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# Noise Impact Report

<b>Project Details</b>	
Client	Elizabeth Rose Homes Limited
Client Address	Elizabeth Rose Homes Limited 79 Kentons Lane Windsor SL4 4JH
Site Address	Land North of Mill Lane Sindlesham Wokingham RG41 5DF
Reference	22824E

<b>Quality Assurance</b>	
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<b>Revision History</b>			
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V2	24/09/2025	Ben Bielicki	Amended client name and updated proposed block plan with acoustic fence
V3	09/10/2025	Ben Bielicki	Report updated following change of proposal from four to three houses
V4	23/10/2025	Phil Lodge	Client name change



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## 1 Executive Summary

A noise impact assessment has been undertaken in support of a planning application for the proposed development of three new residential dwellings at Land North of Mill Lane, Sindlesham, Wokingham, RG41 5DF

The assessment has been carried out with reference to *BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings*, supported by the *World Health Organisation (WHO) Guidelines for Community Noise*, to ensure that appropriate internal and external noise criteria for residential amenity can be achieved.

The noise impact assessment indicates that the proposed dwellings can achieve compliance with *BS 8233:2014* internal and external guideline values, subject to installing the recommended glazing and ventilation specification in all habitable rooms and an acoustic fence along the garden perimeter.



## 2 Introduction

MGI Architecture Limited has instructed Spratt and Hamer Limited, on behalf of Elizabeth Rose Homes Limited, to undertake an environmental noise impact assessment. The purpose of this report is to evaluate the impact from the nearby motorway, as well as other general noise within the local environment that may affect future residents of the proposed development comprising three detached houses with associated gardens.

This report has been prepared solely for MGI Architecture Limited and Elizabeth Rose Homes Limited Land Limited. Spratt and Hamer Limited accept no responsibility for its use by any third party.

This document has been prepared using the various documents listed within the appendices of this report, together with drawings, technical information and additional verbal representations made by third parties. We have not audited nor independently verified the content or accuracy of any of the documents and information provided to us in the preparation of this report.

If additional information comes to light subsequent to the production of this report, we reserve the right to revise our opinions and the conclusions reached within this report.

### 2.1 Noise Impact Assessment

Spratt and Hamer Limited has undertaken an environmental noise impact assessment at the above site with noise levels measured externally during weekdays from Wednesday to Friday consisting of 16-hour days (07:00 – 23:00) and eight-hour nights (23:00 – 07:00).

This report will state the measured noise levels and will refer to guidance relevant to the nature of this survey whilst considering Local Planning Authority guidance and conditions.



## 3 Assumptions, Limitations & Uncertainty

- a. All suggested specifications require a good level of workmanship and for materials to be installed as the manufacture intends. Any poor workmanship may lead to weaknesses in the sound attenuation provided by the building elements.
- b. It is assumed that the sound pressure levels measured on site during the environmental noise survey are typical of the site.
- c. It is assumed that the technical data provided by glazing and ventilation manufacturers is up to date and correct.
- d. It is assumed that drawings and information supplied by MGI Architecture Limited are up to date and correct.



## 4 Planning Policies, Guidance and Criteria

The planning policies and criteria listed below are taken from associated relevant guidance documents, all of which should be considered for the internal and external noise levels.

### 4.1 National Planning Policy

The National Planning Policy Framework (NPPF) December 2024 set out the Government's planning policies for England and how they are expected to be applied. It provides a framework within which the Local Authorities are to prepare local plans and use their planning powers to minimise the adverse impact of noise. It should contain the following in relation to noise impacts.

187. 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.'*

198. 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:

*'mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life'*

NPPF previously characterised noise by grading and recommending actions and different effect levels as reproduced in Table 1.



Perception	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	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			
Present and intrusive	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			
Present and disruptive	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
Present and very disruptive	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

Table 1: Noise exposure hierarchy based on likely average response



## 4.2 Criteria

### 4.2.1 Local Planning Authority Criteria

At the time of writing, the consultant is unaware of any noise-related planning conditions or specific criteria issued by the Local Planning Authority for this development. Accordingly, this assessment has been undertaken with reference to *BS 8233:2014 – Guidance on Sound Insulation and Noise Reduction for Buildings*, the *World Health Organisation (WHO) Guidelines for Community Noise*.

