PROPOSED RESIDENTIAL DEVELOPMENT
LAND NORTH OF OLD ASHFORD ROAD
LENHAM, KENT

NOISE IMPACT ASSESSMENT

Report No. MRL/100/978.1v1
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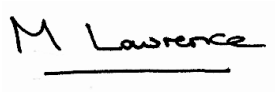

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1.0 INTRODUCTION

1.1 MRL Acoustics Limited was commissioned by Eurocanterbury to assess the impact of noise on a proposed residential development scheme at land north of Old Ashford Road, Lenham, Kent.

1.2 The proposed development consist of approximately 150 no. houses of mixed style and size with associated gardens, amenity areas and parking spaces.

1.3 The noise impact assessment has included:-

- measurements of the existing ambient noise climate at the site over a full 24-hour period;
- assessment of likely noise impact on the proposed residential development in accordance with the National Planning Policy Framework and BS 8233 : 2014;
- recommendation of an appropriate mitigation scheme for the proposed residential development, if necessary.

1.4 Noise levels referred to in the text have been rounded to the nearest whole decibel (dB), as fractions of decibels are imperceptible.

1.5 The various noise units and indices referred to in this report are described in Appendix I.

2.0 DESCRIPTION OF THE SITE

2.1 The proposed development scheme is at land directly north of Old Ashford Road, Lenham, Kent. The A20 Ashford Road runs along the northern site boundary.

2.2 The site is currently green open space used for agricultural purposes. Directly to the north-west of the site is Lenham Community Centre, a Doctors Surgery and a car park. To the south-west are some recently constructed new houses.

2.3 To the south-east is an existing dwelling and further to the east there are some commercial units.

2.4 The A20 Ashford Road is a busy main road with considerable numbers of HGVs and cars travelling past the site at speed. In contrast, the Old Ashford Road is a quiet low-trafficked road with only a handful of vehicles passing by the site in any given 1-hour period.

2.5 It was observed on site that the development land is affected mainly by noise from road traffic on the A20 Ashford Road which is by far the dominant noise source in the area.

2.6 The site location and development layout plans are shown at the end of this report.

3.0 NOISE LEVEL SURVEY

3.1 A noise level survey at the development site was carried out over a full 24-hour period from 11.00am on Thursday 7th January until 11.30am on Friday 8th January 2016 in order to establish the general ambient noise climate of the area during the typical weekday period.

3.2 The measurements were taken approximately at the position of the proposed elevations of the new dwellings that are the nearest to the A20 Ashford Road in order to represent the facades that are the most likely to be affected by noise from road traffic. The noise measurements consisted of consecutive 30-minute samples of noise over a continuous 24-hour period.

3.3 The site location plan and noise monitoring location are shown below:-

Noise Monitoring Location ☆

3.4 The noise survey was carried out using a Rion NA-28 Type 1 Sound Level Meter (serial no. 01291241) fitted within an environmental weather-proof case. The calibration level of the meter was checked before and after the survey with a Rion NC-74 sound calibrator (serial no. 35094450) with no variation in the levels observed.

3.5 The microphone was fitted on a tripod at 1.5m height above ground level and was fitted with a Rion WS-15 weather-proof windshield at all times.

3.6 The weather conditions for the survey were generally mild and dry with a light breeze throughout which represented acceptable conditions for noise measurements.

3.7 The measured results are 'free-field' levels as the microphone was not within 3.5m of a reflective surface (other than the ground) and therefore a -2.5 dB façade correction does not need to be applied to the measured results in order to assess the noise impact in accordance with BS 8233 : 2014.

Results

3.8 The measured noise results are detailed in Appendix II at the end of this report and are summarised in Table 1 below:-

Table 1: Measured 'Free-Field' Noise Levels

Location	Description	Noise Levels (dB)		
		L_{Aeq}		L_{Amax}
		Day (07:00 – 23:00	**Night** (23:00 – 07:00)	**Night** (23:00 – 07:00)
At Position of Proposed Building Elevations	24-Hour Measured Noise Levels	63	60	75

4.0 ASSESSMENT OF NOISE IMPACT

National Planning Policy Framework (NPPF)

4.1 National Government Guidance has recently become available in the form of the National Planning Policy Framework (NPPF). The NPPF sets out the Government's planning policies for England and how these are expected to be applied.

