wardell-armstrong.com

ENERGY AND CLIMATE CHANGE
ENVIRONMENT AND SUSTAINABILITY
INFRASTRUCTURE AND UTILITIES
LAND AND PROPERTY
MINING AND MINERAL PROCESSING
MINERAL ESTATES
WASTE RESOURCE MANAGEMENT

BLOOR HOMES

Land at Wickwar

Noise Assessment

November 2021

wardell armstrong

Wardell Armstrong
41-50 Futura Park, Aspinall Way, Middlebrook, Bolton, BL6 6SU United Kingdom
Telephone: +44 (0)1204 227 227 www.wardell-armstrong.com

DATE ISSUED:	November 2021
JOB NUMBER:	**GM11781**
REPORT NUMBER:	**0001**
VERSION:	**V1.0**
STATUS:	**FINAL**

BLOOR HOMES

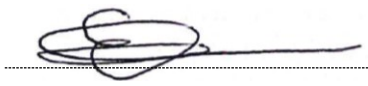
Land At Wickwar

Noise Assessment

November 2021

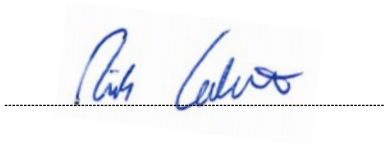
PREPARED BY:

Emily Forster, TechIOA Senior Environmental Scientist



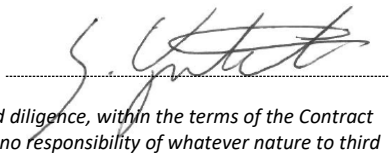
CHECKED BY:

Richard Calvert, MIOA Associate Director



APPROVED BY:

Simon Urquhart, MIOA Technical Director



CONTENTS

TABLES

APPENDICES

FIGURES

EXECUTIVE SUMMARY

Wardell Armstrong LLP has carried out a noise assessment to accompany an outline planning application for a proposed residential development on land at Wickwar, Gloucestershire.

The noise sources which will potentially affect the residents of the proposed residential development are road traffic on Sodbury Lane and industrial noise from the dairy farm to the north and the Country Style Supplies premises to the east. A noise survey has been undertaken and has established that road traffic and industrial noise are the dominant sources of noise affecting the proposed development site.

Without mitigation measures, the assessment indicates that there is potential for proposed dwellings closest to Sodbury Road and the dairy farm to experience an adverse effect due to road traffic and industrial noise.

Outline noise mitigation measures have been suggested for proposed dwellings closest to Sodbury Road and the dairy farm. The assessment indicates that gardens could be located on the screened side of dwellings, to adequately protect garden areas from road and industrial noise. Dwellings located near to Sodbury Road and the dairy farm would meet internal noise guideline levels with windows closed in the facades closest to the lane. Standard thermal glazing would be sufficient, together with an alternative means of ventilation so that the windows could be closed as required by the occupant, and ventilation maintained. Further into the site noise levels will be lower, and therefore the potential for an adverse impact will be less due to the screening provided by the intervening dwellings themselves.

Mitigation requirements can be confirmed at the reserved matters stage, on a plot-by-plot basis, once a detailed design layout is available.

Future occupiers will not be exposed to unacceptably high levels of noise, and the proposed development will meet the appropriate external and internal noise standards during the daytime and night-time, with the use of normal methods of mitigation, in compliance with relevant planning policies and guidance.

In accordance with the National Planning Policy Framework (NPPF) and Planning Practice Guidance – Noise (PPG-Noise), the noise assessment has demonstrated that adverse noise impacts can be addressed with suitable mitigation. Any significant impacts at the development would be avoided and reduced to a minimum. When considered in accordance

with the Noise Policy Statement for England (NPSE), the potential noise impact, the proposed development is below the Lowest Observed Adverse Effect Level (LOAEL).

1 INTRODUCTION

1.1.1 Wardell Armstrong LLP (WA) has been commissioned by Bloor Homes to undertake a noise assessment to accompany the outline planning application for a proposed residential development on land off Sodbury Road, Wickwar.

1.1.2 The proposed development site is located in Wickwar, a village in Gloucestershire. It is proposed up to 180 units would be built on the site. To the north is a dairy farm and to the east are existing residential dwellings and the Country Style Supplies premises, which front onto Sodbury Road. To the east of Sodbury Road are existing residential dwellings and two future residential development sites, which have been granted planning approval. To the south and west are agricultural fields.

1.1.3 This report details the results of the noise assessment undertaken to accompany the outline planning application for the proposed development. The report assesses the results of baseline noise monitoring and noise modelling carried out in accordance with current guidance and includes recommendations for outline noise mitigation where appropriate.

2 ASSESSMENT METHODOLODGY

2.1 Consultation and Scope of Works

2.1.1 The general principles of the assessment methodology were sent to Ms Nicola Cox Environmental Health Officer (EHO) at South Gloucestershire Council (SGC) on 4h May 2021.

2.1.2 The following methodology was agreed with SGC:

- A noise assessment is required for the operational phase of the development, to consider the potential effects of existing noise sources on the proposed residential units. The most significant existing source of noise is road traffic on Sodbury Road and industrial noise from the dairy farm to the north and the Country Style Supplies premises to the east.
- A noise survey will be carried out to establish ambient, and background noise levels on the site, and the specific sound levels from the industrial and commercial premises.
- A 3D noise model using software SoundPLAN v8.2 will be created, with the results analysed and assessed.
- Mitigation requirements, where necessary, will be provided to demonstrate that guidance levels can be met.

2.1.3 The scope of the noise assessment includes consideration of noise at the proposed residential areas, specifically in terms of the potential impact of existing transportation and industrial noise and is in line with current guidance.

2.1.4 The noise assessment will take into account current guidance including:

- National Planning Policy Framework, 2021 (NPPF).
- Noise Policy Statement for England 2010 (NPSE).
- Planning Practice Guidance - Noise, 2019 (PPG-Noise).
- ProPG Planning & Noise – Professional Practice Guidance on Planning & Noise, 2017 (ProPG).
- Acoustics Ventilation and Overheating – Residential Design Guide, 2020 (AVO).
- British Standard 8233:2014 Guidance on Sound Insulation and noise reduction for buildings (BS8233).

- British Standard 4142:2014+A1:2019 Methods for Rating & Assessing Industrial & Commercial Sound (BS4142).

2.1.5 Further details of these documents are included in **Appendix A**.

2.2 Noise Survey

2.2.1 As part of this assessment, Wardell Armstrong LLP has carried out unattended and attended noise surveys, to assess the current ambient and background noise levels at proposed receptor locations. Furthermore, detailed measurements of the sources of industrial and commercial noise have been carried out.

2.2.2 The results of the noise survey are detailed in Section 3 of this report.

2.3 Noise Modelling

2.3.1 SoundPLAN v8.2 noise modelling software has been used to calculate the propagation of noise across the development site and has been used to determine the need for any mitigation measures.

2.3.2 The modelling has been carried out in accordance with ISO 9613-2:1996 Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation (ISO9613). The software uses geographical information to create a model of the study area on which to generate noise contours and includes objects that affect the propagation of sound such as buildings and topography.

2.4 COVID-19

2.4.1 The noise survey was carried out during the COVID-19 pandemic, which could have a potential effect on ambient noise levels. During the time of the survey, restrictions had been relaxed, allowing individuals to leave home and meet up to 6 people in both an outdoor and indoor settings. Leisure facilities and pubs, cafes and restaurants were also open for indoor and outdoor services.

2.4.2 Due to the easing of restrictions, it is believed the COVID-19 pandemic is unlikely to have had a significant impact on the measured noise levels at the proposed development site. During the time of the survey, traffic levels were at 96 – 99% of their normal level and therefore the measured noise levels are believed to be robust.

3 NOISE SURVEY

3.1 Introduction

3.1.1 Between the 1st and 4th June 2021, WA carried out a noise survey to measure existing ambient and background noise levels at the proposed development site. In addition, specific noise levels of the equipment and processes associated with the adjacent industrial premises and farm have been undertaken.

3.1.2 Attended and unattended noise measurements, supplemented with audio recordings, were taken between 1523 hours on 1st June 2021 to 1139 hours on 4th June 2021.

3.1.3 Three monitoring locations (ML(s)) were selected to capture the noise from road traffic on Sodbury Road and industrial noise from the dairy farm and the Country Style Supplies premises. The location of each noise monitoring location is shown on Drawing GM11781/001.

3.1.4 The following noise sources and activities were identified:

- Road traffic on Sodbury Road.
- Use of tractors, with associated engine noise and reverse alarms, and occasional bangs from the dairy farm (to the north).
- Use of forklifts, with associated engine noise and reverse alarms and occasional bangs from Country Style Supplies Ltd.

3.1.5 Table 1 shows the noise monitoring periods at each of the monitoring locations, together with associated observations undertaken during the installation and decommissioning of the noise meters.

3.1.6 The locations are shown on Drawing GM11781/001.

Table 1: Noise Monitoring Periods			
Monitoring Location	**Start Date and Time**	**Finish Date and Time**	**Comments**
ML1	01/06/2021 15:23:14	02/06/2021 10:38:47	Attended and unattended noise measurement of noise from the dairy farm to the west. During the survey, noise from tractors, including reverse alarms, engine noise and occasional bangs could be heard.
ML2	02/06/2021 11:05:37	03/06/2021 10:48:52	Attended and unattended noise measurement of noise from the Country Style Supplies premises. During the survey, noise from forklifts, including reverse alarms, engine noise and occasional bangs could be heard. Noise from road traffic on Sodbury Road could also be heard.
ML3	03/06/2021 11:01:15	04/06/2021 11:39:24	Unattended noise measurement of road traffic on Sodbury Road. During the survey, and from a review of the noise data, noise from road traffic was dominant.

3.1.7 The noise measurements were made using Class 1, integrating sound level meters. The microphones were mounted on tripods 1.5 metres above the ground, with the diaphragm horizontal, and more than 3.5 metres from any other reflecting surfaces. The sound level meters were calibrated to a reference level of 94dB at 1kHz both before, and on completion of, the noise survey. No significant drift in the calibration during the survey was noted.

3.1.8 A-weighted[1] L_{eqs}[2] were measured in accordance with current guidance. The maximum and minimum sound pressure levels, A-weighted L_{90s}[3] , A-weighted L_{10s}[4] were also measured to provide additional information. The measured noise levels are set out in full in **Appendix C**.

3.2 Meteorological Conditions

3.2.1 The weather conditions between the 1st and 4th June 2021 were obtained on site during the noise survey and from the Time and Date (timeanddate.com) meteorological website.

[1] A' Weighting — An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions.

[2] L_{eqs} — Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.

[3] L_{90} — The noise level which is exceeded for 90% of the measurement period.

[4] L_{10} — The noise level which is exceeded for 10% of the measurement period.

3.2.2 Between the 1st and 4th June 2021, the weather conditions were as follows;

- Temperatures between 8 and 24°C.
- Wind speeds up to 5m/s.
- Dry weather conditions.

3.2.3 The weather conditions were considered to be suitable for environmental noise measurements.

3.3 Measured Noise Levels

3.3.1 The measured noise levels at all MLs are summarised below in Table 2. Daytime hours are taken to be 0700 to 2300 hours and night-time to be 2300 to 0700 hours.

Table 2: Measured Noise Levels at monitoring location

Noise Monitoring Location	Daytime dB(A) $L_{eq, 16hour}$	Night-time dB(A) $L_{eq, 8hour}$	Night-time dB(A) $L_{max,f}$ *
ML1	48	47	N/A
ML2	49	44	N/A
ML3	62	54	76

*In accordance with ProPG, the 10th highest $L_{Amax, f}$ level during the night-time has been selected and used in the assessment for road traffic. The $L_{Amax, f}$ level is only relevant for the assessment of road traffic and therefore has not been considered at ML1 and ML2.