### 4.2.2 BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

The British Standard BS 8233:2014, Guidance on Sound Insulation and noise reduction for buildings, provides appropriate internal levels of noise within dwellings, flats and rooms in residential use when unoccupied.

Section 7.2.2 'Internal ambient noise levels in dwellings' of BS 8233: 2014 states that 'In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values in Table 4'.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

Table 2: Table 4 of BS 8233:2014

Note 7 of section 7.7.2 states 'Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed up to 5 dB and reasonable internal conditions still achieved'.

In addition, Note 4 of section 7.7.2 states, 'Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or  $L_{Amax,F}$  (SIC), depending on the character and number of events per night. Sporadic noise events could require separate values'.

In the absence of a specific performance criterion within BS 8233 for short-term noise maxima, reference can be made to guidance published by the WHO. In particular, the WHO publication 'Guidelines for Community Noise' (1999), from which the guidance given in BS 8233: 2014 is itself derived, states that 'for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB  $L_{Amax}$  more than ten to fifteen times per night'.

The WHO publication 'Guidelines for Community Noise' (1999) has since been updated in 2018; however, it is widely accepted by Local Authorities that  $L_{Amax}$  45 dB is the target level for short-term noise maxima between 23:00–07:00.



### 4.2.3 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following internal noise levels are applicable within dwellings.

Specific Requirement	Critical Health Effect (s)	$L_{Aeq,T}$ (dB)	Time base,T (hours)	$L_{AFmax}$ (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night time	30	8	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

Table 3: A Summary of the Guidance Noise Levels

### 4.3 Criteria Summary

This assessment and the associated recommendations have been prepared in accordance with the guideline values contained in *BS 8233:2014* and the *WHO Guidelines for Community Noise*.



## 5 Site Description

The proposed development site is a vacant plot of land situated north of Mill Lane in Sindlesham, Wokingham, approximately 7 km southeast of Reading town centre and 4 km northwest of Wokingham.

The site lies on the edge of a small settlement, with surrounding land comprising a mixture of residential dwellings, local roads, and open agricultural fields. The northern boundary of the site runs adjacent to the M4 motorway, located approximately 60 m from the nearest proposed dwellings. A substantial acoustic barrier is installed along the motorway, providing shielding from direct line-of-sight to the site.

To the south and east, the site is bordered by existing residential properties, with the nearest being the dwellings situated immediately to the south.

The overall noise environment is influenced primarily by the proximity of the M4 motorway supplemented by local road traffic along Mill Lane and other sources secondary in nature.

### 5.1 Subjective Observations

During site attendance, subjectively the main source of noise was vehicular traffic on the M4 motorway provided a constant noise floor. Secondary noise sources included occasional aircraft and birdsong.

### 5.2 Weather Conditions

03-05/09/2025	Wednesday	Thursday	Friday
Temperature (°C)	15.0 – 21.4	12.0 – 19.9	9.2 – 22.7
Wind Speed (m/s)	0.1 – 6.0 (mean 2.5)	0.0 – 4.9	0.0 – 3.2
Wind Direction	SSW	SSW	SSE
Precipitation (mm/h)	0.0 – 3.6	0.0 – 3.6	0.0
Damp road/ wet ground	Damp	Damp	No
Fog/snow/ice	None	None	None

Table 4: Measuring Weather Conditions

All weather data taken from [wow.metoffice.gov.uk](http://wow.metoffice.gov.uk) from the 'Wokingham Weather monitoring station – Berkshire', located at approximately 2.7km east of the proposed development.



## 6 Noise Measurement Procedure

### 6.1 Survey Date(s)

Tuesday 02/09/2025 to Friday 05/09/2025.

### 6.2 Personnel Present

Luke Owen BSc (Hons) AMIOA.

