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GLADMAN DEVELOPMENTS LIMITED

SWANSTREE AVENUE, SITTINGBOURNE

NOISE ASSESSMENT REPORT

SEPTEMBER 2021

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DATE ISSUED:	**20TH SEPTEMBER 2021**
JOB NUMBER:	**GM11657**
REPORT NUMBER:	**0002**
VERSION:	**V0.1**
STATUS:	**Final**

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SEPTEMBER 2021

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EXECUTIVE SUMMARY

A noise assessment has been undertaken to accompany an outline planning application for a proposed development on land off Swanstree Avenue, Sittingbourne.

The assessment has considered the site suitability in terms of noise impacts from existing sources and has been informed by noise survey data obtained by Wardell Armstrong LLP in June 2021. COVID-19 restrictions were relaxed at this time and it was confirmed with the Environmental Health Officer (EHO) at Swale Borough Council (SBC) that road traffic levels had returned to a typical level.

The road traffic noise impact assessment indicates that the BS8233 guideline for noise levels in outdoor living spaces will be met across most the proposed development without the need for mitigation. However, for any proposed gardens areas located in the northern part of the site, that are not screened by proposed dwellings, it is recommended that a 2.0m close boarded fence is installed around the gardens to ensure noise guideline levels are met.

Any proposed dwellings that face Swanstree Avenue and are within 40m from the roadside, will require noise mitigation in the form of enhanced glazing and acoustic trickle ventilation to achieve BS8233 internal noise guidelines. The amount and type of glazing needed to achieve guidelines cannot be confirmed until a site layout is available, and should therefore be confirmed at the detailed design stage.

The industrial noise assessment concluded that noise impact from activity at the Chilton Manor Farm will be low across the entire site.

The assessment demonstrates that the proposed development will not lead to an unacceptable noise impact at existing and proposed sensitive receptors provided the recommended mitigation is implemented and is therefore compliant with all relevant legislation and guidance.

Following the implementation of the necessary noise mitigation measures which will depend on the final site layout, the proposed development falls within the Lowest Observed Adverse Effect Level (LOAEL), in line with the Noise Policy Statement for England. It is on this basis we do not consider noise to be a determining factor of this planning application.

1 INTRODUCTION

1.1.1 Wardell Armstrong LLP has been commissioned by Gladman Developments Limited, to undertake an outline noise assessment for a proposed residential development on land off Swanstree Avenue, Sittingbourne.

1.1.2 The site is 7.24ha and has been proposed for a residential development. The existing surrounding area is residential to the north and west. The nearest properties are located on Haysel to the north and Marjoram Drive to the west.

1.1.3 The northern site boundary is bordered by Swanstree Avenue. Chilton Manor Farm and the associated farm shop is located on the west boundary of the site, with Highsted Road immediately beyond.

1.1.4 This noise assessment report has been prepared to accompany an outline planning application, considering all current and relevant guidance. Recommendations for noise mitigation are provided where appropriate in outline terms. Final mitigation strategies should be reviewed and considered further at the detailed design stage.

2 ASSESSMENT METHODOLOGY

2.1 Local Authority Consultation

2.1.1 The potential impacts of the proposed development and general principles of the assessment methodology were sent to Swale Borough Council (SBC) on the 1st April 2021.

2.1.2 A response from Ms Julie Oates, Mid-Kent Environmental Protection Team Leader, dated 4th June 2021 agreed that the proposed noise assessment methodology would be acceptable, however suggested to review measured road traffic noise levels against 2019 traffic flow data, to ensure the assessment was not influenced by the COVID-19 pandemic restrictions at the time.

2.2 Scope of Works

2.2.1 Based on the consultation with SBC, the scope of this assessment includes the following considerations:

- Noise monitoring at the development site for 24 hours at 3 locations representative of the proposed development.
- Predictions of noise across the development site.
- Assessment of transportation noise levels at the proposed development in accordance with ProPG and BS8233 and AVO.

2.3 Assessment Methodology

2.3.1 This assessment has been prepared with reference to;

- National Planning Policy Framework, 2021 (NPPF);
- Planning Practice Guidance – Noise, 2019 (PPG);
- Noise Policy Statement for England, 2010 (NPSE);
- ProPG Planning & Noise – Professional Practice Guidance on Planning & Noise, 2017 (ProPG);
- Acoustics Ventilation and Overheating – Residential Design Guide, January 2020 (AVO);
- Department of Transport's memorandum, Calculation of Road Traffic Noise, 1998 (CRTN);

- British Standard 4142:2014+A1 2019 'Methods for rating and assessing industrial and commercial sound (BS4142);
- British Standard 8233:2014 Guidance on sound Insulation and noise reduction for buildings (BS8233).

2.3.2 Further details on the guidance and standards used in this assessment can be found in Appendix A.

2.4 Acoustic Design Criteria

2.4.1 The adopted acoustic design criteria have been taken from BS8233 are summarised as follows.

- 50 dB $L_{Aeq,16h}$ as a desirable limit, with 55 dB $L_{Aeq,16h}$ considered as an upper limit during the daytime in outdoor living areas.
- 35 dB $L_{Aeq,16hour}$ during the daytime in living rooms and bedrooms.
- 30 dB $L_{Aeq,8hour}$ during the night-time in bedrooms.
- 45 dB $L_{Amax,f}$ during the night time in bedrooms.

2.5 Overheating

2.5.1 The proposed development is likely to be impacted by road traffic noise, particularly from the adjacent roads on the north and west site boundaries. Therefore, future residents at certain dwellings, if located adjacent to a noise source may require windows to be closed for some or all the time to mitigate the noise.

2.5.2 Therefore, in addition to whole dwelling ventilation requirements, this assessment includes an AVO assessment to consider the potential risk of overheating in the residential rooms of the development.

3 BASELINE NOISE LEVELS

3.1 Measurements of the Ambient Sound Levels

3.1.1 Between the 8th and 9th June 2021, Wardell Armstrong LLP carried out a baseline noise survey at the development site.

3.1.2 Noise measurements were carried out at three monitoring locations. The monitoring locations (ML) are detailed in Table 1 and their locations are shown on Drawing Number GM11567-001.

Table 1: Summary of Noise Monitoring Locations

Monitoring Location	Location Description	Time Period Monitored		Attended or Unattended Monitoring
		Start	End	
ML1	Western part of proposed development, 4 metres away from Highsted Road	1530 hrs 08/06/2021	1320hrs 09/06/2021	Unattended
ML2	Within the Chilton Manor Farm Shop yard	1415hrs 08/06/2021	1330hrs 09/06/2021	Partially Attended
ML3	Northern site boundary, adjacent to Swanstree Avenue	1430hrs 08/06/2021	1300 hrs 09/06/2021	Unattended

Measurement Configuration

3.1.3 The noise measurements were made using four Class 1, integrating sound level meters (with continuous audio recording). In accordance with guidance, the microphones were mounted vertically on tripods 1.5m above the ground and more than 3.5 metres from any other reflecting surfaces.

3.1.4 The sound level meters were calibrated to a reference level of 94dB at 1kHz both before, and on completion of, the noise survey. No drift in the calibration during the survey was noted.

3.1.5 In accordance with current British Standards, for this assessment, daytime hours are taken to be 0700 to 2300 hours and night-time hours to be 2300 to 0700 hours.

3.1.6 A-weighted[1] L_{eq}[2] noise levels were measured to comply with the requirements of WHO, BS8233, BS4142 and BS5228. A-weighted L_{90}[3] and L_{10}[4] noise levels, together with the maximum and minimum sound pressure levels, were also measured to provide additional information. The measured noise levels are set out in full in Appendix B.

Weather Conditions

3.1.7 The weather conditions during the survey period were:

- Dry, temperatures which ranged between 13-26˚C
- Clear, up to 10% cloud coverage
- 0mm precipitation
- Wind speeds ranging between less than 1ms^{-1} and up to 5ms^{-1}

Site Observations

3.1.8 Attended noise monitoring during installation allowed for observations and detailed notes to be made of the significant noise sources which contributed to each of the measured levels. The observations identified the following:

Road Traffic Noise: Noise from road traffic on Highsted Road was dominant in the western part of the site. Noise from Swanstree Avenue was dominant at the northern part of the site.

Birdsong: Birdsong was audible at all monitoring locations.

Chilton Manor Farm: Occasional tractor movements were audible at ML1 and ML2 within the Chilton Manor Farm Shop yard. Note that tractor movements across the development site were also audible at ML3, however, since the land in which the tractor was working on is part of the development proposals, this has been disregarded from the assessment.

[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_{eq} — 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 Noise Monitoring Results

3.2.1 The results of the noise survey are shown in Table 2 below. The full set of noise monitoring results is presented in Appendix B.

3.2.2 The maximum night-time noise levels presented in Table 2 are the 10th highest level measured during the survey period, in accordance with ProPG 2017.

Table 2: Noise Monitoring Results

Monitoring Location	Daytime (0700-2300 hrs)			Night-time (2300-0700 hrs)		
	$L_{Aeq\ 16h}$ dB	$L_{A90,\ 16h}$ dB	$L_{Af,Max}$ dB	$L_{Aeq\ 8h}$ dB	$L_{A90,\ 8h}$ dB	$L_{Af,Max}$ dB
ML1	64	40	85	57	36	81
ML2	62	45	83	51	38	76
ML3	64	42	88	54	31	76

4 SITE NOISE RISK ASSESSMENT

4.1.1 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 and other noise sources which may have an adverse impact on the proposed development based on the overall measured levels, with no mitigation in place.

4.1.2 The results of noise measurements carried out during the daytime and night-time periods are presented in Table 3 and have been compared to the information provided on Figure 1 of ProPG 2017.

Table 3: Stage 1 Risk Assessment of noise levels.

Monitoring Location	Residential Property Location	Daytime Noise Level (dB $L_{Aeq,16h}$)	Risk of Adverse Effect	Night-time Noise Level ($L_{Aeq,8h}$)	Risk of Adverse Effect
ML1	Approximately 4 metres away from Highsted Road (western site boundary)	64	Medium	57	High
ML3	Approximately 4 metres away from Swanstree Avenue (northern site boundary)	64	Medium	54	Medium

4.1.3 Table 3 indicates that during the daytime and night-time periods, any proposed receptors of the development located closest to Highsted Road and Swanstree Avenue are at a 'Medium' to 'High' risk of adverse effect. It should be noted that the above results present a worst-case scenario for the site by considering noise levels measured adjacent to the surrounding roads.

