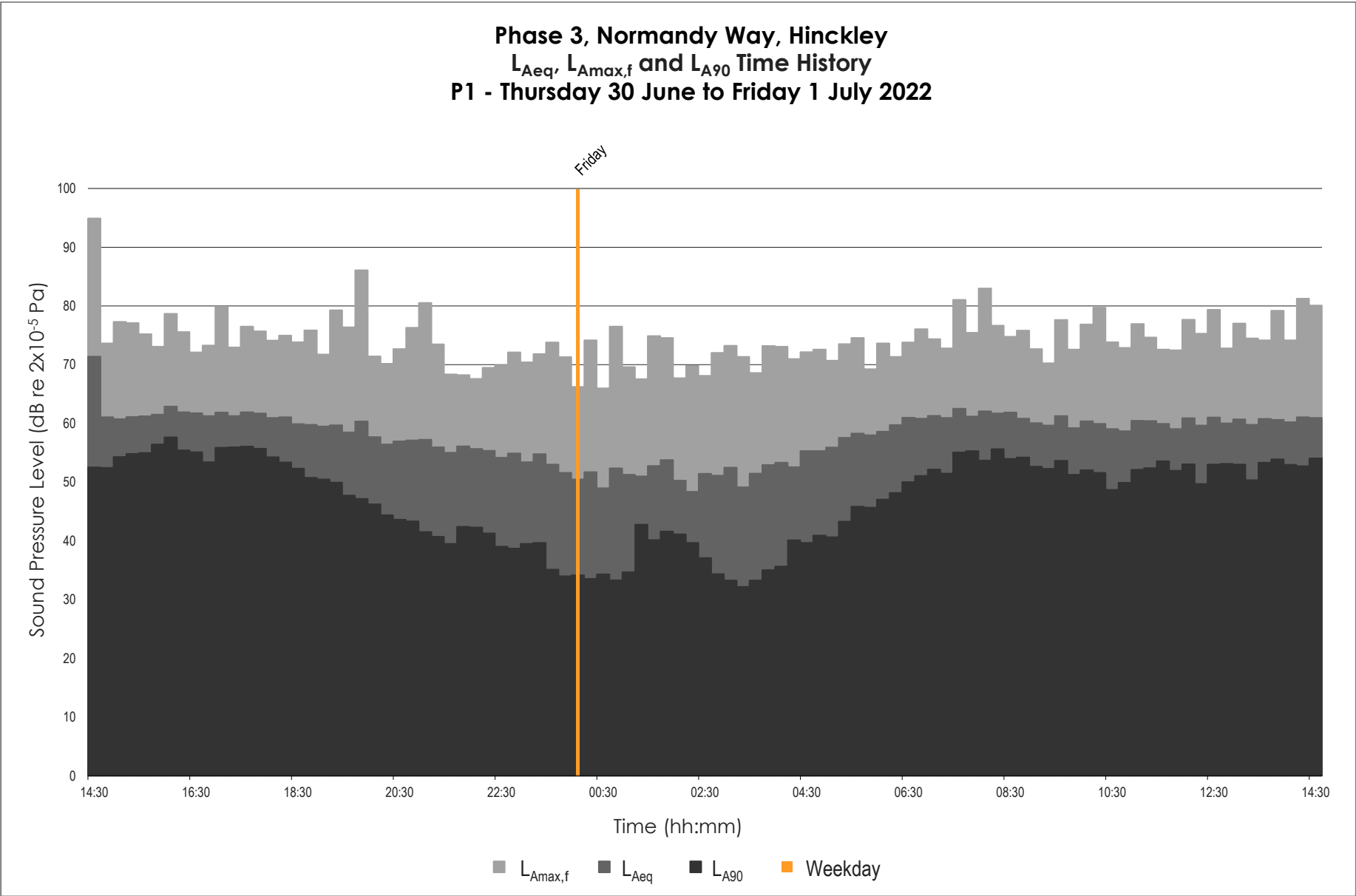
Appendix B Instrumentation

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	Brüel & Kjær	2250	2626233	25/03/2022
½" Pre- Polarised microphone		4189	2621212	
Pre-amplifier		ZC0032	11992	
Sound Calibrator	Brüel & Kjær	4231	2619374	06/10/2021

