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### References

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## 1.0 INTRODUCTION

It is proposed to develop land at Land at Cinders Lane, Yapton for residential use. The site is currently occupied by residential property and former horticultural buildings which are now derelict. It is bounded by agricultural land to the south and to the east, with residential houses/bungalows surrounding the site in all other directions.

Clarke Saunders Associates has been commissioned by WYG to undertake an assessment of the current environmental noise impact on the site. Noise will be assessed in accordance with the National Planning Policy Framework with reference made to the relevant guidance set out in BS8233: 2014 *Guidance on sound Insulation and noise reduction for buildings* and the World Health Organisation *Guidelines for Community Noise 1999*.

This assessment would also consider the requirement for any outline mitigation measures as appropriate for the proposed residential development.

## 2.0 NATIONAL PLANNING POLICY FRAMEWORK

The National Planning Policy Framework (NPPF) was published in March 2012 and revoked all previous planning policy statements and guidance notes.

The document sets out the Government's planning policies and how these are expected to be applied. Paragraph 123 refers to noise impact:

123. 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 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;*
- and*
- *identify and protect areas of tranquility which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason*

With regards to mitigation, reference is made to the Noise Policy Statement for England (DEFRA, 2010). The Policy aims are defined as,

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

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.

Clarification of the terms *adverse* and *significant adverse* are given as follows,

*There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:*

*NOEL – No Observed Effect Level*

*This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*

LOAEL -- Lowest Observed Adverse Effect Level

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

*Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.*

SOAEL -- Significant Observed Adverse Effect Level

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

*It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.*

In order to enable assessment of impacts in line with these requirements, reference should be made to other currently available guidance.

## 2.1 WHO Guidelines for Community Noise (1999)

The guidance in this document details suitable noise levels for various activities within residential and commercial buildings.

The relevant sections of this document are shown in Table 2.1.

| Criterion                                                                         | Environment  | Design range $L_{Aeq,T}$ dB |
|-----------------------------------------------------------------------------------|--------------|-----------------------------|
| Maintain speech intelligibility and avoid moderate annoyance, daytime and evening | Living Rooms | 35                          |
| Prevent sleep disturbance, night time                                             | Bedrooms     | 30                          |

Table 2.1 - Excerpt from WHO

[dB ref. 20µPa]

This guidance also states:

*For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB  $L_{Amax}$  more than 10-15 times a night (Vallet & Vernet 1991)".*

For outdoor living areas, it is stated that:

*To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB  $L_{Aeq}$  on balconies, terraces and in outdoor living areas. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level should not exceed 50dB  $L_{Aeq}$ . Where it is practical and feasible, the lower outdoor sound level should be considered the maximum desirable sound level for new development.*

## 2.2 BS8233:2014 Guidance on sound insulation and noise reduction for buildings

The guidance in this document indicates acceptable noise levels for various activities within residential dwellings.

The relevant section of this standard is shown in the following table:

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

Table 2.2 - Excerpt from BS8233: 2014

[dB ref. 20µPa]

For external areas, the standard states the following:

*For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB  $L_{Aeq,T}$ , with an upper guideline value of 55 dB  $L_{Aeq,T}$  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.*

### 3.0 SURVEY PROCEDURE & EQUIPMENT

A survey of the existing background noise levels was undertaken at the locations shown in site plan AS9465/SP1. Measurements of consecutive 5-minute  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{A10}$  and  $L_{A90}$  sound pressure levels were taken between 12:00 hours on Thursday 5<sup>th</sup> January and 10:00 hours on Monday 9<sup>th</sup> January 2017.

The following equipment was used during the course of the survey:

- Rion data logging sound level meter type NL32;
- Norsonic data logging sound level meter type 118;
- GRAS Environmental Microphone type 41-AL;
- Rion sound level calibrator type NC-74.
- Norsonic sound level calibrator type 1253.

The calibration of the sound level meters was verified before and after use. No significant calibration drift was detected.

The weather during the survey was mostly dry with light winds, which made the conditions suitable for the measurement of environmental noise. Data taken during periods of inclement weather has not been excluded from the results.

Measurements were made following procedures in ISO 1996-2:2007 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of environmental noise levels*.