4.1.4 For high-risk sites, ProPG states:

'High noise levels indicate that there is an increased risk that the development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.'

4.1.5 For medium risk sites, ProPG states:

'As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS (Acoustic Design Statement) which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly

demonstrate that a significant adverse noise impact will be avoided in the finished development.'

4.1.6 The Site Noise Risk Assessment shows that local noise mitigation and good acoustic design will be required to ensure that the potential risk of the noise impact is minimised, and guideline internal and external noise levels are achieved.

4.1.7 Therefore, a full noise assessment is required to ensure future residents are protected and good acoustic design has been implemented.

5 AVO – STAGE 1 OVERHEATING RISK ASSESSMENT

5.1.1 In January 2020 the Acoustics Ventilation and Overheating: Residential Design Guide (AVO) was published by the Association of Noise Consultants. Therefore, the risk of overheating within proposed dwellings has been considered in this report in line with the AVO guide.

5.1.2 In accordance with AVO, the existing noise levels, from transportation sources, across the proposed development site have been compared to the Level 1 risk assessment shown in Table 3.2 of AVO, to establish the potential risk of an overheating condition.

5.1.3 The results of noise measurements carried out during the daytime and night-time periods are presented in Table 4 and have been compared to the information provided on Table 3.2 of AVO.

Table 4: Stage 1 Risk Assessment of Noise Levels in Accordance with AVO 2020.

Monitoring Location	Residential Property Location	Daytime Noise Level (Figures in dB L_{Aeq})	Risk of Overheating Condition (AVO)	Night-time Noise Level (Figures in dB L_{Aeq})	Risk of Overheating Condition (AVO)
ML1	Approximately 4 metres away from Highsted Road (western site boundary)	64	High	58	High
ML3	Approximately 4 metres away from Swanstree Avenue (northern site boundary)	64	High	54	Medium

5.1.4 AVO states that where a noise level of 78 L_{AFmax} is exceeded, this is an indication that noise levels at the site may not be regarded as negligible. The assessment indicates that the maximum noise levels will have the potential to regularly exceed 78dB L_{AFmax} during the night-time, if proposed dwellings are located close to Highsted Road.

5.1.5 However, the proposed dwellings located nearest to Highsted Road are likely to be exposed to a high risk of overheating both during the daytime and night-time. L_{AFmax} night-time levels also have the potential to cause a high risk. It should be noted that the above results present a worst-case scenario for the site by considering noise levels measured adjacent to the surrounding roads.

5.1.6 In accordance with the AVO guide, it is required to ensure good acoustic design at any proposed dwellings located near to the north and west of boundaries of the site. It is recommended that a Mechanical Engineer be consulted at the later design stages to

ensure thermal comfort is controlled whilst ensuring road traffic noise is mitigated appropriately, where required.

6 ASSUMPTIONS, LIMITATIONS AND UNCERTAINTY

6.1 Introduction

6.1.1 The following assessments are affected by the assumptions and limitations detailed below.

6.2 Assumptions

6.2.1 The following assumptions have been made;

- An open window provides approximately 13dB noise attenuation.

6.3 Limitations

6.3.1 The proposed development is currently in outline stages. In the absence of a proposed dwelling layout, it is not possible to assess the noise levels across the site on a plot-by-plot basis. Therefore, the following assessment is in outline terms only.

6.4 Uncertainty

6.4.1 To reduce the level of uncertainty within the assessment, the following steps have been taken:

- In accordance with guidance, the microphone was mounted vertically on a tripod 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.

6.5 Noise Modelling

6.5.1 The assessment of the propagation of sound across the developed site has been undertaken using the noise modelling software SoundPLAN version 8.2 (SoundPLAN).

6.5.2 SoundPLAN 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 noise such as buildings and topography.

6.5.3 SoundPLAN model uses the noise prediction methodology set out in ISO 9613-2:1996 ‘Attenuation of sound during propagation outdoors’. The noise modelling produces noise contour plans demonstrating the levels of road traffic and industrial noise across the site.

6.5.4 SoundPLAN conforms to the calculation procedures set out in the Department of Transport's memorandum, "Calculation of Road Traffic Noise" (CRTN), 1988 and ISO 9613:1996 Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation.

6.5.5 The model assumes a temperature of 10^{o}C, 70% humidity, and 1013.3mbar air pressure. The intervening ground between the factory and site is a mixture of hard and soft ground, hence the use of 0.6 as the term to represent ground absorption (where 0 = completely absorbent and 1 = completely reflective).

6.5.6 The noise modelling has been checked for accuracy against the measured noise levels. This has been undertaken to assess the suitability of the noise model to determine the propagation of noise across the site by co-locating a receptor location with a monitoring location in the model.

7 ROAD TRAFFIC NOISE IMPACT ASSESSMENT

7.1 Existing Noise Levels

7.1.1 The measured road traffic noise levels from the noise survey have been summarised below in Table 8. These measured levels have been used in this assessment and the monitoring locations are shown in drawing GM11527-001.

7.1.2 Note that the maximum levels presented in Table 8 are the 10th highest recorded during the night-time, in line with ProPG 2017.

Table 5: Measured Road Traffic Noise Levels at ML1

Monitoring Location	Location	Daytime dB(A) $L_{eq, 16hour}$	Night-time dB(A) $L_{eq, 8hour}$	Night-time dB(A) $L_{max,F}$
ML1	Highsted Road	64	57	81
ML3	Swanstree Avenue	64	54	76

7.2 Road Traffic – Noise Modelling

7.2.1 The measured daytime $L_{Aeq,16h}$, night-time $L_{Aeq,8h}$ and night-time maximum $L_{Amax,F}$ noise levels for Highsted Road and Swanstree Avenue have been calibrated to and checked for accuracy against the measured noise levels at ML1 and ML3 as shown in Table 6. This has been carried out by co-locating the receptor locations in the model with an actual monitoring location.

7.2.2 Note that DfT statistics on transport use during the COVID-19 pandemic indicate that on the days in which the survey took place, road traffic flows were 92% of what they would be on a typical day pre-COVID-19. Therefore the noise survey data used to calibrate the model is considered to be representative.

7.2.3 A comparison between the measured transportation noise and the modelled levels at the monitoring locations are detailed in Table 6.

Table 6: Comparison of the Modelled and Monitored Maximum Night-time Road Traffic Noise Levels (Figures in dB)

Time period	Average Assessment Noise Level (L_{Aeq})	Modelled Noise Level (L_{Aeq})	Difference in Averaged Noise Level	Maximum Assessment Noise Level (L_{Afmax})	Maximum Modelled Noise Level (L_{Afmax})	Difference in Maximum Noise Level
ML1 – Highsted Road, Daytime	64.0	64.0	0	-	-	-
ML2 – Swanstree Avenue, Daytime	64.3	64.3	0	-	-	-
ML1 – Highsted Road, Night-time	56.5	56.5	0	81.4	81.4	0
ML2 – Swanstree Avenue, Night-time	54.3	54.3	0	76.1	76.1	0

7.2.4 The results of the noise model calibrations agree with the measured noise levels to the nearest one decimal place. Therefore, the model presents an accurate representation of the noise levels across the proposed development site and has been used with confidence to inform the assessment of nearby road traffic noise sources.

7.3 Road Traffic Noise Impact Assessment

7.3.1 The following figures have been prepared using the results of the noise model which show the predicted propagation of road traffic noise from the surrounding road network across the developed site, based on the measured noise levels presented in Table 5.

- Drawing GM11527-002: Daytime average road traffic noise levels ($L_{Aeq,16h}$) across the undeveloped site.
- Drawing GM11527-003: Night-time average road traffic noise levels ($L_{Aeq,8h}$) across the undeveloped site.
- Drawing GM11527-004: Night-time maximum road traffic noise levels ($L_{Amax,f}$) across the undeveloped site.

7.3.2 If dwelling garden areas are proposed within the orange or yellow contours on drawing GM11567-002, mitigation will be required to meet BS8233 external living space criteria. Figure 2 indicates that the majority of the site can meet external noise

guideline levels without the need for noise mitigation. This is further discussed in Section 8.

7.3.3 Considering a +3dB correction to account for the noise level at any proposed façade, the noise levels across the site, with respect to drawings GM11567- 002, GM11567- 003 and GM11567-004 are as follows:

- During the daytime, façade noise levels will likely range between <48 dB(A) to 63 dB(A). Higher noise levels will be experienced in the northern part of the site.
- During the night-time, façade noise levels will likely range between <43 dB(A) to 55 dB(A). Higher noise levels will be experienced in the northern part of the site.
- Night-time maximum noise levels will likely be within the range of 58 dB(A) to 73 dB(A). Higher noise levels will be experienced in the northern part of the site.

7.3.4 With windows open, the attenuation provided by the façade will be approximately 13dB(A). This would mean the recommended noise guideline value in living rooms and bedrooms would be exceeded in northern parts of the site as shown in drawings GM11567-003 and GM11567-004.

7.3.5 Therefore, based on the noise levels predicted, mitigation will be required at dwellings where the noise level is higher than 48 dB(A) during the daytime, higher than 43 dB(A) during the night-time, or experiences maximum noise levels higher than 58 dB(A). This to ensure that BS8233 internal noise level criteria are met in living rooms and bedrooms. Mitigation recommendations are detailed in Section 8 of this report.

7.1 Industrial Noise Impact Assessment

Industrial Noise Modelling of Existing Specific Sound

7.1.1 As noted during the noise survey, some light industrial noise was present at the Chilton Manor Farm. This included:

- Tractor movements via the farm shop access road through to the back of the shop (to collect equipment).
- Agricultural activities including planting fruit and vegetables in the orchards across the proposed development site.

7.1.2 As the farm shop will continue to operate following the opening year of the proposed residential scheme, a BS4142 assessment has been carried out to ensure future residents are not disturbed by any industrial noise from the farm shop.