Appendix C Sound Time History Graph



Appendix D Noise Contour Plots

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

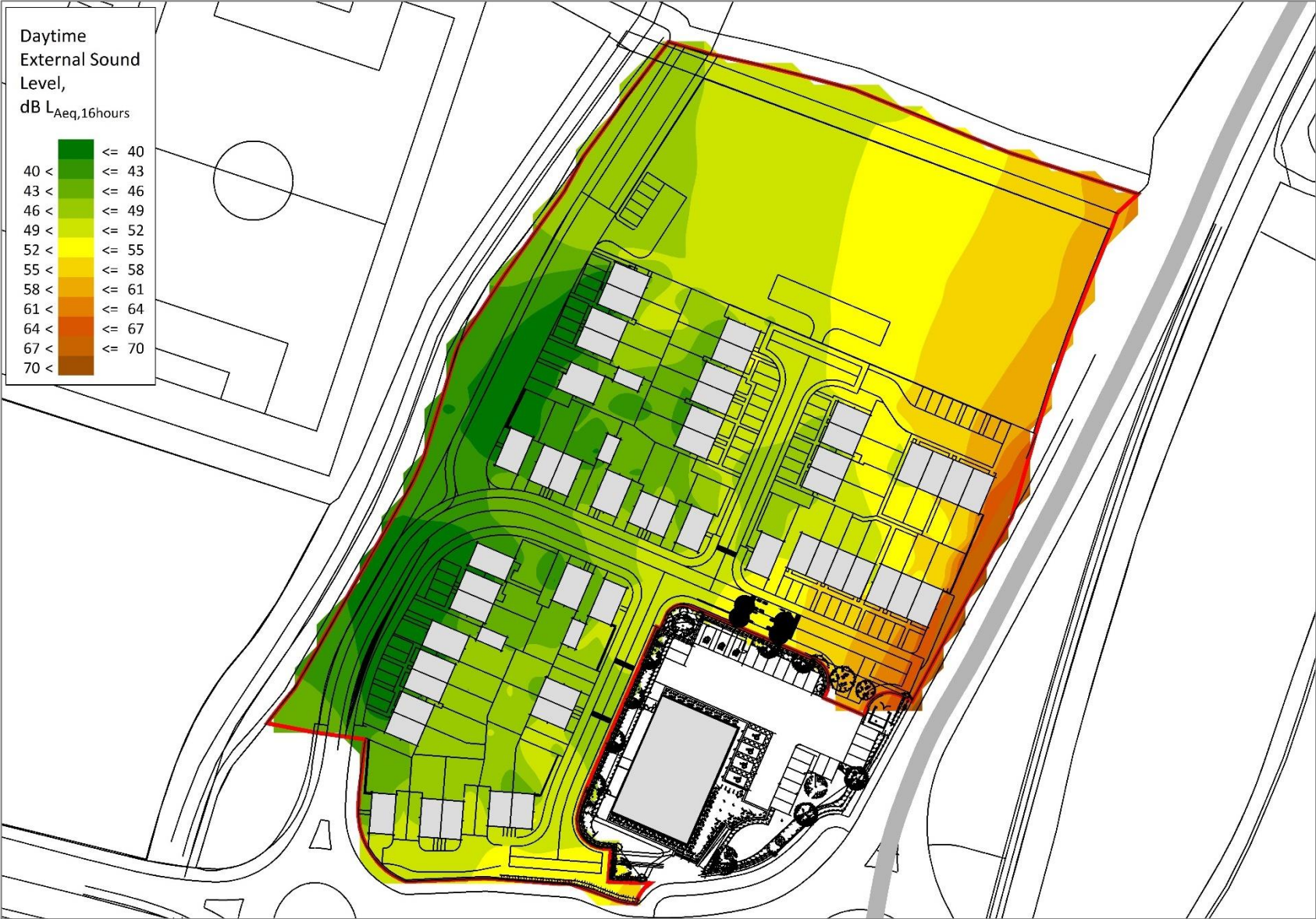


