LFAcoustics
consulting engineers

PRELIMINARY NOISE ASSESSMENT

PROPOSED RESIDENTIAL DEVELOPMENT ON LAND OFF STATION ROAD, MELDRETH

ENDURANCE ESTATES

APRIL 2018

LF Acoustics Ltd
Wrest Park Enterprise Centre
Building 52, Wrest Park
Silsoe, Bedfordshire
MK45 4HS

Registered in England
Company Reg: 8434608

LFAcoustics
consulting engineers

PRELIMINARY NOISE ASSESSMENT

PROPOSED RESIDENTIAL DEVELOPMENT ON LAND OFF STATION ROAD, MELDRETH

ENDURANCE ESTATES

APRIL 2018

Status	Prepared By	Date
1.0	L Jephson BEng (Hons) MIOA	24/4/18

CONTENTS

1.	Introduction	1
2.	Applicable Standards and Guidance	2
3.	Site Description	6
4.	Noise Monitoring	7
5.	Assessment of Noise Environment	10
6.	Initial Recommendations for Noise Mitigation	11
7.	Summary	12
	References	
	Figures	
	Appendices	

1. Introduction

LF Acoustics Ltd have been appointed by Endurance Estates to carry out a preliminary assessment of the noise environment on land off Station Road, Meldreth, proposed for a new residential development.

The site is located to the north west of Melbourn. The site is bounded to the west by the A10, which runs on an embankment past the site and Station Road, which runs along the northern site boundary. There is also a railway line further to the west, whilst trains were audible at times during periods of lighter traffic on the A10, the train movements had minimal influence on the overall noise environment within the site.

Noise levels within the site are principally influenced by road traffic. A preliminary assessment of the noise environment has been undertaken to determine the suitability of the site for residential development and to identify any constraints / outline noise mitigation measures, which may be required to ensure a satisfactory noise environment within the proposed residential development.

The following section of this report provides a brief description of the Standards and guidance applicable to this development. Section 3 provides a description of the site and its surroundings. Section 4 presents the results of a noise monitoring exercise, carried out to determine the present noise levels across the site. Section 5 presents an initial assessment of the noise environment. Preliminary recommendations for mitigation measures to ensure a satisfactory noise environment is achieved are discussed in outline within Section 6. Finally, Section 7 provides a summary of the report and recommendations.

2. Applicable Standards and Guidance

2.1. A description of the noise and vibration units referred to in this report is provided in Appendix A.

2.2. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in 2012 [1]. The aim of the Framework was to move the decision making process to a local level and to promote new development, with the presumption in favour of sustainable development.

Local planning authorities are required to develop local policies, and with regards noise, planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life from new development;
- Mitigate and reduce to a minimum, other adverse impacts on heath and quality of life arising from noise from new development, including through the use of conditions; and
- Recognise that development will often create 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.

2.3. British Standard BS 8233

BS 8233 [2] recommends design aims for noise levels to be achieved in new buildings and is the most appropriate guidance in defining applicable noise levels within the proposed development. The Standard was updated in 2014 to better reflect the requirements of the NPPF in terms of impact classifications and achieving the recommended guidance values, seeks to ensure that the occupants would not be subject to any significant adverse impacts, to ensure compliance with the requirements of the NPPF.

For residential properties, the guidance recommends the following design aims for the daytime (07:00 – 23:00) and night-time (23:00 – 07:00) periods:

- 35 dB $L_{Aeq,T}$ within living rooms and bedrooms during the daytime period;
- 40 dB $L_{Aeq,T}$ within dining areas / rooms during the daytime period;
- 30 dB $L_{Aeq,T}$ within bedrooms at night; and
- 50 – 55 dB $L_{Aeq,T}$ within gardens and patios during the daytime.

With regards internal noise levels, the Standard advises:

"Where development is considered necessary or desirable, external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

Where the above limits require windows to be closed to maintain the standard of noise, there needs to be appropriate alternative ventilation provided that does not compromise the façade insulation or resulting noise level.

With regards outdoor amenity space, it is recognised in the Standard that these guideline values may not be achievable in all circumstances. Where development might be desirable, 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, the development should be designed to achieve the lowest practicable levels, but should not be prohibited. Given that there is a need for the development, it is considered in this situation, that this relaxation could be applied, providing the lowest practicable levels have been achieved.

2.4. ProPG: Planning and Noise

Professional planning guidance on planning and noise was published in May 2017 [3]. The guidance seeks to provide a recommended approach to the management of noise within the planning system in England. The guidance has been prepared jointly between the Association of Noise Consultants, The Institute of Acoustics and the Chartered Institute of Environmental Health with the aim of providing a coherent approach to achieving the requirements of the NPPF.

The guidance advocates a systematic, proportionate, risk based, 2-stage approach, encouraging early consideration of noise within the design process for new residential developments:

- Stage 1 provides an initial noise risk assessment of the development site;
- Stage 2 provides systematic consideration of four key elements: demonstrating a good acoustic design process; observing internal noise level guidelines; undertaking an external amenity area noise assessment; and consideration of other relevant issues.

The initial risk assessment should identify the risk of adverse effects from noise and identifying whether the site poses a negligible, low, medium or high risk. The level of risk does not determine whether a site may be unsuitable for development, but highlights an increasing requirement for noise to be considered within the design of the development and the likelihood of a need for specific noise mitigation measures, as follows:

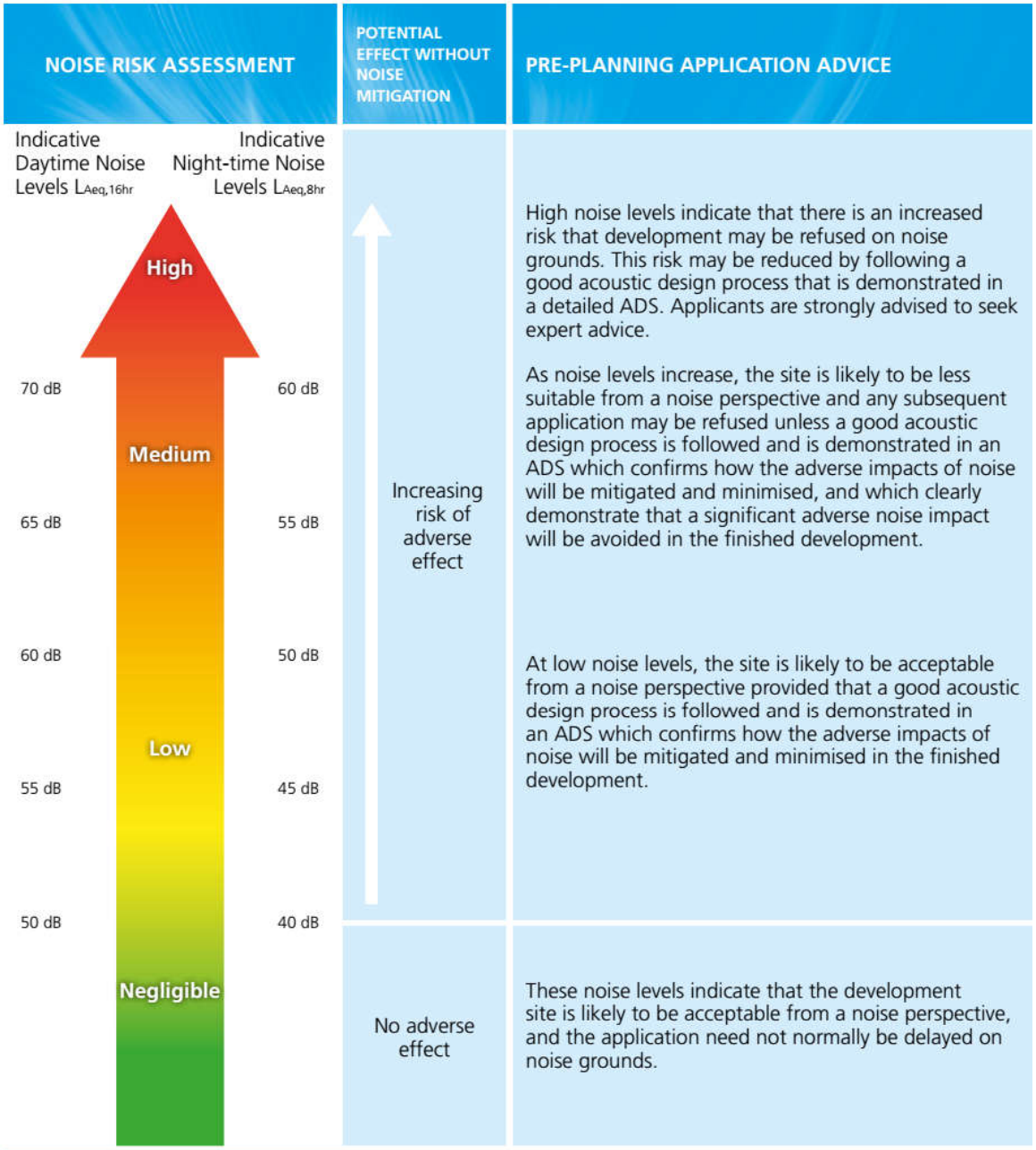

Figure 1 Notes:

a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.

b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".

c. $L_{Aeq,16hr}$ is for daytime 0700 – 2300, $L_{Aeq,8hr}$ is for night-time 2300 – 0700.

d. An indication that there may be more than 10 noise events at night (2300 – 0700) with $L_{Amax,F} > 60$ dB means the site should not be regarded as negligible risk.

This preliminary report considers the Stage 1 Risk Assessment.

The categories / noise levels indicated in the figure above do not provide specific limits above which adverse effects would occur and are intended as a guide to the requirement for additional noise mitigation and design measures. Based upon the above figure significant adverse noise effects would be unlikely to occur at noise levels below 65 dB $L_{Aeq, 16\ hour}$, with a number of other local authorities having adopted a limit of 72 dB $L_{Aeq, 16\ hour}$, as representing a daytime level above which significant adverse effects would occur.

For a Stage 2 assessment, which would be prepared at a later stage, the guidance additionally refers to BS 8233 with respect of achieving an acceptable internal noise environment and within gardens.

Internally, the guidance recommends that the targets within BS 8233 are adopted as an aim. Expanding upon the guidance within BS 8233, for internal noise environments It is stated:

"Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as "unreasonable". Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has been kept to a minimum. Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing "unacceptable" noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form."

Within external amenity areas, the guidance reflects BS 8233, as follows:

"These guideline values (i.e. a level of between 50 – 55 dB L_{Aeq}) may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces ***but should not be prohibited****."*

3. Site Description

The site lies to the north west of Melbourn and is bounded to the north by Station Road, which links Melbourn to Meldreth to the west. At present the western area of the site is mainly forested, with open grassed area within the southern half of the site.

The A10 runs along the western boundary of the site on an embankment increasing in height to allow the road to pass over Station Road. Noise from vehicles travelling along the A10 was observed to be the main source of noise within the majority of the site.

There is also a railway line to the west of the A10. Trains travelling along the line were audible during breaks in traffic, although the train movements were observed to have minimal influence on the overall noise levels within the site.

The location of the site and the surrounding area is indicated on Figure 1.

4. Noise Monitoring

In order to establish the current noise climate within the site, noise surveys were carried out between Monday 16th and Thursday 19th April 2018.

Unattended noise surveys were used principally to determine the day and night-time noise environment, which were supplemented with sample measurements taken at further positions along the A10 boundary to determine the variation in noise levels.

Weather conditions for the survey were good for environmental noise monitoring, with dry conditions and either calm conditions or light south westerly winds throughout.

4.1. Unattended Noise Surveys

Unattended noise surveys were carried out at two positions within the site, one located along the western boundary, 10m from the fence at the foot of the A10 embankment (Position U1) and a second located along the northern boundary, positioned 10 metres from the kerb of Station Road (Position U2). The monitoring positions are indicated on Figure 1.

Two Rion NL-52 Class 1 Sound Level Meters were used for the exercise, which were calibrated with a Rion NC-74 Class 1 Acoustic Calibrator before and after the exercise, with the instruments reading 94.0 dB on each occasion.

The instruments were configured to record over contiguous 5 minute periods throughout the survey period, which allowed a comparison to be made with the sample measurement results. The measured data has been summarised into hourly periods for reporting purposes using the Rion AS-60 Data Management Software and to enable the period day and night-time levels to be determined.

The results of the survey are summarised in Appendices B and C, with a graphical representation of the results provided on Figures 2 and 3. The period noise levels evaluated from the results are presented below.

Position U1 – 10m from A10 boundary

The microphone at this position was set at a height of 4 metres above the ground to be representative of the first floor level of the properties (i.e. bedroom windows). This position was chosen, as it was considered to provide the likely worst case noise levels.

Noise levels at this position were observed to be principally attributable to passing traffic on the A10, although there was also birdsong audible, which was most audible during the dawn chorus. Whilst audible as passing during breaks in traffic, noise levels associated with the train movements at this location had minimal influence on the noise environment.

Period	Period $L_{Aeq,T}$ Noise Levels [dB]	
	Daytime (07:00 – 23:00)	**Night-time (23:00 – 07:00)**
Tuesday 10/4/18	62.3*	56.7
Wednesday 11/4/18	62.6	56.5
Thursday 22/4/18	61.7	56.2
Average	**62**	**57**

Note: * Period comprised 11:00 – 23:00 hours Monday and 07:00 – 11:00 Thursday

Table 4.1 Period Noise Levels Evaluated from Unattended Noise Survey at Position U1 – 10 Metres from A10 Boundary

Maximum noise levels were observed to be typically of the order of 70 - 75 dB $L_{Amax,F}$ throughout the day and generally below 70 dB $L_{Amax,F}$ overnight during periods when there was less HGV traffic on the road.

Position U2 – Northern Boundary, 10m from Station Road

This monitoring location was set approximately 10 metres from the kerb of the A10, with the microphone set at a height of 1.3 metres above the ground and with a clear line of sight onto the carriageway.

Noise levels monitored at this location were attributable to a mix of road traffic from vehicles using the A10 and local traffic along Station Road. The period noise levels evaluated from the analysis of the noise monitoring undertaken at this location are as follows.

Period	Period $L_{Aeq,T}$ Noise Levels [dB]	
	Daytime (07:00 – 23:00)	**Night-time (23:00 – 07:00)**
Tuesday 10/4/18	61.7*	53.5
Wednesday 11/4/18	63.0	53.6
Thursday 22/4/18	61.7	53.7
Average	**62**	**54**

Note: * Period comprised 11:00 – 23:00 hours Monday and 07:00 – 11:00 hours Thursday

Table 4.2 Period Noise Levels Evaluated from Unattended Noise Survey at Position U2 – Northern Boundary, 10m from Station Road

Maximum noise levels monitored at this location were principally attributable vehicles travelling along Station Road and were observed to be typically of the order of 70 – 75 dB $L_{Amax,F}$ during the daytime period, and generally below 70 dB $L_{Amax,F}$ overnight. There were occasional higher levels observed during the survey, which were identified to be generally attributable to passing motorbikes.

4.2. Attended Noise Surveys

To supplement the unattended noise surveys, a series of attended noise measurements were made during Thursday 16th April 2018, concurrent with the unattended noise surveys, to evaluate the variation in noise levels around the site.

Measurements were taken at a further six positions within the western and northern areas of the site at height of 1.2 and 4 metres, representative of ground and first floor levels.

The measurements were made using a combination of Rion NL-52 / NA-28 Class 1 Sound Level Meters, which were calibrated before and after the exercise using a Rion NC-74 Class 1 Acoustic Calibrator. The measurements were all made freefield.

The monitoring locations are indicated on Figure 1.

