



**GLADMAN DEVELOPMENTS LTD**

**Land at Hempsted Lane, Gloucester**

**Noise Assessment Report**

**January 2020**

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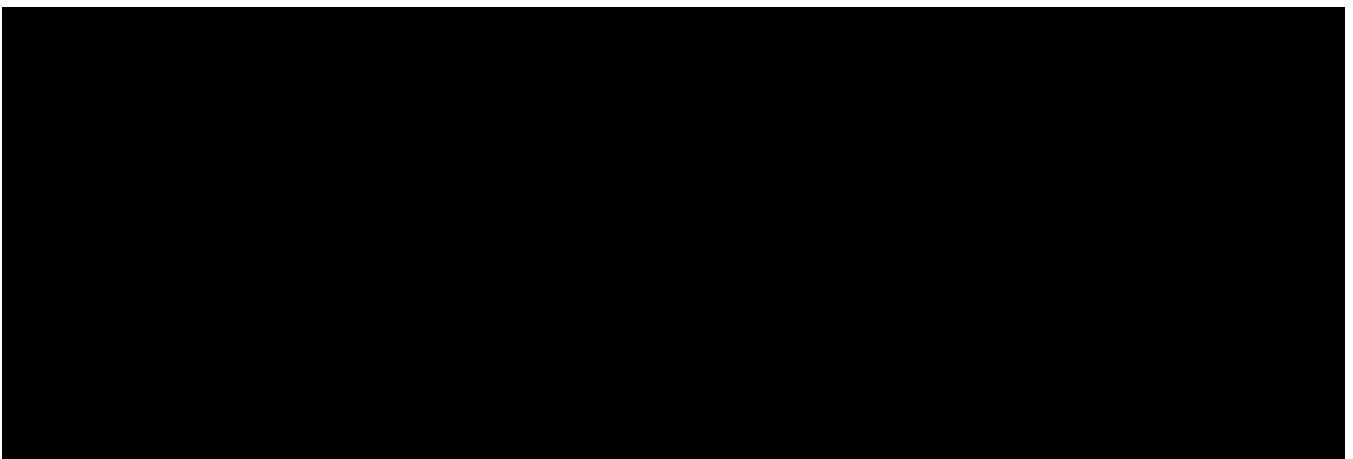
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**PREPARED BY:**



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## 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 Hempsted Lane, Gloucester.

The noise sources which will potentially affect the residents of the proposed residential development are road traffic on the A430 and the Gloucester Car Boot and Flea Market.

A noise survey has been undertaken and road traffic noise from the A430 was established as the main source of noise at the proposed development site. An increase in traffic noise was noted during market days. Therefore, the higher noise levels, when the market was taking place, have been used to assess any potential noise impacts. No noise was not audible from the commercial units to the south east of the A430.

The assessment indicates that there is potential for proposed dwellings closest to the A430 to experience an adverse noise impact due to road traffic. Further into the site noise levels will be lower, and therefore the potential for an adverse noise impact will be less.

Outline noise mitigation measures are suggested for proposed dwellings in the eastern part of the site, closest to the A430. The assessment indicates that for these dwellings, gardens could be located on the screened side of dwellings, to provide noise screening from road traffic. The façades of dwellings closest to the A430 would require enhanced glazing and an alternative means of ventilation to ensure that noise guideline levels are met in sensitive rooms whilst maintaining adequate ventilation.

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

Following the implementation of suitable mitigation measures, future receptors would be protected and therefore, the application need not be delayed on noise grounds.

## **1 INTRODUCTION**

- 1.1.1 Wardell Armstrong LLP (WA) was commissioned by Gladman Developments Ltd to undertake a noise assessment for a proposed residential development on Land at Hempsted Lane, Gloucester.
- 1.1.2 The proposed development is located to the south of Hempsted, a village part of the City of Gloucester. To the north of the site are existing residential dwellings, including those along Hempsted Lane. To the south east is the A430, the Gloucester Car Boot and Flea Market and the Gloucester and Sharpness Canal beyond. To the south are wetlands with a sewage treatment works beyond. To the west are open fields and the River Severn beyond.
- 1.1.3 The proposed development is residential in nature and the location of the site is shown on Figure 1.
- 1.1.4 This noise assessment has been prepared to accompany an outline planning application. The report assesses the results of baseline noise monitoring and noise modelling carried out in accordance with current guidance and includes recommendations for noise mitigation where appropriate.

## 2 ASSESSMENT METHODOLOGY

2.1.1 The potential impact of the existing noise sources on the proposed development were considered, and the general principles of the assessment methodology were sent to Development Control at Gloucester City Council (GCC). GCC did not want to provide comment on the methodology until the planning application had been submitted.

2.1.2 The following methodology was sent to GCC:

- The noise assessment will be undertaken 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 likely to be road traffic on the A430 and potentially noise from the Gloucester Car Boot and Flea Market.
- As part of this assessment, WA will carry out an attended and unattended noise survey to establish the current baseline noise levels at proposed receptor locations.

2.1.3 The scope of the noise assessment includes consideration of noise at sensitive areas of the proposed development, i.e. proposed residential areas, specifically in terms of the potential impact of existing transportation noise and the Gloucester Car Boot and Flea Market, in line with current guidance.

2.1.4 The noise assessment will consider current guidance including:

- National Planning Policy Framework, 2019 (NPPF);
- Planning Practice Guidance, 2019 (PPG);
- Noise Policy Statement for England, 2010 (NPSE);
- ProPG Planning & Noise – Professional Practice Guidance on Planning & Noise, 2017 (ProPG);
- British Standard 8233:2014 Guidance on Sound Insulation and noise reduction for buildings (BS8233); and,
- Department of Transport's Memorandum, Calculation of Road Traffic Noise, 1998 (CRTN).