7.1.3 Using the noise modelling software, SoundPLAN, noise egress from tractor movements have been modelled as a line source, with a sound power level spectrum of a tractor moving less than 30km per hour and at 0.5m above the ground (approximate height of engine). The sound power level of this source from the SoundPLAN database is 62 dBA $L_{w.}$

7.1.4 The site observations taken during the survey indicated that tractor movements in the farm shop yard can be expected to occur once every 30 minutes. Therefore, the line source has been modelled with an on-time correction of 2 events per hour to demonstrate a typical scenario.

7.1.5 It is understood that the tractor movements will occur during the daytime period only and therefore the following assessment is applicable to the daytime only.

7.2 Rating level

Acoustic Feature Correction

7.2.1 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.

7.2.2 Noise from tractor movements at Chilton Manor Farm was considered to be broadband and steady during the noise survey. Based on this, no acoustic feature correction has been applied in this case.

Selection of the Background Sound

7.2.3 The noise measurements obtained at ML1 have been analysed to establish a representative background sound level as required by BS4142. The average daytime background sound level at ML1 was 40 dB $L_{A90,16hour}$ which is the lowest background sound level out of the three monitoring locations. Therefore, to present a robust assessment, 40 dB $L_{A90,1hour}$ has been taken to be the representative background sound level for this assessment.

Comparison of the Background and Rating Levels

7.2.4 In accordance with BS4142, the sound rating levels of operations from the Swangleys Farm, have been compared with the representative background sound level obtained during the noise survey.

7.2.5 Drawings GM11567-005 and GM11567-006 display the noise contours across the undeveloped site in terms of specific sound level and the exceedance of background sound level from the rating level, respectively. Table 7 below considers the closet potential dwelling location to the farm shop.

Table 7: Comparison of rating level and background sound levels - Outdoor Living Areas

Description		**Daytime**
		Plots at the Western Site Boundary, Closest to Chilton Manor Farm
Specific Noise Level Range, L_{Aeq} (dB)		40
Acoustic Feature Correction (dB)	Tonality (dB)	+0
	Impulsivity (dB)	+0
	Intermittency (dB)	+0
Calculated Rating Level Range (dB)		40
Measured Background Sound Level L_{A90} (dB)		40
Range of excess of the rating level over the background sound level (dB)		0

7.2.6 Table 7 shows the rating level at the worst-case location of the proposed development has been found to be equal to the background sound level, which is an indication of a low impact, depending on context.

7.3 Context Assessment

7.3.1 In accordance with BS4142 an assessment of the context in which the industrial sound resides must be undertaken to determine the potential noise impact.

7.3.2 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*".

7.3.3 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

7.3.4 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."*

7.3.5 The background and rating levels are 40 dB(A) and 40 dB(A) respectively and these levels are considered to be neither high nor low and therefore the difference between rating level and background sound level is not relevant in this case.

Character and Level of Residual Sound Compared with the Specific Sound

7.3.6 The specific sound from the industrial activity at Chilton Manor Farm comprises vehicle movements and would be similar in character to typical road traffic noise which is broadband in nature.

7.3.7 Based on the sound levels displayed in drawings GM11567-005 and GM11567-006, the rating level of industrial noise across the entire site is less than the measured background sound levels during the daytime. The specific sound level is shown to be equal to or less than 40 dB(A) $L_{Aeq,1hour}$ across the undeveloped site which shows that the desirable BS8233 criteria of 50 dBA $L_{Aeq,\ 16hour}$ for outdoor living spaces will be met.

Sensitivity of Receptor

7.3.8 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."*

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

7.3.10 This assessment has shown that sensitive internal areas at the proposed dwellings will include the implementation of standard double glazing and an alternative means of ventilation to allow residents to close their windows and ventilation maintained. These mitigation measures are discussed in Section 8 of this report.

7.4 BS4142 Summary

7.4.1 A BS4142 assessment of existing industrial noise at the Chilton Manor Farm has been carried out to assess the potential impact across the proposed undeveloped site.

7.4.2 The assessment in Table 7 shows that the rating levels of activities associated with proposed development would likely be equal to background sound levels during the daytime at the most western side of the site where a dwelling or garden area could be proposed. The remainder of the site is shown to experience specific sound levels that are 10+ dB lower than the background sound level.

7.4.3 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 remains low. Therefore,

the BS4142 assessment indicates that the noise associated with the existing industrial noise will have a low impact at proposed dwellings without the need for mitigation measures.

8 MITIGATION RECOMMENDATIONS

8.1 Road Traffic Noise

Noise Levels in Outdoor Living Spaces

8.1.1 Drawing GM11567-002 shows that when considering transportation noise sources, guideline noise levels for outdoor living areas can be met without mitigation across the majority of the site.

8.1.2 However, the most northern area of the site up to 40m south of Swanstree Avenue exceeds the upper guideline level of 55 dBA. If outdoor living spaces are proposed within this part of the site, mitigation would be required in the form of a 2.0m high close boarded fence around garden areas. With the 2.0m garden fences in place, BS8233 outdoor living space guidelines are met across the entire site.

8.1.3 Alternatively, if gardens are proposed on the screened side of dwellings facing Swanstree Avenue, the buildings should provide enough attenuation themselves to ensure the external living space guidelines are met, across the site. Garden areas set back into the site will be protected by the development itself and would achieve the external noise guideline level without specific mitigation.

8.1.4 It should be noted that the final height and location of close boarded fencing to mitigate noise will depend on the final layout of the site and can be determined at the detailed design stage.

Internal Noise Levels

8.1.5 When considering road traffic noise impacts across the undeveloped site, dwellings that will fall within the dark green contour band in drawings GM11567-002, GM1567-003 and GM1567-004, will meet internal noise level criteria with standard thermal double glazing and openable windows for ventilation.

8.1.6 For dwellings located in the northern part of the site, within 40m from Swanstree Avenue, noise mitigation measures will be required which will comprise acoustic glazing together with alternative ventilation strategies to ensure that the windows can be closed as required.

8.1.7 The final noise mitigation strategy should be confirmed at the design stage.

8.2 Glazing and Acoustic Ventilation Requirements

8.2.1 It is recommended that the acoustic 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". Acoustic ventilation is only recommended for noise sensitive rooms, which are bedrooms and living/dining rooms.

8.2.2 The implementation of the recommended glazing together with appropriate acoustic ventilation should ensure that the required internal daytime and night-time noise guideline levels are achieved.

8.2.3 Appropriate façade mitigation, including a suitable glazing and ventilation scheme, to remove the need to open windows for ventilation, should be installed at the relevant façades.

8.2.4 Table 8 below shows the amount of attenuation required from the façade mitigation strategy that will likely be required at each façade within the northern part of the site where road traffic noise from Swanstree Avenue is most dominant.

8.2.5 The façades of the buildings that face away from Swanstree Avenue will be screened by the building itself, and dwellings further into the site will benefit from screening from dwellings closer to the roads. Therefore, the level of attenuation these façades would need to provide will be less than those detailed in Table 8. Note that the predicted façade levels shown are the free field noise level +3 dB correction for façade reflections.

Table 8: Façade noise level closest to road traffic and level of attenuation required to achieve the internal daytime and night-time Guidance Noise Levels (Figures in dB(A))

Assessment Location	Daytime Noise Level at the Façade of the Property (dB L_{Aeq})	Night-time Noise Level at the Façade of the Property (dB L_{Aeq})	Maximum Noise Level at the Façade of the Property (dB L_{Amax})	Level of Attenuation Needed to Achieve the Noise Guidance Levels in Living Rooms and Bedrooms (dB(A))
Noise level at the nearest proposed façade facing Swanstree Avenue	61	58	71	26

8.2.6 Based on the attenuation requirement shown in Table 8 for the worst-case façade within the proposed development, an example noise break-in calculation has been carried out to determine the specification of glazing that would likely provide sufficient attenuation should any properties be built within the northern part of the site.

8.2.7 In the absence of design details for the building facades, it has been assumed that the glazing to noise sensitive rooms would comprise about 35% of the facade area. To calculate the overall attenuation provided by this percentage of glazing in a brick or block facade, a non-uniform partition calculation can be used.

8.2.8 An example calculation for a living room and bedroom is presented in Appendix C which shows that the implementation of 10/12/4 glazing in combination of Greenwood 5000AEW.AC2 trickle vents, as part of an Approved Document F system 3 design, provides sufficient attenuation to ensure BS8233 internal noise guidelines are met.

8.3 Stage 2 AVO Assessment

8.3.1 In accordance with the AVO guide, a Stage 2 overheating assessment is required following an indication of high risk as shown in Section 5. This is to ensure good acoustic design and thermal comfort for future residents of the development, where mechanical ventilation strategies can be further explored as a mitigation option.

8.3.2 The Good Homes Alliance Tool for early-stage overheating risk has been used to determine the need for further mitigation to prevent overheating. The Good Homes Alliance Tool process is presented in Appendix D. The resultant score following each consideration of contributing factors and mitigating factors based on the location of the site is 15, as shown in Appendix D. This is an indication of a high risk.

8.3.3 On this basis, we would recommend that overheating in proposed dwellings is considered at the detailed design stage by a Mechanical Engineer, who can ensure thermal comfort is controlled, particularly within dwellings that are most exposed to road traffic noise.

8.4 Acoustic Design Process

8.4.1 The development proposals are currently at outline planning stage and therefore the exact location of each proposed dwelling is unknown. The mitigation measures suggested in this report are in outline terms only.

8.4.2 Drawings GM11567-002, GM11567-003 and GM11567-004 show that the northern area of the site is exposed to higher noise levels than the south, suggesting that if any dwellings or garden spaces are proposed in this area, mitigation will be required to ensure future residents are not disturbed by road traffic noise.

8.4.3 Depending on the site layout at the design stages, it is currently recommended that garden spaces in the north of the site be orientated so that they are screened from Swanstree Avenue. If this is not possible, a 2m high fence along the northern site boundary would provide sufficient attenuation to reduce noise levels in the north of the site such that garden areas could be facing Swanstree Avenue and still meet BS8233 external noise guidelines.