Measurements were taken over a period of 30 minutes at each position, which was considered sufficient duration for comparative purposes. The results of the monitoring have been compared to the unattended survey results to determine the period noise levels. The results and analysis of the noise levels are provided in Appendix D and have been summarised below.

Position	**Height [m]**	**Period $L_{Aeq,T}$ Noise Levels [dB]**	
		Daytime (07:00 – 23:00)	**Night-time (23:00 - 07:00)**
S1 - Western Boundary, 10m from Boundary with A10	1.2	60	55
	4	62	57
S2 – Western Boundary, 25m from Boundary with A10	1.2	59	53
	4	59	54
S3 – Western Boundary, 50m from Boundary with A10	1.2	58	52
	4	58	52
S4 – Western Boundary, 10m from Boundary with A10 (Adjacent to U1)	1.2	58	53
	4	60	54
S5 – North Western Boundary, 10m from Boundary with A10 and Station Road	1.2	61	55
	4	63	57
S6 – North Western Boundary, 10m from Boundary with A10 and Station Road	1.2	59	54
	4	60	55

Table 4.3 Period Noise Levels Evaluated from Attended Noise Surveys

5. Assessment of Noise Environment

The noise surveys indicated that the noise environment within the site is principally influenced by road traffic travelling along the A10 to the west and Station Road to the north.

Based upon the noise monitoring results, the noise levels within the site have been modelled using the SoundPlan computer noise modelling package, to calculate the noise levels across the site. Figures 4 and 5 present the day and night-time noise levels, calculated at ground and first floor levels respectively.

The calculations indicate relatively high noise levels within the areas of the site within approximately 25 metres of the two roads and lower levels elsewhere within the site, which are further from the noise sources.

ProPG provides the most recent guidance to assess the suitability of a site for proposed residential developments exposed to transportation noise. At this stage, a Stage 1 Initial Site Noise Risk Assessment has been undertaken, referring to the assessment figure presented on Page 4, which indicates that the site is subject to a low to medium risk of exposure from noise within the areas of the site adjacent to the two roads and a low risk elsewhere.

For sites exposed to low to medium risk, the guidance advises that the site is suitable for residential development providing a good acoustic design process is followed to ensure that any potential adverse effects of noise are mitigated and minimised and that it can be demonstrated that a significant adverse noise impact would be avoided to ensure that the requirements of the NPPF could be achieved.

In this regard, the development would need to be designed to meet the requirements of BS 8233, ProPG and any specific local guidance, with the following limits recommended to avoid significant effects:

- 35 dB $L_{Aeq,\ 16\ hour}$ within habitable rooms during the daytime period, assuming windows closed and alternative means of background ventilation provided;
- 30 dB $L_{Aeq,\ 8\ hour}$ night-time within bedrooms, assuming windows closed and alternative means of background ventilation provided;
- Seek to ensure maximum noise levels within bedrooms do not exceed a level of 45 dB $L_{Amax,F}$ more than 10 times a night, with windows closed and alternative means of background ventilation provided;
- Aim to achieve a level of 55 dB $L_{Aeq,\ 16\ hour}$ within gardens through appropriate designs.

Initial recommendations for appropriate mitigation are discussed in the following section.

6. Initial Recommendations for Noise Mitigation

At this stage, it is understood that no design layout has presently been prepared for the site and the mitigation measures described in outline below are provided to assist in the design and to ensure a good acoustic design is achieved. A further, more detailed noise assessment should be undertaken once an initial layout has been prepared, which fully considers the potential requirement for noise mitigation within the dwellings.

Daytime noise levels along the boundaries with the A10 and Station Road were observed to be between 60 – 62 dB $L_{Aeq, 16\ hour}$ during the daytime periods. Noise levels of this order of magnitude would be unlikely to be acceptable within gardens, should they be positioned close to the site boundaries. Whilst it would be possible to mitigate noise levels along Station Road with the provision of boundary mitigation, it would be difficult to mitigate noise from the A10, given it is elevated above the site, without consideration of providing mitigation along the edge of the carriageway.

A more appropriate solution may be to orientate the dwellings adjacent to the two roads to face onto the roads and position the gardens to the rear, thus utilising the property facades as effective mitigation. This option not only mitigates noise by the facades, but also locates the garden areas further from the roads.

Consideration may also be given to providing the access roads to the properties to the front, particularly alongside the A10, which would create a buffer zone between the road and properties, thus seeking to further reduce noise levels.

Internally, it is recommended that, where possible, the dwellings constructed adjacent to the two roads are designed such that the less noise sensitive rooms, such as kitchens and bathrooms are positioned within the windows facing onto the roads, thus reducing the numbers of habitable rooms exposed to road traffic noise.

Where rooms would face onto roads, consideration would need to be given to ensuring that the design aims of BS 8233 are achieved internally.

Indicative calculations have been prepared for rooms facing onto the two roads, on the basis of the provision of standard 4-16-4 thermal double glazing and standard trickle vents to provide background ventilation. The calculations, details of which are provided in Appendix E, indicated the following internal noise levels, assuming closed windows:

- A10 – 37 dB $L_{Aeq, 16\ hour}$ daytime and 31 dB $L_{Aeq, 8\ hour}$ night-time; and
- Station Road – 37 dB $L_{Aeq, 16\ hour}$ daytime and 29 dB $L_{Aeq, 8\ hour}$ night-time

The calculations indicate that with standard glazing / vents it is unlikely that the requirements of BS 8233 would be achieved internally.

Calculations taking consideration of the use of an acoustically treated background ventilator into account, which could normally be fitted above the window in place of the standard vent, indicates that an additional 4 dB(A) reduction in noise levels would be achieved, which would be sufficient to meet the requirements of BS 8233 and thus the NPPF.

A further assessment of the internal noise levels would need to be undertake at a later stage, once the positions of the dwellings are known, but it is likely that an acceptable internal noise environment would be achieved using relatively minor additional noise mitigation measures.

7. Summary

LF Acoustics Ltd were appointed to undertake a preliminary noise assessment for a proposed residential development to be constructed off Station Road, Meldreth.

Noise levels within the site are principally influenced by road traffic from vehicles travelling along the A10, which is on an embankment to the west and from local traffic using Station Road to the north.

A series of noise surveys have been undertaken to evaluate the existing noise climate within the site. The noise monitoring data has subsequently been used to prepare a noise model to evaluate the noise environment across the site.

An initial risk assessment of the noise levels within the site indicates that the site is exposed to a low to medium risk from exposure to noise when assessed against the Stage 1 requirements from the ProPG guidance. At this level, it will be necessary to consider noise within the design of the proposed development, with appropriate design and mitigation measures adopted to ensure that the design does not result in significant adverse noise effects.

Indicative measures have been outlined within this report, which should be developed as an initial layout for the development is prepared.

With an appropriate design and mitigation measures implemented, it is considered that the site would be suitable for residential development, ensuring no significant adverse noise effects, thus meeting the requirements of the NPPF.

References

1. Department for Communities and Local Government. National Planning Policy Framework. March 2012.

2. British Standards Institute. Guidance on Sound Insulation and Noise Reduction for Buildings. BS 8233. 2014.

3. ANC / Institute of Acoustics / Chartered Institute of Environmental Health. ProPG: Planning and Noise. Professional Practice Guidance on Planning & Noise. New Residential Development. May 2017.