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

### 3 NOISE SURVEY

#### 3.1 Introduction

- 3.1.1 Between the 20<sup>th</sup> and 22<sup>nd</sup> July 2019, WA carried out a noise survey to measure existing ambient and background noise levels at the proposed development site.
- 3.1.2 Attended and unattended noise measurements, supplemented with audio recording, were taken between 1716 hours on Saturday 20<sup>th</sup> July 2019 to 1340 hours on Monday 22<sup>nd</sup> July 2019. One monitoring location (ML) was selected to capture the noise from road traffic on the A430 and any noise from the Gloucester Car Boot and Flea Market. The ML is shown on Figure 1 (Drawing GM10710/004).
- 3.1.3 During the attended survey, noise was not audible from the commercial units to the south east of the A430 and road traffic dominated. Therefore, in accordance with BS4142, the commercial units were not considered in the assessment.
- 3.1.4 The Gloucester Car Boot and Flea Market (referred to hereafter as market) operates on land to the south east of the proposed development site, approximately 62m away, with the A430 situated in between. The market is open every Wednesday and Sunday, between 6 am and 12pm.
- 3.1.5 During the attended survey, when the market was operating on a Sunday, only road traffic was audible from the site. The noise levels prior to the market opening (between 5:30 am and 6am), when people are likely to be setting up pitches, and during the running of the market (between 6am and 12pm) have been measured. Based on the site observations and a review of the noise monitoring data, road traffic noise was found to increase on market days.
- 3.1.6 Table 1 shows the noise monitoring period at ML1, together with associated observations undertaken during the installation and decommissioning of the noise monitor, and the attended noise survey.

Monitoring Location	Start Date and Time	Finish Date and Time	Comments
ML1	20/07/19 17:16:21	22/07/19 13:40:54	On-site observations and a review of the audio files for this monitoring location identified road traffic was dominant. Due to the market being held early on a Sunday morning, increased traffic from this was noted and remained the most significant source at the site during the market.

3.1.7 The noise measurement was made using Class 1, integrating sound level meter. The microphone was mounted on a tripod 1.5m above the ground and more than 3.5 metres from any other reflecting surfaces. The sound level meter was 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.

3.1.8 A-weighted<sup>1</sup>  $L_{eqs}$ <sup>2</sup> were measured in accordance with the requirements of BS8233. The maximum and minimum sound pressure levels, A-weighted  $L_{90s}$ <sup>3</sup> , A-weighted  $L_{10s}$ <sup>4</sup> were also measured to provide additional information. The measured noise levels are set out in full in **Appendix B**.

### 3.2 Meteorological Conditions

3.2.1 The weather conditions between the 20<sup>th</sup> and 22<sup>nd</sup> July 2019 were obtained from the Weather Underground ('Wunderground') meteorological website.

3.2.2 Between the 20<sup>th</sup> and 22<sup>nd</sup> July 2019 the weather conditions were as follows;

- Temperatures between 18 and 25°C.
- Wind up to 5 m/s.
- Dry weather conditions.

### 3.3 Existing Road Traffic Noise Levels

3.3.1 The measured road traffic noise values are summarised below in Table 2, further detail can be found in **Appendix B**. The highest values during the day and night-time are marked in bold in Table 2 and whilst some of the values do not represent a full 16 hour or 8 hour period, these have been used as worst-case values of road traffic noise for the purpose of this assessment. Daytime hours are taken to be 0700 to 2300 hours and night-time to be 2300 to 0700 hours.

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<sup>1</sup> 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.  
<sup>2</sup>  $L_{eqs}$               Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.  
<sup>3</sup>  $L_{90}$                 The noise level which is exceeded for 90% of the measurement period.  
<sup>4</sup>  $L_{10}$                 The noise level which is exceeded for 10% of the measurement period.



<b>Period</b>	<b>Daytime dB(A) <math>L_{eq,t}</math></b>	<b>Night time dB(A) <math>L_{eq,t}</math></b>	<b>Night time dB(A) <math>L_{max}</math> (10th)</b>
Saturday 20/07 Daytime (18:00 to 23:00)	62	N/A	<b>71*</b>
Saturday 20/07 Night-time before market (23:00 to 05:30)	N/A	58	
Sunday 21/07 night-time during market set-up (05:30 to 06:00)	N/A	57	
Sunday 21/07 night-time during market running (06:00 to 07:00)	N/A	<b>58</b>	
Sunday 21/07 daytime during market running and packing up (07:00 to 13:00)	62	N/A	
<b>*In accordance with ProPG, the 10<sup>th</sup> highest <math>L_{Amax,f}</math> level during both night-time periods has been selected.</b>			

3.3.2 A CRTN calculation was undertaken using the measured noise levels collected on Monday 22<sup>nd</sup> between 1000 and 1300 hours. The calculated levels for road traffic during the daytime and night-time road traffic are 63dB and 54dB, respectively. To provide a robust approach to the assessment, the highest measured or calculated values for the daytime and night-time have been utilised for the assessment (i.e. 63dB daytime and 58dB night-time).

## 4 ROAD TRAFFIC NOISE ASSESSMENT

### 4.1 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 sources having an adverse impact on a proposed development, based on the overall measured levels with no mitigation in place.

4.1.2 A 3D noise model was built in the noise modelling software SoundPLAN version 8.1. 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 only relevant for those dwellings closest to the noise source.

4.1.3 The model was calibrated using the measured data collected at ML1 and presented in bold in Table 2 above. The modelled values allow for predictions of existing noise levels across the site, and figures showing daytime  $L_{Aeq,16hour}$ , night-time  $L_{Aeq,8hour}$  and night-time  $L_{Amax,f}$  levels are included as Figure 2 to Figure 4 (Drawings GM10710/002 to 004). The colouring on the figures shows the potential risk of noise from the A430 in accordance with ProPG:2017.

4.1.4 The existing noise levels across the site, derived from the modelling, at 1.5m height during the daytime and 4m height (to represent 1<sup>st</sup> floor bedroom height) during the night time, are presented in Table 3. The 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.