### 6.3 Survey Equipment Used

Manufacturer	Model	Serial No.	Description
Rion	NL-52	00976149	Integrating Sound Level Meter and Real Time Analyser
Pulsar	Model 105	59964	Acoustic Calibrator

Table 5: Survey Equipment Used

### 6.4 Calibration

The sound level meter was calibrated with the field calibrator to a level of 94.0 dB @ 1 kHz prior to and on completion of the survey. No significant drift in calibration was observed. The meter used during the survey is precision grade Class 1.

Calibration certificates are available on request.

### 6.5 External Sound Level Measurements

The measurement location chosen during the survey was deemed suitable for the determination of the sound levels able to impact upon the façades of the proposed development.

The sound level meter was set to measure broadband and 1:1 octave centre frequency bands  $L_{Aeq}$ ,  $L_{A90}$ ,  $L_{A10}$  and  $L_{AFmax}$  in 5-minute intervals for the complete survey period. However, it should be noted that the meter ceased operating before completing a full 24-hour measurement. The equipment was subsequently re-established to ensure measurements included a complete 16-hour day and 8-hour night.

#### 6.5.1 Monitoring Position 1 (MP1)

A microphone was placed in free-field conditions on a tripod 1.5m above the grass, at the approximate location of the proposed houses. The sound level meter was set to record WAV file audio recordings or all maximum sound level events above 75 dBA.



## 6.6 Location Plan of Measurement Positions

The location plan below shows the proposed development site and position of the monitoring equipment.



Figure 1: Indicative Location Map. Image taken from [www.google.com/maps](http://www.google.com/maps)



## 7 Results and Analysis

### 7.1 External Ambient Sound Measurement Analysis in Accordance with BS 8233:2014

The following table presents the measured ambient sound levels from Monitoring Position 1 (MP1).

Day	Time Period	Time Base $T$	$L_{Aeq,T}$ (dB)	Highest $L_{Aeq,1hour}$ (dB)	$L_{AFmax}$ (dB)
Tuesday	13:00 - 23:00	10hr	62.3	65.1	-
	Night-time	8hr	60.1	64.9	59.8 - 71.1
Wednesday	14:00 - 23:00	9hr	67.2	69.2	-
	Night-time	8hr	58.7	61.7	59.9 - 68.3
Thursday	Daytime	16hr	66.7	68.3	-
	Night-time	8hr	59.2	63.7	59.2 - 67.8
Friday	07:00 - 10:00	3hr	64.0	64.8	-

Table 6: Ambient Sound Level Measurement Results

For a robust assessment, the highest ambient sound levels in 1-hour intervals will be used in the for both daytime and nighttime periods.

Data charts and further measurement results can be found in the appendix.

#### 7.1.1 Nighttime $L_{AFmax}$ Analysis

The  $L_{AFmax}$  measured during the nighttime (23:00-07:00) has been analysed. WHO Community Noise Guidelines states “For a good night sleep it is believed that indoor sound pressure should not exceed approximately 45 dB  $L_{AFmax}$  more than 10 – 15 times per night (Vallet & Vernet 1991).

The WAV file recordings and frequency spectrum data indicate that the highest  $L_{AFmax}$  71.1 dB and subsequent events were from car pass-bys. As such, it will be used for the assessment at this monitoring position as this is considered representative of other  $L_{AFmax}$  events during the nighttime period.



## 8 Recommendations

To provide a robust approach, the estimated internal noise levels attributed by the external noise sources have been assessed using the highest 1-hour  $L_{Aeq,T}$  for both the daytime and nighttime periods, and the highest  $L_{AFmax}$  from the nighttime periods. This, along with the building element evaluation will provide the basis for the following recommendations.

### 8.1 Glazing & Ventilation Specification

The glazing and ventilation specification in bedrooms & living rooms should consist of double-glazed unit in well-sealed frames and a quality mechanical system or a passive acoustic vent as shown in the table below.

Room	Glazing	Ventilation
Bedrooms	8mm glass / 16mm air / 6mm glass	Mechanical (active) ventilation or Greenwood EAQ42W Acoustic Window Vent
Living rooms		

Table 7: Glazing and Ventilation Specification

### 8.2 Notes on Ventilation

NOTE 5 in section 7.7.2 of BS 8233:2014 states “if relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level.”