Figures

Key

- Unattended Survey Position
- Attended Noise Survey Position

Figure 1:
Site Location and Monitoring Positions

LFAcoustics
consulting engineers

LFAcoustics
consulting engineers

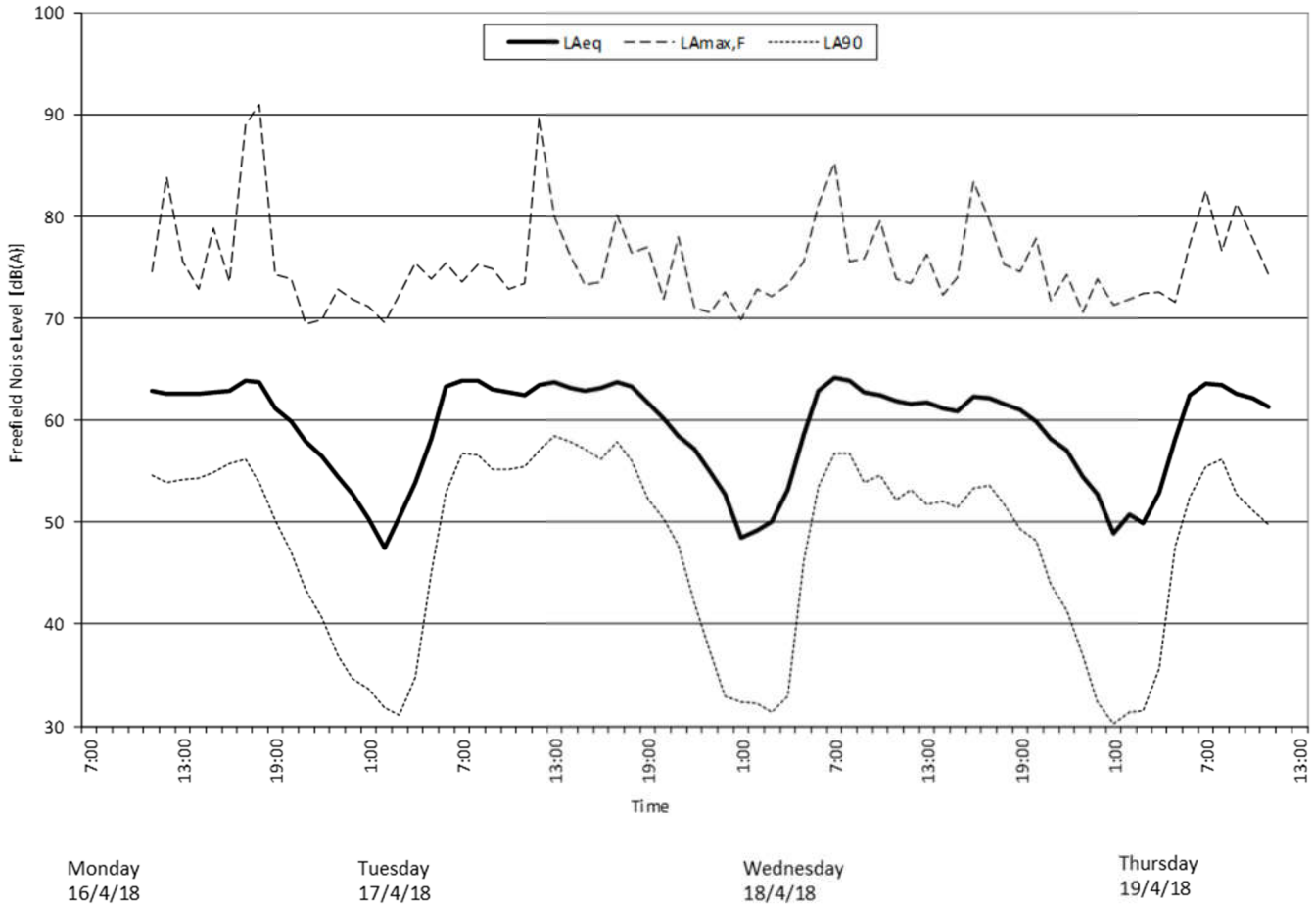

Figure 2:
Unattended Noise Survey
Results Position U1 (A10)

LFAcoustics
consulting engineers

LFAcoustics
consulting engineers

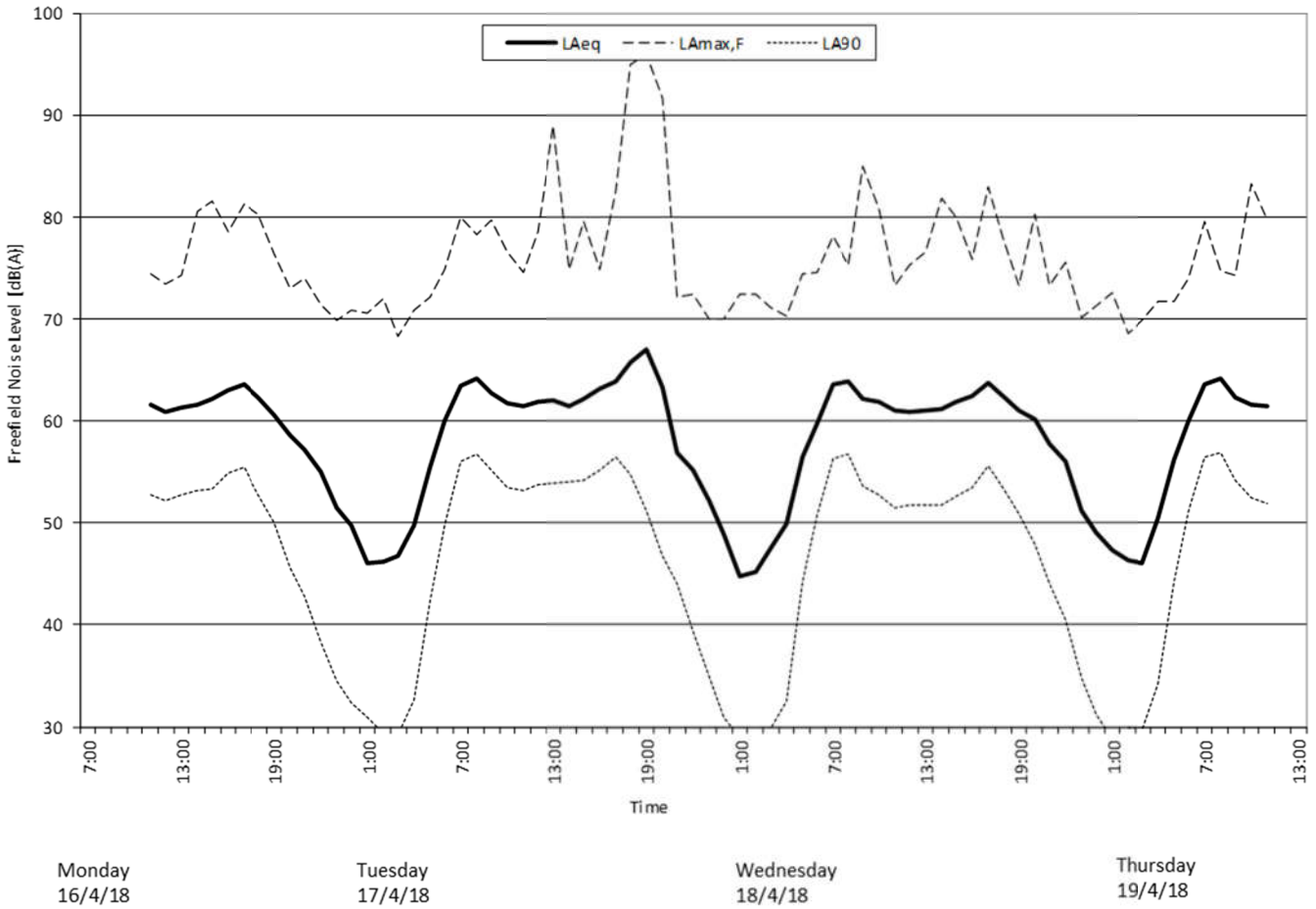

Figure 3:
Unattended Noise Survey Results Station Road Boundary

LFAcoustics
consulting engineers

LFAcoustics
consulting engineers

Noise Level LAeq,T
in dB(A)

<	40
40 -	43
43 -	46
46 -	49
49 -	52
52 -	55
55 -	58
58 -	61
61 -	64
64 -	67
67 -	70
>=	70

Figure 4:
Existing Noise Levels
Daytime – Ground Floor

LFAcoustics
consulting engineers

LFAcoustics
consulting engineers

Noise Level LAeq,T
in dB(A)

	< 40
	40 - 43
	43 - 46
	46 - 49
	49 - 52
	52 - 55
	55 - 58
	58 - 61
	61 - 64
	64 - 67
	67 - 70
	>= 70

Figure 5:
Existing Noise Levels
Night-time – First Floor

LFAcoustics
consulting engineers

LFAcoustics
consulting engineers

Appendix A
Noise Units

Decibels (dB)

Noise can be defined as unwanted sound. Sound in air can be considered as the propagation of energy through the air in the form of oscillatory changes in pressure. The size of the pressure changes in acoustic waves is quantified on a logarithmic decibel (dB) scale firstly because the range of audible sound pressures is very great, and secondly because the loudness function of the human auditory system is approximately logarithmic.