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 the A430, Gloucester	51 -70	Negligible to High	46- 65	Low to High

4.1.5 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 would be higher than 60 dB and therefore the site should not be regarded as negligible risk.

4.1.6 Table 3 indicates that there is some potential for proposed dwellings closest to the A430 to be at high risk of experiencing an adverse noise impact due to road traffic.

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

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

4.1.8 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.

#### 4.2 Acoustic Design Statement

4.2.1 The results from the ProPG:2017 Stage 1: Initial Site Noise Risk Assessment show that part of the proposed development is at a high risk of experiencing an adverse noise impact due to road traffic.

##### ***BS8233 Assessment of Daytime Noise Levels in Outdoor Living Areas***

4.2.2 The noise model has been used to determine the noise levels likely in outdoor living areas of properties in close proximity of the A430 during the daytime period. Figure 2 shows the daytime noise levels across the whole site.

4.2.3 The calculated noise levels on the site boundary closest to the A430, 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 4.

<b>Residential Property Location</b>	<b>Noise Level (dB <math>L_{Aeq}</math> 16 hour)</b>	<b>Level of Attenuation Needed to Achieve 55dB <math>L_{Aeq}</math> in Outdoor Living Areas</b>
Proposed residential dwellings in the eastern part of the site, adjacent to the A430.	70	15

4.2.4 Proposed properties with gardens located adjacent to the A430, will require mitigation to reduce the level of road traffic noise. Outline mitigation measures are discussed in Section 5 of this report.

4.2.5 Outdoor living areas of dwelling further into the site will require less, or no mitigation, due to screening from the development.

##### ***Assessment of Daytime Noise Levels in Living Rooms and Bedrooms***

4.2.6 The daytime noise levels in noise sensitive rooms of the proposed dwellings closest to the A430 have been assessed in accordance with BS8233 for living room and bedroom

areas. The guideline daytime noise level within living rooms and bedrooms is 35 dB  $L_{Aeq,16\text{ hour}}$ .

- 4.2.7 The measured daytime noise levels have been used to determine the noise levels likely at facades of dwellings closest to the A430 during the daytime period. Figure 2 shows the daytime  $L_{Aeq,16\text{ hour}}$  noise levels across the whole, undeveloped site.
- 4.2.8 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.
- 4.2.9 The calculated noise levels at the facades of the proposed dwellings nearest to the A430, together with the level of attenuation required to achieve 35dB  $L_{Aeq,16\text{ hr}}$  in living rooms and bedrooms is summarised in Table 5.

<b>Residential Property Location</b>	<b>Noise Level at the Façade of the Property (<math>L_{eq,16\text{ hour}}</math>)</b>	<b>Level of Attenuation Needed to Achieve Guideline Noise Levels in Living Rooms and Bedrooms</b>
Proposed residential dwellings in the eastern part of the site, adjacent to the A430.	73	38

- 4.2.10 The results indicate that the noise sensitive rooms at the site boundary, closest to, and facing, the A430 are likely to exceed guideline noise levels with windows open during the daytime. Therefore, dwellings will require mitigation to reduce the level of road traffic noise. Outline mitigation measures are discussed in Section 5 of this report.
- 4.2.11 The facades of the dwellings further into the site will require less, or no mitigation, due to screening from the development.

***Assessment of Night-time Noise Levels in Bedrooms***

- 4.2.12 The night-time noise levels in bedrooms of the proposed dwellings closest to the A430 have been assessed in accordance with BS8233. The guideline noise level within bedroom areas is 30 dB  $L_{Aeq,8\text{ hr}}$ . In addition, individual noise events should not normally exceed 45dB  $L_{Amax}$ .
- 4.2.13 The measured night-time noise levels have been used to determine the noise levels likely at facades of dwellings closest to the A430, during the night-time. Figures 3 and 4 show the night-time  $L_{Aeq,8\text{ hour}}$  and night-time  $L_{Amax, f}$  noise levels across the whole, undeveloped site.

4.2.14 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.

4.2.15 The calculated noise levels at the facades of the dwellings, together with the level of attenuation required to achieve 30dB  $L_{Aeq}$  and 45dB  $L_{Amax}$  in the bedrooms, are summarised in Table 6.

<b>Table 6: Façade Noise Level at Properties adjacent to the A430 and Level of Attenuation required to Achieve the Internal Night-time Guidance Noise Levels (Figures in dB(A))</b>			
<b>Residential Property Location</b>	<b>Noise Level at the Façade of the Property (<math>L_{eq}</math>)</b>	<b>Maximum Noise Level at the Façade of the Property (<math>L_{max}</math>)</b>	<b>Level of Attenuation Needed to Achieve the Noise Guideline Levels in Bedrooms</b>
Proposed residential dwellings in the eastern part of the site, adjacent to the A430.	68	78	38

4.2.16 The results indicate that the noise sensitive rooms at the site boundary, closest to, and facing, the A430 are likely to exceed guideline noise levels with windows open during the night-time. Therefore, dwellings will require mitigation to reduce the level of road traffic noise. Outline mitigation measures are discussed in Section 5 of this report.

4.2.17 The facades of the dwellings further into the site will require less, or no mitigation, due to screening from the development.

## 5 OUTLINE MITIGATION MEASURES

5.1.1 At this outline planning stage, the exact locations of the dwellings are unknown, therefore mitigation measures are recommended in outline terms only with regard to road traffic noise.

### ***Daytime Noise Levels in Outdoor Living Areas***

5.1.2 The noise levels, as detailed in Table 4 and shown on Figure 2, indicate that outdoor living areas in the eastern part of the site, closest to the A430, will require mitigation to achieve the daytime noise guideline level of 55dB  $L_{Aeq}$ .

5.1.3 To achieve noise guideline levels in garden areas nearest to the A430, it is recommended that gardens are located on the screened side of dwellings, with localised close boarded fencing utilised where required.

### ***Glazing and Ventilation Requirements***

5.1.4 When assessing daytime 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.

5.1.5 In the absence of design details for the building facades, it has been 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.