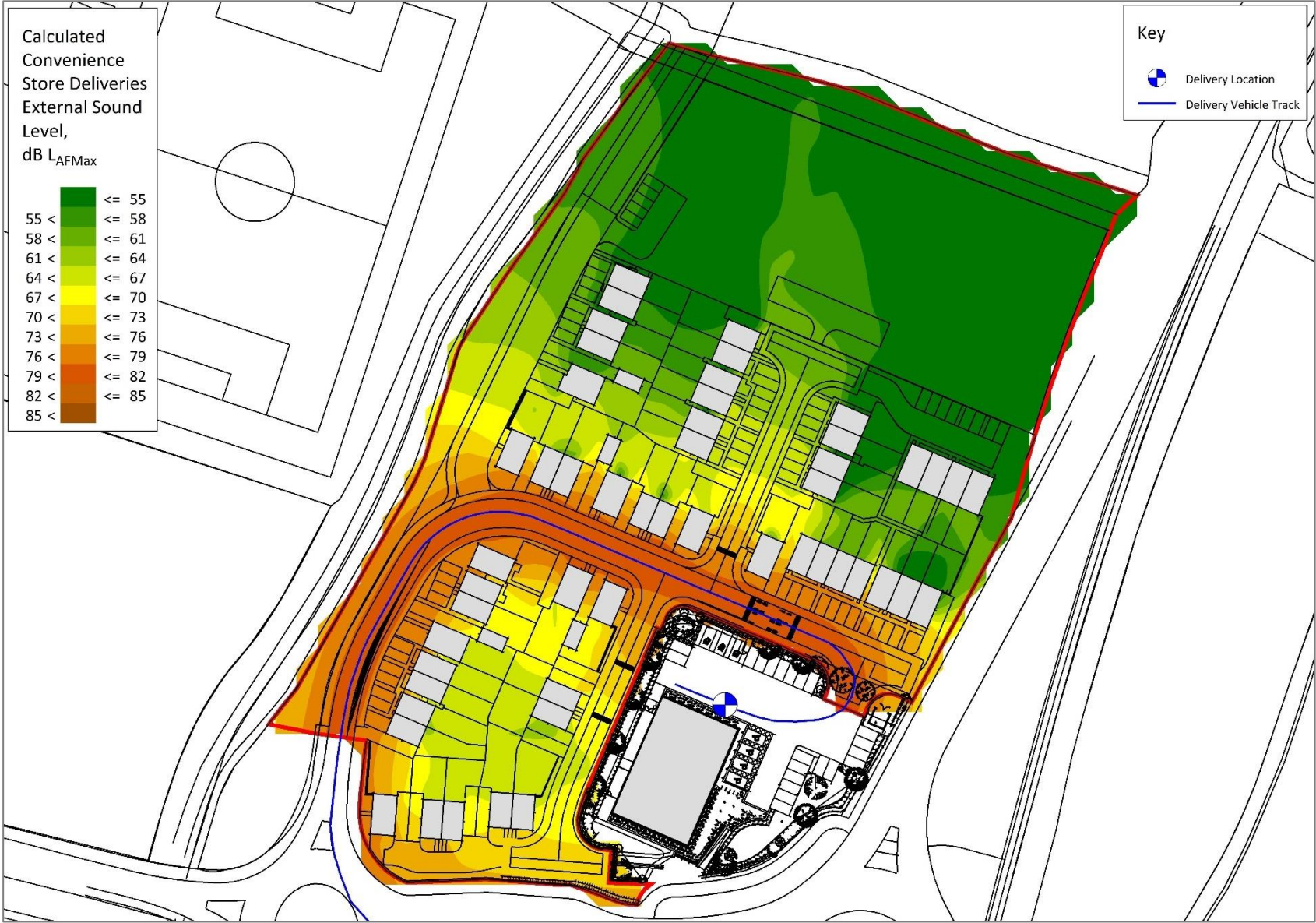
Figure D.2: Calculated Night-Time External Sound Levels – Road Traffic Noise, dB L_{Aeq,8hours}



