

35-43 GREYFRIARS ROAD, READING

NOISE IMPACT ASSESSMENT , NOISE EXPOSURE ASSESSMENT

Report **9787-NEA-01-RevA**

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Issued For

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9787-SP1	Indicative Site Plan
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1.0 INTRODUCTION

Clement Acoustics has been commissioned by Croudace Asset Development to assess the suitability of the proposed site at 35-43 Greyfriars Road, Reading RG1 1NP for commercial development.

This report presents the results of environmental noise survey undertaken in order to measure prevailing ambient and background noise levels on the site. Measured data will then be undertaken to assess any possible noise implications and outlines any necessary mitigation measures.

2.0 SITE DESCRIPTION

The existing site is a three storey office block (formerly Reading Metropolitan College) located in a mixed use urban area. The main noise source associated with the site will be traffic noise from surrounding roads and to a lesser extent from the railway lines into Reading Station, approximately 100m to the north of the site.

Environmental noise surveys have been undertaken at two positions; one on the South east corner of the building overlooking Greyfriars Road and Stanshaw Road, with the other on the north facing façade to the rear, overlooking Tudor Road.

The current proposals are to refurbish the existing building and convert it into commercial use offices. The following assessments have been undertaken as detailed in this report:

- Assessment of whether a proposed plant installation will have an impact on existing surrounding residential receivers,
- Assessment of whether existing noise due to road traffic noise and other sources will affect the proposed use of the site as offices.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

A noise survey was undertaken at two positions on the proposed site as shown in Figure 9787-SP1. These locations were chosen in order to collect data representative of the worst case levels expected due to the adjacent and surrounding roads and train station and railway lines to the north.

Continuous automated monitoring was undertaken for the duration of the surveys between 16:00 on 26 January and 17:30 on 27 January 2015.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise.

The measurement procedures generally complied with BS7445:1991 *"Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use"*.

3.2 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed.

The equipment used was as follows.

- 2 No. Svantek Type 957 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator

4.0 RESULTS

4.1 Environmental Noise Survey

The $L_{Aeq: 5min}$, $L_{Amax: 5min}$, $L_{A10: 5min}$ and $L_{A90: 5min}$ acoustic parameters were measured throughout the duration of the survey.

Measured levels are shown as a time histories in Figures 9787-TH1-2.

	Ambient Noise Level $L_{Aeq,T}$	Minimum Background Noise Level $L_{A90,5mins}$
POSITION 1 [FRONT FACADE –GREYFRIARS ROAD]		
Daytime [07:00 - 23:00]	61	49
Night-time [23:00 - 07:00]	54	45
POSITION 2 [REAR FACADE –TUDOR ROAD]		
Daytime [07:00 - 23:00]	56	46
Night-time [23:00 - 07:00]	49	40

Table 4.1: Site noise levels for daytime and night time

As the proposed development is for commercial office use, only the daytime results will be considered in this assessment.

5.0 NOISE IMPACT ASSESSMENT

5.1 Noise Criteria

The Reading Borough Council's general criteria for noise emissions are as follows:

"The 'A' weighted sound pressure level from the plant, when operating at its noisiest, shall not at any time exceed a value of 10 dB below the minimum external background noise, at a point 1 metre outside any window of any residential property."

We therefore propose to set the noise criteria as shown in Table 5.1 which is 10 dB(A) below the minimum measured background noise shown in Table 4.1.

The nearest residential receiver is represented by data at Position 2, therefore only this data will be used in this assessment in order to present a worst case scenario.

Noise Emissions Criteria at Receiver [10dB Below Minimum L_{A90}]	
Daytime (07:00 - 23:00)	36
Night-time (23:00 - 07:00)	30

Table 5.1: Proposed Noise Emissions Criteria

The plant under assessment is only to be in operation during commercial office hours. The daytime criterion of 36 dB(A) will therefore be used.

5.2 Proposed Plant Installation

The proposed plant installation is comprised of 6 identical air conditioning compressors and an air handling unit, selected as follows:

- Air conditioning units: 6 No. Daikin REYQ14P8 Condenser Unit,
- Air Handling Unit: Envirofresh ENV4000A Air Handling Unit.

Noise emissions for each unit as provided by the manufacturer are as shown in Table 5.2.

Noise Emissions (dB) in each Frequency Band at 1m								
Unit	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Air Conditioning Units - Sound Pressure Levels at 1m								
Daikin REYQ14P8 Condenser Unit	66	64	63	59	56	53	45	44
Air Handling Unit - Sound Power Levels								
Envirofresh ENV4000A [Supply Fan Inlet]	73	79	76	73	71	69	67	64
Envirofresh ENV4000A [Extract Fan Outlet]	76	81	77	77	77	74	72	69

Table 5.1: Manufacturers Sound Pressure Levels

The plant installation will be located on the main roof of the building in the position shown in site plan 9787-SP1.

