



**Land off Lucas Lane, Derby**

# **Environmental Noise Assessment**





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# Land off Lucas Lane, Derby

## Environmental Noise Assessment

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<b>CONTENTS</b>	<b>PAGE</b>
1 Introduction	1
2 Site Description	2
3 Assessment Methodology	3
4 Environmental Noise Measurements	8
5 Noise Assessment	10
6 Mitigation	12
7 Consideration of Existing Assessment	13
8 Conclusions	14
APPENDIX A – Introduction to noise	15
APPENDIX B – Graphical Representation of Noise Measurement Results	17

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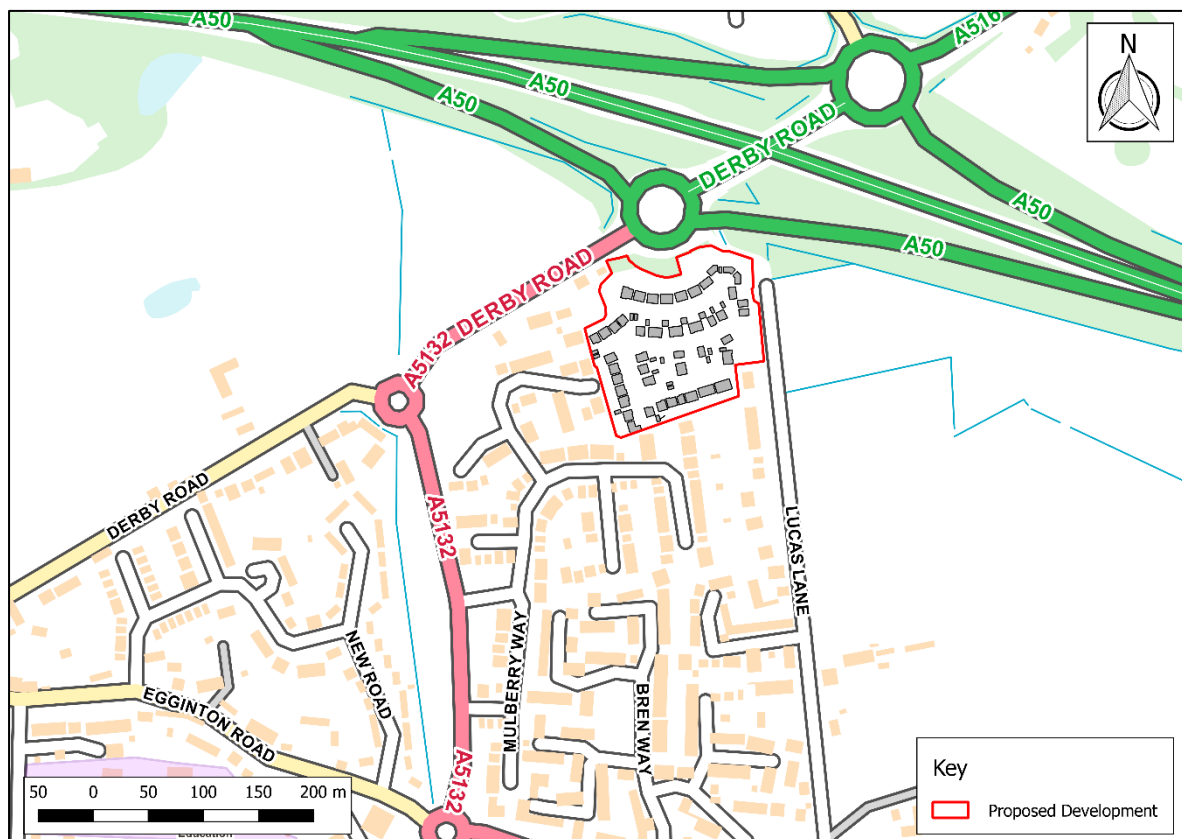
## 1 INTRODUCTION

- 1.1 Entran Ltd has been commissioned to undertake a noise assessment for a proposed development at the Land of Lucas Lane in Derby.
- 1.2 The assessment has been prepared to verify an existing noise assessment for the Proposed Development. The assessment considers the existing ambient noise and the suitability of the site for residential use.
- 1.3 The potential noise impacts are assessed in accordance with the most relevant national and local standards and guidelines.
- 1.4 This report is necessarily technical in nature and contains terminology relating to acoustics and noise. Therefore, a glossary together with a brief introduction to the subject of noise has been provided in Appendix A.