It should be noted that it's the responsibility of MGI Architecture Limited to ensure that the ventilation strategy is sufficient to meet the requirements of Building Regulations Approved Documents F and O.

It is our understanding that all dwellings may be ventilated either with passive vents or mechanically ventilated. Where mechanical ventilation is utilised, the system is to be designed by a suitably qualified engineer or M&E consultant. The system should be designed so the cumulative internal ambient sound levels are not exceeded. Typically, a good quality MVHR system, when operated at mean capacity should not pose a significant contribution. Furthermore, Approved Document F states in Section 1.7:

*“Account should be taken of outside noise when considering whether openable windows are appropriate for purge ventilation.*

*NOTE: Although there is no requirement to undertake noise testing, achieving the levels in the following guidance would ensure good acoustic conditions. The average A-weighted sound pressure level for a ventilator operating under normal conditions and not at boost rates should not exceed both of the following.*

*30dB  $L_{Aeq,T}$  for noise-sensitive rooms (e.g. bedrooms and living rooms) when a continuous mechanical ventilation system is running on its minimum low rate.*

*45dB  $L_{Aeq,T}$  in less noise-sensitive rooms (e.g. kitchens and bathrooms) when a continuous operation system is running at the minimum high rate or an intermittent operation system is running.”*

Externally, a well-designed mechanical ventilation system is likely be inaudible at the nearest receptor, with supply and exhaust vents typically not surpassing 35 dB(A) at 1 meter.

The glazing and ventilation suggestions have been calculated assuming the windows are tightly closed. However, it must be noted that windows are suggested to be openable to provide rapid or purge ventilation or means of escape.



## 8.3 Acoustic Barrier Specification

The architect's drawings show gardens at the rear of the proposed houses.

Section 7.7.3.2 of BS 8233:2014 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 LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited."*

The gardens associated with the houses are likely to experience noise levels exceeding the upper guideline values of 55 dBA. Therefore, to achieve the lowest practical levels, a solid imperforate acoustic fence should be incorporated around the garden perimeters to the north, east and west (see Appendix for the proposed location) at a height of no less than 1.8m. In addition, it is important to note that further shielding attenuation will be provided by the buildings, situated between the primary source of noise (M4 motorway) and the gardens.

### 8.3.1 Acoustic Barrier Attenuation

Barriers and fences can be used as a means of controlling noise from an external noise source. The barrier interrupts the transmission between the source and receiver. In its simplest form a noise barrier can be a continuous close-boarded wooden fence, masonry wall or earth bund.

- Generally, the minimum mass of any acoustic barrier should not be less than 10kg/m<sup>2</sup>
- Openings and gaps should be avoided with openings not to exceed 1% of the total surface area

The below table describes the common good rule of thumb for basic barrier design.

Type of barrier	Noise level reduction
Full barrier (full break in line of site from source to receiver)	10 dB
Partial barrier (partial break in line of sight from source to receiver)	5 dB

Table 8: Basic Barrier Design (A.M. Jaramillo & C. Steel 2015)

For further information on acoustic barrier construction details can be obtained from directly from suppliers such as Jacksons Fencing or Gramm Barriers.

### 8.3.2 Trees and Vegetation

It is a common misconception that trees or shrubs can be used as an effective means to control noise. Trees and shrubs; however, can provide other benefits. By providing a visual screen, they can help reduce the perception of noise as an issue. They can help to provide some masking noise as a result of wind blowing through leaves and branches.



## 9 Calculation Methodology

Calculations for the BS 8233:2014 assessment have been based on the rigorous calculation method of BS 8233:2014 and BS EN 12354-3.

The calculations aim to meet the requirement of Approved Document F (ventilation). However, Part F expert advice must be sought. If more ventilation is required, further calculations may need to be carried out.

At the time of writing this report, room dimensions are unknown; therefore, all room dimensions are based on a typical room and window sizes as shown in the following table.