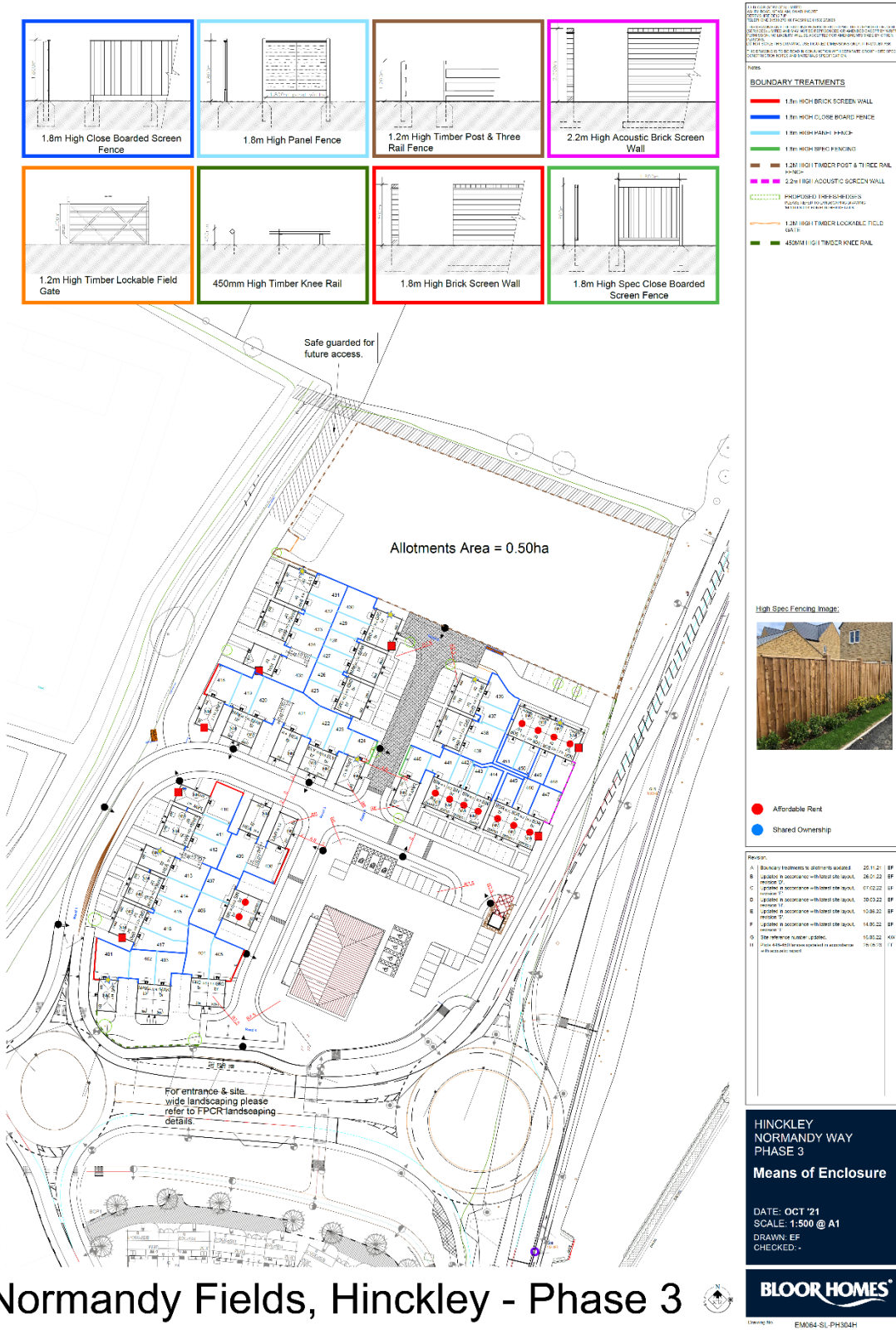
Figure D.3: Calculated External Sound Levels – Convenience Store Deliveries, dB L_{Aeq,1hour}



Figure D.4: Calculated External Sound Levels – Convenience Store Deliveries, dB L_{AFMax}



Appendix E Means of Enclosure



Normandy Fields, Hinckley - Phase 3

Appendix F Barrier Specification

F.1 Overview

- F.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 the most common material used in these applications.

F.2 Garden Fencing

- F.2.1 Acoustic screening shall extend up to a minimum height of 1.8 m above ground level.