## 2 SITE DESCRIPTION

- 2.1 The proposed development at Lucas Lane will comprise 61 residential units. The Proposed Development is situated north east of the village of Hilton, at the northern end of Lucas Lane. The site is situated directly south of the A5132 Derby Road, which runs diagonally from the west to the north of the site, with the A50 running beyond from east to west. The surrounding area is mainly residential to the south east, with the remaining area comprising open grassland.
- 2.2 The Proposed Development location and boundary, in relation to the surrounding area, are identified in Figure 1 below.

**Figure 1 – Proposed Development Location Plan**



- 2.3 The existing noise climate within the vicinity of the Proposed Development is dominated by road traffic on Derby road and the A50, as well as road traffic on the surrounding road network.



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### 3 ASSESSMENT METHODOLOGY

#### National Policy

##### ***National Planning Policy Framework (NPPF) (February 2019)***

- 3.1 The National Planning Policy Framework (NPPF) (February 2019) sets out the Government's economic, environmental and social planning policies for England. It attempts to summarise in a single document all previous national planning policy advice. Taken together, these policies articulate the Government's vision of sustainable development, which should be interpreted and applied locally to meet local aspirations.
- 3.2 Under Section 15; Conserving and enhancing the natural environment, the following is stated in paragraph 170:

*“Planning policies and decisions should contribute to and enhance the natural and local environment by:*

*preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability”*

- 3.3 The NPPF goes on to state in paragraph 180 that:

*“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as 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 value for this reason”*



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### **Noise Policy Statement for England NPSE (March 2010)**

3.4 The Government is committed to sustainable development and the Department for Environment Food and Rural Affairs (Defra) plays an important role in this by working to secure a healthy environment in which current and future generations can prosper. One aspect of meeting these objectives is the need to manage noise for which Defra has the overall responsibility in England.

3.5 In March 2010, the Noise Policy Statement for England (NPSE) set out the long-term vision of Government noise policy as to:

*'Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.'*

3.6 The long-term vision is supported by the following aims:

*'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life: and,*
- *Where possible, contribute to the improvement of health and quality of life.'*

3.7 The explanatory note to the policy statement emphasises that sustainable development is a core principle underpinning all government policy. In this respect, there is a need to integrate consideration of the economic and social benefit of the activity under examination with proper consideration of the adverse environmental effects.

3.8 To achieve these objectives the NPSE sets out three noise conditions to be determined by the assessor:

*NOEL - No Observed Effect Level*

3.9 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.



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*LOAEL - Lowest Observed Adverse Effect Level*

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

*SOAEL - Significant Observed Adverse Effect Level*

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

3.12 The NPSE considers that noise levels above the SOAEL would be seen to have, by definition, significant adverse effects and would be considered unacceptable.

3.13 Where the assessed noise levels fall between the LOAEL and the SOAEL noise levels, the NPSE requires that:

*'All reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.... This does not mean that such adverse effects cannot occur.'*

3.14 No objective values are offered within the NPSE, as the document does indicate that each site should be considered on its own merits. Consequently, consideration of the observed effects is made through an assessment methodology as detailed below.

***British Standard BS 8233: 2014 Guidance on Sound Insulation and Noise Reduction for Buildings (BS 8233)***

3.15 The scope of BS 8233 is the provision of recommendations for the control of noise in and around buildings. It suggests appropriate criteria and limits for different situations, which are primarily intended to guide the design of new or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate.

3.16 This Standard suggests suitable internal noise levels within different types of buildings, including residential dwellings. It suggests that an internal noise level of 30 dB  $L_{Aeq, T}$  within bedrooms is a 'desirable' standard. For living areas during the daytime, the standard recommends 35 dB  $L_{Aeq, T}$  as a desirable standard for resting.

3.17 Whilst BS 8233 recognises that a guideline value may be set in terms of SEL or  $L_{AFmax}$  for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criterion is not stipulated. Accordingly, reference has been made in





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this assessment to the World Health Organisation (WHO) 1999: *Guidelines for Community Noise*.