Room	Room Size	Window Size
Living Rooms	5m x 4m x 2.5m	2.5m <sup>2</sup>
Bedrooms	4m x 3m x 2.5m	1.5m <sup>2</sup>

Table 9: Room & Window Size

The calculations assume the external walls to be brick – cavity (with mineral wool insulation) – block as modelled in Insul Acoustic Prediction Software. Corrections for uncertainty have been applied.

The calculations assume each room has a reverberation time of 0.5 seconds in living rooms and 0.4 seconds in bedrooms.

The predictions also have been calculated assuming all windows are tightly closed.

### 9.1 Building Elements

The following table shows the expected performance of the glazing and ventilation.

Element	Description	$R_w/D_{n,e,w}$ ( $C; C_{tr}$ ) (dB)	Octave Centre Frequency (Hz) SRI / $D_{n,e}$ (dB)					
			125	250	500	1k	2k	4k
Glazing	8mm (16) 6mm	35 (-2; -6)	20	21	33	40	36	48
Ventilation	Greenwood EAQ42W Acoustic Window Vent	55 (-3)	47	46	49	56	66	69

Table 10: Glazing & Ventilation SRI

The selected units or products described have been used as a guide to form part of the specification. Other similar units or products can be used provided they can achieve the given minimum acoustic performance.



## 10 Example of Estimated Performance

The following table compares the estimated performance values with the measured values.

Location	Time period	Measured Level		Estimated Internal / External	
		$L_{Aeq,t}$ (dB)	$L_{AFmax}$ (dB)	$L_{Aeq,t}$ (dB)	$L_{AFmax}$ (dB)
Bedroom	Daytime (07:00 – 23:00)	69.2	-	32.8	-
	Nighttime (23:00 – 07:00)	65.7	71.1	29.5	37.4
Living Room	Daytime (07:00 – 23:00)	69.2	-	32.8	-
Outdoor Amenity	Daytime (07:00 – 23:00)	69.2	-	59.2	-

Table 11: Estimated performance



## 11 Conclusion

When installing the glazing, ventilation and acoustic fence, as discussed in the recommendations section, noise levels described in BS 8233:2014 can be achieved in all habitable rooms and external amenity spaces, thereby satisfying the anticipated local authority noise ingress requirements for planning.



## 12 References

National Planning Policy Framework (NPPF)

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

BS 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound

World Health Organisation Guidelines for Community Noise

BS 7445-1:2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures

BS EN 12758:2011 Glass in building – Glazing and airborne sound insulation

[www.google.co.uk/maps](http://www.google.co.uk/maps)

[www.metoffice.gov.uk](http://www.metoffice.gov.uk)

### 12.1 Drawing References

PL-01 Information Layout

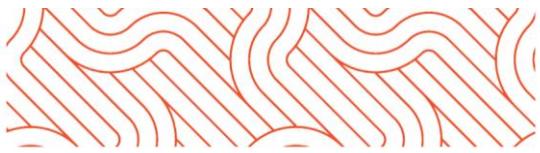
PL-01 Location Plan

PL-01 Proposed Block Plan



## Appendix

Photograph of Monitoring Position 1 (MP1)