5.1.6 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).

### ***Daytime Living Rooms and Bedrooms***

5.1.7 The noise attenuation requirements for proposed noise sensitive living room and bedroom facades nearest to the A430 are summarised in Table 5.

- 5.1.8 With windows open, the attenuation provided by the façade will be approximately 15dB(A). This would allow the recommended internal noise guideline levels to be exceeded in some living rooms and bedrooms closest to and facing the A430.
- 5.1.9 On occasion, this may be acceptable to a resident, but when quiet conditions are required, the resident should be able to close windows whilst maintaining adequate ventilation.
- 5.1.10 Therefore, enhanced glazing with an alternative method of ventilation would be required for sensitive rooms in those dwellings closest to and facing the A430.
- 5.1.11 Living rooms and bedrooms located on the screened side of the dwellings, facing away from the A430 and all facades further into the site, are likely to meet the guideline noise levels even with windows open.
- 5.1.12 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'.
- 5.1.13 It should be noted that this assessment assumes dwellings are located on the site boundary, in practice a standoff from the road would be expected. Therefore, the level of façade mitigation required is likely to be less. Glazing and ventilation requirements can be confirmed, once a detailed design layout is available.

#### ***Night-time Bedrooms***

- 5.1.14 The noise attenuation requirements for proposed noise sensitive bedroom facades nearest to the A430 are summarised in Table 6.
- 5.1.15 With windows open, the attenuation provided by the façade will be approximately 15dB(A). This would allow the recommended internal noise guideline levels to be exceeded in some bedrooms closest to and facing the A430.
- 5.1.16 On occasion, this may be acceptable to a resident, but when quiet conditions are required, the resident will then be able to close windows whilst maintaining adequate ventilation.
- 5.1.17 Therefore, enhanced glazing combined with an alternative method of ventilation would be required for bedrooms in those dwellings closest to and facing the A430.

- 5.1.18 Bedrooms located on the screened side of dwellings, facing away from the A430 and all facades further into the site, are likely to meet the guideline noise levels even with windows open.
- 5.1.19 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'.
- 5.1.20 It should be noted that this assessment assumes dwellings are located on the site boundary, in practice a standoff from the road would be expected. Therefore, the level of façade mitigation required is likely to be less. Glazing and ventilation requirements can be confirmed, once a detailed design layout is available.



## 6 CONCLUSIONS

- 6.1.1 Wardell Armstrong has carried out a noise assessment for the proposed residential development on Land at Hempsted Lane, Gloucester.
- 6.1.2 In policy terms there is no presumption against development in places with high noise levels, provided that the noise can be adequately mitigated taking into account the economic and social benefits of the proposed scheme.
- 6.1.3 The existing noise sources which will potentially affect the residents of the proposed residential development are road traffic on the A430 and the Gloucester Car Boot and Flea Market.
- 6.1.4 A noise survey has been undertaken and a small increase in road traffic noise levels on the A430 during markets days was noted. Therefore, the higher noise levels, when the market was taking place, have been used to assess any potential noise impacts. No other significant noise sources from market activities were noted.
- 6.1.5 Road traffic noise levels have been assessed against the guideline values suggested by ProPG and BS8233. The initial Site Noise Risk Assessment carried out in accordance with ProPG shows that proposed receptors in the eastern part of the proposed development are at a medium to high risk of experiencing an adverse noise impact due to road traffic during the day and night-time periods respectively, with no mitigation in place.
- 6.1.6 Outline mitigation measures for road traffic noise are set out in Section 5 of this report, which include orientating gardens on the screened side of buildings for those dwellings with direct line of sight to the A430.
- 6.1.7 Any mitigation requirements can be confirmed, on a plot by plot basis, once a detailed design layout is available.
- 6.1.8 Following the implementation of suitable mitigation measures, future receptors would be protected and therefore, the application need not be delayed on noise grounds.

## **Appendix A Noise Legislation and Guidance**

## Appendix A: Noise Legislation and Guidance

### ***National Planning Policy Framework***

A.1 In July 2018, updated February 2019, the 'National Planning Policy Framework' (NPPF) was introduced as the current planning policy guidance within England. Paragraph 180 of the NPPF states:

*'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

- a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity values for this reason;''*

### ***Noise Policy Statement for England***

A.2 With regard to 'adverse impacts' the NPPF refers to the 'Noise Policy Statement for England' (NPSE), which defines three categories, 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.3 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***

- A.4 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.
- A.5 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.
- A.6 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.
- A.7 At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise. The following Table summarises the noise exposure hierarchy.

National Planning Practice Guidance Noise Exposure Hierarchy			
Perception	Examples of Outcomes	Increasing Effect Level	Action
<b>Not Present</b>	No Effect	No Observed Effect	No specific measures required
		No Observed Effect Level	
<b>Present and not intrusive</b>	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
<b>Present and intrusive</b>	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, 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 some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
<b>Present and disruptive</b>	The noise causes a material change in behaviour, attitude or other physiological response, 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
<b>Present and very disruptive</b>	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

A.8 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.”*

**BS8233 Guidance on sound insulation and noise reduction for buildings**

A.9 British Standard 8233 “Guidance on sound insulation and noise reduction for buildings” 2014 bases its advice on the WHO Guidelines. In addition, for internal noise levels it states:

A.10 “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.11 Furthermore, with regard to external noise, the Standard states:

*“For traditional external areas that are used for amenity space such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB  $L_{Aeq,T}$  with an upper guidance value of 55 dB  $L_{Aeq,T}$  which would be acceptable in noisier environments. 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.”*

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

A.12 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.

A.13 A two-stage process is suggested:

- Stage 1 – Initial Noise Risk Assessment
- Stage 2 – Detailed assessment (Acoustic Design Statement), required where the Stage 1 risk is identified above negligible.