Please refer to Appendix A for details of the acoustic terminology used throughout this report.

## 4.0 RESULTS

Figures AS9465/TH1-TH7 show the  $L_{Aeq}$ ,  $L_{Amax}$ ,  $L_{A10}$  and  $L_{A90}$  sound pressure levels as time histories at the measurement position.

The noise climate during the Saturday night is determined by periods of wind and rain. It has been noted that the noise levels during this period are higher than during the same period on the Thursday, Friday and Sunday night. This has been considered during the assessment.

The noise levels for the 'Daytime' and 'Night-Time' periods at the measurement positions are shown in Table 4.1.

| Measurement Position | Daytime $L_{Aeq}$ , 16-hour | Night-time, $L_{Aeq}$ , 8-hour | Typical Night-time, $L_{A10max}$ |
|----------------------|-----------------------------|--------------------------------|----------------------------------|
| Position 1           | 48 dB                       | 38 dB                          | 54 dB                            |
| Position 2           | 42 dB                       | 37 dB                          | 53 dB                            |

**Table 4.1 - Daytime and night-time measured noise levels**

10/20/2019

## 5.0 ASSESSMENT

The results above indicate that the internal noise level criteria set out in BS8233:2014 *Guidance on sound insulation and noise reduction for buildings* (as shown in Table 2.2) are expected to be achieved with natural ventilation via an open window, which would reduce the measured levels by approximately 15 dB (ref.BS8233:2014). Night-time maximum noise levels would also not normally be expected to exceed  $L_{A\text{Fmax}}$  45dB limit set in the World Health Organisation *Guidelines for Community Noise* (1999).

Data collected during adverse weather was taken into consideration, however not excluded from the results, as the criteria are still achieved. Therefore, it should be noted that typical levels are likely to be even less than recorded during the survey period.

## 6.0 CONCLUSIONS

Measurements have been made of the prevailing noise climate at the proposed site for residential development at Land at Cinders Lane, Yapton.

The measured levels have been assessed against the National Planning Policy Framework and currently available standards and guidance documents including World Health Organisation

*Guidelines for Community Noise (1999) and BS8233:2014 Guidance on sound Insulation and noise reduction for buildings, to consider whether the site is suitable for its proposed residential use.*

It is expected that the internal noise criteria would be achieved with open window ventilation.



Daniel Saunders MIOA

CLARKE SAUNDERS ASSOCIATES

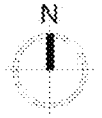
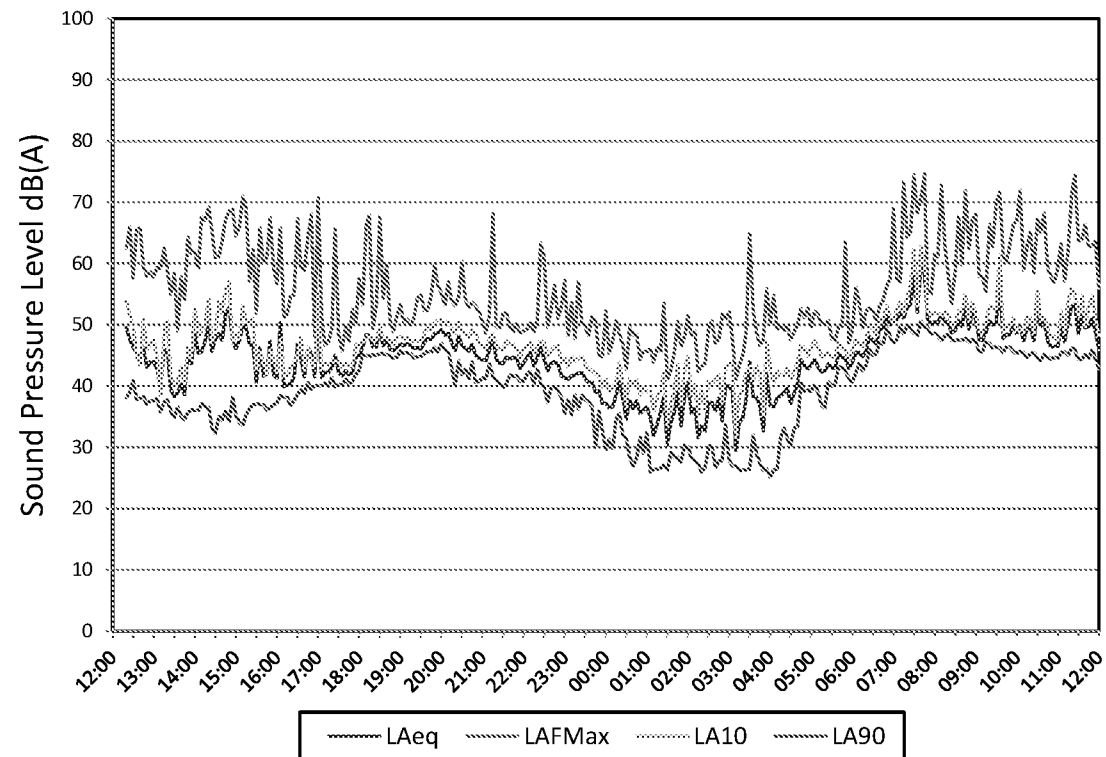