8.4.4 The facades of some of the properties further into the site will be protected by the buildings themselves and/or screened by other buildings. Therefore, acoustic ventilation may not be required for some plots. The requirement for acoustic ventilation can be confirmed on a plot-by-plot basis at the detailed design stage, at which we would recommend consulting with a Mechanical and Engineering consultant to ensure thermal comfort is controlled.

8.4.5 It is also recommended that, if possible, the location and orientation of dwellings is designed such that exposure to road traffic noise is minimised, and where possible, dwellings screening is provided for outdoor living spaces to avoid adverse impacts.

8.4.6 The detailed site design and mitigation strategy can be confirmed at the detailed design stage.

9 CONCLUSIONS

9.1.1 Wardell Armstrong has carried out a noise assessment to accompany an outline planning application for a proposed development, located off Swanstree Avenue, Sittingbourne.

9.1.2 The assessment has considered the site suitability in terms of noise impacts from existing sources, including transportation noise and industrial noise from agricultural activities at Chilton Manor Farm.

9.1.3 Industrial noise has been determined to be insignificant in terms of impact at the proposed development, as specific sound levels have been determined to be far below background noise levels across the site.

9.1.4 The road traffic noise impact assessment concludes that the development will require mitigation in the form of acoustic glazing and ventilation for some plots located closest to Swanstree Avenue. A 2.0m high fence has been recommended to be implemented around gardens close to the northern site boundary, should proposed external living areas be located adjacent to Swanstree Avenue.

9.1.5 It is advised that careful design of the proposed development is considered during the detailed design stages to ensure the most affected façades of proposed dwellings are screened where possible, with bedrooms and living rooms located on lesser impacted façades. This can be addressed at a later stage.

9.1.6 Should it not be possible to design individual plots in a way that protects the most sensitive rooms from noise, the glazing and acoustic ventilation recommendations should be followed to ensure future residents are exposed to an acceptable level of internal noise from road traffic.

9.1.7 The assessment demonstrates that the proposed development will not lead to an unacceptable risk from noise if mitigation measures are followed in line with this report.

9.1.8 The AVO overheating assessment has concluded that additional measures may need to be taken at the detailed design stage, depending on the location of the proposed dwellings with respect to Swanstree Avenue. It is recommended that a Mechanical Engineer is consulted on determining an appropriate strategy for thermal comfort across the proposed development, considering the site has been identified as ‘high risk’ in terms of the AVO guidance.

9.1.9 Following the implementation of the necessary noise mitigation measures which will depend on the final site layout, the proposed development falls within the Lowest Observed Adverse Effect Level (LOAEL), in line with the Noise Policy Statement for England. It is on this basis we do not consider noise to be a determining factor of this planning application.

APPENDICES

Appendix A

Policy, Standards and Guidance

National Planning Policy Framework

In July 2021 the 'National Planning Policy Framework' (NPPF) was amended as the current planning policy guidance within England.

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'…

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

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

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.

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'.

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

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 A1 - 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 area but not such that there is a perceived change in the quality of life.	No Observed adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for 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

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

ProPG Planning and Noise provides professional practice guidance in relation to new residential development exposed to noise from transport sources. It provides practitioners with a recommended approach to the management of noise within the planning system in England.

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

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.

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."

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".

Guidance on Assessment of Road Traffic Noise

The Department of Transport's memorandum, "Calculation of Road Traffic Noise" (CRTN), 1998 defines a shortened measurement procedure which is used to calculate the $L_{A10,18hour}$ noise level from a measured 3 hour period. The method requires the measurement of noise over 3 consecutive hours between 1000 and 1700 hours.

From the measured 3 hour period, the arithmetic average of the three $L_{A10,1Hour}$ measurements is taken. The $L_{A10,18Hour}$ noise level is then determined using the following calculation method;

- $L_{A10,18Hour} = L_{A10,3hour} - 1$

The document "*Converting the UK traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping"* by P G Abbott and P M Nelson (The TRL Method) provides a calculation method to convert the calculated $L_{A10,18Hour}$ into a daytime L_{Aeq} as described below.

- $L_{day} = 0.95 \times L_{A10,18hour} + 1.44dB$

The calculation for the night-time period is shown below.

- $L_{night} = 0.90 \times L_{A10,18hour} - 3.77$

AVO: Acoustics, Ventilation and Overheating Residential Design Guide

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. 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

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):

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.

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 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.

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

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 industrial noise. The 'specific noise' sources, of the existing industrial premises that have been observed are detailed in Section 3 of this report.

BS4142 assesses the significance of impacts by comparing the specific noise level to the background noise level (L_{A90}). Section 3 of this report provides details of the background noise survey undertaken.

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'.

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.

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.

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 MONITORING RESULTS TABLES

ML1 - Daytime, 15 min					
Period start	**L_{Aeq}**	**L_{Amin}**	**L_{AFmax}**	**L_{A90}**	**L_{A10}**
08/06/2021 14:30	63.2	34.7	83.1	36.5	64.2
08/06/2021 14:45	65	33.6	83.9	37.3	68.1
08/06/2021 15:00	66.3	37.2	85.4	40.2	70.7
08/06/2021 15:15	66.7	33.7	82.4	39	72.1
08/06/2021 15:30	65.1	37.9	81.1	40.7	69.9
08/06/2021 15:45	65.4	33.6	83.4	37.7	69.8
08/06/2021 16:00	64	33.5	83	36.2	65.9
08/06/2021 16:15	64.6	35	81.5	37.5	68.4
08/06/2021 16:30	66.3	36.6	84.7	39.5	70.4
08/06/2021 16:45	63.8	34.9	83.4	37.7	65.9
08/06/2021 17:00	65.4	36.4	84.8	41.9	69.3
08/06/2021 17:15	64.9	37	82.9	39.1	67.8
08/06/2021 17:30	66.6	35.8	86.6	39.1	69.4
08/06/2021 17:45	65.8	37.1	85.8	39.1	68.5
08/06/2021 18:00	64.3	35.6	85.1	38.2	66.2
08/06/2021 18:15	64.1	35.8	83.9	38	64.9
08/06/2021 18:30	58.3	33	80.1	35.8	54.6
08/06/2021 18:45	66	34.6	95.1	36.8	64.3
08/06/2021 19:00	64.7	35.8	82.6	39.1	68.3
08/06/2021 19:15	62.3	34.1	83.3	36.7	63.1
08/06/2021 19:30	61.3	34.8	79.9	37.7	60.6
08/06/2021 19:45	61.3	34.9	84.5	37.1	58.7
08/06/2021 20:00	63	34.8	82.8	37.7	62.7
08/06/2021 20:15	60.4	35.4	82.5	36.6	58.2
08/06/2021 20:30	60.3	33.8	80.8	35.7	58.5
08/06/2021 20:45	62.3	32.6	83	36.2	60.8
08/06/2021 21:00	59.7	32.8	83.7	34.7	53.3
08/06/2021 21:15	59.4	34.5	80.8	35.9	54.2
08/06/2021 21:30	54.6	32.8	77.9	34.2	45.3
08/06/2021 21:45	57.8	32.1	80.5	34.3	49.2
08/06/2021 22:00	58.4	33.2	80	35.7	51.8
08/06/2021 22:15	57.1	32.8	80.8	34.8	41.5
08/06/2021 22:30	47.7	28.5	76.2	31	40.9
08/06/2021 22:45	49.4	27.4	78.5	29.2	38.5
09/06/2021 07:00	64.4	39	86	39.9	64.8
09/06/2021 07:15	64.9	39.5	86.7	40.8	66.7
09/06/2021 07:30	65.8	38.1	84.9	39.4	68.1
09/06/2021 07:45	66.2	38.5	81	40.4	71.5
09/06/2021 08:00	66.5	38.6	82.4	42.1	71.4
09/06/2021 08:15	68.1	39.3	83.2	44.7	73.3
09/06/2021 08:30	67.9	39.1	82.3	46	73
09/06/2021 08:45	67.3	35.8	82.5	40.3	72.2
09/06/2021 09:00	66	39.7	83.2	41.9	70.4
09/06/2021 09:15	62	37.7	81.8	40.3	62.7
09/06/2021 09:30	64.7	41.9	84.4	46.4	67.8
09/06/2021 09:45	64	42.5	83.4	46.5	64.9

09/06/2021 10:00	64.1	45.4	82.4	48.5	67
09/06/2021 10:15	64.4	44.7	83.8	47.4	66.9
09/06/2021 10:30	62.7	38.5	82	42.4	65.4
09/06/2021 10:45	60.9	37.1	79.9	41.1	62.1
09/06/2021 11:00	61.6	37.2	82.1	41.8	63
09/06/2021 11:15	62	37.9	81.6	41.7	63.1
09/06/2021 11:30	62.2	39.2	81.6	42.6	63
09/06/2021 11:45	61.4	40.8	81.4	44.4	62.1
09/06/2021 12:00	64.1	41.5	86.1	45.4	65.9
09/06/2021 12:15	63.9	42.1	81.3	45.8	67.1
09/06/2021 12:30	63.5	38.6	83.6	45.5	64.9
09/06/2021 12:45	64.4	41.6	82.8	46.1	65.8
09/06/2021 13:00	62.6	42.2	85.3	46.6	63.6
09/06/2021 13:15	62.7	39.8	81.2	45.7	63.9
09/06/2021 13:30	62.6	41.6	82.7	46.5	62.9