The dynamic range of the auditory system is generally taken to be 0 dB to 140 dB. Generally, the addition of noise from two sources producing the same sound pressure level, will lead to an increase in sound pressure level of 3 dB. A 3 dB noise change is generally considered to be just noticeable, a 5 dB change is generally considered to be clearly discernible and a 10 dB change is generally accepted as leading to the subjective impression of a doubling or halving of loudness.

A-Weighting

The bandwidth of the frequency response of the ear is usually taken to be from about 18 Hz to 18,000 Hz. The auditory system is not equally sensitive throughout this frequency range. This is considered when making acoustic measurements using A-weighting, a filter circuit which has a frequency response similar to the human auditory system. All the measurement results referred to in this report are A-weighted.

Units Used to Describe Time-Varying Noise Sources (L_{Aeq}, L_{A90} and L_{Amax})

Instantaneous A-weighted sound pressure level is not generally considered as an adequate indicator of subjective response to noise because levels of noise usually vary with time.

For many types of noise, the Equivalent Continuous A-Weighted Sound Pressure Level ($L_{Aeq,T}$) is used as the basis of determining community response. The $L_{Aeq,T}$ is defined as the A-weighted sound pressure level of the steady sound which contains the same acoustic energy as the noise being assessed over a specific time period, T.

The L_{A90} is the noise level exceeded for 90% of the measurement period. It is generally used to quantify the background noise level, the underlying level of noise which is present even during the quietest part of the measurement period.

The L_{Amax} is the maximum value that the A-weighted sound pressure level reaches during a measurement period. $L_{Amax,F}$, or Fast, is averaged over 0.125 of a second.

Appendix B
Results of Unattended Noise Survey
Carried Out Adjacent to A10 – Position U1

Proposed Residential Development on Land off Station Road, Meldreth
Results of Noise Measurements Carried Out Between
16 - 19 April 2018

Equipment Used: Rion NL-52 Class 1 Sound Level Meter (Serial No. 01021287)
Location: Position U1 - Western, 10m from A10 Boundary
All Levels; Fast, Freefield, Mic Height 4 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Monday	11:00	62.8	74.5	65.9	54.6
16/04/2018	12:00	62.6	83.8	65.6	53.9
	13:00	62.6	75.5	65.7	54.1
	14:00	62.6	72.8	65.5	54.3
	15:00	62.7	78.9	65.8	54.9
	16:00	62.8	73.6	65.6	55.7
	17:00	63.8	88.9	66.2	56.2
	18:00	63.7	91.0	65.8	53.9
	19:00	61.1	74.2	64.9	50.2
	20:00	59.8	73.9	64.0	47.0
	21:00	57.9	69.4	62.7	43.4
	22:00	56.4	69.8	61.6	40.6
	23:00	54.4	72.8	58.1	36.9
Tuesday	0:00	52.8	71.8	52.8	34.6
17/04/2018	1:00	50.3	71.1	48.0	33.7
	2:00	47.4	69.5	41.7	31.8
	3:00	50.5	72.3	48.6	31.1
	4:00	53.9	75.4	53.3	34.8
	5:00	58.2	73.9	61.9	45.1
	6:00	63.3	75.4	66.7	52.9
	7:00	63.8	73.5	66.8	56.8
	8:00	63.8	75.2	66.5	56.6
	9:00	63.0	74.8	66.0	55.2
	10:00	62.7	72.8	65.9	55.2
	11:00	62.4	73.4	65.5	55.4
	12:00	63.5	89.8	65.9	57.0
	13:00	63.7	80.0	66.2	58.4
	14:00	63.1	76.1	65.8	57.9
	15:00	62.9	73.3	65.7	57.1
	16:00	63.1	73.5	66.0	56.1
	17:00	63.7	80.1	66.2	57.9
	18:00	63.3	76.4	66.2	56.0
	19:00	61.7	77.0	65.1	52.3
	20:00	60.2	71.8	64.2	50.3
	21:00	58.4	78.0	62.8	47.7
	22:00	57.1	71.0	61.9	42.1
	23:00	54.9	70.5	58.8	37.2
Wednesday	0:00	52.7	72.6	52.1	32.9
18/04/2018	1:00	48.5	69.9	45.9	32.4
	2:00	49.2	72.8	47.2	32.2
	3:00	50.1	72.1	47.4	31.3
	4:00	53.2	73.3	52.6	32.9
	5:00	58.6	75.5	61.9	46.2
	6:00	62.8	81.1	66.0	53.4
	7:00	64.1	85.3	66.8	56.7
	8:00	63.8	75.5	66.7	56.7

Proposed Residential Development on Land off Station Road, Meldreth
Results of Noise Measurements Carried Out Between
16 - 19 April 2018

Equipment Used: Rion NL-52 Class 1 Sound Level Meter (Serial No. 01021287)
Location: Position U1 - Western, 10m from A10 Boundary
All Levels; Fast, Freefield, Mic Height 4 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Wednesday	9:00	62.7	75.8	65.9	53.9
18/04/2018	10:00	62.4	79.6	65.4	54.6
	11:00	61.8	73.8	65.1	52.2
	12:00	61.6	73.4	64.6	53.1
	13:00	61.7	76.2	64.9	51.8
	14:00	61.2	72.2	64.4	52.0
	15:00	60.9	74.0	64.3	51.5
	16:00	62.3	83.4	64.8	53.3
	17:00	62.1	79.6	65.0	53.6
	18:00	61.6	75.2	64.9	51.7
	19:00	61.0	74.5	64.7	49.3
	20:00	59.9	77.9	63.8	48.2
	21:00	58.2	71.7	62.7	43.9
	22:00	57.0	74.2	61.9	41.3
	23:00	54.4	70.5	57.9	36.9
Thursday	0:00	52.7	73.9	53.2	32.4
19/04/2018	1:00	48.9	71.3	44.8	30.2
	2:00	50.7	71.8	48.3	31.3
	3:00	49.9	72.4	45.7	31.5
	4:00	52.9	72.5	53.3	35.7
	5:00	58.1	71.6	62.1	47.6
	6:00	62.4	77.3	66.0	52.5
	7:00	63.6	82.5	66.5	55.5
	8:00	63.4	76.6	66.4	56.2
	9:00	62.6	81.2	65.5	52.8
	10:00	62.1	77.9	65.2	51.2
	11:00	61.3	74.2	64.7	49.7

Appendix C
Results of Unattended Noise Survey
Carried Out Adjacent to Station Road – Position U2

Proposed Residential Development on Land off Station Road, Meldreth
Results of Noise Measurements Carried Out Between
16 - 19 April 2018