3.4 Existing Background Noise Levels and Industrial Noise Measurements

3.4.1 The noise measurements obtained at ML1 and ML2 have been used to:

- Establish representative background noise levels for the relevant daytime 1hour and night-time 15min periods.
- Establish specific noise levels from the dairy farm to the north (ML1).
- Establish specific noise levels from Country Style Supplies Ltd (ML2).
- Undertake a BS4142 assessment of the impact of industrial noise. This assessment is provided in detail in Section 5 below.

3.4.2 The data captured at ML1 and ML2 has been presented in **Appendix B**.

4 ASSUMPTIONS, LIMITATIONS AND UNCERTAINTY

4.1 Introduction

4.1.1 The assessment is affected by the following assumptions and limitations

4.2 Assumptions

4.2.1 The following assumptions have been made.

- Proposed dwellings will be 8m high and comprise 2 storeys.
- An open window provides approximately 13dB noise attenuation.
- Fences around gardens of dwellings are not required to provide acoustic attenuation.

4.3 Limitations

4.3.1 Traffic data has not been provided showing the percentage of HGVs. However, the measured noise levels from Sodbury Lane have been checked for accuracy against the noise levels from the computer noise model.

4.3.2 Finished site ground levels have not been included into the noise model.

4.4 Uncertainty

4.4.1 To reduce measurement uncertainty, the following steps have been taken:

- In accordance with guidance, the microphones were mounted vertically on tripods 1.5m above the ground, unless otherwise stated. Monitoring locations were more than 3.5 metres from any other reflecting surfaces.
- The distance between the source and nearest receptors has been measured from scale plans showing the locations of the development.
- The background noise measurement location was selected to be representative of the background noise levels at the closest proposed receptors to the noise sources.
- In accordance with guidance, the sound level meter was mounted on a tripod 1.5m above the ground. The monitoring locations were also more than 3.5 metres from any other reflecting surfaces.
- The noise measurements were taken during dry and calm weather conditions.
- The noise measurements were undertaken during representative period of daytime and night time.

- The daytime and night-time background noise measurements were undertaken in accordance with the reference period required by BS4142.
- The results of each measurement period were reported to the nearest 0.1dB.
- Background noise measurements were made using Class 1 integrating sound level meters.

5 NOISE IMPACT ASSESSMENT

5.1 Site Noise Risk Assessment

5.1.1 In accordance with ProPG:2017, a Site Noise Risk Assessment (SNRA) has been carried out. The SNRA assesses the initial risk of noise from transportation sources having an adverse impact on a proposed development, based on the overall measured levels with no mitigation in place.

5.1.2 A 3D noise model has been built in the noise modelling software SoundPLAN version 8.2. The noise model considers the existing undeveloped site and its surrounding environment. The propagation of noise across the site will be affected by the presence of proposed dwellings, and therefore the model is relevant only for those dwellings closest to the noise source.

5.1.3 The noise model has been prepared using the measured noise levels as detailed in Table 2 of this report.

5.1.4 The modelled values allow for predictions of existing noise levels across the site to be made. Figures showing daytime $L_{Aeq,16hour}$, night-time $L_{Aeq,8hour}$ and night-time $L_{Amax,f}$ levels are included as Figure 2, Figure 3 and Figure 4 attached to this report. The colouring on the attached Figures shows the potential level of noise from road traffic in accordance with ProPG:2017 as follows.

- Green – Negligible risk of an adverse impact due to noise.
- Yellow – Low risk of an adverse impact due to noise.
- Orange – Medium risk of an adverse impact due to noise.
- Red – High risk of an adverse impact due to noise.

5.1.5 The predicted noise levels across the site, at 1.5m height during the daytime and 4m height (to represent 1st floor bedroom height) during the night-time, are presented in Table 3. The calculated noise levels have been compared to guidance provided on *Figure 1, Stage 1 – Initial Site Noise Risk Assessment* of ProPG:2017, to assess the risk category of the site.

Table 3: Initial Site Noise Risk Assessment Average Daytime and Night-time Noise Levels

Risk Assessment Location	Daytime Noise Level Range (dB $L_{Aeq,16hr}$)	Daytime Risk of Adverse Effect	Night-time Noise Level Range (dB $L_{Aeq,8hr}$)	Night-time Risk of Adverse Effect
West of Sodbury Road (ML3)	40 - 62	Negligible to Low	33 - 54	Negligible - Medium

5.1.6 Table 3 indicates that there is some potential for proposed dwellings closest to Sodbury Road to have up to a medium risk of experiencing an adverse noise impact, due to road traffic during the night-time. The risk of an adverse impact during the daytime is less.

5.1.7 However, further into the site noise levels will be lower, and therefore the potential for an adverse noise impact will be less.

5.1.8 In accordance with ProPG, where there are more than 10 noise events at night with an $L_{Amax,f}$ higher than 60 dB, a site should not be regarded as negligible risk. As shown in Table 2 and Figure 4, the $L_{Amax,f}$ level is greater than 60 dB and therefore the site should not be regarded as negligible risk.

5.1.9 The SNRA shows that local noise mitigation and good acoustic design will be required for eastern areas of the proposed development, to ensure that the potential risk of the noise impact is minimised, and internal and external noise guideline levels are achieved.

5.1.10 In accordance with ProPG:2017, a Stage 2 full noise assessment is required to ensure future residents are protected and good acoustic design has been implemented.

5.2 Overheating Risk Assessment

5.2.1 In accordance with the AVO guide, an Overheating Risk Assessment (ORA) has been carried out. The ORA assesses the initial risk of overheating, caused by the need to mitigate against noise generated by nearby transportation sources, based on the noise levels at the development site.

5.2.2 The daytime ($L_{Aeq,16hr}$) and night-time ($L_{Aeq,8hr}$) noise levels measured at ML3 (representative of Sodbury Road) have been compared to the information provided in Table 3-2 of AVO. The results are shown in Table 4.

Table 4: Stage 1 Overheating Risk Assessment

Risk Assessment Location	Average Daytime Noise Level (dB $L_{Aeq,16hr}$)	Daytime Risk of Overheating	Average Night-time Noise Level (dB $L_{Aeq, 8hr}$)	Night-time Maximum Noise Level (dB $L_{Amax,f}$)	Night-time Risk of Adverse Effect
West of Sodbury Road (ML3)	62	Medium	54	76	Medium

5.2.3 Table 4 indicates that during the daytime and night-time periods, proposed receptors adjacent to Sodbury Road would be at a medium risk of an overheating condition.

5.2.4 In accordance with AVO a Stage 2 overheating assessment is required to establish the level of overheating risk and to ensure future residents are protected from noise ingress. The Stage 2 assessment is detailed in Section 6.2 below and shown in **Appendix C**.

6 ACOUSTIC DESIGN STATEMENT – ASSESSMENT OF ROAD TRAFFIC NOISE

6.1.1 This section of the assessment considerers the need for noise mitigation measures to protect future residents from road traffic noise only. A consideration of industrial and commercial noise at the site is provided in Section 7 of this report.

6.1.2 The results from the ProPG:2017 Stage 1: Initial Site Noise Risk Assessment show that part of the proposed development closest to Sodbury Road, is at a medium risk of experiencing an adverse noise impact due to road traffic during the night-time, and a low risk during the daytime.

BS8233 Assessment of Daytime Noise Levels in Outdoor Living Areas

6.1.3 The noise model has been used to determine the potential noise levels likely in outdoor living areas of properties across the site. Figure 2 shows the daytime noise levels across the whole site.

6.1.4 The calculated noise levels, together with the level of attenuation required to achieve the upper guideline of 55dB L_{Aeq} recommended in BS8233 (Appendix A.9 to A.12), during the daytime in outdoor living areas, are summarised in Table 5.

Table 5: Average Daytime Noise Levels in Outdoor Living areas closest to Sodbury Road

Residential Property Location	Noise Level (dB $L_{Aeq, 16\ hour}$)	Level of Attenuation Needed to Achieve 55dB L_{Aeq} in Outdoor Living Areas
Proposed residential dwellings in the eastern part of the site, adjacent to Sodbury Road	62	7

6.1.5 Table 5 shows that during the daytime, noise levels affecting the eastern parts of the development site are above the upper guideline level of 55dB L_{Aeq}. Therefore, noise mitigation measures are required for properties in this area.

6.1.6 The outdoor living areas of the dwellings further into the site will be protected by the intervening buildings. It is considered that these garden areas will not require any mitigation from road traffic noise.

Assessment of Daytime Noise Levels in Living Rooms and Bedrooms

6.1.7 The daytime noise levels in noise sensitive rooms of the proposed dwellings closest to Sodbury Road have been assessed in accordance with BS8233. The guideline daytime noise level within living rooms and bedrooms is 35 dB $L_{Aeq,16\ hour}$.

6.1.8 The measured daytime noise levels have been used to determine the noise levels likely at facades of dwellings closest to Sodbury Road. Figure 2 shows the daytime $L_{Aeq, 16hour}$ noise levels across the whole, undeveloped site.

6.1.9 Before internal noise levels can be calculated, 3dB(A) must be added to the free-field measured levels to allow for the reflection of noise from the facades of the proposed dwellings.

6.1.10 The calculated noise levels at the facades of the proposed dwellings nearest to Sodbury Road, together with the level of attenuation required to achieve 35dB $L_{Aeq, 16hour}$ in living rooms and bedrooms are summarised in Table 6.

Table 6: Façade Noise Level at Properties adjacent to Sodbury Road and Level of Attenuation Required to Achieve the Internal Daytime Guideline Noise Level (dB(A))

Residential Property Location	Noise Level at the Facade of the Property ($L_{eq, 16 hour}$)	Level of Attenuation Needed to Achieve Guideline Noise Levels in Living Rooms and Bedrooms
Proposed residential dwellings in the eastern part of the site, adjacent to Sodbury Road	65	30

6.1.11 The facades of dwellings further into the site will be screened by the intervening buildings. It is considered that the noise levels at these facades, and therefore the level of attenuation the facades would need, if any, to provide to achieve 35dB L_{Aeq} during the daytime in the living room and bedroom areas, will be less than those detailed in Table 6.

Assessment of Night-time Noise Levels in Bedrooms

6.1.12 The night-time noise levels in bedrooms of the proposed dwellings closest to Sodbury Road have been assessed in accordance with BS8233. The noise guideline level within bedroom areas is 30 dB $L_{Aeq, 8hour}$. In addition, individual noise events should not normally exceed 45dB $L_{Amax,f}$.

6.1.13 The measured night-time noise levels have been used to determine the noise levels likely at facades of dwellings closest to Sodbury Road. Figures 3 and 4 show the night-time $L_{Aeq, 8hour}$ and night-time $L_{Amax,f}$ noise levels across the whole, undeveloped site.

6.1.14 Before internal noise levels can be calculated, 3dB(A) must be added to the free-field measured levels to allow for the reflection of noise from the facades of the proposed dwellings.

6.1.15 The calculated noise levels at the facades of the dwellings, together with the level of attenuation required to achieve 30dB L_{Aeq} and 45dB $L_{Amax,f}$ in the bedrooms, are summarised in Table 7.

Table 7: Façade Noise Level at Properties adjacent to Sodbury Road and Level of Attenuation required to Achieve the Internal Night-time Guidance Noise Levels (Figures in dB(A))			
Residential Property Location	**Noise Level at the Façade of the Property ($L_{eq\ 8hour}$)**	**Maximum Noise Level at the Façade of the Property ($L_{max,\ f}$)**	**Level of Attenuation Needed to Achieve the Noise Guideline Levels in Bedrooms**
Proposed residential dwellings in the eastern part of the site, adjacent to Sodbury Road	57	79	34

6.1.16 The facades of dwellings further into the site will be screened by the intervening buildings. It is considered that the noise levels at these facades, and therefore the level of attenuation the facades would need to provide to achieve 30dB L_{Aeq} and 45dBL_{Amax} during the night-time in the living room and bedroom areas, will be less than those detailed in Table 7.