Figure AS9465/SP1

## Land at Cinders Lane, Yapton

### Environmental Noise Time History - Position 1

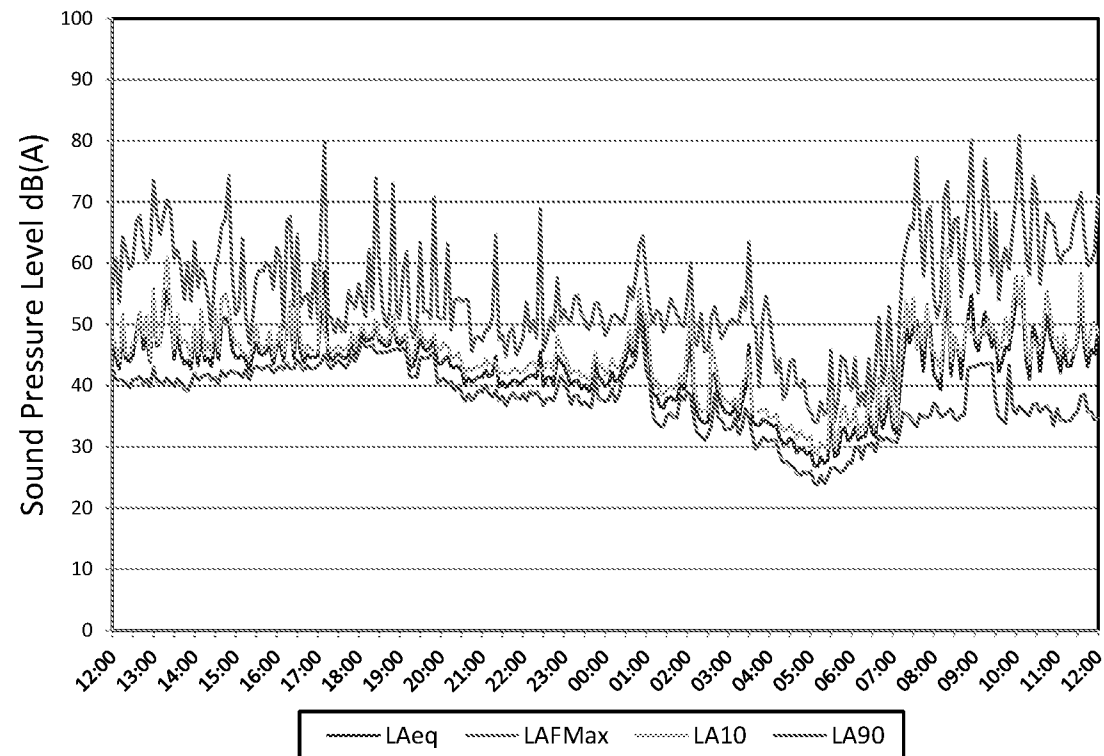


Thursday 05 January to Friday 06 January 2017

Figure AS9465/TH1

## Land at Cinders Lane, Yapton

### Environmental Noise Time History - Position 1

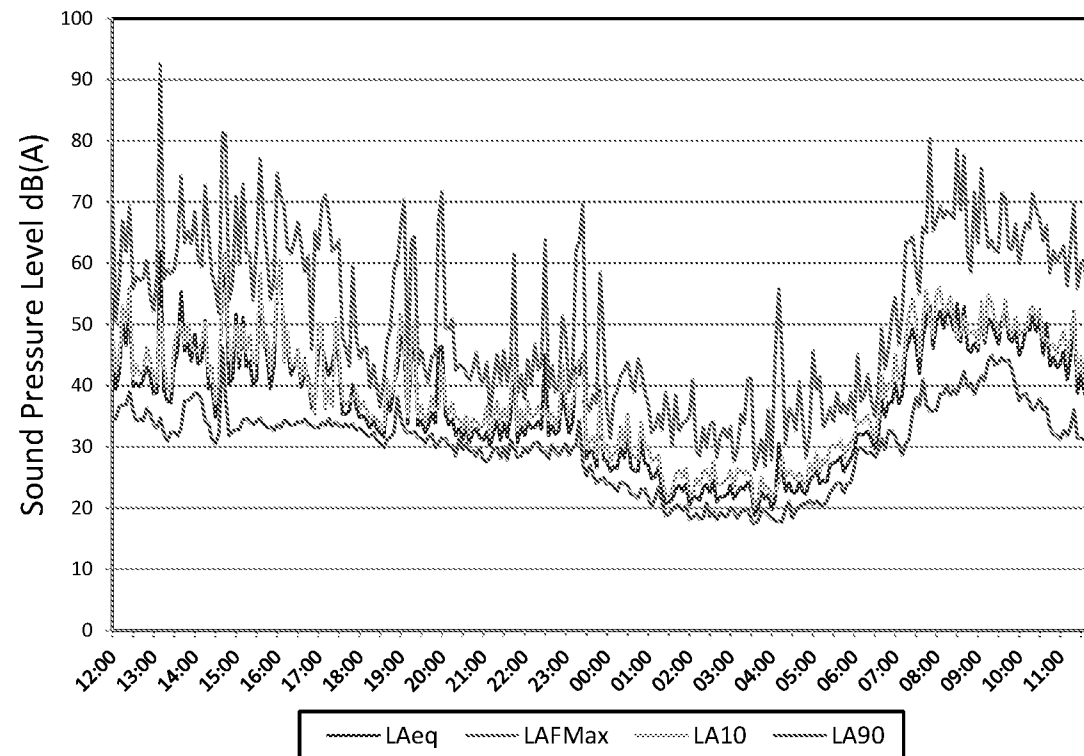


Friday 06 January to Saturday 07 January 2017

Figure AS9465/TH2

## Land at Cinders Lane, Yapton

### Environmental Noise Time History - Position 1

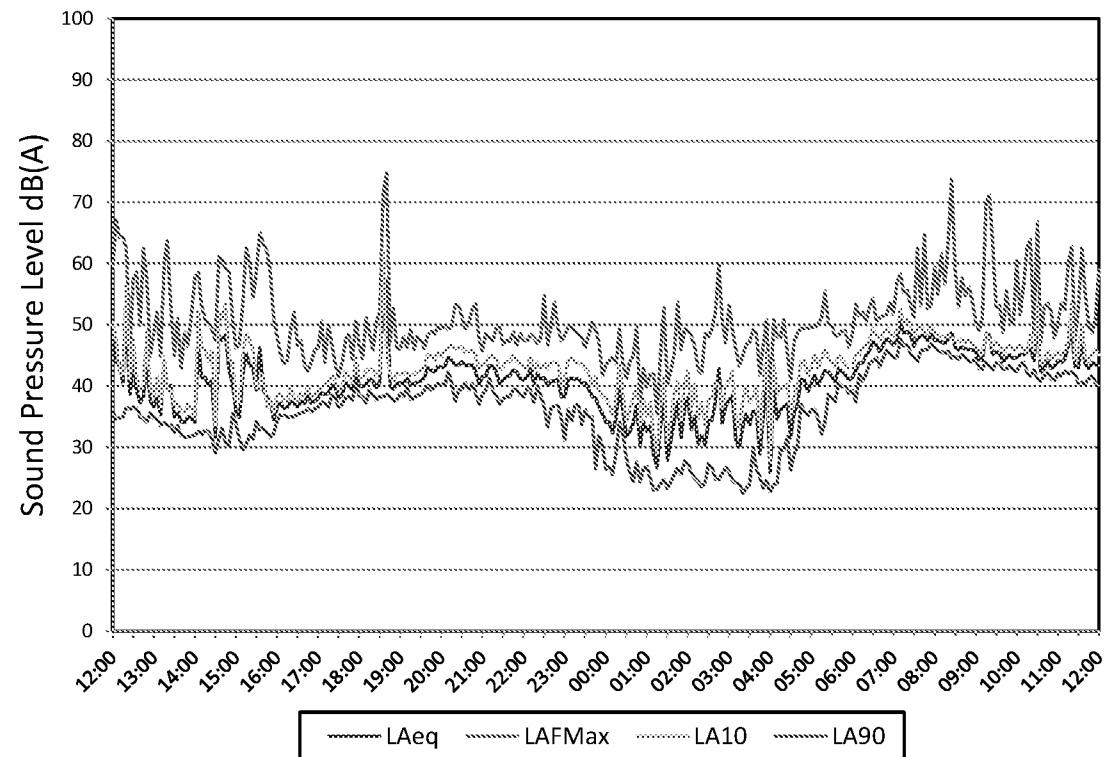


Saturday 07 January to Sunday 08 January 2017

Figure AS9465/TH3

## Land at Cinders Lane, Yapton

### Environmental Noise Time History - Position 2

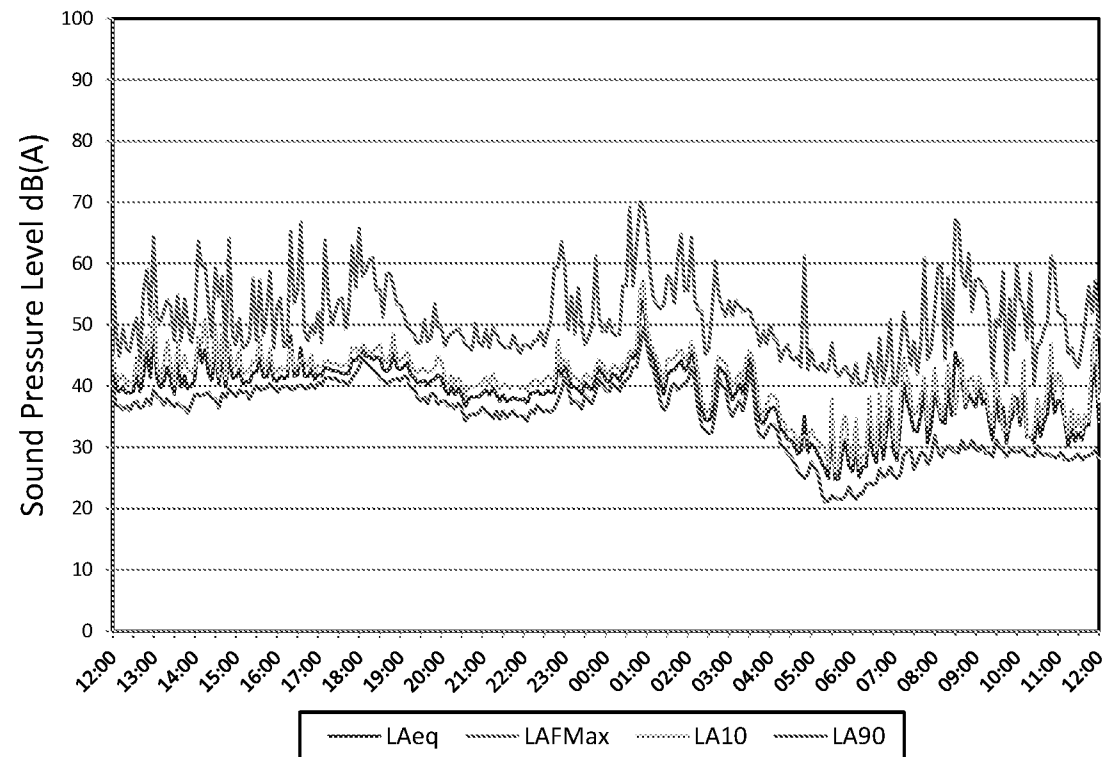


Thursday 05 January to Friday 06 January 2017

Figure AS9465/TH4

## Land at Cinders Lane, Yapton

### Environmental Noise Time History - Position 2

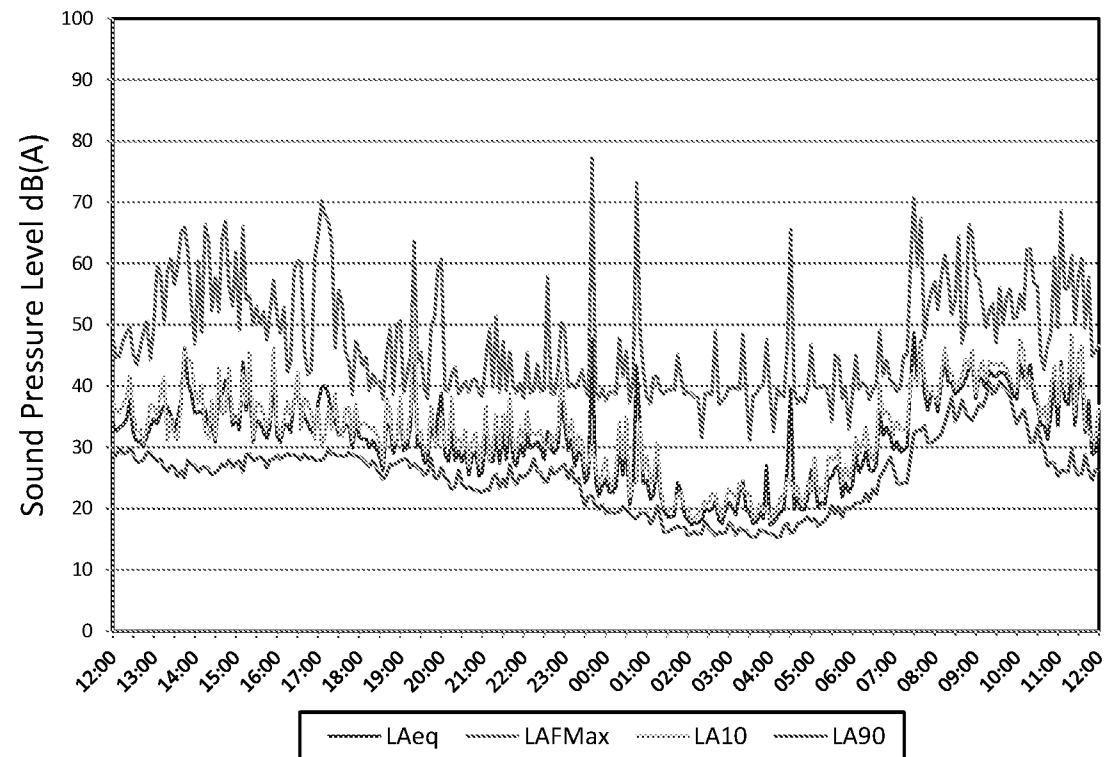