## Proposed Block Plan with Acoustic Fence



### PROPOSED BLOCK PLAN

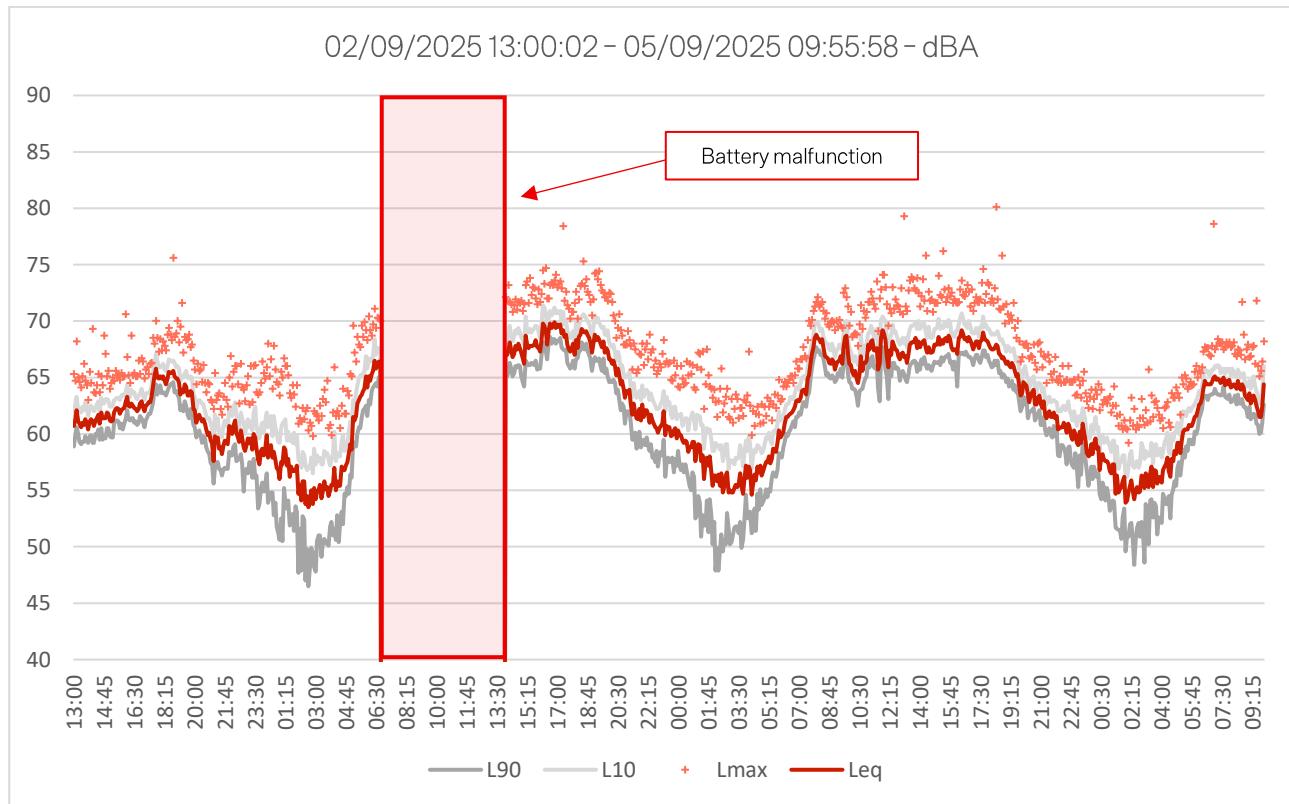
SITE ADDRESS - Land North of Mill Lane, Sindlesham Wokingham, RG41 4DF  
 DRAWING REF - PL-01  
 DRAWING SCALE - 1:500@A3  
 DRAWING REV - P1