7 INDUSTRIAL NOISE ASSESSMENT

7.1 Introduction

7.1.1 Site observations show that industrial noise is audible in the northern and eastern parts of the site. Therefore, this section of the assessment considers the potential impact of industrial noise at proposed dwellings at the development site.

7.1.2 A dairy farm is found to the north and the Country Style Supplies Ltd (CSSL) premises to the east and have been identified as sources of industrial noise at the proposed development site.

7.1.3 The dairy farm at times is readily distinguishable from the noise environment, which is dominated by road traffic, and includes the following noise sources:

- Tractor movements.
- Reverse alarms.
- Bangs and crashes.

7.1.4 From observations during the noise survey, and information from the owner of the dairy farm to the north, activity from the farm can begin at approximately 0400 hours (i.e. night-time period). At around 0700 hours (i.e. daytime period) a 'JCB' is typically used which has a reverse alarm. Activity at the dairy farm is normally restricted to the morning period and no activity was measured in the afternoon period.

7.1.5 The commercial premises of CSSL was only audible on occasion. Road traffic on Sodbury Road dominated in proximity of the premises. Table 2 shows noise from Sodbury Road is higher than the noise measured at ML2, representative of proposed receptors adjacent to CSSL. Due to the dominance of road traffic in proximity of CSSL and the influence on the noise level measured at ML2, the noise from CSSL is not significant and has not been considered further.

7.2 Selection of the Specific Sound

7.2.1 The measured sound level at ML1 includes all of the above sources during what are considered to be typical operations, at locations which are representative of future receptor locations.

7.2.2 During the daytime period, the ambient noise level was constant, even during times when farm activity ceased operation. However, during the night-time period (0400

to 0700), there is a distinguishable period where activity from the dairy farm can be heard.

7.2.3 Therefore, the specific sound from the dairy farm has been established from the night-time period. The specific sound level selected is detailed in Table 8.

Table 8: Specific Sound Level		
Industrial Source	**$L_{Aeq,t}$ (dB)**	**$L_{Amax,f}$ (dB)**
Dairy Farm	51	74

Rating level

Acoustic Feature Correction

7.2.4 BS4142 includes guidance on the application of an additional weighting which should be applied to the specific sound level should the industrial noise be tonal, impulsive, or intermittent, as experienced at proposed receptors. Observations made during the survey allow for the identification of such characteristics.

7.2.5 Based on observations made during the noise survey, the sound from the dairy farm is considered to be impulsive, which is perceptible at the closest proposed receptors. Therefore, a 6dB penalty for impulsivity has been applied to those receptors closest to the dairy farm (i.e. ML1) during the daytime and night-time period.

Selection of the Background Sound

7.2.6 Section 8 of BS4142 provides guidance on the selection of the background sound to be used in the assessment. BS4142 states that the background sound levels should be representative of the period being assessed (i.e. daytime or night-time periods), and that there is no "single" background sound level.

7.2.7 The measurement at ML1 includes noise from activity at the dairy farm, however during the daytime period, the ambient sound level was constant, even during times when farm activity ceased operation. **Appendix D** shows the time history at ML1 during the daytime period and a comparison of the L_{Aeq} and L_{A90} levels measured over the time period. Due to the ambient noise level remaining constant, the lowest L_{A90} measured during the likely time the dairy farm would be operating has been used, as this is representative of the period being assessed.

7.2.8 During the night time period, activity at the dairy farm started at 0400 hours, and therefore the background sound level has been established from the period between 2300hrs and 0400hrs hours. No activity was noted during this time period and

therefore this period is believed to be representative of the background sound level experienced on the site.

7.2.9 Table 9 shows the selected background sound level used in the assessment and **Appendix D** shows how the background sound level was established.

Table 9: Representative Background Sound Levels (Figures in dB)		
Monitoring Location	**Daytime Background Sound Level ($L_{A90,1hour}$)**	**Night time Background Sound Level ($L_{A90,15min}$)**
ML1	36	28

Comparison of the Background Sound and Rating Levels

7.2.10 In accordance with BS4142, the rating level of industrial noise at the proposed dwellings has been compared with the representative background sound levels, as shown in Table 10 for the day and night-time respectively.

Table 10: Comparison of rating level and background sound levels			
Description		**Daytime**	**Night-time**
Measured Specific Noise Level, L_{Aeq} (dB)		51	
Acoustic Feature Correction (dB)	Tonality (dB)	0	
	Impulsivity (dB)	6	
	Intermittency (dB)	0	
Calculated Rating Level (dB)		57	
Measured Background Sound Level at ML1 L_{A90} (dB)		36	28
Excess of the rating level over the background sound level (dB)		+21	+29

7.2.11 Table 10 shows that industrial noise at the development site exceeds the background sound levels by up to 21dB during the daytime and 29dB during the night time period. In accordance with BS4142, a difference of around +10dB is likely to be an indication of a significant adverse impact, depending on context.

7.2.12 Therefore, mitigation measures have been suggested to reduce the level of industrial noise at the proposed development site prior to undertaking the context assessment.

8 NOISE ATTENUATION SCHEME

8.1 Introduction

8.1.1 The results of the noise assessment, for the proposed residential areas of the development, indicate that noise mitigation measures would need to be incorporated into the proposed site design. The mitigation measures are required to ensure that guideline noise levels are achieved within external and internal areas of proposed dwellings, and that the impact of any industrial noise is reduced to acceptable levels.

8.1.2 At this outline planning stage, the exact locations of the dwellings are unknown, therefore mitigation measures are recommended in outline terms only.

8.2 Road Traffic

Daytime Noise Levels in Outdoor Living Areas

8.2.1 The noise levels, as detailed in Table 5 and shown on Figure 2, indicate that outdoor living areas in the eastern part of the site, closest to Sodbury Road will require mitigation to achieve the daytime noise guideline level of 55dB $L_{Aeq.}$

8.2.2 To achieve noise guideline levels in properties nearest to Sodbury Road, it is recommended that gardens are located on the screened side of dwellings, with localised close boarded fencing utilised around garden areas, where required. Should gardens be placed facing Sodbury Road, a 1.8m high close boarded fence, ensuring no gaps, and a minimum density of >15kg/m^2, could be utilised around garden areas to ensure noise guideline levels are met.

8.2.3 With the above mitigation measures in place, all plots will meet the upper guidance level of 55dB$L_{Aeq, 16hour}$ suggested by BS8233 for outdoor living areas.

8.2.4 It should be noted that the final mitigation measures will depend upon the final layout of the site, and mitigation requirements can be confirmed on a plot-by-plot basis, once a detailed design layout is available.

Daytime and Night-time levels in Living Rooms and Bedrooms

8.2.5 When assessing daytime and night-time noise levels in noise sensitive rooms, the noise attenuation provided by the overall building façade should be considered. To mitigate noise levels, the composition of the building façade can be designed to provide the level of attenuation required. Glazing is generally the building element

that attenuates noise the least, so the proportion of glazing in a building façade is an important consideration when assessing overall noise attenuation.

8.2.6 In the absence of design details for the building facades, it is assumed that the glazing to noise sensitive rooms would comprise about 25% of the façade area. To calculate the overall attenuation provided by this percentage of glazing in a brick or block façade, a non-uniform partition calculation can be used.

8.2.7 The calculation combines the different degrees of attenuation of the wall element and the window element. A façade element comprising a standard modern solid brick or block work construction will typically attenuate by 50-55dB (BS8233 Table E1.A) whereas standard double glazing will attenuate road traffic noise by 26-29dB(A) (BRE Digest 379 'Double glazing for heat and sound insulation'). The overall noise attenuation provided by this combination is therefore between 32dB(A) and 35dB(A).

8.2.8 The noise attenuation requirements for living rooms and bedrooms during the daytime and night-time in properties closest to Sodbury Road are summarised in Table 6 and 7. The requirements indicate that standard thermal double glazing should ensure that internal noise levels are met with the windows closed, for dwellings located closest to Sodbury Road.

8.2.9 However, with windows open, the attenuation provided by the façade will be approximately 13dB(A). This would potentially allow the recommended internal noise guideline level to be exceeded in some living rooms and bedrooms in eastern parts of the site, located nearest to and facing Sodbury Road.

8.2.10 On occasions, this may be acceptable to a resident, but when quiet conditions are required, the resident should be able to close the windows whilst maintaining adequate ventilation. Some form of alternative ventilation would therefore need to be installed in some of the living rooms and bedrooms in eastern parts of the site. Alternatively, to meet the required noise levels, living rooms and bedrooms, where required, could be located on the screened side of the proposed buildings, facing away from Sodbury Road.

8.2.11 Proposed dwellings further into the site, will be protected by the buildings themselves and/or screened by other buildings, from the main sources of noise. These façades are likely to achieve the internal guideline limits, which can be provided by standard thermal double glazing, even with windows open.

8.2.12 It is recommended that the ventilation proposed at the site should, as a minimum, comply with Building Regulations 2000 Approved Document F1 Means of Ventilation and British Standard BS5925 1991: 'Code of Practice for Ventilation Principles and Designing for Natural Ventilation'.

8.2.13 Glazing and ventilation requirements can be confirmed, once a detailed design layout is available.

8.3 AVO Stage 2 Assessment

8.3.1 AVO suggests the significance of the effect on human health depends on the frequency of overheating and the internal ambient noise level. Where the noise level is high but there is a low risk of overheating, the effect on human health is low. However, where there is an increased risk of overheating, the potential for significant observed adverse effect on human health increases. This is illustrated on Figure 3-3 of the AVO guidance.

8.3.2 The results of the Stage 1 overheating assessment indicate that the site will be subject to a 'Negligible' to 'Medium' risk of an overheating condition occurring. An assessment has therefore been carried out in accordance with AVO and can be seen in full in Appendix C.

8.3.3 The Stage 2 Assessment has found that mitigation will be required for some areas of the development, closest to and with direct line of sight of Sodbury Road.

8.3.4 As this assessment has been undertaken for submission alongside an outline planning application, no detailed designs are available for the proposed development. As a stand-off from Sodbury Road or orientation of the development cannot be confirmed forms of mitigation at this stage, façade design and ventilation strategy have been considered. In the absence of detailed drawings, calculations have been carried out using enhanced acoustic glazing and the assumption that glazing will comprise <35% of the total facade. In addition, an alternative form of cooling to that of an open window has been considered, such as mechanical cooling or boost fans. The results are summarised in Table 11 below.

Table 11: Summary Stage 2 Overheating Risk Assessment

Location	Mitigation Considered
West of Sodbury Road (ML3)	Standard thermal double glazing, mechanical cooling would be provided to manage thermal comfort as part of a MVHR ventilation system.

8.3.5 The Stage 2 overheating assessment has shown that with the implementation of mitigation, the risk of an overheating condition low.

8.3.6 It should be noted that mitigation has been provided in outline terms only and alternatives could be explored to avoid overheating. These could include:

- Minimising internal heat generation through energy efficient design.
- Reduce heat entering the sensitive dwellings via orientation, shading, albedo, fenestration, insulation and green roofs and walls.
- Control heat within buildings through exposed internal thermal mass and high ceilings.
- Alternative means of ventilation that offer a high volume of air exchange.

8.3.7 Overheating mitigation requirements can be provided at the detailed design stage on a plot-by-plot basis and should be confirmed by thermal and/or mechanical services engineering, as required.

8.4 Industrial Noise

8.4.1 The assessment has shown that noise mitigation is required for the proposed development to reduce the potential noise impact.

8.4.2 It should be noted that the final mitigation measures will depend upon the final layout of the site, and mitigation requirements can be confirmed on a plot-by-plot basis, once a detailed design layout is available. The proposed mitigation measures below assume receptors would be positioned at a similar location to ML1, approximately 27m from the boundary with the dairy farm, where industrial noise was heard.

Outdoor Living Areas

8.4.3 To achieve noise guideline levels in properties nearest to the dairy farm, it is recommended that gardens are located on the screened side of dwellings, with localised close boarded fencing utilised around garden areas, where required.