3.18 The Standard also states that “*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.*”

***The Institute of Environmental Management & Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014)***

3.19 The Institute of Environmental Management and Assessment (IEMA) have recently published the ‘*Guidelines for Environmental Noise Impact Assessment*’. The guidelines are applicable to noise impact assessment for any scale of development proposal, including core principles to achieve effectively integration with the EIA, and provide advice on the issues that need to be considered in a noise impact assessment and whether the appropriate conclusions are being reached. The factors include:

- The appropriateness of the noise parameters used for the situation;
- The reference time period used in making the assessment;
- The level, character and frequency content of the noise sources under investigation; and,
- How the predicted noise levels relate to relevant Standards and guidelines.

3.20 The guidelines also recommend that the assessor should determine the degree of impact based on evidence derived from the assessment.

***The Draft Professional Practice Guidance on Planning and Noise (2016)***

3.21 The draft ‘*Professional Practice Guidance on Planning and Noise*’ (ProPG) has been recently produced by a Working Group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH) to provide acoustical practitioners with guidance on the management of noise within the planning system in England.

3.22 The reparation of the ProPG acknowledges and reflects the Government’s overarching NPSE, the NPPF and Planning Practice Guidance (including PPG-Noise), as well as other authoritative sources of guidance. It provides advice for Local Planning Authorities (LPAs)



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and developers, and their respective professional advisers which complements Government planning and noise policy and guidance and, in particular, aims to:

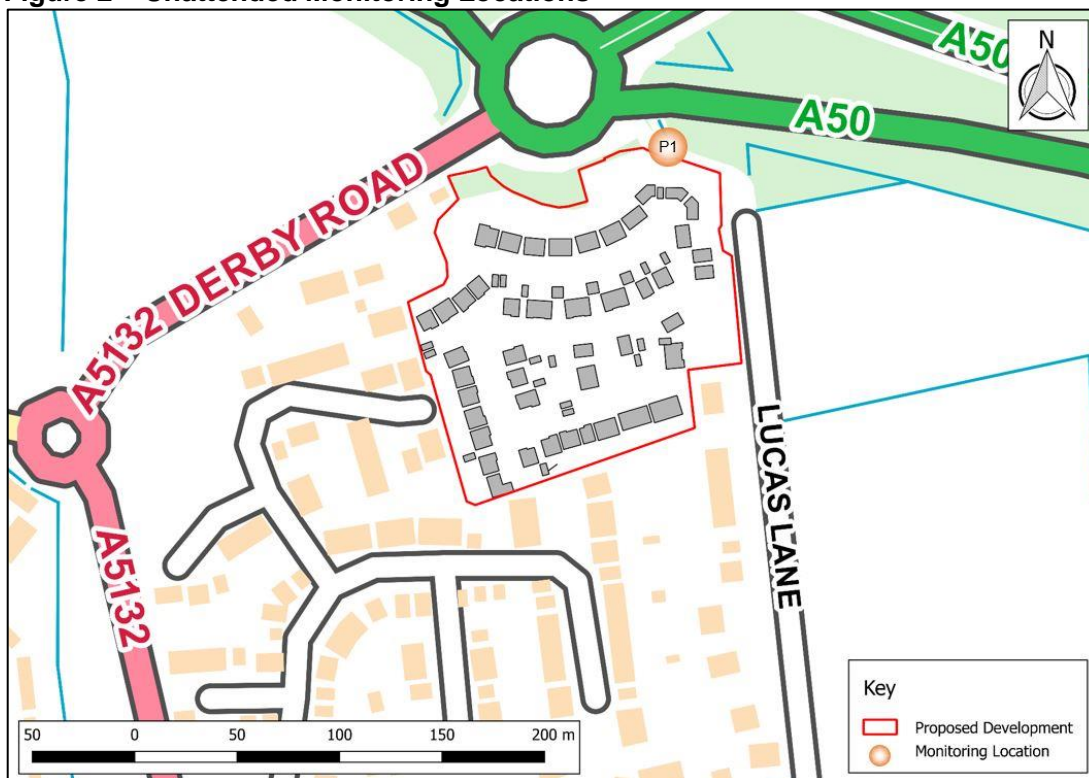
- advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;
- encourage the process of good acoustic design in and around new residential developments;
- outline what should be taken into account in deciding planning applications for new noise-sensitive developments;
- promote appropriate noise exposure standards; and,
- assist the delivery of sustainable development.

3.23 Whilst the draft guidance has only recently completed its consultation stage, it is considered of interest to the development proposals under consideration.

## 4 ENVIRONMENTAL NOISE MEASUREMENTS

4.1 Existing noise conditions in the vicinity of the Proposed Development have been determined by an environmental noise survey conducted between 8<sup>th</sup> and 13<sup>th</sup> May 2019. The monitor was positioned at the north of the site, as presented in Figure 2.