4.2 Paragraph 123 of section 11 of the NPPF, 'Conserving and enhancing the natural environment' provides general guidance regarding planning and noise. It states:-

Planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;

- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;

- Recognise that development will often cause some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established, and;

- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

4.3 The NPPF and its accompanying Explanatory Note provide only general guidance on planning and noise.

British Standard 8233 : 2014

4.4 Guidance on acoustic design goals for residential development is set out in British Standard 8233 : 2014 *'Guidance on sound insulation and noise reduction for buildings'*. The World Health Organisation *'Guidelines for Community Noise'* generally concurs with the recommendations of BS 8233 : 2014. The criteria are summarised in Table 2 below:-

Table 2: BS 8233 Recommended Acoustic Design Criteria

Location	**Internal Noise Levels**	
	Daytime (07:00 – 23:00)	**Night-time (23:00 – 07:00)**
Living Room	35 dB L_{Aeq}	-
Dining Room	40 dB L_{Aeq}	-
Bedroom	35 L_{Aeq}	30 dB L_{Aeq}
Garden	Desired Limit Not Exceeding 50 dB L_{Aeq} Upper limit of 55 dB L_{Aeq}	

4.5 The results of the noise level survey indicate that at the noise monitoring position, the development site is exposed to daytime external noise levels of 63 dB L_{Aeq}. For the night-time period, the site is exposed to external noise levels of 60 dB $L_{Aeq.}$

4.6 Allowing -13 dB attenuation for an open window, the resultant internal noise level within living rooms, dining rooms and bedrooms during the daytime will be 50 dB L_{Aeq} (63 dB – 13 dB).

4.7 For the night-time period, allowing -13 dB attenuation for an open window, the resultant internal noise level within bedrooms will be 47 dB L_{Aeq} (60 dB – 13 dB).

4.8 Therefore, with windows open, the internal noise limits outlined within BS 8233 : 2014 of 35 dB L_{Aeq} within living rooms and bedrooms, and 40 dB L_{Aeq} within dining rooms during the daytime will be exceeded.

4.9 The internal noise limit of 30 dB L_{Aeq} within bedrooms at night will also be exceeded and therefore a scheme of mitigation measures is required, as set out in Section 5.0.

4.10 Table 3 below provides information on the typical sound insulation performance of various glazing specifications:-

Table 3: Sound Insulation of Typical Windows

Description	Weighted Sound Reduction Index, R_w
Any type of window in a facade when partially open	10 - 15
Single glazed windows (4mm glass)	22 - 30
Thermal insulating units (6-12-6)	33 - 35
Secondary glazed windows (6-100-6)	35 - 40
Secondary glazed windows (4-200-4)	40 - 45

4.11 Therefore for any living room, bedroom and dining room windows throughout the development, acoustically upgraded double glazing of minimum construction 4mm glass – nominal 16mm air gap – 4mm glass will be required to ensure that the required 35 – 40 dB L_{Aeq} daytime noise criteria for living rooms, dining rooms and bedrooms, and the 30 dB L_{Aeq} night-time criteria for bedrooms are achieved with the windows closed.

5.0 RECOMMENDED NOISE MITIGATION MEASURES

5.1 In order to ensure that the internal noise limits are achieved without the need to open a window for ventilation, we would recommend the following scheme of mitigation measures as outlined below:-

Daytime Period: Living Rooms, Dining Rooms & Bedrooms

5.1 For all living room, dining room and bedroom windows on the building elevations **facing north, east and west**, (i.e. those with a line of sight of the A20 Ashford Road), standard thermal double glazing of minimum construction 4mm glass – nominal 16mm air gap – 4mm glass will be adequate to achieve the adopted internal noise limits.

5.2 It will be important to ensure that all glazing is well sealed when closed so there are no air gaps present.

5.3 Standard window frame trickle-vents **should not be used** in these windows.

5.4 The window construction outlined above should provide approximately 32 dB(A) attenuation in levels of external noise when closed.

Night-time Period: Bedrooms

5.5 For all bedroom windows on the building elevations **facing north, east and west**, (i.e. those with a line of sight of the A20 Ashford Road), standard thermal double glazing of minimum construction 4mm glass – nominal 16mm air gap – 4mm glass will be adequate to achieve the adopted internal noise limits.

5.6 It will be important to ensure that all glazing is well sealed when closed so there are no air gaps present.

5.7 Standard window frame trickle-vents **should not be used** in these windows.

5.8 The window construction outlined above should provide approximately 32 dB(A) attenuation in levels of external noise when closed.