Internal Living Areas

8.4.4 With windows open, the attenuation provided by the façade will be approximately 13dB(A). Using the calculated rating level of 57dB(A) for both the daytime and night-time period, as shown in Table 10, the internal noise level would be approximately

44dB(A). For reference, this internal level would exceed BS8233 noise guideline levels of 35dB(A) during the daytime and 30dB(A) during the night-time period.

8.4.5 BS8233 has been used in this assessment to provide context to the noise levels and the level of mitigation required to achieve good internal living conditions.

8.4.6 Therefore, an alternative means of ventilation is required for facades of those dwellings adjacent to the dairy farm, to allow windows to be closed, as required, and an adequate level of ventilation maintained. In addition, the main habitable rooms could be placed on the screened side of dwellings.

8.4.7 Proposed dwellings further into the site, will be protected by the buildings themselves and/or screened by other buildings, from the main sources of noise. These façades are likely to achieve the internal guideline limits, which can be provided by standard thermal double glazing, even with windows open.

8.4.8 It is recommended that the ventilation proposed at the site should, as a minimum, comply with Building Regulations 2000 Approved Document F1 Means of Ventilation and British Standard BS5925 1991: 'Code of Practice for Ventilation Principles and Designing for Natural Ventilation'.

8.4.9 Glazing and ventilation requirements can be confirmed, once a detailed design layout is available.

9 RESIDUAL INDUSTRIAL IMPACT ASSESSMENT

9.1 Industrial Noise

9.1.1 Following implementation of the mitigation measures stated in Section 8 of this report, the specific sound level and thus the rating level will be reduced at the proposed dwellings.

9.1.2 In accordance with BS4142, the rating level of industrial noise at the proposed dwellings has been compared with the representative background sound levels, as shown in Table 12, with mitigation in place. For reference, the noise impact at the proposed dwelling has been considered in two locations, one location with line of sight of the dairy farm (PSR1) and the second location being behind the dwelling, which is representative of a garden area on the screened side of the dwellings.

Table 12: Comparison of rating level and background sound levels

Description		Daytime	
		PSR1	PSR2
Measured Specific Noise Level, L_{Aeq} (dB)		51	41
Acoustic Feature Correction (dB)	Tonality (dB)	0	0
	Impulsivity (dB)	6	0*
	Intermittency (dB)	0	0
Calculated Rating Level (dB)		57	41
Measured Background Sound Level at ML1 L_{A90} (dB)		36	
Excess of the rating level over the background sound level (dB)		+21	+5

* With the suggested mitigation incorporated the sound level and thus the impulsivity of the sound from the farm is reduced and therefore no penalty has been applied

BS4142 Context Assessment

9.1.3 BS4142:2014 states *"The significance of sound of an industrial and/or commercial nature depends upon both 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".*

9.1.4 The first requirement of this statement has been determined within the noise impact assessment section above. To determine the context in which the industrial sound will reside, three factors must be considered, these are;

- 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.

Absolute Level of Sound

9.1.5 To determine the first context test in BS4142 it is necessary to determine whether the residual and background sound levels are high or low. Section 11 of BS4142 states;

"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.

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

9.1.6 The background and rating levels are considered low, and therefore the absolute level may be more relevant than the difference between the two.

9.1.7 During the daytime period, an absolute sound level of 48 dB(A) was measured at ML1, which is representative of proposed receptors close to the dairy farm. A noise level of 48 dB(A) is below the desirable outdoor noise guideline level of 50 dB(A) and upper guideline noise level of 55 dB(A). During the daytime period, internal noise levels would also be met.

9.1.8 This is an indication that the potential noise impact at the proposed sensitive receptors is less than detailed in the assessment tables.

Character and Level of Residual Sound Compared with the Specific Sound

9.1.9 The character of the residual sound, which contains mid frequency noise from road traffic, and the character of the specific sound of the dairy farm, which contains mainly engine noise from tractor movements, are very similar. Therefore, the character of the dairy farm is overall very similar to that of road traffic. Some impulsive sounds from the dairy farm were established, these are less in keeping with the general ambient noise levels within the local area.

9.1.10 Therefore, the character and level of the residual sound when compared with the specific sound does not alter the findings of Table 12.

Sensitivity of Receptor

9.1.11 With regard to pertinent factors to be taken into consideration, Section 11 of BS4142 states;

"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:

i) facade insulation treatment;

ii) ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and

iii) acoustic screening."

9.1.12 The proposed receptors will have moderate to high sensitivity given their residential nature. However, BS4142 states that design measures will influence the sensitivity.

9.1.13 During the daytime period, when residents are more likely to be in external areas (gardens), the farming activity may still be heard although at a lower level due to the screening provided by the dwelling itself. Although this would still slightly exceed the background sound level, the levels would achieve the good standard for external living areas as stated in BS8233. Furthermore, the development could be designed at the detailed design stage to further reduce the specific sound levels. This could include a stand-off from the dairy farm or increasing the screen provided by the development itself.

9.1.14 Therefore, following the implementation of noise mitigation, the character of the industrial sound is expected to be significantly less distinguishable in external areas, as the level of the specific sound would be reduced. This is a positive indication that the noise impact from the industrial area would be significantly less than is suggested in Table 10.

9.1.15 Sensitive internal areas at the proposed dwellings will benefit from the implementation of standard glazing and an alternative means of ventilation to allow residents to close their windows, as required, and ventilation maintained, as presented in section 7.3.5.

9.1.16 Glazing and trickle vents are the building elements that provide the least noise attenuation. Detailed noise break-in calculations have been undertaken to consider

these building elements of noise sensitive rooms (i.e. living rooms and bedrooms) across the development.

9.1.17 The break-in calculations are based on the calculated noise levels at the proposed dwelling façades and an example worst-case ratio of room volume to glazing surface for a general living room and bedroom. The break-in calculations are included in **Appendix E** for reference**.**

9.1.18 Table 13 below shows the calculated internal noise level with mitigation in place.

Table 13: Calculated internal noise level with mitigation in place

Description	Daytime $L_{Aeq,1hour}$		Night time $L_{Aeq,15min}$		Night time Maximum $L_{Amax,f}$	
	PSR1	PSR2	PSR1	PSR2	PSR1	PSR2
Specific Noise Level, (dB)*	54	44	54	44	77	67
Façade Attenuation, (dB)	26		32		33	
Calculated Internal Noise Level, (dB)	28	18	22	12	44	34
Noise Guideline Level in BS8233, (dB)	35		30		45	
Comparison between calculated level and guideline level	-7	-17	-8	-18	-1	-11

*3dB(A) has been added to the free field level in Table 12 to account for reflection at the facade

9.1.19 As shown in Table 14 and Appendix E, the implementation of standard glazing and an alternative means of ventilation would mean the specific sound level from the dairy farm would not exceed internal noise guideline levels, and significantly below the guidelines in most cases.

9.1.20 When considering all of the above mitigation measures, the noise impact from the industrial area is likely to be significantly less than is suggested in Table 12.

Summary of the BS4142 Assessment

9.1.21 It should be noted that this assessment has been undertaken based on a worst-case scenario for a 1 hour period during the daytime and a 15 minute period at night. In practice the modelled scenarios would not take place during the whole daytime and

night-time periods. Particularly as the farming activity does not take place for the whole day and night-time periods. Therefore, the impact over the full daytime and night periods would be less.

9.1.22 Table 10 shows that the proposed development would likely cause an exceedance of the background sound level during the daytime and night-time, indicating a significant adverse impact, depending on context. Therefore, mitigation measures have been recommended to reduce the level of industrial sound at the proposed development.

9.1.23 It is recommended the development design should allow for gardens to be placed on the screened side of dwellings. Additionally, standard glazing and an alternative means of ventilation should be installed to allow windows to be closed, as required, and an adequate level of ventilation maintained.

9.1.24 In accordance with BS4142, the context in which the sound resides must be considered as part of the assessment. As demonstrated in this assessment, when considering context, the noise impact at proposed dwellings will be significantly less due to the implementation of mitigation measures, which include noise screening, and an alternative means of ventilation. Via use of mitigation the development would achieve good living conditions for all residents when considering the potential impact from farming noise.

9.1.25 Therefore, the BS4142 assessment indicates that the noise associated with the proposed development will have a low to minor adverse impact at all proposed dwellings.

9.1.26 The noise guideline levels stated in BS8233 for outdoor and internal living areas can be achieved via appropriate mitigation specified in this report. Therefore, the impact of the proposed development is not significant, with the inclusion of appropriate mitigation. A detailed mitigation strategy could be designed at the reserved matters stage.

10 CONCLUSIONS

10.1.1 Wardell Armstrong LLP has carried out a noise assessment to accompany an outline planning application for a proposed residential development on land at Wickwar.

10.1.2 Measured on-site noise levels have been input into the 3D noise model SoundPLAN, which has been used to calculate road traffic noise across the development site and at proposed receptors.

10.1.3 Without mitigation measures, the assessment indicates that there is potential for proposed dwellings closest to Sodbury Road to experience an adverse effect due to road traffic noise.

10.1.4 An assessment of noise from the dairy farm in accordance with BS4142 has been undertaken and has shown that associated activities exceed the background noise levels, and will cause a significant adverse impact at some areas of the development with no mitigation.

10.1.5 Therefore, mitigation measures have been suggested to reduce the impact of road traffic noise and existing industrial noise at proposed dwellings.

10.1.6 In outdoor living areas, gardens adjacent to Sodbury Road and the dairy farm could be located on the screened side of dwellings, to adequately protect garden areas from road traffic and industrial noise. Alternatively, should garden areas be placed facing Sodbury Road, a 1.8m high close boarded fence should be utilsied.

10.1.7 For internal living areas, internal noise levels will be met with standard double glazing and an alternative means of ventilation, for those receptors adjacent to Sodbury Road and the dairy farm.

10.1.8 Mitigation requirements can be confirmed as a reserved matter, on a plot-by-plot basis, once a detailed design layout is available.

10.1.9 In accordance with the National Planning Policy Framework (NPPF) and Planning Practice Guidance – Noise (PPG-Noise), the noise assessment has demonstrated that adverse noise impacts can be addressed with suitable mitigation. Any significant impacts at the development would be avoided and reduced to a minimum. When considered in accordance with the Noise Policy Statement for England (NPSE), the potential noise impact, the proposed development is below the Lowest Observed Adverse Effect Level (LOAEL).

Appendix A Noise Legislation and Guidance

Appendix A: Noise Policy and Guidance

National Planning Policy Framework

A.1 The 'National Planning Policy Framework' (NPPF), revised in July 2021, is the current planning policy guidance within England.

A.2 Paragraph 185 of the NPPF states:

'*Planning policies and decisions should also ensure that new development is appropriate for its location taking in account the likely effects (including cumulative effects) of pollution on heath, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impact 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 impact on health and the quality of life;

b. *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason'…*

A.3 Paragraph 187 of the NPPF states:

'*Planning policies and decisions should ensure that new development can be integrated with existing business 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.*'

Noise Policy Statement for England

A.4 With regard to 'significant adverse impacts on health and the quality of life' the NPPF refers to the 'Noise Policy Statement for England' (NPSE).

A.5 The Noise Policy Statement for England refers to the World Health Organisation when discussing noise impacts and introduces observed effect levels which are based on established concepts from toxicology that are applied to noise impacts by WHO.

A.6 Three levels are defined as follows:

'*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.*

SOAEL – Significant Observed Adverse Effect Level

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

A.7 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere between LOAEL and SOAEL, and it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. However, this does not mean that such adverse effects cannot occur.

Planning Practice Guidance – Noise

A.8 The Planning Practice Guidance (PPG) provides further detail about how the effect levels can be recognised. Above the NOEL noise becomes noticeable, however it has no adverse effect as it does not cause any change in behaviour or attitude. Once noise crosses the LOAEL threshold it 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. Increasing noise exposure further might cause the SOAEL threshold to be crossed. If the exposure is above this level the planning process should be used to avoid the effect occurring by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused. At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise. Table 1 summarises the noise exposure hierarchy.