A.14 The guidance reflects the Government’s overarching National Planning Policy Framework, the Noise Policy Statement for England, and Planning Practice Guidance - 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.

***Department for Transport Calculation of Road Traffic Noise***

A.15 The Department of Transport's memorandum, "Calculation of Road Traffic Noise" (CRTN), 1998 defines a shortened measurement procedure which is used to calculate the LA10,18hour noise level from three consecutive 1-hour measurements taken between 1000 and 1700 hours.

A.16 The arithmetic average of the three LA10,1Hour measurements is taken to derive the LA10 (3 hour). The LA10,18Hour noise level is then determined using the following calculation method;

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

A.17 The document "Converting the UK traffic noise index LA10,18h 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 LA10,18Hour into a daytime LAeq as described below.

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

A.18 The calculation for the night-time period is shown below.

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

## **Appendix B Noise Survey Results**



Client: Gladman Developments Ltd  
 Job No: GM10710  
 File No:  
 Monitor No: ML1  
 Date Calculated: 30/07/2019  
 Calc's by: EF  
 Checked by:

20/07/2019 - Daytime					
Time	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	Comments
18:00:00	61.9	76.3	53.8	64.8	Saturday
19:00:00	61.0	74.4	51.6	64.2	
20:00:00	59.9	81.8	47.7	63.4	
21:00:00	59.7	73.8	49.2	63.3	
22:00:00	58.4	71.6	43.2	62.2	

Summary - Daytime 20/07		
L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)
62.1	52	65.1

20/07/2019 - 21/07/2019 - Night-time					
Time	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	Comments
2300-2315	57.3	73.5	40.1	61.5	Saturday Night - Sunday Morning
2315-2330	58.1	69.2	43.5	62.4	
2330-2345	55.4	67.7	37	60.2	
2345-2400	54.9	67.7	36.8	58.9	
0000-0015	58	78.8	35.4	61.8	
0015-0030	54	66.6	35.7	58.9	
0030-0045	64.3	90.1	35.9	65	
0045-0100	54.8	69.8	34	58.8	
0100-0115	52.9	66.9	34	57.5	
0115-0130	56	80.4	34.6	56.8	
0130-0145	52.4	68.3	33.7	56.1	
0145-0200	51.5	69.4	31	55.7	
0200-0215	52.7	72.9	32.2	56.9	
0215-0230	52.7	67	34	57.5	
0230-0245	52.9	68.4	33.7	57.8	
0245-0300	50.2	70.5	31.7	53.7	
0300-0315	47.9	64.4	32.7	50.7	
0315-0330	52.4	67.7	34	56.7	
0330-0345	52.9	68.7	37	57.6	
0345-0400	54.2	68.3	40.8	59.1	
0400-0415	64	67.2	44.5	57.9	
0415-0430	53.4	72.4	40.1	57.3	
0430-0445	53.1	67.9	38.9	57.5	
0445-0500	52.5	67.8	36.7	57.2	
0500-0515	54.4	68.8	35.7	60.5	
0515-0530	56.3	71	38.8	60.2	
0530-0545	57	70.4	40.9	61.9	
0545-0600	56.5	68.6	43	61.4	
0600-0615	57.4	70.8	40.9	62.3	
0615-0630	57.9	70.7	42.9	62.2	
0630-0645	57.9	73.1	43.4	62.4	
0645-0700	58.7	77.9	40.8	62.8	

Summary - Night time 20/07 (23:00 to 05:30)		
L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)
57.9	55.6	60.8

Summary - Sunday Market Set Up, Night-time (05:30 to 06:00)		
L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)
56.8	42	61.6

Summary - Sunday Market Running, Night-time (06:00 to 07:00)		
L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)
58.0	41.8	62.4

21/07/2019 - Daytime					
Time	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	Comments
07:00:00	59.5	73.8	45.2	63.3	Market - Daytime Period
08:00:00	60.4	75.9	50.4	63.8	
09:00:00	61.7	73.1	54.1	64.7	
10:00:00	64.4	93.3	55.4	65.3	
11:00:00	62.5	77.4	56	65.2	
12:00:00	62.6	81.4	55.7	65.2	Market packing up
13:00:00	62.8	78.4	55.9	65.2	
14:00:00	62.5	82.3	56	65.1	Sunday
15:00:00	63	81.9	55.5	65.5	
16:00:00	62.5	86.2	54.4	65.1	
17:00:00	61	86.6	54.7	65.4	
18:00:00	62	76.2	53.4	65	
19:00:00	61.3	77.9	50.6	64.8	
20:00:00	60.7	74.9	49.4	64.2	
21:00:00	59.4	72.6	45.5	63.2	
22:00:00	58.2	73.1	43	62.4	

Summary - Sunday Market Running, Daytime		
L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)
62.0	51.9	64.7

21/07/2019 - 22/07/2019 - Night-time					
Time	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	Comments
2300-2315	56.7	69.3	40.8	61.6	Sunday Night - Monday Morning
2315-2330	53.8	68.3	38.6	58.6	
2330-2345	55.3	66.8	39.5	59.6	
2345-2400	54.2	71.1	38.7	58.9	
0000-0015	52.5	66	39.9	57.3	
0015-0030	52.9	69.4	38.8	57.5	
0030-0045	51.3	70.3	38.6	54.5	
0045-0100	50.8	71	38.5	50.6	
0100-0115	51.9	68.2	38	56.3	
0115-0130	50.4	68	36.5	52.9	
0130-0145	45.7	65.1	34.7	46.6	
0145-0200	49.2	67.6	34	49.7	
0200-0215	49.4	66.8	36.2	51.8	
0215-0230	42.2	63.1	34.9	42.8	
0230-0245	50	72.3	32.4	46	
0245-0300	47.8	69	32.8	45.7	
0300-0315	44	66	33.6	41.9	
0315-0330	49.4	67.2	35.1	52.5	
0330-0345	70.5	106.7	35.9	56	
0345-0400	51.7	69.3	37.6	55.2	
0400-0415	51.5	65.8	39.1	54.8	
0415-0430	54	67	41	58	
0430-0445	52.8	69.5	37.1	56.3	
0445-0500	55.9	72.4	38.3	60.9	
0500-0515	56.9	70.1	37.4	61.5	
0515-0530	56.6	70.1	38	61.4	
0530-0545	60.1	70.7	44.9	64	
0545-0600	60.5	71	48.3	64.3	
0600-0615	61.4	71.4	48.7	65.2	
0615-0630	62.7	80.4	53.1	65.8	
0630-0645	63.5	77.5	52.8	66.8	
0645-0700	64.4	74.1	56.8	67.2	