**Figure 2 – Unattended Monitoring Locations**



4.2 A summary of the unattended survey is provided in Table 1, graphical representation of the results is presented in Appendix B.

**Table 1: Summary of Unattended Survey**

Monitoring Position	Date	Measured Free-Field Sound Pressure Level, dB re. $2 \times 10^{-5}$ Pa.					
		Day Time (07:00 - 23:00)			Night-time (23:00 - 07:00)		
		$L_{Amax,F}$	$L_{Aeq,T}$	$L_{A90,T}$	$L_{Amax,F}$	$L_{Aeq,T}$	$L_{A90,T}$
P1	08/05/2019	90.6	65.2	60.0	78.7	60.2	50.9
	09/05/2019	80.4	65.8	61.3	79.1	59.5	50.1
	10/05/2019	90.6	64.6	59.7	81.0	59.0	49.9
	11/05/2019	87.0	63.2	58.2	84.0	57.3	47.9
	12/05/2019	81.6	61.4	56.4	78.5	59.5	49.6
	13/05/2019	79.6	63.6	59.0	-	-	-

Maximum levels represent the highest  $L_{Amax,F}$  sound level during the given period.  
 The period  $L_{Aeq,T}$  is obtained from the logarithmic average of measured sound levels.  
 The period  $L_{A90,T}$  is obtained from the average of the measured sound levels.



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- 4.3 The unattended noise monitoring was undertaken for verification of noise modelling, to allow assessment in accordance with BS 8233, and to determine the likelihood of adverse effects relating to the proposed development.
- 4.4 All noise measurements were undertaken by competent individuals with experience in environmental noise monitoring. Measurements were obtained in accordance with the principles of BS 7445: 2003: '*Description and measurement of environmental noise*'.
- 4.5 All acoustic measurement equipment used during the noise surveys conformed to Type 1 specification of British Standard 61672: 2003: '*Electroacoustics. Sound level meters. Part 1 Specifications*'. The noise measurement equipment used during the survey was calibrated at the start and end of the measurement period. The calibrator used had itself been calibrated by an accredited calibration laboratory within the twelve months preceding the measurements.
- 4.6 The sound level meter was calibrated before and after the unattended survey. There was no significant drift in calibration measurements observed during the survey period.
- 4.7 The microphones were positioned at approximately 1.5 m above local ground level and in free-field conditions. Each microphone was fitted with a protective windshield and the sound level meters were situated in a weatherproof case. Consideration of weather conditions and stability of the unattended data indicates that the weather conditions during the survey did not significantly affect the survey.



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## 5 NOISE ASSESSMENT

### Ambient Noise Levels

- 5.1 Noise emission levels affecting the Proposed Development have been calculated using predictive computer noise modelling. The noise modelling software (Cadna-A) uses algorithms based on ISO 9613 'Attenuation of sound during outdoor propagation' to predict noise levels generated at receiver locations by noise sources.
- 5.2 The noise levels have been predicted across the Application Site. To account for multi-storey buildings, noise contours have been calculated at 4 m above ground level.
- 5.3 The primary noise source affecting the Proposed Development would be road traffic on Derby Road and the A50. The results of the ambient noise survey have been used to calibrate the noise emission from the nearby road sources. The software uses the CRTN procedure to calculate noise levels from free-flowing traffic on roads.
- 5.4 The existing noise levels at the Proposed Development site have been assessed by considering the results of the calculations against the guidance provided in BS 8233 and the WHO Guidelines.
- 5.5 Calculated daytime and night-time noise contours are presented in Appendix B.
- 5.6 The ambient noise levels at properties that have a direct line of site to Derby Road and the A50 exceed the BS 8233 criterion noise levels within habitable rooms with windows partially open, therefore windows would need to remain closed in order to achieve the criteria.
- 5.7 Calculated noise levels at all other properties across the development, that do not overlook the main roads, indicate that ambient noise levels would be suitably low to achieve the criteria with both partially open and closed windows.
- 5.8 BS 8233:2014 provides guideline values for external amenity areas and internal rooms during the day and night. Calculated noise contours indicate that all external amenity areas screening by buildings would achieve the criterion noise levels across the development.
- 5.9 The WHO Guidelines states that indoor noise levels should not exceed approximately 45 dB  $L_{Amax}$  more than 10-15 times a night to ensure there are no negative health effects related to sleep disturbance.