Friday 06 January to Saturday 07 January 2017

Figure AS9465/TH5

## Land at Cinders Lane, Yapton

### Environmental Noise Time History - Position 2

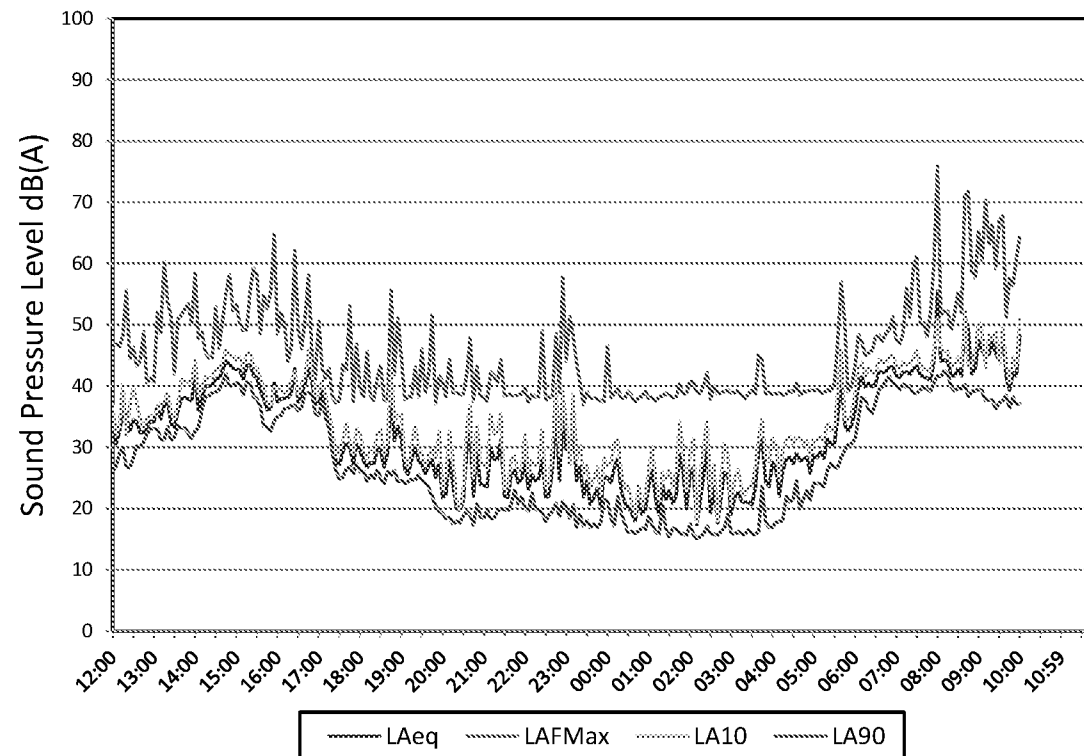


Saturday 07 January to Sunday 08 January 2017

Figure AS9465/TH6

## Land at Cinders Lane, Yapton

### Environmental Noise Time History - Position 2



Sunday 08 January to Monday 09 January 2017

Figure AS9465/TH7

## ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND SOUND

### 1.1 Acoustic Terminology

The human impact of sounds is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and variation in level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

|                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>dB(A):</b>                                         | Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or $L_A$ .                                                                                                                                                                                                                                                                                                                                                                                 |
| <b><math>L_{eq}</math>:</b>                           | <p>A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc).</p> <p>The concept of <math>L_{eq}</math> (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because <math>L_{eq}</math> is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.</p> |
| <b><math>L_{10}</math> &amp; <math>L_{90}</math>:</b> | <p>Statistical <math>L_n</math> indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, <math>L_{10}</math> is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, <math>L_{90}</math> is the typical minimum level and is often used to describe background noise.</p> <p>It is common practice to use the <math>L_{10}</math> index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.</p>                                                                                                   |
| <b><math>L_{max}</math>:</b>                          | The maximum sound pressure level recorded over a given period. $L_{max}$ is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged $L_{eq}$ value.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

### 1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

|                                 |    |     |     |     |      |      |      |      |
|---------------------------------|----|-----|-----|-----|------|------|------|------|
| Octave Band Centre Frequency Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|---------------------------------|----|-----|-----|-----|------|------|------|------|

## ACOUSTIC TERMINOLOGY & HUMAN RESPONSE TO BROADBAND SOUND

### 1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

#### INTERPRETATION

| Change in Sound Level<br>dB | Subjective Impression                             | Human Response   |
|-----------------------------|---------------------------------------------------|------------------|
| 0 to 2                      | Imperceptible change in loudness                  | Marginal         |
| 3 to 5                      | Perceptible change in loudness                    | Noticeable       |
| 6 to 10                     | Up to a doubling or halving of loudness           | Significant      |
| 11 to 15                    | More than a doubling or halving of loudness       | Substantial      |
| 16 to 20                    | Up to a quadrupling or quartering of loudness     | Substantial      |
| 21 or more                  | More than a quadrupling or quartering of loudness | Very Substantial |