Equipment Used: Rion NL-52 Class 1 Sound Level Meter (Serial No. 00231655)
Location: Position U2 - Northern, 10m from Station Road
All Levels; Fast, Freefield, Mic Height 4 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Monday	11:00	61.6	74.4	65.6	52.7
16/04/2018	12:00	60.9	73.4	65.0	52.2
	13:00	61.3	74.2	65.3	52.7
	14:00	61.6	80.6	65.6	53.1
	15:00	62.1	81.6	65.9	53.3
	16:00	63.0	78.6	66.7	54.9
	17:00	63.6	81.3	67.2	55.4
	18:00	62.3	80.3	66.1	52.8
	19:00	60.6	76.4	64.6	50.0
	20:00	58.6	73.0	62.3	45.6
	21:00	57.2	74.0	60.7	42.8
	22:00	55.0	71.4	58.0	38.4
	23:00	51.4	69.8	54.2	34.5
Tuesday	0:00	49.8	70.9	50.5	32.3
17/04/2018	1:00	46.0	70.6	44.2	30.9
	2:00	46.2	72.0	39.5	29.3
	3:00	46.8	68.3	46.3	29.2
	4:00	49.7	70.8	50.2	32.7
	5:00	55.4	72.1	57.7	42.4
	6:00	60.0	74.9	63.2	49.8
	7:00	63.4	80.0	66.7	56.0
	8:00	64.2	78.2	67.6	56.7
	9:00	62.7	79.7	66.5	55.1
	10:00	61.7	76.5	65.7	53.4
	11:00	61.5	74.5	65.5	53.1
	12:00	61.8	78.6	65.6	53.7
	13:00	62.0	89.0	65.3	53.9
	14:00	61.4	74.9	65.2	54.0
	15:00	62.2	79.6	66.0	54.1
	16:00	63.1	74.9	66.9	55.2
	17:00	63.8	82.5	67.3	56.5
	18:00	65.7	94.9	66.7	54.8
	19:00	67.0	96.0	65.5	51.2
	20:00	63.3	91.6	63.3	46.8
	21:00	56.9	72.1	60.8	44.1
	22:00	55.1	72.4	58.7	39.3
	23:00	52.1	70.0	55.3	34.9
Wednesday	0:00	48.9	70.0	49.6	30.9
18/04/2018	1:00	44.8	72.4	41.8	29.0
	2:00	45.2	72.4	41.7	29.3
	3:00	47.4	71.2	43.5	29.8
	4:00	49.9	70.3	50.6	32.5
	5:00	56.4	74.4	58.8	44.2
	6:00	59.7	74.5	63.1	50.7
	7:00	63.6	78.1	67.1	56.3
	8:00	63.8	75.3	67.1	56.8

Results of Noise Measurements Carried Out Between
16 - 19 April 2018

Equipment Used: Rion NL-52 Class 1 Sound Level Meter (Serial No. 00231655)
Location: Position U2 - Northern, 10m from Station Road
All Levels; Fast, Freefield, Mic Height 4 metres.

Date	Start Period	Measured Noise Levels [dB]			
		L_{Aeq}	L_{Amax}	L_{A10}	L_{A90}
Wednesday	9:00	62.1	84.9	65.8	53.6
18/04/2018	10:00	61.8	80.8	65.8	52.8
	11:00	61.0	73.3	65.2	51.4
	12:00	60.8	75.3	65.0	51.8
	13:00	61.0	76.5	65.1	51.8
	14:00	61.1	81.8	64.7	51.8
	15:00	61.9	79.9	65.8	52.6
	16:00	62.5	75.8	66.4	53.4
	17:00	63.7	83.0	67.0	55.6
	18:00	62.4	78.0	66.2	53.4
	19:00	61.0	73.3	65.3	50.9
	20:00	60.2	80.2	64.4	47.9
	21:00	57.7	73.2	61.0	44.1
	22:00	56.0	75.6	58.7	40.5
	23:00	51.2	70.2	53.6	34.8
Thursday	0:00	49.0	71.3	50.7	31.2
19/04/2018	1:00	47.3	72.6	43.7	28.8
	2:00	46.3	68.6	46.3	29.9
	3:00	46.1	69.8	43.4	29.6
	4:00	50.4	71.7	52.2	34.2
	5:00	56.1	71.7	59.1	44.2
	6:00	60.0	74.0	63.3	51.1
	7:00	63.6	79.6	66.9	56.5
	8:00	64.2	74.7	67.6	56.9
	9:00	62.3	74.2	66.2	54.2
	10:00	61.6	83.3	65.3	52.4
	11:00	61.4	79.7	65.3	51.9

Appendix D
Results of Attended Noise Measurements

Proposed Residential Development on Land off Station Road, Meldreth
Results of Attended Noise Measurements made on 19 April 2018

Equipment Used: Rion NA-28 / NL-52 Class 1 Sound Level Analysers, Calibrated with Rion NC-74 Class 1 Acoustic Calibrator

		FREEFIELD Sample Measurement Results				FREEFIELD Unattended Measurement Results (U1)				Difference			
Location	Start **Time**	L_{Aeq}	$L_{Amax,F}$	L_{A10}	L_{A90}	L_{Aeq}	$L_{Amax,F}$	L_{A10}	L_{A90}	L_{Aeq}	L_{A90}		
S1	09:45	60.3	71.9	63.7	50.7	61.5	73.1	65.1	48.9	-1.2	1.8		
South Western Boundary	09:50	60.1	69.4	63.6	47.9	62.0	71.8	65.4	51.4	-1.9	-3.5		
10m from A10 Boundary	09:55	60.4	70.3	63.1	51.5	62.3	71.2	65.4	54.1	-1.9	-2.6		
1.2m Height	10:00	60.2	74.7	63.0	50.7	62.2	77.1	65.3	52.3	-2.0	-1.6		
NL-52	10:05	59.7	69.0	63.4	48.9	61.8	70.5	65.1	51.2	-2.1	-2.3		
	10:10	60.6	68.6	64.2	49.9	62.0	69.0	65.8	49.3	-1.4	0.6		
								Average Difference =		**-1.8**	**-1.3**	60	55
S1	09:45	62.0	73.6	65.5	52.0	61.5	73.1	65.1	48.9	0.5	3.1		
South Western Boundary	09:50	62.0	71.9	65.4	50.0	62.0	71.8	65.4	51.4	0.0	-1.4		
10m from A10 Boundary	09:55	62.2	71.9	65.0	53.2	62.3	71.2	65.4	54.1	-0.1	-0.9		
4m Height	10:00	62.0	75.9	65.0	53.1	62.2	77.1	65.3	52.3	-0.2	0.8		
NL-52	10:05	61.5	70.4	65.3	49.9	61.8	70.5	65.1	51.2	-0.3	-1.3		
	10:10	62.3	68.9	65.9	51.5	62.0	69.0	65.8	49.3	0.3	2.2		
								Average Difference =		**0.0**	**0.4**	62	57
S2	09:40	58.8	67.8	62.2	48.2	62.3	72.9	65.5	51.1	-3.5	-2.9		
South Western Boundary	09:45	58.2	67.1	61.6	49.1	61.5	73.1	65.1	48.9	-3.3	0.2		
25m from A10 Boundary	09:50	58.4	67.5	61.7	47.1	62.0	71.8	65.4	51.4	-3.6	-4.3		
1.2m Height	09:55	58.7	67.3	61.3	50.5	62.3	71.2	65.4	54.1	-3.6	-3.6		
NL-52	10:00	58.3	69.0	61.4	50.1	62.2	77.1	65.3	52.3	-3.9	-2.2		
	10:05	57.9	66.9	61.6	48.8	61.8	70.5	65.1	51.2	-3.9	-2.4		
								Average Difference =		**-3.6**	**-2.5**	59	53
S2	09:40	59.5	68.9	62.7	49.8	62.3	72.9	65.5	51.1	-2.8	-1.3		
South Western Boundary	09:45	59.1	67.6	62.3	50.9	61.5	73.1	65.1	48.9	-2.4	2.0		
25m from A10 Boundary	09:50	59.2	67.5	62.3	49.6	62.0	71.8	65.4	51.4	-2.8	-1.8		
4m Height	09:55	59.4	68.2	61.8	51.9	62.3	71.2	65.4	54.1	-2.9	-2.2		
NA-28	10:00	59.2	71.5	62.2	51.4	62.2	77.1	65.3	52.3	-3.0	-0.9		
	10:05	58.6	67.6	62.1	49.9	61.8	70.5	65.1	51.2	-3.2	-1.3		
								Average Difference =		**-2.9**	**-0.9**	59	54