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5.10 Considering the measured noise levels, and accounting for the façade sound reduction from typical design as used in the 8233 assessment, maximum night time noise levels with windows closed exceed the WHO criteria of 45 dB by no more than 9 times per night, when assessed over 1-minute periods and with windows closed. Maximum  $L_{Amax,F}$  noise levels are considered to achieve the criteria set out in the WHO Guidelines.



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## 6 MITIGATION

- 6.1 Assessment of the proposed development indicates that noise levels satisfy the criteria provided by both BS 8233 and the WHO guidelines.
- 6.2 The façade reductions adopted for this assessment are considered to be the typical minimum values that would be achieved. It is therefore likely that with modern façade design the reduction may be greater than in this assessment.
- 6.3 The assessment indicates that all locations will achieve the BS 8233 and WHO Guidelines criteria within habitable rooms with windows closed, and properties not directly overlooking Derby Road/ the A50 are likely to achieve the criteria with partially open windows.
- 6.4 Maximum noise levels are within the WHO criteria with windows closed. However, maximum noise levels may exceed the criteria with windows partially open. Sufficient ventilation is required at properties where the construction of the façade will rely on closed windows to achieve the criteria.
- 6.5 Examples of façade mitigation include acoustic air bricks, trickle ventilation and mechanical ventilation. Any passive or mechanical system should allow for sufficient airflow whilst maintaining the integrity of the façade with regard to noise insulation.



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## **7 CONSIDERATION OF EXISTING ASSESSMENT**

- 7.1 The existing assessment was undertaken by Mayer Brown in March 2019. The report concluded that “the proposed development should not raise any residual significant or other adverse impacts on the health and/or quality of life for existing residential and commercial neighbours of the site arising from noise”.
- 7.2 The calculated noise levels in this assessment are lower than those in the existing assessment, with both reports concluding that the site is likely to be suitable for the proposed development. The conclusions of the assessments are consistent, with similar propagation of noise across both sets of noise contours.
- 7.3 Both assessments indicate that the noise levels across the site are deemed to be suitable. Provided sufficient mitigation measures are employed, the proposed development will comply with the identified criteria.





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## 8 CONCLUSIONS

- 8.1 An assessment of the potential noise impacts attributable to the existing ambient environment has been undertaken for the proposed residential development at Lucas Lane, Derby.
- 8.2 Unattended noise measurements were undertaken to obtain sound levels representative of the existing environment for calculation and assessment of ambient noise levels in accordance with BS 8233:2014 and the WHO Guidelines for Community Noise.
- 8.3 Calculated ambient  $L_{Aeq,T}$  noise levels achieve the BS 8233 criterion noise levels for residential rooms with windows closed, assuming a façade reduction of 33 dB. Ambient noise levels at properties that do not have a direct line of site to either Derby Road or the A50 fall below the BS 8233 criteria with windows partially open, assuming a façade reduction of 15 dB.
- 8.4 Noise levels at amenity areas are calculated to fall below the BS 8233 upper guideline noise level across the development.
- 8.5 Night-time maximum  $L_{Amax,F}$  noise levels achieve the WHO guideline noise level for the onset of sleep disturbance, when assessed over 1-minute intervals and with windows closed.
- 8.6 The assessment indicates that a typical façade design will achieve the required noise levels and therefore no specific consideration to the proposed design would be required. Suitable ventilation options have been suggested and sufficient ventilation should be incorporated to allow windows to remain closed.



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## APPENDIX A – INTRODUCTION TO NOISE

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB.

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs. For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest.

In the UK, traffic noise is measured as the  $L_{A10}$ , the noise level exceeded for 10% of the measurement period. The  $L_{A90}$  is the level exceeded for 90% of the time and has been adopted to represent the background noise level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level,  $L_{Aeq}$ . This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142 specifies background noise measurement periods of 1 hour during the day and 5 minutes during the night. The noise levels are commonly symbolised as  $L_{A90(1hour)}$  and  $L_{A90(5mins)}$ . The noise measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.