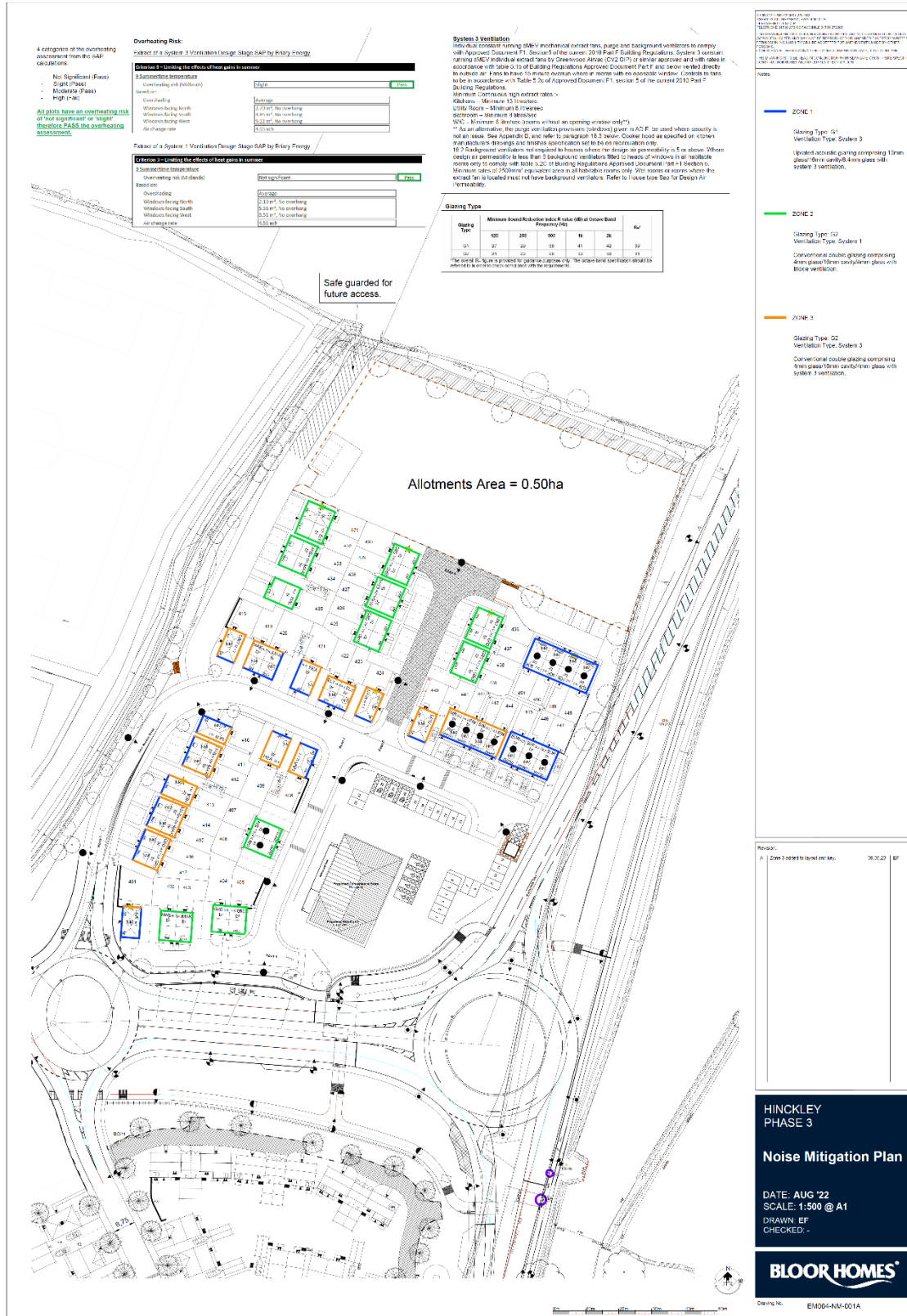
Airborne Sound Insulation

- F.2.2 The screen shall be imperforate (solid) and have a minimum mass per unit area of at least 10 kg/m². This requirement can usually be met with a solid and imperforate 20 mm thick timber fence.
- F.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.

Mechanical Performance and Stability

- F.2.4 The barrier shall be capable of resisting wind loadings and the self-weight of its component parts without reducing its effectiveness as a garden fence. The material shall retain its structural integrity over the specified life of the barrier.

Appendix G Ventilation Strategy and Façade Zone Map



Appendix H External Building Fabric Acoustic Performance Specification

H.1 General

- H.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.
- H.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.
- H.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.
- H.1.4 As a result of wind or other atmospheric effects, external building elements should not give rise to rattling, creaking or whistling.

H.2 Glazing Sound Insulation Performance

- H.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	21	23	28	33	33	31

*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.

H.3 Trickle Ventilator Sound Insulation Performance

- H.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	32	32	31	33	31	32

*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.

- H.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 free area of 8000 mm². If the number of ventilators (of the same free area) in a habitable space is greater than this, then the specification of each ventilator should be adjusted using the corrections in the table below.

Performance Correction (dB) For Equivalent Opening Area of Trickle Ventilators in Room (mm²)				
4000	8000	10,000	12,000	16,000
-3	+0	+1	+2	+3

H.3.3 If the equivalent free area is not listed within the table, please refer to a suitably qualified acoustician to determine the appropriate performance correction.