5.9 In terms of L_{Amax} noise levels at night, with the 32 dB R_w sound reduction performance of the proposed glazing, the average measured night-time L_{Amax} level of 75 dB(A) should be adequately attenuated to below 45 dB L_{Amax} and therefore the external noise climate in terms of maximum noise levels will be within acceptable limits with the bedroom windows closed.

Extent of Noise Mitigation Scheme

5.10 Based on our measured noise level of 63 dB(A) at approximately 20m distance from the A20 Ashford Road, the noise mitigation measures will be applicable to all new dwellings **within 300m distance** from this road.

5.11 This is has been calculated using 'line-source' noise propagation of 3 dB attenuation per doubling of distance, i.e. 63 dB(A) at 20m distance equates to 60 dB(A) at 40m distance.

5.12 Therefore, for this particular development scheme, the noise mitigation measures are applicable to all the proposed new dwellings across the entire site.

Ventilation

5.13 Since opening the windows would reduce the sound insulation of the building envelope, it is considered that an acoustically treated alternative method of ventilation should be provided for all affected living rooms, dining rooms and bedrooms. This approach, which is recommended in BS 8233 : 2014, would provide the new residents with the option of ventilating rooms whilst maintaining the sound insulation of the building envelope.

5.14 For the living room, dining room and bedroom windows outlined above, acoustically treated ventilation will be required to meet the required internal noise limits without the need to open the windows for ventilation and cooling.

5.15 We therefore recommend the following options for the windows of any habitable rooms throughout the development:-

- acoustically screened wall mounted mechanical (i.e. powered) acoustic ventilators such as Titon 'Sonair F+' or Silavent Type SM2/C units; or

- a fully ducted passive or mechanical ventilation system with appropriate sound attenuation measures incorporated into the design; or

- Titon – HRV 2 Q Plus (MVHR) system 4 - This system is a 'whole house' continuous ventilation system that does not use trickle vents and is considered to be acceptable for this development; or

- any other similar performing acoustic ventilation system.

5.16 However, we would recommend that the ventilation requirements are checked with the Local Authority Building Control Officer at an early stage.

5.17 It is considered that the above mitigation measures should provide sufficient sound insulation from road traffic noise and also any other external noise sources, to ensure the required internal noise limits are achieved.

External Areas

5.18 The measured 'free-field' outdoor daytime noise level at the development site was 63 dB L_{Aeq}. This level of noise is 8 dB above the upper external daytime noise limit of 55 dB L_{Aeq} outlined in BS 8233 and the WHO Guidelines.

5.19 We would therefore recommend that for any proposed rear gardens, acoustic screening in the form of minimum 1.8m high good quality close-boarded timber fencing is provided at any rear garden perimeters. The screens should be constructed from solid material with a minimum mass per unit area of at least 15 kg/m^2.

5.20 It may therefore be typically constructed from solid timber of nominal 25mm thickness and density of at least 600 kg/m^3 and with no holes or gaps in its construction.

5.21 The screens may also be constructed using 1.8m high suitable dense solid masonry or appropriately designed earth bunds.

5.22 It is considered that the provision of the appropriate perimeter screening outlined above should provide a general level of noise attenuation of approximately 8 dB(A). This should ensure a resultant noise level in any rear garden areas of around 55 dB L_{Aeq} which is at the upper external daytime noise criteria set out in BS 8233 and the WHO Guidelines and is therefore within acceptable limits.

6.0 SUMMARY AND CONCLUSIONS

6.1 The impact of noise has been assessed for the proposed residential development at land north of Old Ashford Road, Lenham, Kent.

6.2 The results of the noise level survey and assessment indicate that the development site is exposed to fairly high levels of road traffic noise during both the daytime and the night-time periods.

6.3 Provision of suitable 1.8m high acoustic perimeter screening around any rear garden areas should ensure that the external daytime upper noise limit of 55 dB(A) is achieved.

6.4 An appropriate noise mitigation scheme has been recommended for the new dwellings which should provide sufficient noise attenuation to meet the required internal acoustic criteria and fully protect the amenity of future residents in accordance with the standards outlined in BS 8233 : 2014.