Table 1 - National Planning Practice Guidance noise exposure hierarchy

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the	No Observed adverse Effect	No specific measures required

Table 1 - National Planning Practice Guidance noise exposure hierarchy			
Perception	**Examples of Outcomes**	**Increasing Effect Level**	**Action**
	area but not such that there is a perceived change in the quality of life.		
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

A.9 The PPG summarises the approach to be taken when assessing noise. It accepts that noise can override other planning concerns, but states:

"Neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separate from the economic, social and other environmental dimensions of proposed development"

ProPG: Planning & Noise Professional Practice Guidance on Planning & Noise

A.10 ProPG Planning and Noise, provides professional practice guidance in relation to new residential developments, exposed to noise from transport sources. It provides

practitioners with a recommended approach to the management of noise within the planning system in England.

A.11 The guidance reflects the Government's overarching National Planning Policy Framework, the Noise Policy Statement for England, and Planning Practice Guidance (including PPG-Noise) and draws on other authoritative sources of guidance. It provides advice for Local Planning Authorities and developers, and their professional advisors, on achieving good acoustic design in and around new residential developments.

British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings

A.12 British Standard 8233 "Guidance on sound insulation and noise reduction for buildings" 2014, suggests the following guideline noise levels and states that they are based on guidelines issued by the World Health Organisation;

- 35 dB $L_{Aeq\ (16\ hour)}$ during the day time in noise sensitive rooms
- 30 dB $L_{Aeq\ (8\ hour)}$ during the night time in bedrooms
- 45 dB $L_{Amax,F}$ during the night time in bedrooms
- 50 dB $L_{Aeq\ (16\ hour)}$ desirable external noise levels for amenity space such as gardens and patios
- 55 dB $L_{Aeq\ (16\ hour)}$ upper guideline value which would be acceptable in noisier environments.

A.13 In addition, for internal noise levels it states;

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

A.14 Furthermore, with regard to external noise, the Standard states;

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

AVO: Acoustics, Ventilation and Overheating Residential Design Guide

A.15 The AVO guide recommends an approach to acoustic assessments for residential development that takes into consideration the interdependence of provisions for acoustics, ventilation and overheating.

A.16 The application of the AVO Guide is intended to demonstrate good acoustic design in accordance with ProPG. A two-stage assessment approach is advised as:

- Stage 1 – Site Risk Assessment
- Stage 2 – Detailed assessment of Adverse Effect

A.17 The guide provides a means of assessment to satisfy the need to consider acoustics, ventilation and overheating at the planning stage. It also assists in educating clients, environmental health officers, planning officers and other stakeholders of the interdependence of design for acoustics, ventilation and overheating.

British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS4142):

A.18 BS4142 is used to rate and assess sound of an industrial and/or commercial nature including:

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

A.19 The standard is applicable to the determination of the following levels at outdoor locations:

- rating levels for sources of sound of an industrial and/or commercial nature; and
- ambient, background and residual sound levels, for the purposes of:

  1) Investigating complaints;

  2) Assessing sound from existing, proposed, new, modified or additional source(s) of sound of an industrial and/or commercial nature; and

  3) Assessing sound at proposed new dwellings or premises used for residential purposes.

A.20 The purpose of the BS4142 assessment procedure is to assess the significance of sound of an industrial and/or commercial nature.

A.21 BS4142 refers to noise from the industrial source as the 'specific noise' and this is the term used in this report to refer to noise which is predicted to occur due to activities associated with the existing industrial premises. The 'specific noise' levels, of the existing industrial premises that have been measured are detailed in this report.

A.22 BS4142 assesses the significance of impacts by comparing the specific noise level to the background noise level (L_{A90}). This report provides details of the measured or calculated background noise levels.

A.23 Section 8 of BS4142 discusses ways to determine the background sound level, in Section 8.1 it states;

'Since the intention is to determine a background sound level in the absence of the specific sound that is under consideration, it is necessary to understand that the background sound level can in some circumstances legitimately include industrial and/or commercial sounds that are present as separate to the specific sound.'

A.24 Certain acoustic features can increase the significance of impacts over that expected from a simple comparison between the specific noise level and the background noise level. In particular, BS4142 identifies that the absolute level of sound, the character, and the residual sound and the sensitivity of receptor should all be taken into consideration. BS4142 includes allowances for a rating penalty to be added if it is found that the specific noise source contains a tone, impulse and/or other characteristic, or is expected to be present. The specific noise level along with any applicable correction is referred to as the 'rating level'.

A.25 The greater the increase between the rating level over the background noise level, the greater the magnitude of the impact. The assessment criteria given by BS4142 are as follows:

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

A.26 During the daytime, BS4142 requires that noise levels are assessed over 1-hour periods. However, during the night-time, noise levels are required to be assessed over 15-minute periods.

A.27 Where the initial estimate of the impact needs to be modified due to context, BS4142 states that all pertinent factors should be taken into consideration, including:

- 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.

Appendix B Noise Survey Results

Monitor No: ML1 - Dairy Farm
Calc's by: EF
Checked by:

01/06/2021 - 02/06/2021 - Daytime				
Date and Time	L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
	(dB)	(dB)	(dB)	(dB)
01/06/2021 15:23	52.8	82.8	40.7	52
01/06/2021 16:23	49.5	67.9	40	52.9
01/06/2021 17:23	48.7	71.8	40	51.4
01/06/2021 18:23	47.2	71.7	38.9	50
01/06/2021 19:23	47.2	73.3	39.6	50.1
01/06/2021 20:23	44.7	63.6	38.9	47.3
01/06/2021 21:23	43	67.5	35.5	45.8
01/06/2021 22:23	40	64.1	29.4	42.3
02/06/2021 07:00	48.2	76.4	40.2	49.9
02/06/2021 08:00	47.6	71.5	40.2	51.2
02/06/2021 09:00	47	72.9	38.3	50.2
02/06/2021 10:00	50	82	39.1	52
01/06/2021 - 02/06/2021 - Night-time				
Date and Time	L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
	(dB)	(dB)	(dB)	(dB)
01/06/2021 23:00	41.8	56.1	31.2	45.3
01/06/2021 23:15	42.1	59.6	28.6	43.9
01/06/2021 23:30	41.2	57.7	30.8	45.4
01/06/2021 23:45	39.5	61.2	28.3	41.6
02/06/2021 00:00	35.8	52.5	28.8	38.4
02/06/2021 00:15	36.7	57.4	28.5	39.7
02/06/2021 00:30	32.9	49.5	27.8	35.9
02/06/2021 00:45	31.9	46.8	28.1	34.7
02/06/2021 01:00	35.4	58.7	28	36.9
02/06/2021 01:15	36.4	54.8	28.1	39.3
02/06/2021 01:30	40.2	61.9	28.9	43.4
02/06/2021 01:45	36.3	56.6	28.5	40
02/06/2021 02:00	40.5	58.4	28.7	44.8
02/06/2021 02:15	37.8	58.4	28.7	40.8
02/06/2021 02:30	39.9	59.5	28.8	43.7
02/06/2021 02:45	38.1	57.9	28.7	40.6
02/06/2021 03:00	40.4	60.3	29.3	44.5
02/06/2021 03:15	38.7	54.7	29.1	42.9
02/06/2021 03:30	40.1	60.2	28.4	42.8
02/06/2021 03:45	42	59.3	30.4	46.4
02/06/2021 04:00	45.4	59.4	39.4	48.7
02/06/2021 04:15	47.3	60.6	39.8	50.8
02/06/2021 04:30	55.2	67.5	43.1	60.1
02/06/2021 04:45	50.1	65.6	39.4	52.4
02/06/2021 05:00	49.5	74	40	51.6
02/06/2021 05:15	53.9	67.9	40.4	58.7
02/06/2021 05:30	51.9	67.1	41.8	56.9
02/06/2021 05:45	51.5	69.4	39.9	57.1
02/06/2021 06:00	53.1	72.6	37.4	59.1
02/06/2021 06:15	46.6	67.1	38.9	50.4
02/06/2021 06:30	46.4	60.7	38.6	50.2
02/06/2021 06:45	48.9	66	40.1	52.3

Total - Daytime			
L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
(dB)	(dB)	(dB)	(dB)
48.3	82.8	38.1	50.4

Total - Night time			
L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
(dB)	(dB)	(dB)	(dB)
47.2	74	29	49.5

Monitor No: ML2 - Country Farm Supplies
Calc's by: EF
Checked by:

02/06/2021 - 03/06/2021 - Daytime				
Date and Time	L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
	(dB)	(dB)	(dB)	(dB)
02/06/2021 11:05	50.4	83	40.3	48.8
02/06/2021 12:05	45.7	66	40.5	47.6
02/06/2021 13:05	49.1	75.3	42.5	50.7
02/06/2021 14:05	56	88.5	44.2	54.5
02/06/2021 15:05	47.5	79.2	42.3	48.9
02/06/2021 16:05	46.6	67.2	40.7	48.7
02/06/2021 17:05	46.7	71.7	40.1	48.6
02/06/2021 18:05	48.1	70.7	35.9	48.9
02/06/2021 19:05	47.9	72.1	36	46.9
02/06/2021 20:05	48.7	74.3	36.3	50.5
02/06/2021 21:05	45.2	63.4	31	49.6
02/06/2021 22:05	40.4	58.7	24.2	44.6
03/06/2021 07:00	69.6	65.7	40	48.9
03/06/2021 08:00	65.9	60.1	40.2	48.5
03/06/2021 09:00	70.1	64.5	42.6	50.3
03/06/2021 10:00	71.3	66.1	43.9	53.2
02/06/2021 - 03/06/2021 - Night-time				
Date and Time	L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
	(dB)	(dB)	(dB)	(dB)
02/06/2021 23:00	39.5	55.9	23.5	43.8
02/06/2021 23:15	38.9	58.6	22.9	39.5
02/06/2021 23:30	46.1	73.5	26.6	47.2
02/06/2021 23:45	42.9	66.3	25	44.1
03/06/2021 00:00	44.7	70.4	25.3	44.9
03/06/2021 00:15	36.4	57.5	24.8	39.8
03/06/2021 00:30	40.2	61.6	24.8	43.3
03/06/2021 00:45	40.9	63.3	25.7	43.4
03/06/2021 01:00	39.8	66.8	24.9	37
03/06/2021 01:15	32.4	57.9	23.1	35.2
03/06/2021 01:30	37.9	61.9	23.6	39.9
03/06/2021 01:45	39.2	64	25.5	41.3
03/06/2021 02:00	37.5	65.3	23.7	39.1
03/06/2021 02:15	40.1	64.4	23	41.2
03/06/2021 02:30	44	69	24.7	46.3
03/06/2021 02:45	45.9	69.6	25	49.1
03/06/2021 03:00	43.8	67.7	24.8	45
03/06/2021 03:15	46.2	73.8	22.5	44.9
03/06/2021 03:30	35.4	57.8	24.1	36.3
03/06/2021 03:45	34	54.2	23.8	37.4
03/06/2021 04:00	47.6	63.9	31	52.7
03/06/2021 04:15	49.8	66.4	34.5	53.9
03/06/2021 04:30	46.7	66.8	36.1	51
03/06/2021 04:45	41	58.8	33.3	43.7
03/06/2021 05:00	43	63.7	29.9	46
03/06/2021 05:15	46.5	68.6	32.3	48.2
03/06/2021 05:30	44.7	61.4	31.7	48.8
03/06/2021 05:45	46.2	72.9	33	48.5
03/06/2021 06:00	45.1	62.1	33.9	48.5
03/06/2021 06:15	45	63.8	34.1	48.2
03/06/2021 06:30	45.2	60.2	38.1	48.1
03/06/2021 06:45	46.2	65.5	38.6	48.4