22/07/2019 - Daytime					
Time	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	L <sub>max</sub> (dB)	Comments
07:00:00	64.5	73	58.4	67	Compare max with Saturday Night Max to get RTN Night Max
08:00:00	64.3	81.6	58.1	66.9	
09:00:00	63.3	73.7	55.9	66	
10:00:00	62.6	72.9	56.6	65.3	
11:00:00	62.6	76.6	56.2	65.1	
12:00:00	62.8	76.1	55.4	65.6	

Summary - CRTN AND TRL Calculations for Road Traffic Noise Weekdays and nights			
Measured L <sub>max</sub> (dB)	Calculated L <sub>max</sub> (18 hour)	L <sub>day</sub> (TRL calculation)	L <sub>night</sub> (TRL calculation)
65	64	63	54

Analysis of L<sub>max</sub>f values on Saturday night and Sunday Night

Saturday Night L <sub>max</sub> sorted	Ranking	Sunday Night L <sub>max</sub> sorted	Comment
80.1	1	106.7	
80.4	2	80.4	
78	3	77.5	
77.9	4	74.1	
73.5	5	72.4	
73.1	6	72.3	
72.4	7	71.4	
71	8	71.1	
70.7	9	71	
70.6	10	71	Selected 71dB as 10th L <sub>max</sub> f
70.5	11	70.7	
70.4	12	70.3	
69.8	13	70.3	
69.4	14	70.1	
69.4	15	69.5	
69.2	16	69.4	
68.7	17	68.2	
68.6	18	69.3	
68.4	19	69	
68.3	20	68.3	
68.3	21	68.3	
67.9	22	68	
67.9	23	67.6	
67.8	24	67.2	
67.7	25	67	
67.7	26	66.8	
67.7	27	66.8	
67.2	28	66	
67	29	66	
66.8	30	65.8	
66.6	31	65.1	
65.4	32	63.1	