ML1 - Night-time, 15 min					
Period start	**L_{Aeq}**	**L_{Amin}**	**L_{AFmax}**	**L_{A90}**	**L_{A10}**
09/06/2021 00:00	52.4	27.8	79.6	28.8	33.7
09/06/2021 00:15	31.8	28	39.1	28.7	34.2
09/06/2021 00:30	34.5	28.7	41.6	30.9	36.7
09/06/2021 00:45	52	29.6	81.3	32	39.8
09/06/2021 01:00	35.8	29.5	43.3	31.3	38.5
09/06/2021 01:15	37.5	30.8	44	33.2	40.1
09/06/2021 01:30	36	27.8	44.5	31.3	38.5
09/06/2021 01:45	51.5	30.2	80.7	32	38.6
09/06/2021 02:00	35.5	29.2	42.8	31.3	38.1
09/06/2021 02:15	36.1	29.4	45	31.4	38.7
09/06/2021 02:30	51	30.5	80.1	34.1	41.4
09/06/2021 02:45	38.4	32.4	43.8	34.6	41
09/06/2021 03:00	41.3	30.3	51.8	35.8	44.2
09/06/2021 03:15	39.2	31.7	47.5	34.4	42.5
09/06/2021 03:30	46.1	32.7	75	34.3	40.9
09/06/2021 03:45	52.4	33.5	81.4	37.4	49.4
09/06/2021 04:00	44.5	34.1	61.5	36.2	48.2
09/06/2021 04:15	52.1	33.9	81.5	35.3	44.3
09/06/2021 04:30	48.3	33.9	77.9	35.2	41.2
09/06/2021 04:45	41.9	35.6	60.4	36.4	45.4
09/06/2021 05:00	57.9	35.6	82.4	37.1	46.9
09/06/2021 05:15	57.1	35.4	83.2	36.4	47.4
09/06/2021 05:30	57.9	36.2	81.4	37.3	52.9
09/06/2021 05:45	62.1	36.3	84	37.8	56.2
09/06/2021 06:00	63	36.6	84	37.1	59.3
09/06/2021 06:15	61.7	36.7	83.1	38.1	59.5
09/06/2021 06:30	63.9	37.7	82.9	38.5	63.5
09/06/2021 06:45	63.1	38.8	82.9	39.6	61.6

ML2 - Daytime, 15 min					
Period start	**L_{Aeq}**	**L_{Amin}**	**L_{AFmax}**	**L_{A90}**	**L_{A10}**
08/06/2021 15:15	57.7		82.2	47.6	59

08/06/2021 15:30	55.1		76.3	47.1	54.1
08/06/2021 15:45	58.8		79.2	46.5	57.2
08/06/2021 16:00	60.5		78.9	48.6	61.2
08/06/2021 16:15	57.2		76.2	47.6	57.3
08/06/2021 16:30	65.3		89	48.1	68.3
08/06/2021 16:45	58.4		81.8	46.4	57.2
08/06/2021 17:00	56.6		78.8	46.7	54.8
08/06/2021 17:15	57.5		75.9	47	55.3
08/06/2021 17:30	55.9		74.6	45.6	55.7
08/06/2021 17:45	57.4		78.9	46.1	56.8
08/06/2021 18:00	54.1		72.9	45.8	54.4
08/06/2021 18:15	57		74.8	46.3	57.3
08/06/2021 18:30	57.4		78.1	45.6	56.1
08/06/2021 18:45	60.4		77.7	46.5	62.2
08/06/2021 19:00	59.2		76.2	47.4	60.5
08/06/2021 19:15	56.2		75.8	46	52.6
08/06/2021 19:30	61.7		81	45.3	64.2
08/06/2021 19:45	64.5		83.9	48.5	67.4
08/06/2021 20:00	64.5		81.6	48.7	68.7
08/06/2021 20:15	66		81.7	50.2	71.2
08/06/2021 20:30	66		81.3	49.6	70.8
08/06/2021 20:45	66		81.3	48.8	71.3
08/06/2021 21:00	64.9		78.5	49.6	70.2
08/06/2021 21:15	65.6		79.9	49.9	70.8
08/06/2021 21:30	65.7		82.2	49.4	70.9
08/06/2021 21:45	64.6		79.2	49.5	69.8
08/06/2021 22:00	63.6		77.4	49.1	69
08/06/2021 22:15	64.1		79.1	49.2	68.4
08/06/2021 22:30	61.6		80	47.6	63.5
08/06/2021 22:45	60.6		82.9	46.9	60.6
09/06/2021 07:00	40.2		53.5	37.1	43
09/06/2021 07:15	50.4		77.6	36.3	42.2
09/06/2021 07:30	43.3		66.1	36.7	40.6
09/06/2021 07:45	49.3		73.5	37.4	40.3
09/06/2021 08:00	39.1		50.4	37.7	40.2
09/06/2021 08:15	39.8		49.1	38.2	41.1
09/06/2021 08:30	41.3		53.9	38.9	43
09/06/2021 08:45	49.5		76.1	38.4	43.4
09/06/2021 09:00	40.9		49.6	39.2	42.6
09/06/2021 09:15	48.8		74.7	38.3	42.9
09/06/2021 09:30	41.6		51.5	39.7	43.3
09/06/2021 09:45	44.1		65.3	39.8	44.2
09/06/2021 10:00	40.7		48.9	39.4	42
09/06/2021 10:15	50.6		75.2	40.4	45.5
09/06/2021 10:30	56		75.3	43.3	56.9
09/06/2021 10:45	58.7		74.9	46.4	61.7
09/06/2021 11:00	58.1		78.1	47.1	61.3
09/06/2021 11:15	60.9		75.4	48.5	65.3
09/06/2021 11:30	61.3		78.7	47.9	65.7
09/06/2021 11:45	62.6		75.5	49.5	67.9

09/06/2021 12:00	62.1		78.2	48.5	67
09/06/2021 12:15	61.9		76.6	47	66.8
09/06/2021 12:30	62.7		76.8	47.1	68
09/06/2021 12:45	63.5		79.2	47.3	68.4
09/06/2021 13:00	66		79.4	47.5	71.3
09/06/2021 13:15	64.7		79.4	46.6	69.6

ML2 - Night-time, 15 min					
Period start	**L_{Aeq}**	**L_{Amin}**	**L_{AFmax}**	**L_{A90}**	**L_{A10}**
08/06/2021 23:00	55.4		77.5	46.3	53.1
08/06/2021 23:15	57.4		81.4	45.4	56.5
08/06/2021 23:30	53.7		75	45.3	51
08/06/2021 23:45	57.1		78.2	45.2	51.3
09/06/2021 00:00	55.9		81.4	43.6	52.7
09/06/2021 00:15	52.6		75.6	42.8	49.7
09/06/2021 00:30	50.8		70.5	42.3	48.2
09/06/2021 00:45	54.2		79.3	42.5	47.3
09/06/2021 01:00	53.4		76.8	41.7	45.7
09/06/2021 01:15	52.7		78.2	42.2	48.1
09/06/2021 01:30	44.2		50.6	42	46.1
09/06/2021 01:45	43.7		54.5	41.8	45.3
09/06/2021 02:00	47.7		71	41.8	45.6
09/06/2021 02:15	48.3		71.3	42.5	46.7
09/06/2021 02:30	45		63.4	40.8	45.3
09/06/2021 02:45	49.7		76.3	39.8	44.3
09/06/2021 03:00	55.8		83.1	38	43.1
09/06/2021 03:15	42.4		50.1	40.6	44.1
09/06/2021 03:30	41.9		47.4	39.8	43.7
09/06/2021 03:45	42.5		52	40.5	44.1
09/06/2021 04:00	42.5		49.1	40.6	44.2
09/06/2021 04:15	45.5		65	41.7	45.4
09/06/2021 04:30	45.7		70	40.6	43.8
09/06/2021 04:45	46.5		70.5	40.2	43.9
09/06/2021 05:00	42.3		48.5	40.2	44.1
09/06/2021 05:15	43.1		51.9	41.1	44.9
09/06/2021 05:30	41.6		49.6	39.7	43.4
09/06/2021 05:45	42.1		50.1	39.6	44.1
09/06/2021 06:00	40.9		48.5	38.6	42.7
09/06/2021 06:15	40.3		47.8	38	42.1
09/06/2021 06:30	40.5		50.4	37.7	42.8
09/06/2021 06:45	40		54.9	37.6	41.8

ML3 - Daytime, 15 min					
Period start	**L_{Aeq}**	**L_{Amin}**	**L_{AFmax}**	**L_{A90}**	**L_{A10}**
08/06/2021 14:45	63		77.8		
08/06/2021 15:00	62.9		80		
08/06/2021 15:15	63.9		79.8		
08/06/2021 15:30	77.7		108.1		
08/06/2021 15:45	63		93.3		
08/06/2021 16:00	62.4		81.5		

08/06/2021 16:15	63		78.6		
08/06/2021 16:30	63.7		78.9		
08/06/2021 16:45	63		84.3		
08/06/2021 17:00	65		87.1		
08/06/2021 17:15	64.5		78.6		
08/06/2021 17:30	63.7		76.5		
08/06/2021 17:45	65.1		87.9		
08/06/2021 18:00	62.3		86.9		
08/06/2021 18:15	61.4		80.2		
08/06/2021 18:30	61.6		81.5		
08/06/2021 18:45	63.1		80.3		
08/06/2021 19:00	63.7		85.6		
08/06/2021 19:15	61.2		78.6		
08/06/2021 19:30	61.9		86.6		
08/06/2021 19:45	60.8		77.8		
08/06/2021 20:00	60.4		79.7		
08/06/2021 20:15	60.2		77.8		
08/06/2021 20:30	59.6		82.7		
08/06/2021 20:45	59.2		78.9		
08/06/2021 21:00	58.5		79.8		
08/06/2021 21:15	57.3		80.5		
08/06/2021 21:30	57.7		76.5		
08/06/2021 21:45	54.5		76.3		
08/06/2021 22:00	55.9		76.3		
08/06/2021 22:15	55.4		73.3		
08/06/2021 22:30	50.3		73.5		
08/06/2021 22:45	59.1		88.4		
09/06/2021 07:00	63		81.9		
09/06/2021 07:15	63		79.3		
09/06/2021 07:30	63.9		77.3		
09/06/2021 07:45	64.8		77.1		
09/06/2021 08:00	65.2		79.9		
09/06/2021 08:15	65.4		76.9		
09/06/2021 08:30	65.5		84		
09/06/2021 08:45	64.6		78.1		
09/06/2021 09:00	64.2		83.5		
09/06/2021 09:15	63.1		78.6		
09/06/2021 09:30	62		78.3		
09/06/2021 09:45	61.7		77.3		
09/06/2021 10:00	65.1		86.3		
09/06/2021 10:15	63.4		82.9		
09/06/2021 10:30	62.3		77.5		
09/06/2021 10:45	60.9		80.6		
09/06/2021 11:00	61.4		82.7		
09/06/2021 11:15	61.4		80.7		
09/06/2021 11:30	61.3		91.9		
09/06/2021 11:45	61.3		76.5		
09/06/2021 12:00	60.5		81.5		
09/06/2021 12:15	61.9		78		
09/06/2021 12:30	60.6		78		