Total - Daytime			
L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
(dB)	(dB)	(dB)	(dB)
49	88.5	38	49.9

Total - Night time			
L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
(dB)	(dB)	(dB)	(dB)
44	73.8	24.6	46.9

Monitor No: ML3 - Sodbury Road
Calc's by: EF
Checked by:

03/06/2021 - 04/06/2021 - Daytime				
Date and Time	L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
	(dB)	(dB)	(dB)	(dB)
03/06/2021 11:00	61.1	82.0	46.9	65.4
03/06/2021 12:00	62.4	91.2	46.4	66.6
03/06/2021 13:00	62.3	78.6	45.7	66.6
03/06/2021 14:00	62	86.2	44.9	65.9
03/06/2021 15:00	62.3	87.1	46.6	66.1
03/06/2021 16:00	62.7	76.9	45.5	66.6
03/06/2021 17:00	63.4	90.6	44	67.2
03/06/2021 18:00	63.3	93.1	40.3	67.1
03/06/2021 19:00	61.6	79.8	43.9	66.3
03/06/2021 20:00	60.7	78.2	41.4	65.5
03/06/2021 21:00	58.8	83.7	34.7	62.2
03/06/2021 22:00	58.1	84.7	32.7	61.6
04/06/2021 07:00	62.3	79.9	44.4	66.6
04/06/2021 08:00	62.5	84.2	43.5	66.9
04/06/2021 09:00	61.4	84.6	42.9	65.9
04/06/2021 10:00	61.5	75.7	41	66.2
03/06/2021 - 04/06/2021 - Night-time				
Date and Time	L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
	(dB)	(dB)	(dB)	(dB)
03/06/2021 23:00	56.3	79.2	43.4	57.1
03/06/2021 23:15	55.7	73.9	28.4	56.5
03/06/2021 23:30	52.7	74.2	27.8	51.5
03/06/2021 23:45	56.1	78	28.2	54.6
04/06/2021 00:00	52.6	75.8	26.7	49.7
04/06/2021 00:15	54.3	73.8	28.5	51.8
04/06/2021 00:30	47.1	74.1	25.4	44.2
04/06/2021 00:45	28	50.2	22	29.6
04/06/2021 01:00	48.2	74.1	21.4	40.9
04/06/2021 01:15	23.9	35.9	22.1	25.1
04/06/2021 01:30	49.1	70.4	21.9	44.4
04/06/2021 01:45	41.8	69.3	21	30.4
04/06/2021 02:00	48	74	21.5	40
04/06/2021 02:15	49.5	74.7	21.4	38.3
04/06/2021 02:30	47.8	74.1	21.6	29.3
04/06/2021 02:45	48	75.8	21.8	33.9
04/06/2021 03:00	40.4	66.3	21.9	28.4
04/06/2021 03:15	42.9	71.1	22.1	26.1
04/06/2021 03:30	46.4	70.9	21.7	30.9
04/06/2021 03:45	46.9	69.1	21.1	40.2
04/06/2021 04:00	50.5	73.7	33.4	44.1
04/06/2021 04:15	46	70.1	32.8	42.9
04/06/2021 04:30	51.8	72.7	35	49.3
04/06/2021 04:45	53.9	77.5	34.3	47.3
04/06/2021 05:00	55.9	77.5	35	50.2
04/06/2021 05:15	54.3	75.4	35.3	51
04/06/2021 05:30	57.8	76.8	36.6	58.3
04/06/2021 05:45	57.4	75.9	35.3	58.1
04/06/2021 06:00	57.8	74.7	34.9	59.7
04/06/2021 06:15	60	80.5	38.2	64.1
04/06/2021 06:30	59.9	74	41.2	63.8
04/06/2021 06:45	61	72.9	58.3	63.8

Total - Daytime			
L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
(dB)	(dB)	(dB)	(dB)
61.8	93.1	42.3	66.2

Total - Night time			
L_{Aeq}	$L_{A\,max}$	L_{A90}	L_{A10}
(dB)	(dB)	(dB)	(dB)
54.3	80.5	22.2	55.3

Selection of the Lmax

03/06/2021 - 04/06/2021 - Night-time	
Date and Time	$L_{A\,max}$
04/06/2021 06:20	80.5
03/06/2021 23:13	79.2
04/06/2021 06:18	79.2
04/06/2021 06:21	78.7
03/06/2021 23:48	78
04/06/2021 04:47	77.5
04/06/2021 05:05	77.5
04/06/2021 05:43	76.8
04/06/2021 05:47	75.9
04/06/2021 06:29	75.9
04/06/2021 00:10	75.8
04/06/2021 02:56	75.8
04/06/2021 04:52	75.8
04/06/2021 05:10	75.8
04/06/2021 05:19	75.4
04/06/2021 05:45	75.1
04/06/2021 05:31	74.9
04/06/2021 02:24	74.7
04/06/2021 06:03	74.7
03/06/2021 23:58	74.6
04/06/2021 05:36	74.6
04/06/2021 06:02	74.6
04/06/2021 06:12	74.6
03/06/2021 23:31	74.2
04/06/2021 05:14	74.2
03/06/2021 23:56	74.1
04/06/2021 00:43	74.1
04/06/2021 01:13	74.1
04/06/2021 02:30	74.1
04/06/2021 04:57	74.1
03/06/2021 23:49	74
04/06/2021 02:05	74
04/06/2021 06:15	74
04/06/2021 06:33	74
03/06/2021 23:27	73.9
03/06/2021 23:47	73.8
04/06/2021 00:17	73.8
04/06/2021 05:35	73.8
04/06/2021 04:02	73.7
04/06/2021 05:55	73.7
04/06/2021 06:31	73.7
04/06/2021 05:41	73.6
04/06/2021 05:06	73.4
04/06/2021 05:04	73.3
04/06/2021 05:52	73.3
03/06/2021 23:57	73.2
04/06/2021 05:48	73.2
03/06/2021 23:10	72.9
03/06/2021 23:17	72.9
04/06/2021 00:00	72.9
04/06/2021 00:20	72.9
04/06/2021 06:22	72.9
04/06/2021 06:45	72.9

Appendix C Overheating Risk Assessment

APPENDIX C – Stage 2 Overheating Assessment

C.1 This appendix describes the steps carried out in Stage 2 of the overheating assessment, as carried out in line with the AVO guidance.

C.2 A Stage 1 assessment, has been carried out to assess the potential risk of overheating, caused by transportation noise at proposed dwellings across the site. This has shown that in the eastern parts of the site, next to Sodbury Road, the risk of overheating is Medium during the daytime and night-time.

Degree of Noise Impact

C.3 BS8233 states that where the development is considered necessary or desirable, the internal targets may be relaxed by up to 5dB and reasonable internal conditions still achieved.

C.4 The noise risk assessment carried out in line with ProPG shows that proposed dwellings located adjacent to Sodbury Road are at a medium risk of adverse effect due to noise.

C.5 This therefore increases the risk for significant adverse observed effect level for some parts of the development.

Frequency of Overheating

C.6 The proposed development is located in Wickwar. Areas here can at times be exposed to high temperatures and dry climates, however the development is not located within any central cities and is less at risk of experiencing the urban heat island effect.

C.7 At this outline planning stage details of the development design have not been confirmed, however, the development is likely to comprise singular residential dwellings as opposed to multi-storey apartment blocks. The potential for frequent internal build-up of heat is therefore low.

ML3 - Proposed Dwellings at the Eastern Site Boundary

	External free-field noise level (dB)	Level 1 Risk Assessment (AVO Table 3-2)	Calculated Internal Noise Levels with open windows (-13dB)	Good Homes Alliance Tool Value
Daytime LAeq,16hr	62	Medium	49	8
Night-time LAeq,8hr	54	Medium	41	
Night-time LAFmax	76	Medium Exceeds 78dB	63	

Notes on Overheating Mitigation and Requirements for Level 2 Assessment

Eastern Elevations - Living Rooms and Bedrooms

The Stage 1 overheating assessment indicates that the proposed development is at a Medium risk of overheating during the daytime and night-time. Only those receptors adjacent to Sodbury Road would be at a Medium risk and in reality no receptors would be situated adjacent to the road. Therefore, the risk is assumed to be at the lower end of the Medium category.

The anticipated internal noise levels, in bedrooms with a partially open window (13dB attenuation), located on the facades closest to and facing Sodbury Road, would be 49dB during the daytime, 41dB during the night-time, with the maximum level not normally being exceeded more than 10 times per night being 63dB. These levels are above the SOAEL level, and above a level at which noise can cause a material change in behaviour. They are therefore considered unsuitable for occupants and alternative methods of mitigation overheating will be necessary.

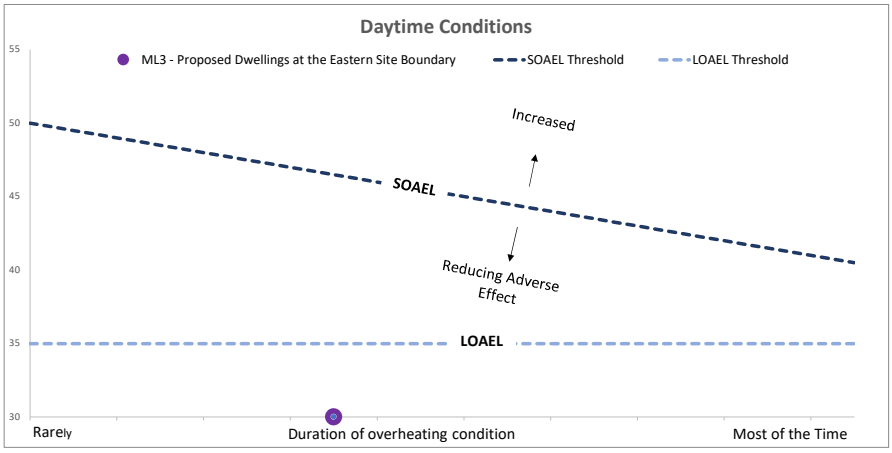
Standard opening windows are not considered to be suitable for facades facing Sodbury Road due to the medium overheating risk and the likely need to have windows open for ventilation, which would cause an unacceptable noise impact if occurring for long periods.

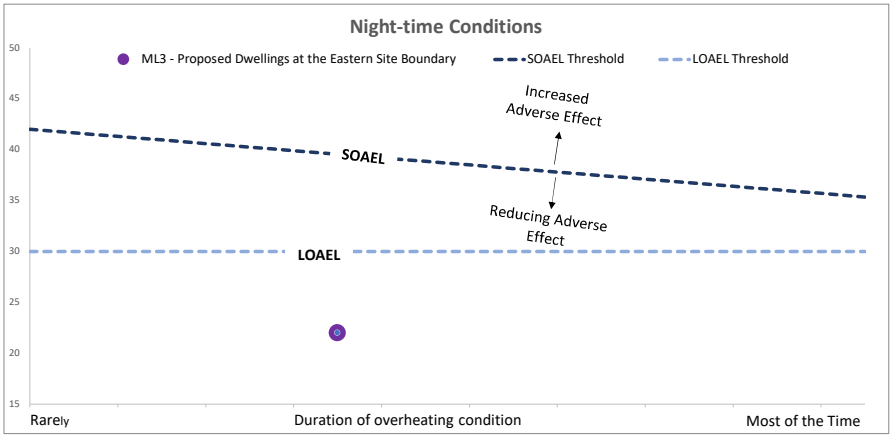
As this assessment has been undertaken for submission alongside an outline planning application, no detailed designs are available for the proposed development. As a stand-off from Sodbury Road and orientation of the development may not be a form of mitigation to be considered, facade design and ventilation strategy have been considered. In the absence of detailed drawings, calculations have been carried out using enhanced acoustic glazing and the assumption that glazing will comprise <35% of the total facade. It has been assumed that windows will remain openable, however, an alternative form of cooling will be provided, such as mechanical cooling or boost fans, to manage thermal comfort as part of the ventilation system. This mitigation strategy has been considered on the AVO diagrams below, these levels are below the SOAEL level for the daytime and night-time. Mitigation requirements can be confirmed on a plot-by-plot basis, once a detailed design layout is available.