PRELIMINARY
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chartered architects and planning consultants
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Eurocanterbury
20/10/15
SITE LAYOUT
Scheme design
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A

APPENDIX I – NOISE UNITS AND INDICES

a) Sound Pressure Level and the decibel (dB)

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

b) Frequency and hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20,000 Hz. However, the upper frequency limit gradually reduces as a person gets older.

c) A-weighting

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters and is denoted dB(A) or dBLA.

d) Glossary of Terms

When a noise level is constant and does not fluctuate over time, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The indices used in this report are described below:-

L_{Aeq} This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period.

L_{Amax} This is the maximum A-weighted noise level that was recorded during the monitoring period.

L_{A10} This is the A-weighted noise level exceeded for 10% of the specified time period. L_{A10} is most often used as a measure of traffic noise.

L_{A90} This is the A-weighted noise level exceeded for 90% of the specified time period. L_{A90} is used as a measure of 'background noise'.

SEL This is the 'sound exposure level' of a single event (such as a passing train) and is the L_{Aeq} value of the whole event normalised to a 1 second period level of a sound.

APPENDIX II – RESULTS OF NOISE LEVEL SURVEY

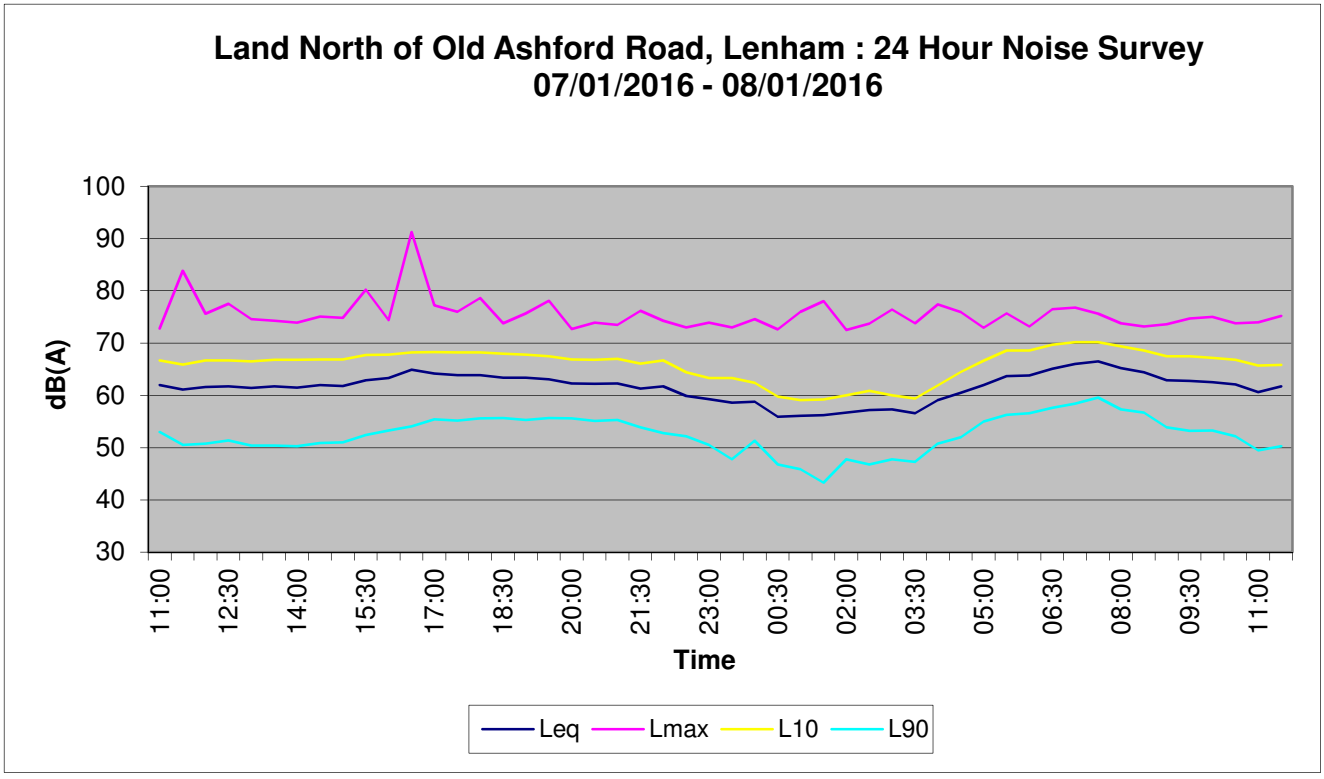
Date: Thursday 7th January – Friday 8th January 2016