09/06/2021 12:45	61.2		80.6		
09/06/2021 13:00	60.9		82.6		
09/06/2021 13:15	60.7		76.6		
09/06/2021 13:30	64		74.3		

ML3 - Night-time, 15 min					
Period start	**L_{Aeq}**	**L_{Amin}**	**L_{AFmax}**	**L_{A90}**	**L_{A10}**
08/06/2021 23:00	53.7		75.2	29	48.7
08/06/2021 23:15	41.1		68.3	28	33
08/06/2021 23:30	52.1		80.1	29.4	39.4
08/06/2021 23:45	50.9		72.6	27.6	42.3
09/06/2021 00:00	45.8		72.3	27	34.9
09/06/2021 00:15	29.7		40.5	26.9	31.6
09/06/2021 00:30	46.3		71.5	27.3	34.4
09/06/2021 00:45	29.1		41	25.6	30.7
09/06/2021 01:00	53		79	26.4	36.6
09/06/2021 01:15	29.4		42.9	26.2	31.7
09/06/2021 01:30	45.3		70.7	25.1	33.1
09/06/2021 01:45	44.9		72.8	27.1	31.8
09/06/2021 02:00	42.5		70.8	28	32.8
09/06/2021 02:15	28.8		37.2	26.2	30.7
09/06/2021 02:30	45.5		74	28.1	34.6
09/06/2021 02:45	30.3		39.8	27.3	32.6
09/06/2021 03:00	47.3		76.1	27.1	35.4
09/06/2021 03:15	30.7		49.9	28	32.5
09/06/2021 03:30	45.6		72	27.8	38.6
09/06/2021 03:45	54.3		75.1	35.1	53.2
09/06/2021 04:00	48.8		74	35	49.4
09/06/2021 04:15	51.2		74.7	34.7	48.5
09/06/2021 04:30	50.5		73.8	35.6	49.3
09/06/2021 04:45	55.7		75.8	37.2	54.6
09/06/2021 05:00	55.7		75.3	36	56
09/06/2021 05:15	56.8		76.5	36.5	55.5
09/06/2021 05:30	56.9		76.8	37.1	57.3
09/06/2021 05:45	56.9		84.4	37.1	55.4
09/06/2021 06:00	58.6		78.5	38.1	59.2
09/06/2021 06:15	59.9		80.3	38.2	60.9
09/06/2021 06:30	61.4		81.4	40	64.4
09/06/2021 06:45	62.3		81.5	41.1	67.1

Octave Band Composite SRI Break In Sheet

INPUT DATA

Project:	Swanstree Avenue
Plot:	Example Dwelling (ML3)
Level:	First Floor
Room:	Living Room most exposed to Road
Description:	Daytime LAeq16h

Surface Area Wall	15.0
Surface Area Glazing	6.0
Roof Area	0.0
Number of vents	4
Room Volume	24.0
Room RT	0.5

	Ref	Description
Wall	1	Two leaves of 102.5mm brickwork, 50mm cavity,rigid wall ties
Glazing	14	10/12/4
Vent	23	Greenwood 5000EAW.AC2
Source type	2	Free field line source

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
Average Noise Level (dB)		55	56	53	56	59	50	38	
Maximum Noise Level (dB)									

SRI DATA

Total Facade Area	21.0		Effective Façade Area	61.0

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
SRI Wall		31	37	42	52	60	63	68	
SRI Glazing		19	25	22	33	32	38	44	
SRI Roof		13	22	38	46	51	52	55	
D_{ne} Vent		30	41	40	38	47	44	47	
T_{wall} X S_{wall}		0.012	0.003	0.001	0.000	0.000	0.000	0.000	
$T_{glazing}$ X $S_{glazing}$		0.076	0.019	0.038	0.003	0.004	0.001	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}		0.040	0.003	0.004	0.006	0.001	0.002	0.001	
Composite T		0.002	0.000	0.001	0.000	0.000	0.000	0.000	
Composite SRI (dB)		27	34	32	38	41	44	48	

BREAK IN CALCULATIONS

Reflection Corrected

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
External Noise Level (dB)		55	56	53	56	59	50	38	
Maximum External Noise Level (dB)		0	0	0	0	0	0	0	
Composite SRI		27	34	32	38	41	44	48	
Surface Area Correction		18	18	18	18	18	18	18	
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)		40	34	34	30	30	18	3	
A weighted		14	18	25	27	30	19	4	
Internal Noise Level dB(A)	**33**								
Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
Internal Noise Level (dB)		-15	-22	-20	-26	-29	-32	-36	
A weighted		-41	-38	-28	-29	-29	-31	-35	
Maximum Internal Noise Level dB(A)	**-23**								

Octave Band Composite SRI Break In Sheet

INPUT DATA

Project:	Swanstree Avenue
Plot:	Example Dwelling (ML3)
Level:	First Floor
Room:	Bedroom most exposed to Road
Description:	Night-time LAeq,8h and LAFmax

Surface Area Wall	15.0
Surface Area Glazing	6.0
Roof Area	0.0
Number of vents	4
Room Volume	24.0
Room RT	0.5

	Ref	Description
Wall	1	Two leaves of 102.5mm brickwork, 50mm cavity,rigid wall ties
Glazing	14	10/12/4
Vent	23	Greenwood 5000EAW.AC2
Source type	2	Free field line source

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
Average Noise Level (dB)		50	51	48	51	54	45	33	
Maximum Noise Level (dB)		65	66	63	66	69	60	48	

SRI DATA

Total Facade Area	21.0		Effective Façade Area	61.0

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
SRI Wall		31	37	42	52	60	63	68	
SRI Glazing		19	25	22	33	32	38	44	
SRI Roof		13	22	38	46	51	52	55	
D_{ne} Vent		30	41	40	38	47	44	47	
T_{wall} X S_{wall}		0.012	0.003	0.001	0.000	0.000	0.000	0.000	
$T_{glazing}$ X $S_{glazing}$		0.076	0.019	0.038	0.003	0.004	0.001	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}		0.040	0.003	0.004	0.006	0.001	0.002	0.001	
Composite T		0.002	0.000	0.001	0.000	0.000	0.000	0.000	
Composite SRI (dB)		27	34	32	38	41	44	48	

BREAK IN CALCULATIONS

Reflection Corrected

Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
External Noise Level (dB)		50	51	48	51	54	45	33	
Maximum External Noise Level (dB)		65	66	63	66	69	60	48	
Composite SRI		27	34	32	38	41	44	48	
Surface Area Correction		18	18	18	18	18	18	18	
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)		35	29	29	25	25	13	-2	
A weighted		9	13	20	22	25	14	-1	
Internal Noise Level dB(A)	**28**								
Frequency (Hz)	***32***	***63***	***125***	***250***	***500***	***1000***	***2000***	***4000***	***8000***
Internal Noise Level (dB)		50	44	44	40	40	28	13	
A weighted		24	28	35	37	40	29	14	
Maximum Internal Noise Level dB(A)	**43**								

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	4
	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	1
	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	4
	>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
>50%	4	2
>35%	2	1

0

#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 minimum required	+50%	+100%
Single-aspect		3	4
Dual aspect		2	3

0

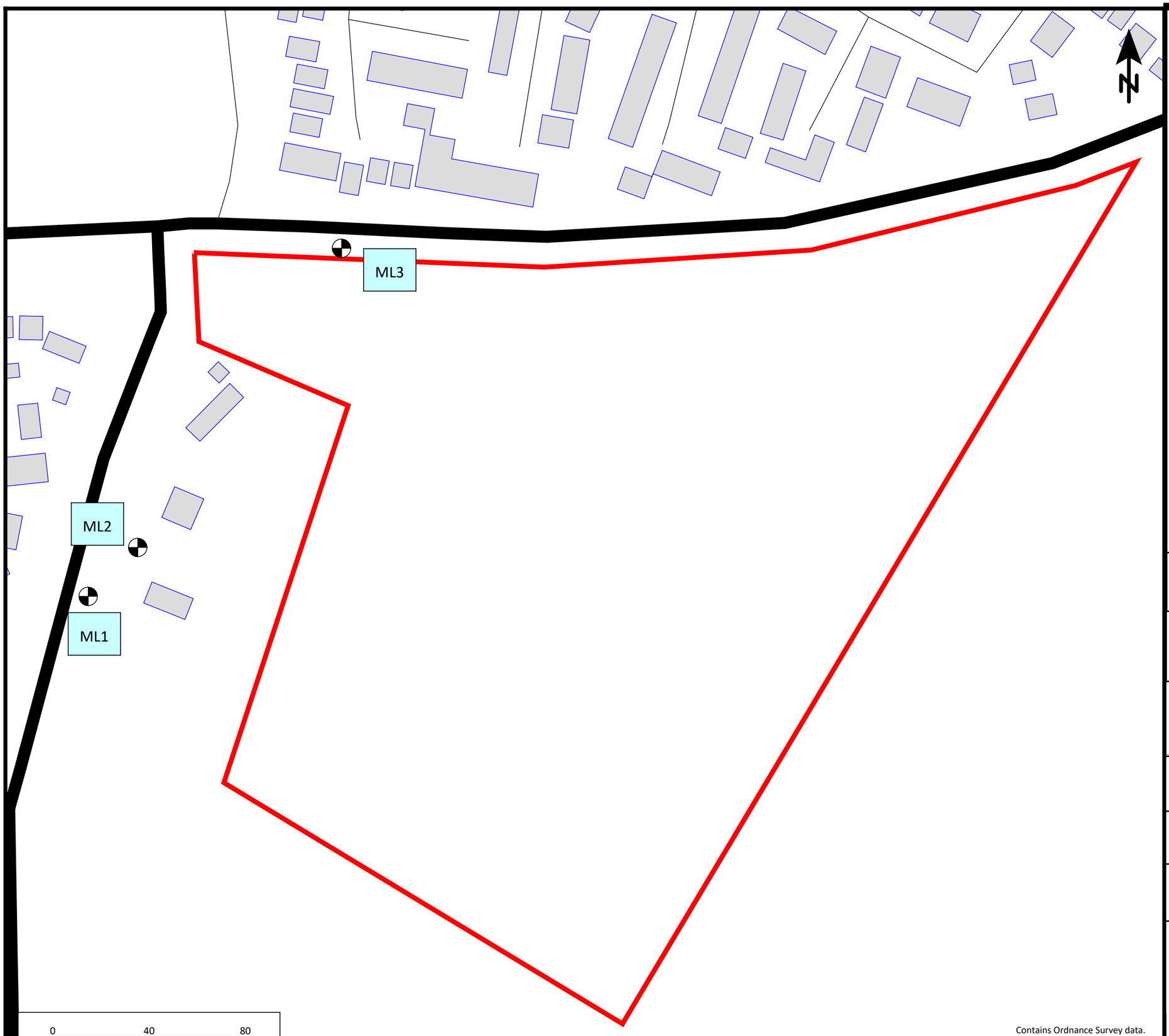
TOTAL SCORE	15	=	Sum of contributing factors:	17	*minus*	Sum of mitigating factors:	2