LFAcoustics consulting engineers

Proposed Residential Development on Land off Station Road, Meldreth
Results of Attended Noise Measurements made on 19 April 2018

Equipment Used: Rion NA-28 / NL-52 Class 1 Sound Level Analysers, Calibrated with Rion NC-74 Class 1 Acoustic Calibrator

		FREEFIELD Sample Measurement Results				FREEFIELD Unattended Measurement Results (U1)				Difference			
Location	Start **Time**	L_{Aeq}	$L_{Amax,F}$	L_{A10}	L_{A90}	L_{Aeq}	$L_{Amax,F}$	L_{A10}	L_{A90}	L_{Aeq}	L_{A90}		
S3	10:15	57.2	66.3	59.8	50.7	62.0	72.8	64.8	52.6	-4.8	-1.9		
South Western Boundary	10:20	59.3	68.2	61.9	53.9	63.3	77.9	65.9	50.5	-4.0	3.4		
50m from A10 Boundary	10:25	57.6	63.2	60.9	50.4	62.6	69.5	66.1	52.7	-5.0	-2.3		
1.2m Height	10:30	57.0	66.6	59.5	51.1	61.4	71.9	64.2	53.0	-4.4	-1.9		
NL-52	10:35	57.4	65.7	60.0	48.3	61.9	70.9	65.0	48.7	-4.5	-0.4		
	10:40	56.6	62.9	59.6	50.0	61.4	69.4	64.8	51.5	-4.8	-1.5		
								Average Difference =		**-4.6**	**-0.8**	58	52
S3	10:15	57.3	69.0	59.5	52.3	62.0	72.8	64.8	52.6	-4.7	-0.3		
South Western Boundary	10:20	59.7	72.1	61.8	54.3	63.3	77.9	65.9	50.5	-3.6	3.8		
50m from A10 Boundary	10:25	57.6	65.5	60.7	51.8	62.6	69.5	66.1	52.7	-5.0	-0.9		
4m Height	10:30	57.1	67.6	59.5	52.2	61.4	71.9	64.2	53.0	-4.3	-0.8		
NA-28	10:35	57.5	65.4	59.9	49.8	61.9	70.9	65.0	48.7	-4.4	1.1		
	10:40	56.6	63.1	59.2	51.1	61.4	69.4	64.8	51.5	-4.8	-0.4		
								Average Difference =		**-4.5**	**0.4**	58	52
S4	10:20	59.3	72.1	61.9	51.1	63.3	77.9	65.9	50.5	-4.0	0.6		
Western Boundary (Adjacent to U1)	10:25	58.3	64.6	62.0	48.1	62.6	69.5	66.1	52.7	-4.3	-4.6		
25m from A10 Boundary	10:30	58.0	67.3	61.0	50.5	61.4	71.9	64.2	53.0	-3.4	-2.5		
1.2m Height	10:35	58.3	67.8	61.2	45.2	61.9	70.9	65.0	48.7	-3.6	-3.5		
NL-52	10:40	57.8	68.1	61.0	49.1	61.4	69.4	64.8	51.5	-3.6	-2.4		
	10:45	59.1	72.1	61.9	50.7	63.3	77.8	66.1	53.2	-4.2	-2.5		
								Average Difference =		**-3.9**	**-2.5**	58	53
S4	10:20	60.9	74.1	63.0	53.2	63.3	77.9	65.9	50.5	-2.4	2.7		
Western Boundary (Adjacent to U1)	10:25	59.4	65.7	63.1	50.1	62.6	69.5	66.1	52.7	-3.2	-2.6		
25m from A10 Boundary	10:30	59.2	68.1	62.2	51.9	61.4	71.9	64.2	53.0	-2.2	-1.1		
4m Height	10:35	59.4	67.8	62.1	47.1	61.9	70.9	65.0	48.7	-2.5	-1.6		
NL-52	10:40	58.8	66.0	61.9	50.5	61.4	69.4	64.8	51.5	-2.6	-1.0		
	10:45	60.4	75.2	63.2	52.1	63.3	77.8	66.1	53.2	-2.9	-1.1		
								Average Difference =		**-2.6**	**-0.8**	60	54

LFAcoustics consulting engineers

Proposed Residential Development on Land off Station Road, Meldreth
Results of Attended Noise Measurements made on 19 April 2018

Equipment Used: Rion NA-28 / NL-52 Class 1 Sound Level Analysers, Calibrated with Rion NC-74 Class 1 Acoustic Calibrator

		FREEFIELD Sample Measurement Results				FREEFIELD Unattended Measurement Results (U1)				Difference			
Location	Start **Time**	L_{Aeq}	$L_{Amax,F}$	L_{A10}	L_{A90}	L_{Aeq}	$L_{Amax,F}$	L_{A10}	L_{A90}	L_{Aeq}	L_{A90}		
S5	11:00	60.5	68.3	63.5	52.8	61.9	74.2	65.0	51.1	-1.4	1.7		
North Western Boundary	11:05	59.7	70.1	62.5	53.3	60.6	70.3	64.2	46.9	-0.9	6.4		
10m from A10 / 10m from Station Road	11:10	60.2	72.3	63.6	49.1	61.5	70.9	65.3	46.7	-1.3	2.4		
1.2m Height	11:15	60.8	71.2	63.9	54.2	62.3	72.9	65.9	52.9	-1.5	1.3		
NL-52	11:20	59.3	68.8	62.5	51.3	60.2	69.8	64.2	48.6	-0.9	2.7		
	11:25	59.7	68.4	62.9	50.8	61.5	70.2	65.0	50.3	-1.8	0.5		
								Average Difference =		**-1.3**	**2.5**	61	55
S5	11:00	62.6	73.9	65.5	54.7	61.9	74.2	65.0	51.1	0.7	3.6		
North Western Boundary	11:05	61.7	71.1	64.7	55.3	60.6	70.3	64.2	46.9	1.1	8.4		
10m from A10 / 10m from Station Road	11:10	61.9	73.2	65.6	50.6	61.5	70.9	65.3	46.7	0.4	3.9		
4m Height	11:15	62.5	72.9	65.6	56.3	62.3	72.9	65.9	52.9	0.2	3.4		
NL-52	11:20	61.3	72.0	64.7	52.9	60.2	69.8	64.2	48.6	1.1	4.3		
	11:25	61.8	70.2	65.0	52.1	61.5	70.2	65.0	50.3	0.3	1.8		
								Average Difference =		**0.6**	**4.2**	63	57
S6	10:55	58.3	67.8	61.2	48.6	61.2	70.6	64.7	49.0	-2.9	-0.4		
North Western Boundary	11:00	58.9	66.5	61.6	53.0	61.9	74.2	65.0	51.1	-3.0	1.9		
25m from A10 / 25m from Station Road	11:05	57.8	67.1	60.3	52.5	60.6	70.3	64.2	46.9	-2.8	5.6		
1.2m Height	11:10	58.7	69.4	62.1	48.9	61.5	70.9	65.3	46.7	-2.8	2.2		
NL-52	11:15	59.4	70.1	62.7	53.3	62.3	72.9	65.9	52.9	-2.9	0.4		
	11:20	57.4	64.6	60.0	51.2	60.2	69.8	64.2	48.6	-2.8	2.6		
								Average Difference =		**-2.9**	**2.1**	59	54
S6	10:55	59.5	68.4	62.5	49.9	61.2	70.6	64.7	49.0	-1.7	0.9		
North Western Boundary	11:00	60.0	69.5	62.8	53.4	61.9	74.2	65.0	51.1	-1.9	2.3		
25m from A10 / 25m from Station Road	11:05	58.8	67.7	61.6	53.8	60.6	70.3	64.2	46.9	-1.8	6.9		
4m Height	11:10	59.4	70.6	62.8	49.7	61.5	70.9	65.3	46.7	-2.1	3.0		
NA-28	11:15	60.2	70.3	63.4	54.5	62.3	72.9	65.9	52.9	-2.1	1.6		
	11:20	58.6	66.4	61.3	51.9	60.2	69.8	64.2	48.6	-1.6	3.3		
								Average Difference =		**-1.9**	**3.0**	60	55