Scale 1:500 5 0 5 10 15 20 25m

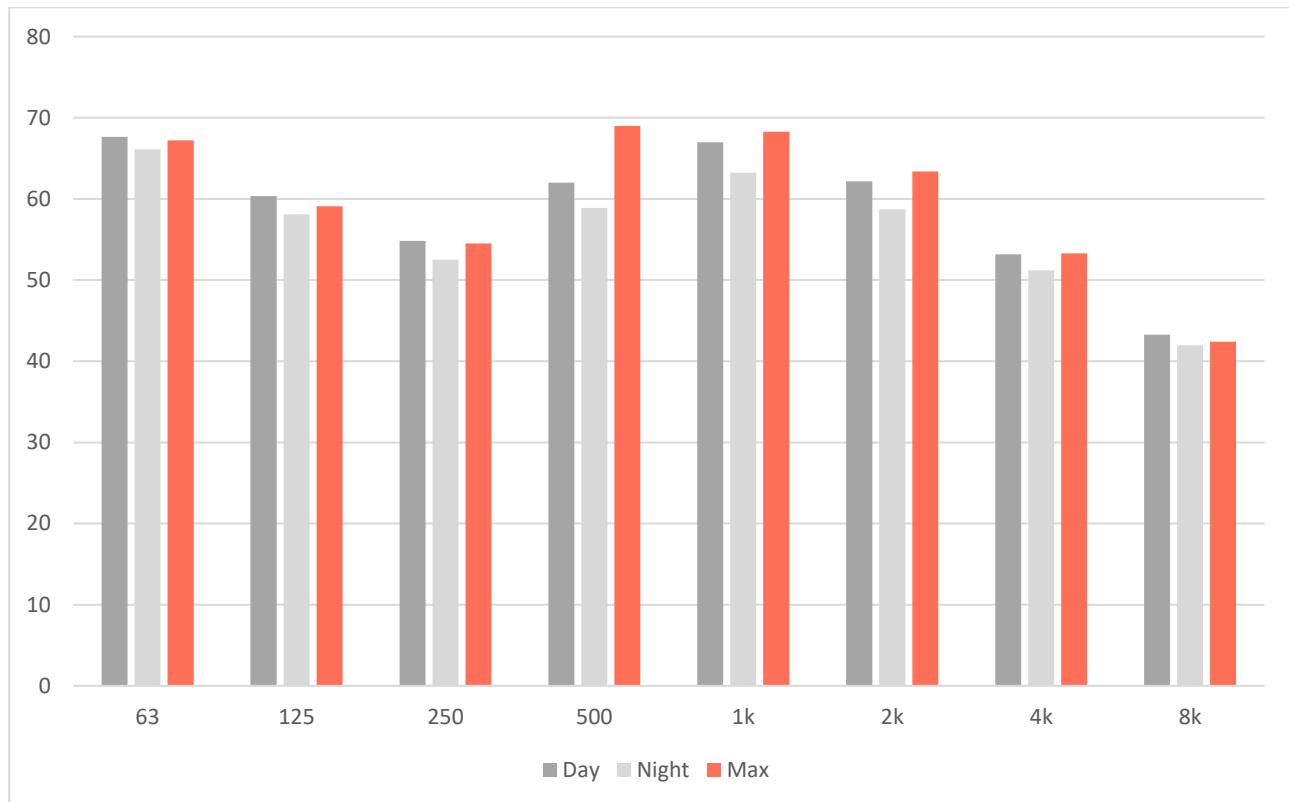


## Measurement Results

### Sound Level Measurement at Monitoring Position 1 (MP1)



### Un-weighted 1:1 Octave Results



## Glossary of Acoustical Terms

### A-weighting

Noise levels are corrected to represent human response to sound.

### $L_{Aeq}$

This is a continuous equivalent of time varying noise, or effectively the average measured (A weighted) noise level over a defined period of time.

### $L_{Aeq,16hour}$

A 16 hour long measurement of the  $L_{Aeq}$  over the period between 07:00 and 23:00, also known as a daytime measurement.

### $L_{Aeq,8hour}$

An 8 hour long measurement of the  $L_{Aeq}$  over the period between 23:00 and 07:00, also known as a night time measurement.

### $L_{AFmax}$

The highest, or maximum A-weighted sound pressure level measured over a specified time period. The 'F' defines a time weighting in Fast.

### $L_{A90}$

The A-weighted noise level or average level which is exceeded for 90 percent of the measured time period. Also known as a background level.

### $L_{A10}$

The A-weighted noise level or average level which is exceeded for 10 percent of the measured time period.

### 1:1 & 1:3 octave spectrum analysis

A single measurement that is separated into frequency bands to allow for a more detailed analysis of the noise source in question.

### $Rw$

The weighted sound reduction index of a partition or facade. A single number value based on the performance of a partition between two rooms across the frequency range 100Hz to 3150Hz. The level is adjusted for the effects of reverberation and background noise.



$D_{h,e,w}$

The weighted level difference of a partition or façade which takes into account a small element such as a grill or vent.

SEL (sound exposure level)

A measure of A-weighted sound energy used to describe a particular event, such as a train pass. It is the sound energy, which, if occurring over one second would contain the same energy as the event.

Free field sound pressure

Is where the radiation or spread of sound is completely unaffected by the presence of any reflecting surfaces or boundaries.

Low Frequency Noise

A term generally used for sound below a frequency of 100 to 150Hz.





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