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)



Key

- Site Boundary
- Existing Buildings
- Road
- Base map
- Monitoring Location

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CLIENT: Gladman Developments Limited

PROJECT: Swanstree Avenue, Sittingbourne

TITLE: Figure 1 - SIte Location Plan and Noise Monitoring Locations

DRG NO:		REV:
GM11657/001		A
DRG SIZE: A3	**SCALE:** 1:1600	**DATE:** 27/08/2021
DRAWN BY RG	**CHECKED BY** RC	**APPROVED BY** SU

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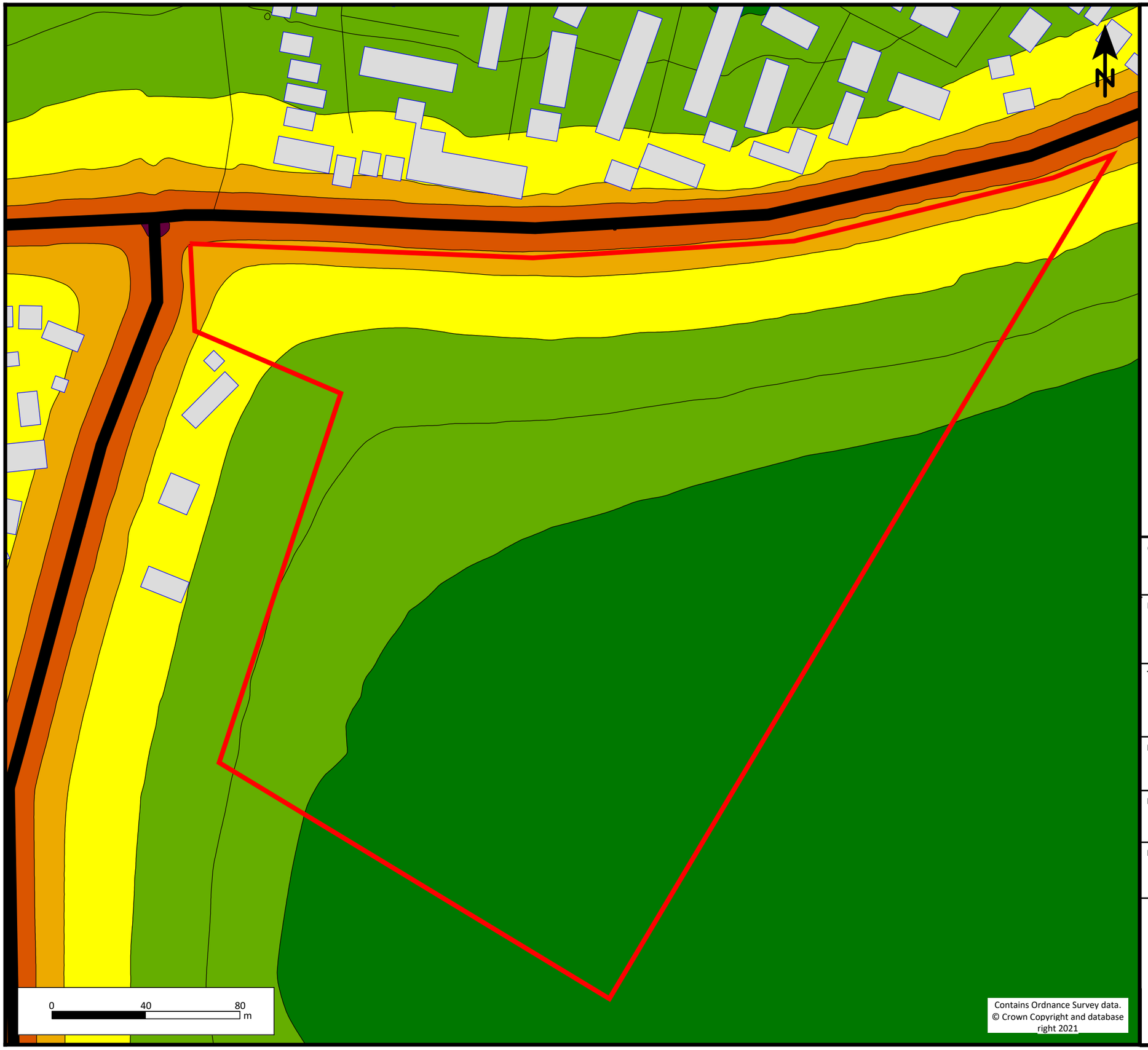

Key

- Site Boundary
- Existing Buildings
- Road
- Base map

Daytime L_{Aeq} dB

	<=	48.0
48.0 <	<=	53.0
53.0 <	<=	58.0
58.0 <	<=	63.0
63.0 <	<=	68.0
68.0 <		

CLIENT: Gladman Developments Limited

PROJECT: Swanstree Avenue, Sittingbourne

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

DRG NO:	REV:
GM11657/002	A

DRG SIZE:	SCALE:	DATE:
A3	1:1600	27/08/2021

DRAWN BY	CHECKED BY	APPROVED BY
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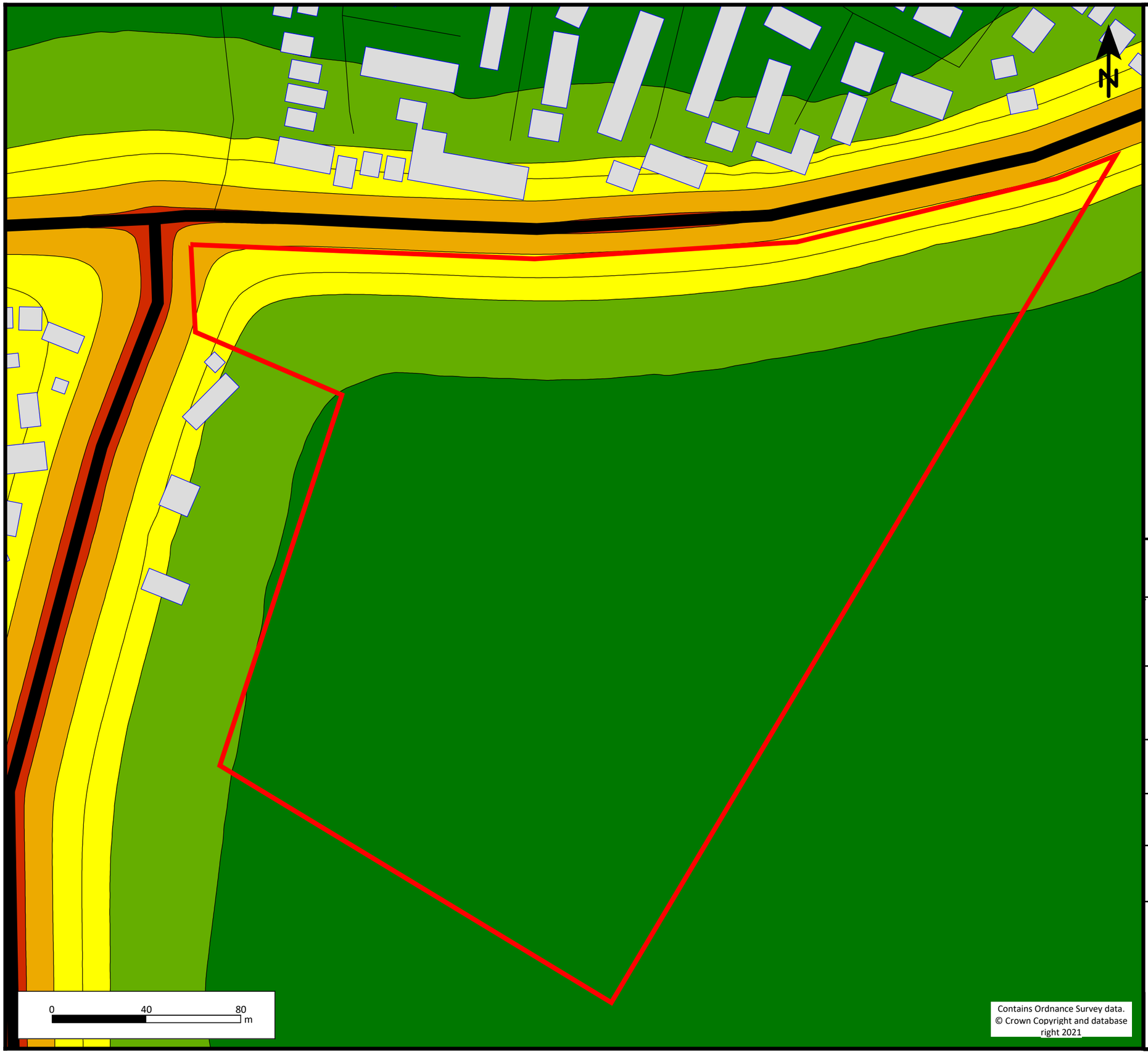