## Figures



KEY

- Site Boundary
- Noise Monitoring Location

REVISION	DETAILS	DATE	DRAWN	CHKD	APPD		

CLIENT  
**GLADMAN DEVELOPMENTS LTD**

PROJECT  
**HEMPSTED LANE, GLOUCESTER**

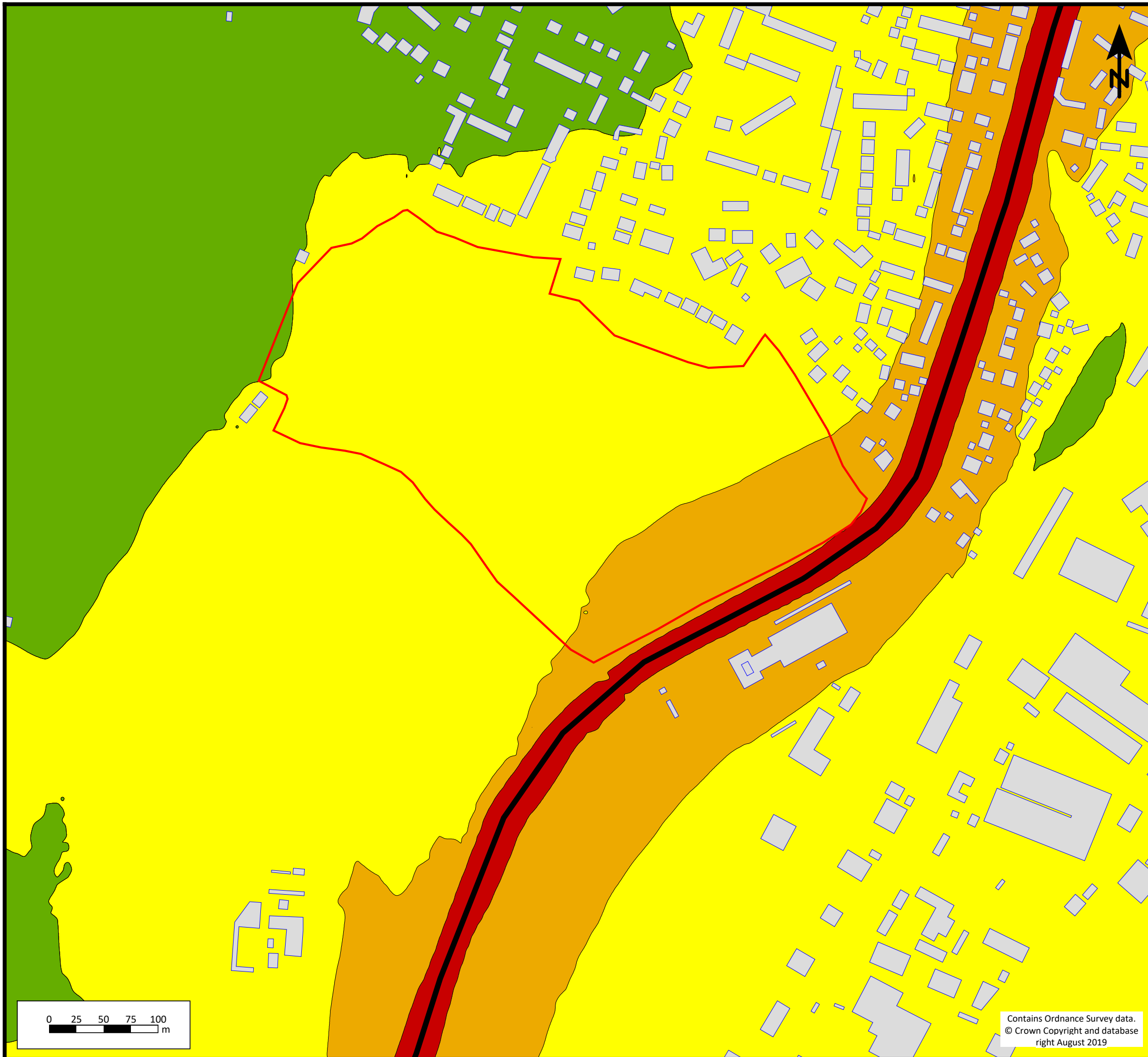
DRAWING TITLE  
**FIGURE 1 - NOISE MONITORING LOCATION PLAN**

DRG No.	GM10710-004	REV	A
DRG SIZE	A3	SCALE	1:3,500
DRAWN BY	EF	CHECKED BY	MC
		APPROVED BY	SU

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<input type="checkbox"/> CARLISLE	<input type="checkbox"/> SHEFFIELD
<input type="checkbox"/> EDINBURGH	<input type="checkbox"/> STOKE ON TRENT

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



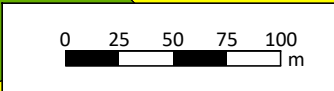
**Key**

- Study Area
- Existing Dwellings
- A430

**Daytime L<sub>Aeq</sub> dB**

- <= 50.0
- 50.0 - 60.0
- 60.0 - 70.0
- > 70.0

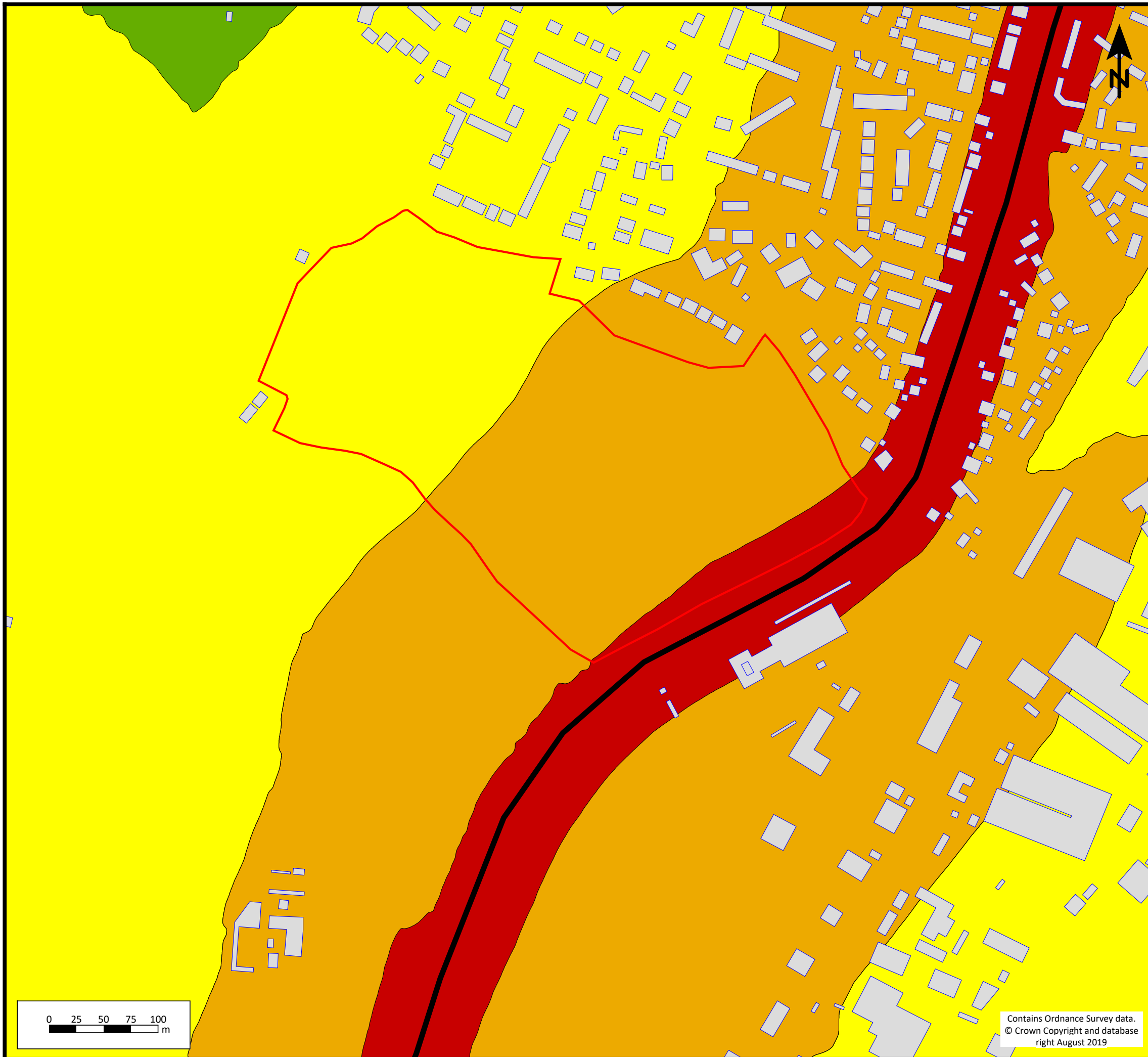
<b>CLIENT:</b>	Gladman Developments Ltd	
<b>PROJECT:</b>	Hempsted Lane Gloucester	
<b>TITLE:</b>	Figure 2 - Daytime Noise Contours Across The Undeveloped Site	
<b>DRG NO:</b>	GM10710/006	<b>REV:</b> A
<b>DRG SIZE:</b>	A3	<b>SCALE:</b> 1:3500
		<b>DATE:</b> 16/09/2019
<b>DRAWN BY</b>	EF	<b>CHECKED BY</b> MC
		<b>APPROVED BY</b> SU