Approximate Internal Noise Levels Including Mitigation (Assumed 35dB Façade Mitigation)	Daytime LAeq,16hr	Night-time LAeq,8hr	Night-time LAFmax
	30	22	44

Level 2 Assessment (in line with Table 3-3, with mitigation)

Noise can be heard, but does not cause any change in behaviour with windows closed. This is below the LOAEL during the daytime and night-time.





EARLY STAGE OVERHEATING RISK TOOL

Version 1.0, July 2019

This tool provides guidance on how to assess overheating risk in residential schemes at the early stages of design. It is specifically a pre-detail design assessment intended to help identify factors that could contribute to or mitigate the likelihood of overheating.

The questions can be answered for an overall scheme or for individual units. Score zero wherever the question does not apply. Additional information is provided in the accompanying guidance, with examples of scoring and advice on next steps.

Find out more information and download accompanying guidance at goodhomes.org.uk/overheating-in-new-homes.

Good Homes Alliance

KEY FACTORS INCREASING THE LIKELIHOOD OF OVERHEATING | **KEY FACTORS REDUCING THE LIKELIHOOD OF OVERHEATING**

Geographical and local context

#1 Where is the scheme in the UK?
See guidance for map

South east	4	2
Northern England, Scotland & NI	0	
Rest of England and Wales	2	

#2 Is the site likely to see an Urban Heat Island effect?
See guidance for details

Central London (see guidance)	3	0
Grtr London, Manchester, B'ham	2	
Other cities, towns & dense sub-urban areas	1	

#8 Do the site surroundings feature significant blue/green infrastructure?
Proximity to green spaces and large water bodies has beneficial effects on local temperatures; as guidance, this would require at least 50% of surroundings within a 100m radius to be blue/green, or a rural context

1	1

Site characteristics

#3 Does the site have barriers to windows opening?
- Noise/Acoustic risks
- Poor air quality/smells e.g. near factory or car park or very busy road
- Security risks/crime
- Adjacent to heat rejection plant

Day - reasons to keep all windows closed	8	4
Day - barriers some of the time, or for some windows e.g. on quiet side	4	
Night - reasons to keep all windows closed	8	4
Night - bedroom windows OK to open, but other windows are likely to stay closed	4	

#9 Are immediate surrounding surfaces in majority pale in colour, or blue/green?
Lighter surfaces reflect more heat and absorb less so their temperatures remain lower; consider horizontal and vertical surfaces within 10m of the scheme

1	1

#10 Does the site have existing tall trees or buildings that will shade solar-exposed glazed areas?
Shading onto east, south and west facing areas can reduce solar gains, but may also reduce daylight levels

1	0

Scheme characteristics and dwelling design

#4 Are the dwellings flats?
Flats often combine a number of factors contributing to overheating risk e.g. dwelling size, heat gains from surrounding areas; other dense and enclosed dwellings may be similarly affected - see guidance for examples

3	0

#5 Does the scheme have community heating?
i.e. with hot pipework operating during summer, especially in internal areas, leading to heat gains and higher temperatures

3	0

#11 Do dwellings have high exposed thermal mass AND a means for secure and quiet night ventilation?
Thermal mass can help slow down temperature rises, but it can also cause properties to be slower to cool, so needs to be used with care - see guidance

1	0

#12 Do floor-to-ceiling heights allow ceiling fans, now or in the future?
Higher ceilings increase stratification and air movement, and offer the potential for ceiling fans

>2.8m and fan installed	2	0
> 2.8m	1	

Solar heat gains and ventilation

#6 What is the estimated average glazing ratio for the dwellings?
(as a proportion of the facade on solar-exposed areas i.e. orientations facing east, south, west, and anything in between). Higher proportions of glazing allow higher heat gains into the space

>65%	12	0
>50%	7	
>35%	4	

#7 Are the dwellings single aspect?
Single aspect dwellings have all openings on the same facade. This reduces the potential for ventilation

Single-aspect	3	0
Dual aspect	0	

#13 Is there useful external shading?
Shading should apply to solar exposed (E/S/W) glazing. It may include shading devices, balconies above, facade articulation etc. See guidance on "full" and "part". Scoring depends on glazing proportions as per **#6**

	Full	Part	
>65%	6	3	0
>50%	4	2	
>35%	2	1	

#14 Do windows & openings support effective ventilation?
Larger, effective and secure openings will help dissipate heat - see guidance

	Openings compared to Part F purge rates		
	= Part F	+50%	+100%
Single-aspect	minimum required	3	4
Dual aspect		2	3

0

TOTAL SCORE **8** = Sum of contributing factors: **10** *minus* Sum of mitigating factors: **2**

High 12 **Medium** 8 **Low**

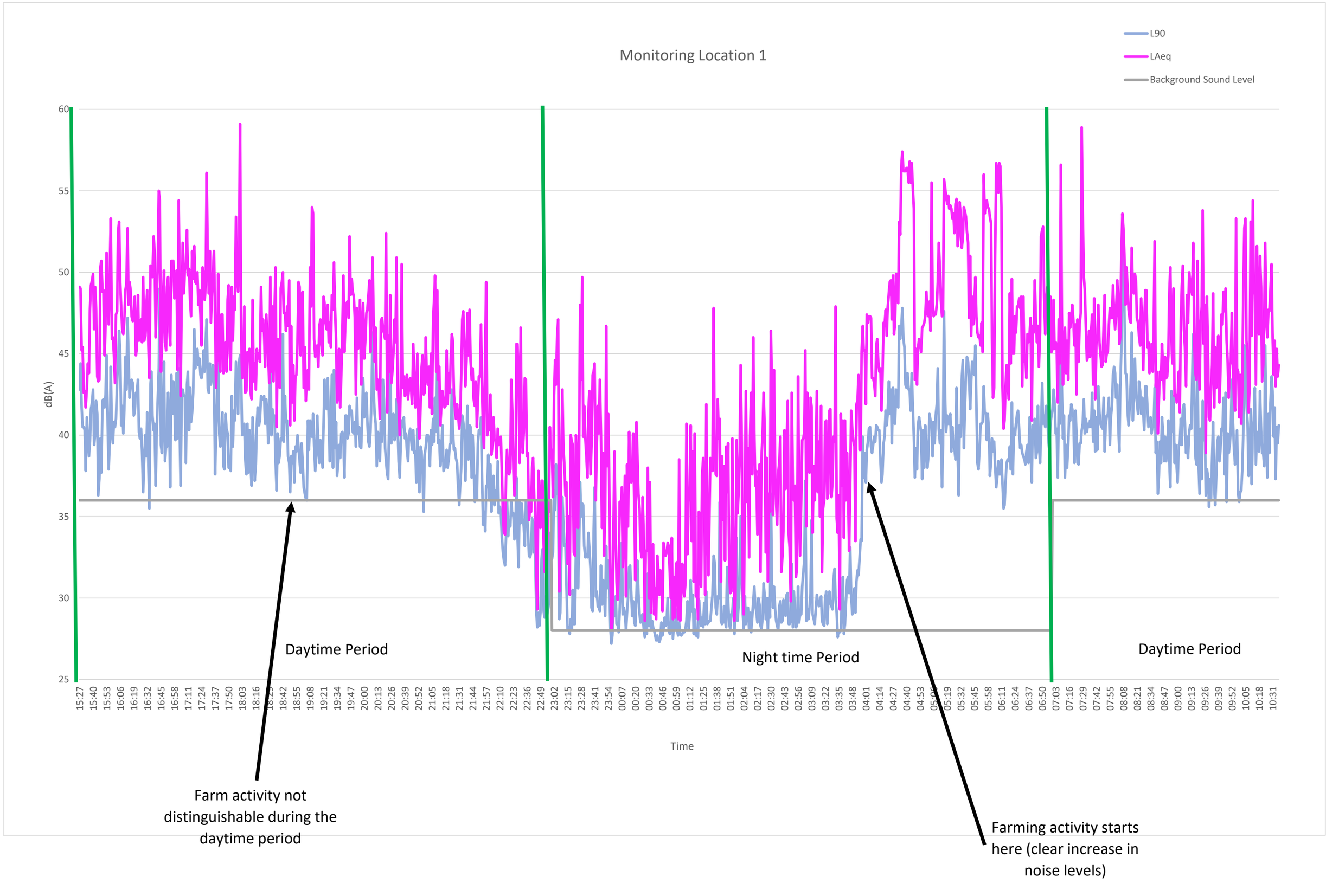
score >12:
Incorporate design changes to reduce risk factors and increase mitigation factors
AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)

score between 8 and 12:
Seek design changes to reduce risk factors and/or increase mitigation factors
AND Carry out a detailed assessment (e.g. dynamic modelling against CIBSE TM59)

score <8:
Ensure the mitigating measures are retained, and that risk factors do not increase (e.g. in planning conditions)

Appendix D Selection of the Background Sound Level

Appendix D – Selection of the background sound level



Appendix E Example Break-in Calculations

Octave Band Composite SRI Break In Sheet

INPUT DATA

Project:	Land at Wickwar
Plot:	General Living Room
Level:	Ground Floor
Room:	Living Room
Description:	Daytime internal Levels

Surface Area Wall	9.6
Surface Area Glazing	6.0
Roof Area	0.0
Number of vents	1
Room Volume	40.0
Room RT	0.5

	Ref	Description
Wall	1	Two leaves of 102.5mm brickwork, 50mm cavity,rigid wall ties
Glazing	11	4/12/4
Vent	22	Greenwood 5000EAW.AC1
Source type	2	Free field line source

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
Average Noise Level (dBz)		61.2	54.5	49.1	48.4	45.9	46.4	47.3	46.9
Maximum Noise Level (dBz)									

SRI DATA

Total Facade Area	15.6		Effective Façade Area	25.6

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
SRI Wall		31	37	42	52	60	63	68	
SRI Glazing		18	24	20	25	23	29	35	
SRI Roof		13	22	38	46	51	52	55	
D_{ne} Vent		30	42	40	36	48	53	56	
T_{wall} X S_{wall}		0.008	0.002	0.001	0.000	0.000	0.000	0.000	
$T_{glazing}$ X $S_{glazing}$		0.095	0.024	0.060	0.019	0.030	0.008	0.002	
T_{roof} X S_{roof}		0.000	0.000	0.000	0.000	0.000	0.000	0.000	
T_{vent} X S_{vent}		0.010	0.001	0.001	0.003	0.000	0.000	0.000	
Composite T		0.004	0.001	0.002	0.001	0.001	0.000	0.000	
Composite SRI (dB)		24	30	26	31	29	35	41	

BREAK IN CALCULATIONS

Reflection Corrected

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
External Noise Level (dB)		61	54	49	48	46	46	47	
Maximum External Noise Level (dB)		0	0	0	0	0	0	0	
Composite SRI		24	30	26	31	29	35	41	
Surface Area Correction		14	14	14	14	14	14	14	
Absorption Correction		11	11	11	11	11	11	11	
Source type correction		3	3	3	3	3	3	3	
Distance Correction		0	0	0	0	0	0	0	
Screening		0	0	0	0	0	0	0	

RESULTS

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
Internal Noise Level (dB)		44	31	29	24	23	17	12	
A weighted		17	15	20	20	23	18	13	
Internal Noise Level dB(A)	**28**								

Octave Band Composite SRI Break In Sheet

INPUT DATA

Project:	Land at Wickwar
Plot:	General Bedroom
Level:	First Floor
Room:	Bedroom
Description:	Night time internal Levels

Surface Area Wall	9.6
Surface Area Glazing	1.4
Roof Area	0.0
Number of vents	1
Room Volume	27.3
Room RT	0.5

	Ref	Description
Wall	1	Two leaves of 102.5mm brickwork, 50mm cavity,rigid wall ties
Glazing	11	4/12/4
Vent	22	Greenwood 5000EAW.AC1
Source type	2	Free field line source