Key

- Site Boundary
- Existing Buildings
- Road
- Line

Night-time $L_{Aeq,8hr}$ dB

	<=	43.0
43.0 <	<=	48.0
48.0 <	<=	53.0
53.0 <	<=	58.0
58.0 <	<=	63.0
63.0 <		

CLIENT:
Gladman Developments Limited

PROJECT:
Swanstree Avenue, Sittingbourne

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

DRG NO:		REV:
GM11657/003		A
DRG SIZE: A3	**SCALE:** 1:1600	**DATE:** 27/08/2021
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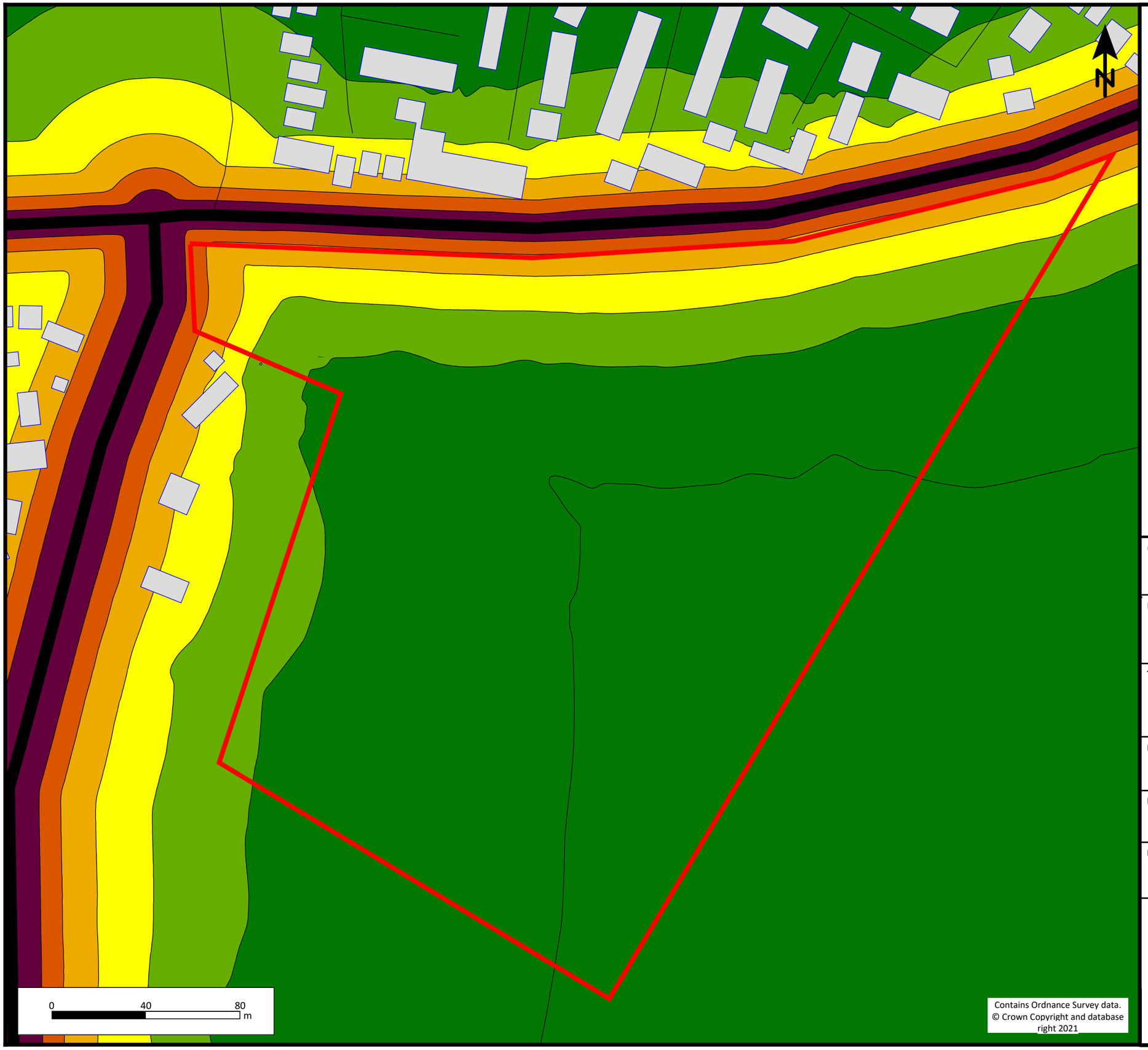

Key

- Site Boundary
- Existing Buildings
- Road
- Line

Night-time $L_{AF,Max}$ dB

	<=	58.0
58.0 <	<=	63.0
63.0 <	<=	68.0
68.0 <	<=	73.0
73.0 <	<=	78.0
78.0 <		

CLIENT:
Gladman Developments Limited

PROJECT:
Swanstree Avenue, Sittingbourne

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

DRG NO:	REV:
GM11657/004	A

DRG SIZE:	SCALE:	DATE:
A3	1:1600	27/08/2021

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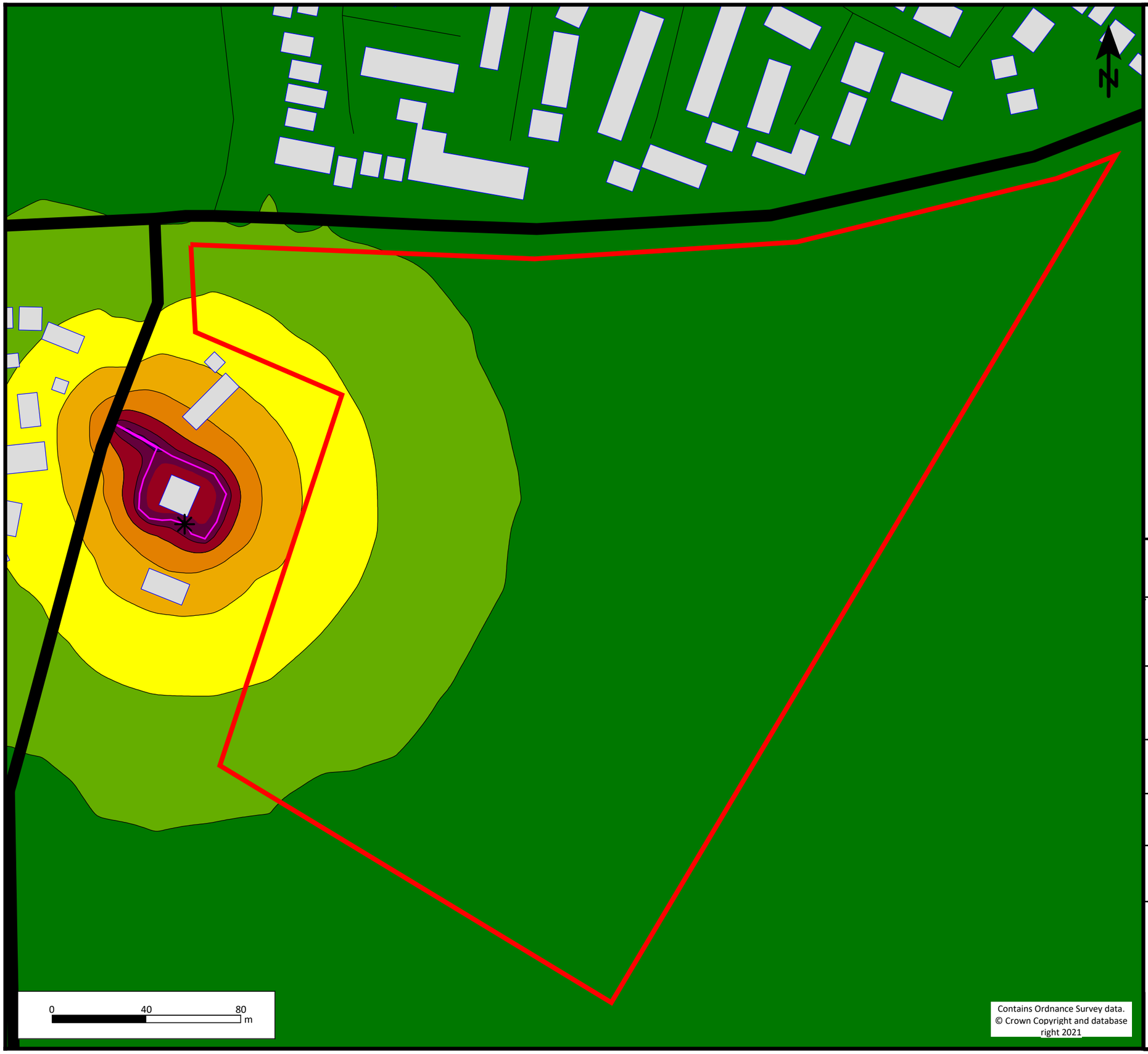

Key

- Site Boundary
- Existing Buildings
- Road
- Base map
- Line source
- Point source

Specific Sound Level L_{Aeq} dB

	<=	30.0
30.0 <	<=	35.0
35.0 <	<=	40.0
40.0 <	<=	45.0
45.0 <	<=	50.0
50.0 <	<=	55.0
55.0 <	<=	60.0
60.0 <		

CLIENT:
Gladman Developments Limited

PROJECT:
Swanstree Avenue, Sittingbourne

TITLE:
Figure 5 - Specific Sound from Chilton Manor Farm - Contours Across the Undeveloped Site

DRG NO:		REV:
GM11657/005		A
DRG SIZE: A3	**SCALE:** 1:1600	**DATE:** 27/08/2021
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Key

- Site Boundary
- Existing Buildings
- Road
- Base map
- Line source
- Point source

Exceedance of Background Sound (dB)

L_{A90} dB = 40

	<=	0.0
0.0 <	<=	5.0
5.0 <	<=	10.0
10.0 <	<=	15.0
15.0 <	<=	20.0
20.0 <		

CLIENT: Gladman Developments Limited

PROJECT: Swanstree Avenue, Sittingbourne

TITLE: Figure 6 - Daytime Exceedance of Specific Sound Over Background Sound

DRG NO:		REV:
GM11657/006		A
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