Equipment: Rion NA-28 'Type 1' sound level meter (s/n 01291241), environmental weather case, outdoor microphone, calibrator, tripod

Weather: Generally mild and dry with a light breeze throughout

Results: All values in dB(A)

Graph A1: Results of 24-Hour Ambient Noise Level Survey



Date	Time	Leq	Lmax	L10	L90	SPL Time Weighting
07/01/2016	11:00	62.00	72.80	66.70	53.00	Fast
07/01/2016	11:30	61.10	83.80	65.90	50.50	Fast
07/01/2016	12:00	61.60	75.60	66.70	50.80	Fast
07/01/2016	12:30	61.70	77.50	66.70	51.40	Fast
07/01/2016	13:00	61.40	74.60	66.50	50.40	Fast
07/01/2016	13:30	61.70	74.30	66.80	50.40	Fast
07/01/2016	14:00	61.50	73.90	66.80	50.30	Fast
07/01/2016	14:30	62.00	75.10	66.90	50.90	Fast

07/01/2016	15:00	61.80	74.80	66.90	51.00	Fast
07/01/2016	15:30	62.90	80.20	67.70	52.40	Fast
07/01/2016	16:00	63.30	74.40	67.80	53.30	Fast
07/01/2016	16:30	64.90	91.20	68.20	54.10	Fast
07/01/2016	17:00	64.20	77.20	68.30	55.40	Fast
07/01/2016	17:30	63.90	76.00	68.20	55.20	Fast
07/01/2016	18:00	63.90	78.60	68.20	55.60	Fast
07/01/2016	18:30	63.40	73.80	68.00	55.70	Fast
07/01/2016	19:00	63.40	75.70	67.80	55.30	Fast
07/01/2016	19:30	63.10	78.10	67.50	55.70	Fast
07/01/2016	20:00	62.30	72.70	66.90	55.60	Fast
07/01/2016	20:30	62.20	73.90	66.80	55.10	Fast
07/01/2016	21:00	62.30	73.50	67.00	55.30	Fast
07/01/2016	21:30	61.30	76.20	66.10	53.90	Fast
07/01/2016	22:00	61.70	74.30	66.70	52.80	Fast
07/01/2016	22:30	59.90	73.00	64.40	52.20	Fast
07/01/2016	23:00	59.30	73.90	63.30	50.50	Fast
07/01/2016	23:30	58.60	73.00	63.30	47.80	Fast
08/01/2016	00:00	58.80	74.60	62.40	51.30	Fast
08/01/2016	00:30	55.90	72.60	59.80	46.80	Fast
08/01/2016	01:00	56.10	76.00	59.10	45.90	Fast
08/01/2016	01:30	56.20	78.00	59.20	43.30	Fast
08/01/2016	02:00	56.70	72.50	60.00	47.80	Fast
08/01/2016	02:30	57.20	73.70	60.90	46.80	Fast
08/01/2016	03:00	57.30	76.40	60.00	47.80	Fast
08/01/2016	03:30	56.60	73.80	59.40	47.30	Fast
08/01/2016	04:00	59.10	77.40	61.90	50.80	Fast
08/01/2016	04:30	60.50	75.90	64.50	52.00	Fast
08/01/2016	05:00	62.00	72.90	66.60	55.00	Fast
08/01/2016	05:30	63.70	75.70	68.60	56.30	Fast
08/01/2016	06:00	63.80	73.20	68.60	56.60	Fast
08/01/2016	06:30	65.10	76.50	69.70	57.60	Fast
08/01/2016	07:00	66.00	76.80	70.20	58.40	Fast
08/01/2016	07:30	66.50	75.60	70.20	59.60	Fast
08/01/2016	08:00	65.20	73.80	69.40	57.30	Fast
08/01/2016	08:30	64.40	73.20	68.60	56.70	Fast
08/01/2016	09:00	62.90	73.60	67.50	53.90	Fast
08/01/2016	09:30	62.80	74.70	67.50	53.20	Fast
08/01/2016	10:00	62.50	75.00	67.20	53.30	Fast
08/01/2016	10:30	62.10	73.80	66.80	52.20	Fast
08/01/2016	11:00	60.60	74.00	65.70	49.50	Fast
08/01/2016	11:30	61.70	75.20	65.80	50.30	Fast