LFAcoustics consulting engineers

Appendix E
Calculations of Internal Noise Levels for Dwellings Alongside Roads

Proposed Residential Development on Land off Station Road, Meldreth
Calculation of Internal Noise Levels

Position : Facades Facing onto A10 (Assumed 10m from site boundary)

Prepared By: LPJ - 24/4/18 **STANDARD GLAZING & VENTS**

Sf	Facade Area (inc Window)	10
Swi	Window Area	3
Sew	Sf-Swi	7
Srr	Area of Ceiling	12
S	Sf+Srr	22
A0	Ref Absorption Area	12

			Overall A-Wtd	1/3 Octave Band Leq 125	250	500	1000	2000	
Source Level	$L_{eq\ Freefield}$	A	**62**	57	59	57	60	56	Equivalent Freefield Daytime Level
Window Vent	Dn,e			34	33	33	27	32	Titon XS13 5000 EA Vent + GS22 Grill - OPEN
		B		0.00022	0.00027	0.00027	0.00109	0.00034	(Standard trickle vent)
Glazing	Rwi			18	17	32	37	40	Standard Glazing 4-16-4 (Munster)
		C		0.00216	0.00272	0.00009	0.00003	0.00001	
Wall	Rew			41	45	45	54	58	
		D		2.527E-05	1.006E-05	1.006E-05	1.267E-06	5.043E-07	
Ceiling	Rrr			30	42	50	54	54	
		E		0.0005455	3.442E-05	5.455E-06	2.171E-06	2.171E-06	
	10Log (B+C+D+E)			-25.303111	-25.173172	-34.260488	-29.511811	-34.4313	
	A (Furnished)			11	14	16	16	15	
	10*log (S/A)			3.0103	1.9629465	1.383027	1.383027	1.6633142	
	Leq,2			38.2	38.4	27.1	34.4	26.1	
	A-Weighting			-16.0	-9.0	-3.0	0.0	1.0	
	LAeq,2			22.2	29.4	24.1	34.4	27.1	

	Day	Night
LAeq, Internal	**37**	**31**
Reduction	**-26**	

Proposed Residential Development on Land off Station Road, Meldreth
Calculation of Internal Noise Levels

Position : Facades Facing onto A10 (Assumed 10m from site boundary)

Prepared By: LPJ - 24/4/18 **STANDARD GLAZING & ACOUSTIC PASSIVE VENTS**

Sf	Facade Area (inc Window)	10
Swi	Window Area	3
Sew	Sf-Swi	7
Srr	Area of Ceiling	12
S	Sf+Srr	22
A0	Ref Absorption Area	12

			Overall A-Wtd	1/3 Octave Band Leq 125	250	500	1000	2000	
Source Level	$L_{eq\ Freefield}$	A	**62**	57	59	57	60	56	Equivalent Freefield Daytime Level
Window Vent	Dn,e			42	42	39	39	48	Acoustic Passive Vent
		B		0.00003	0.00003	0.00007	0.00007	0.00001	(Munster - Open)
Glazing	Rwi			18	17	32	37	40	Standard Glazing 4-16-4 (Munster)
		C		0.00216	0.00272	0.00009	0.00003	0.00001	
Wall	Rew			41	45	45	54	58	
		D		2.527E-05	1.006E-05	1.006E-05	1.267E-06	5.043E-07	
Ceiling	Rrr			30	42	50	54	54	
		E		0.0005455	3.442E-05	5.455E-06	2.171E-06	2.171E-06	
	10Log (B+C+D+E)			-25.580909	-25.528876	-37.689776	-40.029852	-46.028074	
	A (Furnished)			11	14	16	16	15	
	10*log (S/A)			3.0103	1.9629465	1.383027	1.383027	1.6633142	
	Leq,2			37.9	38.1	23.7	23.9	14.5	
	A-Weighting			-16.0	-9.0	-3.0	0.0	1.0	
	LAeq,2			21.9	29.1	20.7	23.9	15.5	

	Day	Night
LAeq, Internal	**31**	**26**
Reduction	**-31**	

Proposed Residential Development on Land off Station Road, Meldreth
Calculation of Internal Noise Levels

Position : Facades Facing onto Station Road (Assumed 10m from kerb)

Prepared By: LPJ - 24/4/18 **STANDARD GLAZING & VENTS**

Sf	Facade Area (inc Window)	10
Swi	Window Area	3
Sew	Sf-Swi	7
Srr	Area of Ceiling	12
S	Sf+Srr	22
A0	Ref Absorption Area	12

			Overall A-Wtd	1/3 Octave Band Leq 125	250	500	1000	2000	
Source Level	$L_{eq\ Freefield}$	A	**62**	62	60	56	60	53	Equivalent Freefield Daytime Level
Window Vent	Dn,e			34	33	33	27	32	Titon XS13 5000 EA Vent + GS22 Grill - OPEN
		B		0.00022	0.00027	0.00027	0.00109	0.00034	(Standard trickle vent)
Glazing	Rwi			18	17	32	37	40	Standard Glazing 4-16-4 (Munster)
		C		0.00216	0.00272	0.00009	0.00003	0.00001	
Wall	Rew			41	45	45	54	58	
		D		2.527E-05	1.006E-05	1.006E-05	1.267E-06	5.043E-07	
Ceiling	Rrr			30	42	50	54	54	
		E		0.0005455	3.442E-05	5.455E-06	2.171E-06	2.171E-06	
	10Log (B+C+D+E)			-25.303111	-25.173172	-34.260488	-29.511811	-34.4313	
	A (Furnished)			11	14	16	16	15	
	10*log (S/A)			3.0103	1.9629465	1.383027	1.383027	1.6633142	
	Leq,2			43.1	40.0	26.6	35.2	22.8	
	A-Weighting			-16.0	-9.0	-3.0	0.0	1.0	
	LAeq,2			27.1	31.0	23.6	35.2	23.8	

	Day	Night
LAeq, Internal	**37**	**29**
Reduction	**-25**	

Proposed Residential Development on Land off Station Road, Meldreth
Calculation of Internal Noise Levels

Position : Facades Facing onto Station Road (Assumed 10m from kerb)

Prepared By: LPJ - 24/4/18 **STANDARD GLAZING & ACOUSTIC PASSIVE VENTS**

Sf	Facade Area (inc Window)	10
Swi	Window Area	3
Sew	Sf-Swi	7
Srr	Area of Ceiling	12
S	Sf+Srr	22
A0	Ref Absorption Area	12

			Overall A-Wtd	1/3 Octave Band Leq 125	250	500	1000	2000	
Source Level	$L_{eq\ Freefield}$	A	**62**	62	60	56	60	53	Equivalent Freefield Daytime Level
Window Vent	Dn,e			42	42	39	39	48	Acoustic Passive Vent
		B		0.00003	0.00003	0.00007	0.00007	0.00001	(Munster - Open)
Glazing	Rwi			18	17	32	37	40	Standard Glazing 4-16-4 (Munster)
		C		0.00216	0.00272	0.00009	0.00003	0.00001	
Wall	Rew			41	45	45	54	58	
		D		2.527E-05	1.006E-05	1.006E-05	1.267E-06	5.043E-07	
Ceiling	Rrr			30	42	50	54	54	
		E		0.0005455	3.442E-05	5.455E-06	2.171E-06	2.171E-06	
	10Log (B+C+D+E)			-25.580909	-25.528876	-37.689776	-40.029852	-46.028074	
	A (Furnished)			11	14	16	16	15	
	10*log (S/A)			3.0103	1.9629465	1.383027	1.383027	1.6633142	
	Leq,2			42.8	39.6	23.1	24.7	11.2	
	A-Weighting			-16.0	-9.0	-3.0	0.0	1.0	
	LAeq,2			26.8	30.6	20.1	24.7	12.2	

	Day	Night
LAeq, Internal	**33**	**25**
Reduction	**-29**	