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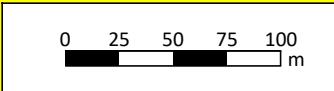
**Key**

- Study Area
- Existing Dwellings
- A430

**Night-time  $L_{Aeq}$  dB**

- <= 40.0
- 40.0 - 50.0
- 50.0 - 60.0
- > 60.0

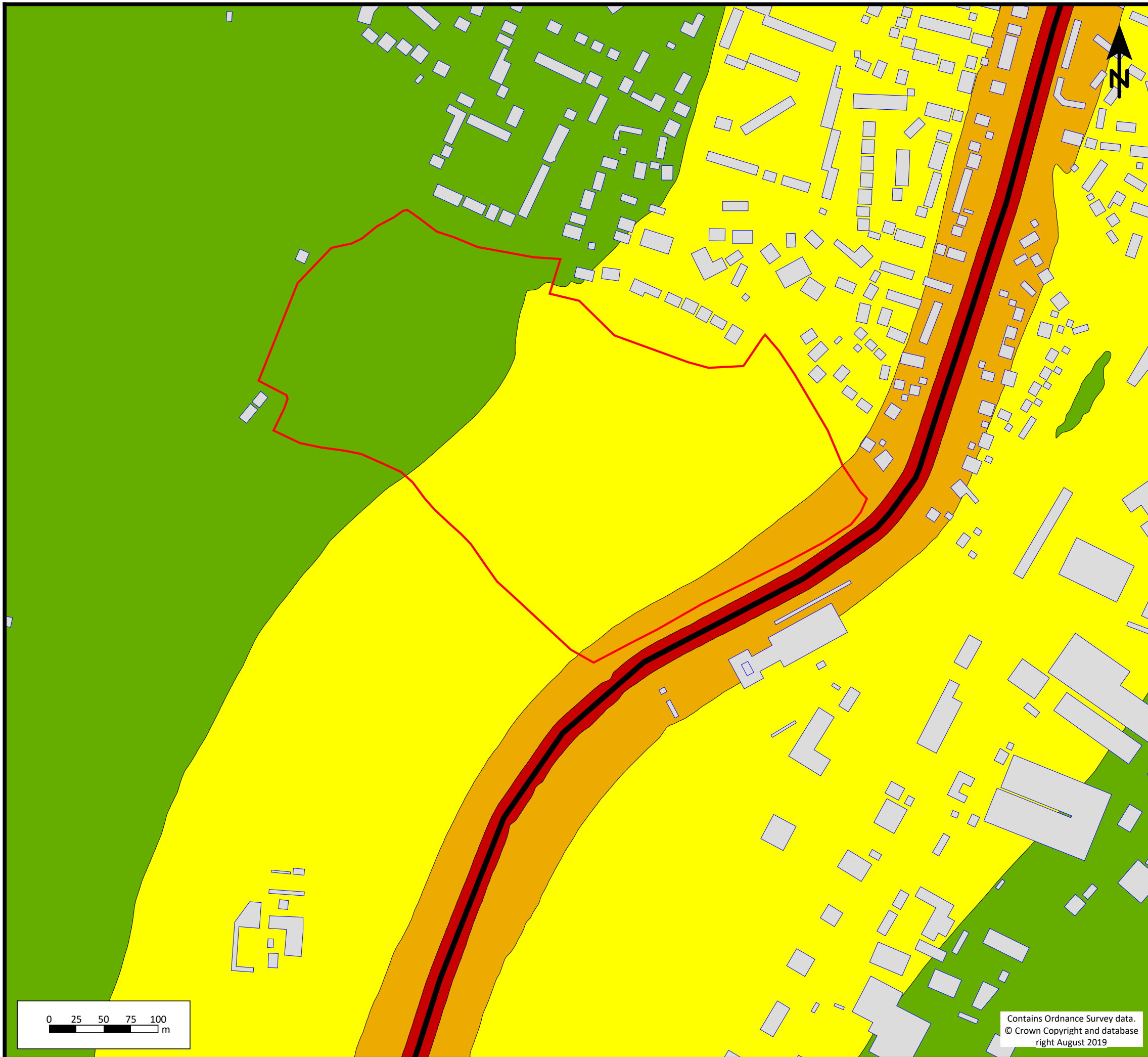
<b>CLIENT:</b>	Gladman Developments Ltd	
<b>PROJECT:</b>	Hempsted Lane Gloucester	
<b>TITLE:</b>	Figure 3 - Night-time Noise Contours Across The Undeveloped Site	
<b>DRG NO:</b>	GM10710/007	<b>REV:</b> A
<b>DRG SIZE:</b>	A3	<b>SCALE:</b> 1:3500
		<b>DATE:</b> 16/09/2019
<b>DRAWN BY</b>	EF	<b>CHECKED BY</b> MC
		<b>APPROVED BY</b> SU



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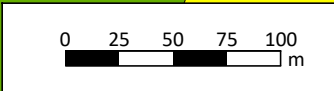
**Key**

- Study Area
- Existing Dwellings
- A430

**Night-time  $L_{Amax}$  dB**

- <= 60.0
- 60.0 - 70.0
- 70.0 - 80.0
- > 80.0

<b>CLIENT:</b>	Gladman Developments Ltd	
<b>PROJECT:</b>	Hempsted Lane Gloucester	
<b>TITLE:</b>	Figure 4 - Night-time Maximum Noise Contours Across The Undeveloped Site	
<b>DRG NO:</b>	GM10710/008	<b>REV:</b> A
<b>DRG SIZE:</b>	A3	<b>SCALE:</b> 1:3500
		<b>DATE:</b> 16/09/2019
<b>DRAWN BY:</b>	EF	<b>CHECKED BY:</b> MC
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