**Table A1: Glossary of Terms**

<b>Term</b>	<b>Definition</b>
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds $s_1$ and $s_2$ is given by $20 \log_{10} (s_1/s_2)$ . The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$ .
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,F}$	A noise level index defined as the maximum noise level during the period T. $L_{max}$ is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall $L_{eq}$ noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The noise level exceeded for 90% of the time over the period T. $L_{90}$ can be considered to be the 'average minimum' noise level and is often used to describe the background noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ( $L_{Aeq,T}$ ).
Residual Noise Level	The ambient noise remaining at a given position in a given situation when specified sources are suppressed to a degree such that they do not contribute to the ambient noise level ( $L_{Aeq,T}$ )
Specific Noise Level	The equivalent continuous A-weighted sound pressure level at the assessment position produced by the specific noise source (the noise source under investigation) over a given time interval ( $L_{Aeq,T}$ )
Rating Noise Level	The specific noise level plus any adjustment for the characteristic features of the noise ( $L_{Ar,Tr}$ ).



## APPENDIX B – GRAPHICAL REPRESENTATION OF NOISE MEASUREMENT RESULTS

Figure B1: Unattended Survey Results at Position 1

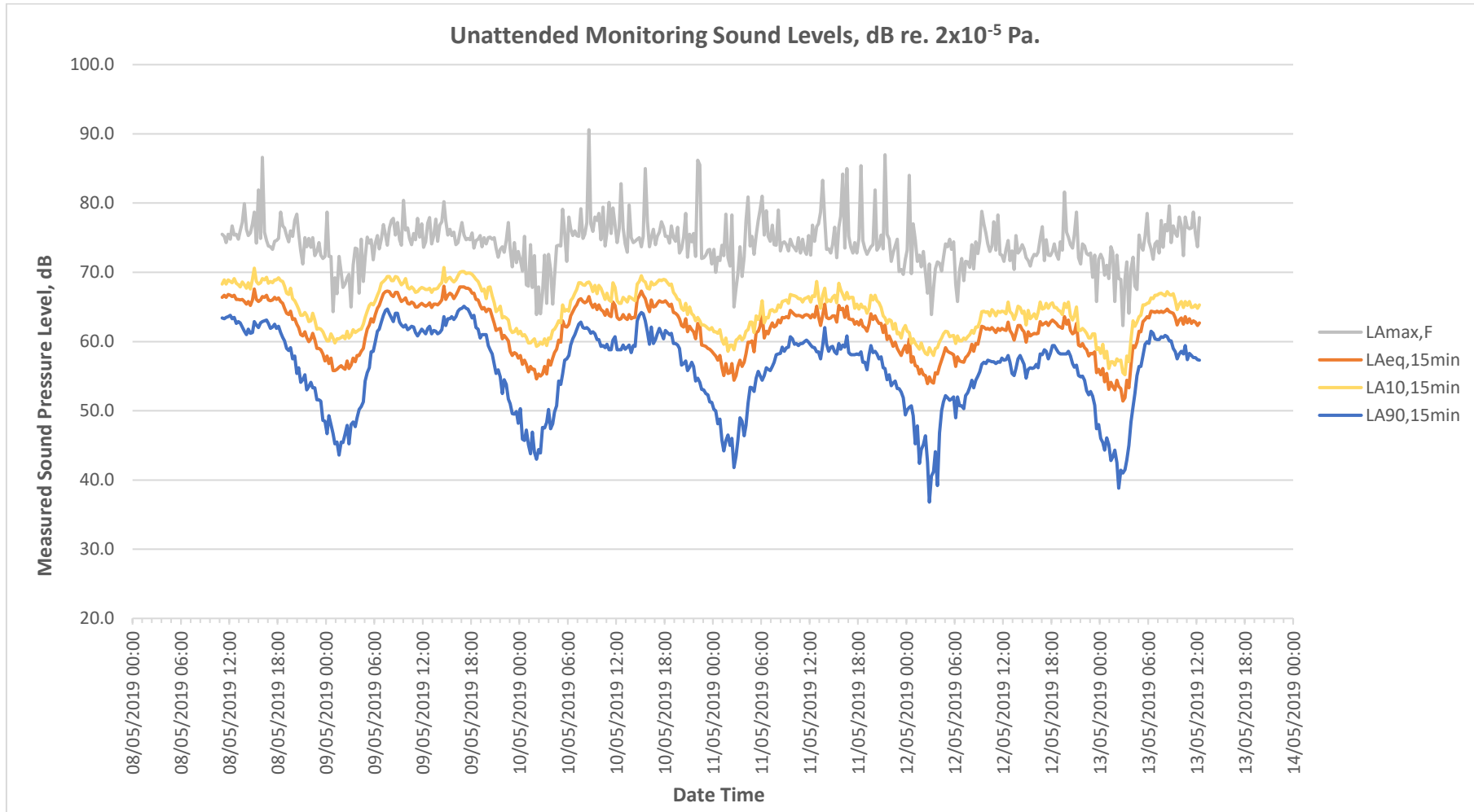


Figure B2: Daytime Noise Contour @ 1.5m

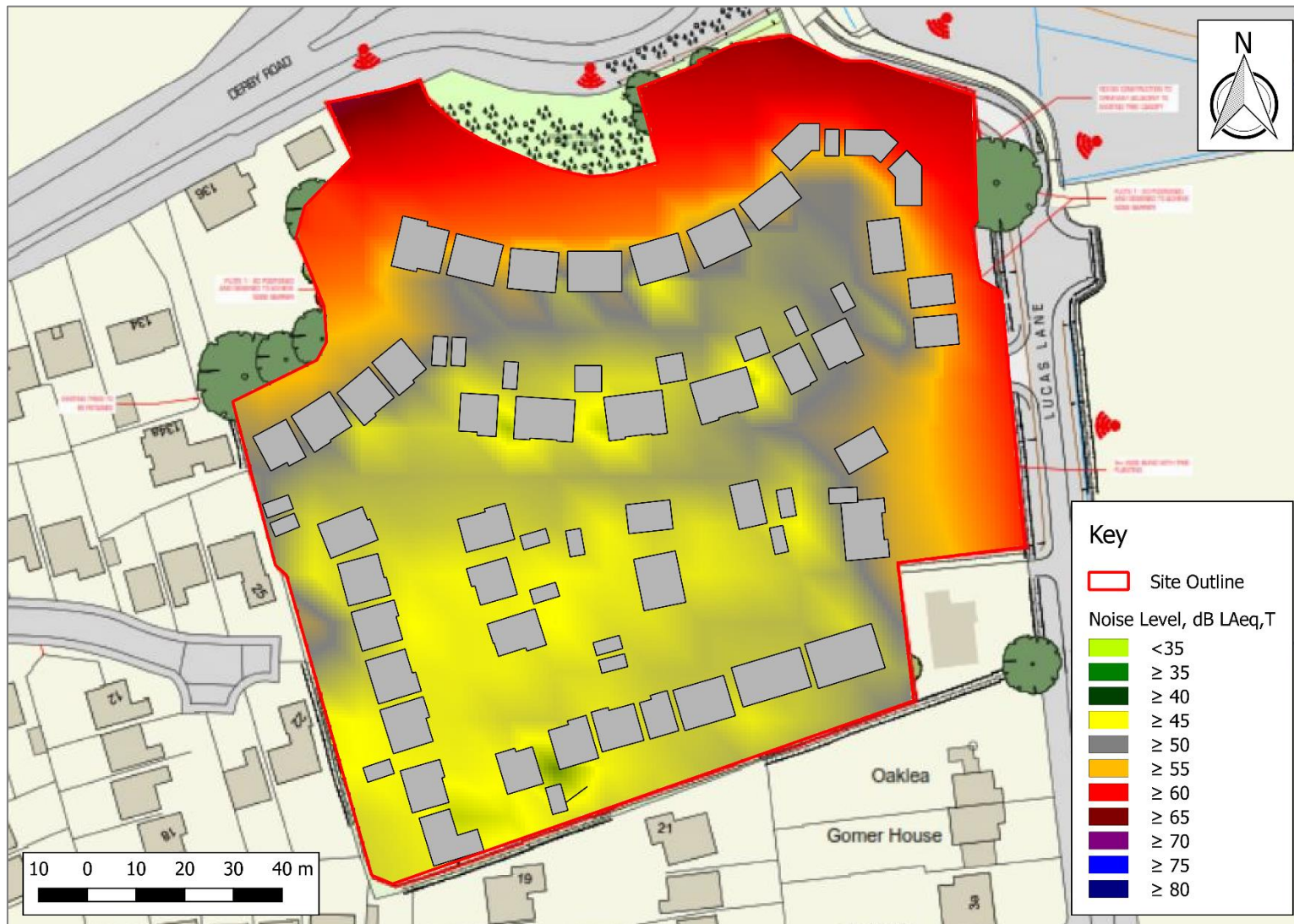




Figure B3: Night Time Noise Contour @ 4m