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
Average Noise Level (dBz)		58.6	51.9	46.6	48.2	43.6	45.4	48.7	48.0
Maximum Noise Level (dBz)		80.2	70.3	64.6	70.2	62.8	69.5	72.7	69.4

SRI DATA

Total Facade Area	11.0		Effective Façade Area	21.0

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
SRI Wall		31	37	42	52	60	63	68	
SRI Glazing		18	24	20	25	23	29	35	
SRI Roof		13	22	38	46	51	52	55	
D_{ne} Vent		30	42	40	36	48	53	56	
T_{wall} X S_{wall}		0.008	0.002	0.001	0.000	0.000	0.000	0.000	
$T_{glazing}$ X $S_{glazing}$		0.022	0.006	0.014	0.004	0.007	0.002	0.000	
T_{roof} X S_{roof}		0.000	0.000	0.000	0.000	0.000	0.000	0.000	
T_{vent} X S_{vent}		0.010	0.001	0.001	0.003	0.000	0.000	0.000	
Composite T		0.002	0.000	0.001	0.000	0.000	0.000	0.000	
Composite SRI (dB)		27	34	31	35	35	41	47	

BREAK IN CALCULATIONS

Reflection Corrected

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
External Noise Level (dB)		59	52	47	48	44	45	49	
Maximum External Noise Level (dB)		80	70	65	70	63	70	73	
Composite SRI		27	34	31	35	35	41	47	
Surface Area Correction		13	13	13	13	13	13	13	
Absorption Correction		9	9	9	9	9	9	9	
Source type correction		3	3	3	3	3	3	3	
Distance Correction		0	0	0	0	0	0	0	
Screening		0	0	0	0	0	0	0	

RESULTS

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
Internal Noise Level (dB)		38	25	22	20	16	12	9	
A weighted		12	8	14	17	16	13	10	
Internal Noise Level dB(A)	**22**								
Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
Internal Noise Level (dB)		60	43	40	42	35	36	33	
A weighted		34	27	31	39	35	37	34	
Maximum Internal Noise Level dB(A)	**44**								

FIGURES

KEY

- Site Boundary
- Noise Monitoring Locations

Notes:

Boundaries are indicative.

Aerial imagery shown for context purposes only.

REVISION	DETAILS	DATE	DRAWN	CHK'D	APP'D

CLIENT

BLOOR HOMES

PROJECT

LAND AT WICKWAR

DRAWING TITLE

FIGURE 1 - NOISE MONITORING LOCATION PLAN

DRG No.	REV
GM11781-001	A

DRG SIZE	SCALE	DATE
A3	1:2,500	17/08/2021

DRAWN BY	CHECKED BY	APPROVED BY
EF	RC	SU

wardell armstrong

NEWCASTLE UPON TYNE | TEL 0191 232 0943
WWW.WARDELL-ARMSTRONG.COM

BIRMINGHAM, BOLTON, CARDIFF, CARLISLE, EDINBURGH, GLASGOW, LONDON, MANCHESTER, SHEFFIELD, STOKE ON TRENT

Key

- Site Boundary
- Existing Buildings
- Sodbury Road

Daytime $L_{Aeq\ 16\ hour}$ dB

	<=	50.0
50.0	-	60.0
60.0	-	70.0
	>	70.0

0 25 50 75 100 m

CLIENT: Bloor Homes

PROJECT: Land at Wickwar

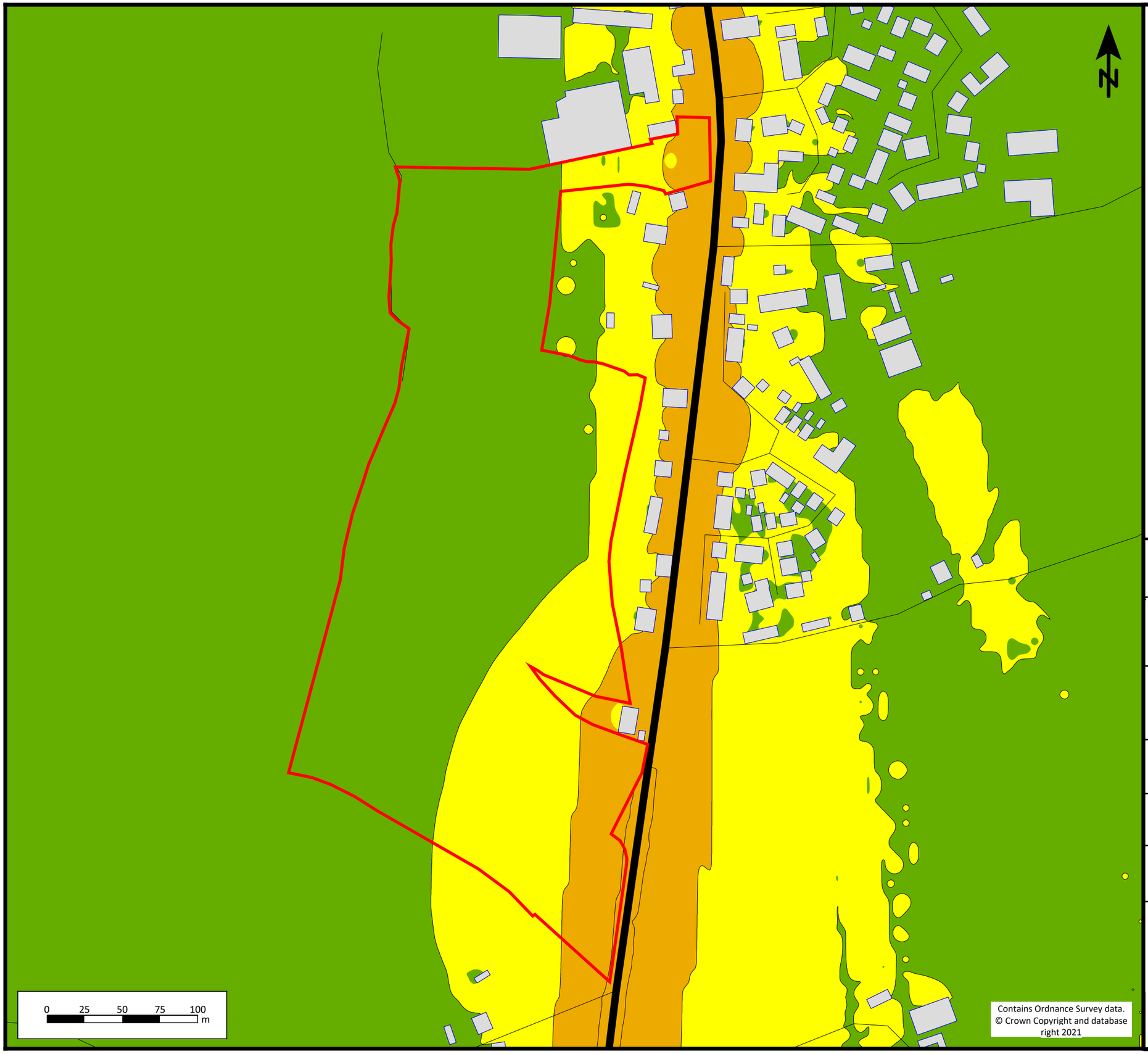
TITLE: Figure 2 - Daytime Noise Contours Across the Undeveloped Site

DRG NO:	REV:
GM11781/002	A

DRG SIZE:	SCALE:	DATE:
A3	1:2500	26/08/2021

DRAWN BY	CHECKED BY	APPROVED BY
EF	RC	SU

wardell armstrong
NEWCASTLE UPON TYNE | TEL 0191 232 0943
WWW.WARDELL-ARMSTRONG.COM
BIRMINGHAM, BOLTON, CARDIFF, CARLISLE, EDINBURGH, GLASGOW, LONDON, MANCHESTER, SHEFFIELD, STOKE ON TRENT



Key

- Site Boundary
- Existing Buildings
- Sodbury Road

Night time $L_{Aeq\ 8\ hour}$ dB

	<=	40.0
40.0	-	50.0
50.0	-	60.0
	>	60.0

CLIENT: Bloor Homes

PROJECT: Land at Wickwar

TITLE: Figure 3 - Night time Noise Contours Across the Undeveloped Site

DRG NO:	REV:
GM11781/003	A

DRG SIZE:	SCALE:	DATE:
A3	1:2500	26/08/2021

DRAWN BY	CHECKED BY	APPROVED BY
EF	RC	SU

wardell armstrong

NEWCASTLE UPON TYNE | TEL 0191 232 0943
WWW.WARDELL-ARMSTRONG.COM

BIRMINGHAM, BOLTON, CARDIFF, CARLISLE, EDINBURGH, GLASGOW, LONDON, MANCHESTER, SHEFFIELD, STOKE ON TRENT

Key

- Site Boundary
- Existing Buildings
- Sodbury Road

Night time L_{Amax} dB

<=	60.0
60.0 -	70.0
70.0 -	80.0
>	80.0

0 25 50 75 100 m

CLIENT: Bloor Homes

PROJECT: Land at Wickwar

TITLE: Figure 4 - Night time Maximum Noise Contours Across the Undeveloped Site

DRG NO:	REV:
GM11781/004	A

DRG SIZE:	SCALE:	DATE:
A3	1:2500	26/08/2021

DRAWN BY	CHECKED BY	APPROVED BY
EF	RC	SU

wardell armstrong

NEWCASTLE UPON TYNE | TEL 0191 232 0943
WWW.WARDELL-ARMSTRONG.COM

BIRMINGHAM, BOLTON, CARDIFF, CARLISLE, EDINBURGH, GLASGOW, LONDON, MANCHESTER, SHEFFIELD, STOKE ON TRENT

wardell-armstrong.com

STOKE-ON-TRENT
Sir Henry Doulton House
Forge Lane
Etruria
Stoke-on-Trent
ST1 5BD
Tel: +44 (0)1782 276 700

BIRMINGHAM
Two Devon Way
Longbridge Technology Park
Longbridge
Birmingham
B31 2TS
Tel: +44 (0)121 580 0909

BOLTON
41-50 Futura Park
Aspinall Way
Middlebrook
Bolton
BL6 6SU
Tel: +44 (0)1204 227 227

BRISTOL
Desklodge
2 Redcliffe Way
Bristol
BS1 6NL

BURY ST EDMUNDS
6 Brunel Business Court
Eastern Way
Bury St Edmunds
Suffolk
IP32 7AJ
Tel: +44 (0)1284 765 210

CARDIFF
Tudor House
16 Cathedral Road
Cardiff
CF11 9LJ
Tel: +44 (0)292 072 9191

CARLISLE
Marconi Road
Burgh Road Industrial
Estate Carlisle
Cumbria
CA2 7NA
Tel: +44 (0)1228 550 575

EDINBURGH
Great Michael House
14 Links Place
Edinburgh
EH6 7EZ
Tel: +44 (0)131 555 3311

GLASGOW
2 West Regent Street
Glasgow
G2 1RW
Tel: +44 (0)141 433 7210

LEEDS
36 Park Row
Leeds
LS1 5JL
Tel: +44 (0)113 831 5533

LONDON
Third Floor
46 Chancery Lane
London
WC2A 1JE
Tel: +44 (0)207 242 3243

NEWCASTLE UPON TYNE
City Quadrant
11 Waterloo Square
Newcastle upon Tyne
NE1 4DP
Tel: +44 (0)191 232 0943

TRURO
Baldhu House
Wheal Jane Earth Science Park
Baldhu
Truro
TR3 6EH
Tel: +44 (0)187 256 0738

International offices:

ALMATY
29/6 Satpaev Avenue
Hyatt Regency Hotel
Office Tower
Almaty
Kazakhstan
050040
Tel: +7(727) 334 1310

MOSCOW
21/5 Kuznetskiy Most St.
Moscow
Russia
Tel: +7(495) 626 07 67

wardell armstrong