The plant area will be enclosed within a screen, mainly for aesthetic reasons. In order to present a robust assessment, the screen will be assumed to be acoustically transparent.

5.3 Noise Impact Assessment

The closest noise sensitive receiver likely to be affected by noise emissions from the proposed plant units has been identified as a top floor window to an end of terrace house on Stanshaw Road, adjacent to the building.

Due to the relative heights of the plant installation and receiver, the roof edge of the commercial building will provide a significant amount of screening to noise emissions.

Taking all necessary acoustic corrections into consideration, noise levels expected at the closest residential window would be as shown in Table 5.3. Detailed calculations are shown in Appendix B.

Receiver	Criterion	Noise Level at Receiver (due to installed plant units)
Nearest Noise Sensitive Window	36 dB(A)	36 dB(A)

Table 5.3: Noise levels and criteria at nearest noise sensitive receiver

As shown in Appendix B and Table 5.3, transmission of noise to the nearest sensitive windows due to the effects of the plant installation would be expected to meet the set noise emissions criteria, without the need for particular mitigation measures.

6.0 NOISE EXPOSURE ASSESSMENT

6.1 Internal Noise Criteria

BS8233:2014 “*Sound insulation and noise reduction for buildings*” describes recommended acceptable internal noise levels for commercial spaces during daytime hours. These levels are shown in Table 6.1.

Objective	Location	Design range $L_{Aeq,T}$ dB
Typical noise level for acoustic privacy in shared spaces	Open plan office	40-45 dB(A)

Table 6.1: BS8233 recommended internal background noise levels

The external building fabric would need to be designed to achieve these recommended internal levels.

6.2 External Building Fabric - Non Glazed Elements

It is currently assumed that the non-glazed external building fabric elements of the existing structure are comprised of concrete and block work. This would contribute towards a significant reduction of ambient noise levels in combination with a good quality double-glazed window configuration, as shown in Section 5.3.

All non-glazed elements of the building facades have been assumed to provide a sound reduction performance of at least the figures shown in Table 6.2 when tested in accordance with BS EN ISO, 140-3:1995.

Element	Octave band centre frequency SRI, dB					
	125	250	500	1k	2k	4k
Non glazed element SRI	41	43	48	50	55	55

Table 6.2: Non-glazed elements assumed sound reduction performance

6.3 External Building Fabric - Specification of Glazed Units

Sound reduction performance calculations have been undertaken in order to specify the minimum performance required from glazed elements in order to achieve recommended internal noise levels shown in Table 6.1.

Calculations are based on the third floor space, with the assumption of an open plan office. Calculations have been based on facades with relatively higher ratios of glazing to masonry, in order to present a more onerous assessment. This specification therefore presents the most robust assessment, for BS8233:2014 criteria for internal noise levels in an office at all affected facades.

The minimum sound reduction index (SRI) value required for all glazed elements to be installed is shown in Table 6.3. The performance is specified for the whole window unit, including the frame and other design features such as the inclusion of trickle vents as specified.

Glazing Type	Required Overall Sound Reduction Performance R_w	Glazing Type - Indicative Only
Type A [Front Facade - Greyfriars Road]	31 dB	R_w 31 dB Standard Double Glazing [eg 4mm Glass / 12mm Gap / 4mm]
		Generic trickle vent [Required $D_{n,e,w}$ 23 dB]
Type B [Rear Facade - Tudor Road]	31 dB	R_w 31 dB Standard Double Glazing [eg 12mm Glass / 4mm Gap / 12mm Glass]
		Generic trickle vent [Required $D_{n,e,w}$ 23 dB]

Table 6.3: Required glazing performances

All major building elements should be tested in accordance with BS EN ISO 140-3:1995. Sole glass performance data would not necessarily demonstrate compliance with this specification.

The assessment demonstrates that even a nominal double glazing system will comfortably achieve acceptable internal levels as specified by the standard. No further mitigation measures would be required to achieve good internal noise levels.

7.0 CONCLUSION

An environmental noise survey has been undertaken at the proposed site at 35-43 Greyfriars Road, Reading.

A noise impact assessment has been undertaken using manufacturer noise data to predict the noise levels due to the current proposal at the nearby noise sensitive receiver.

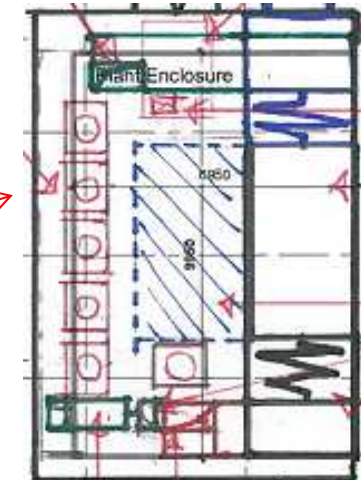
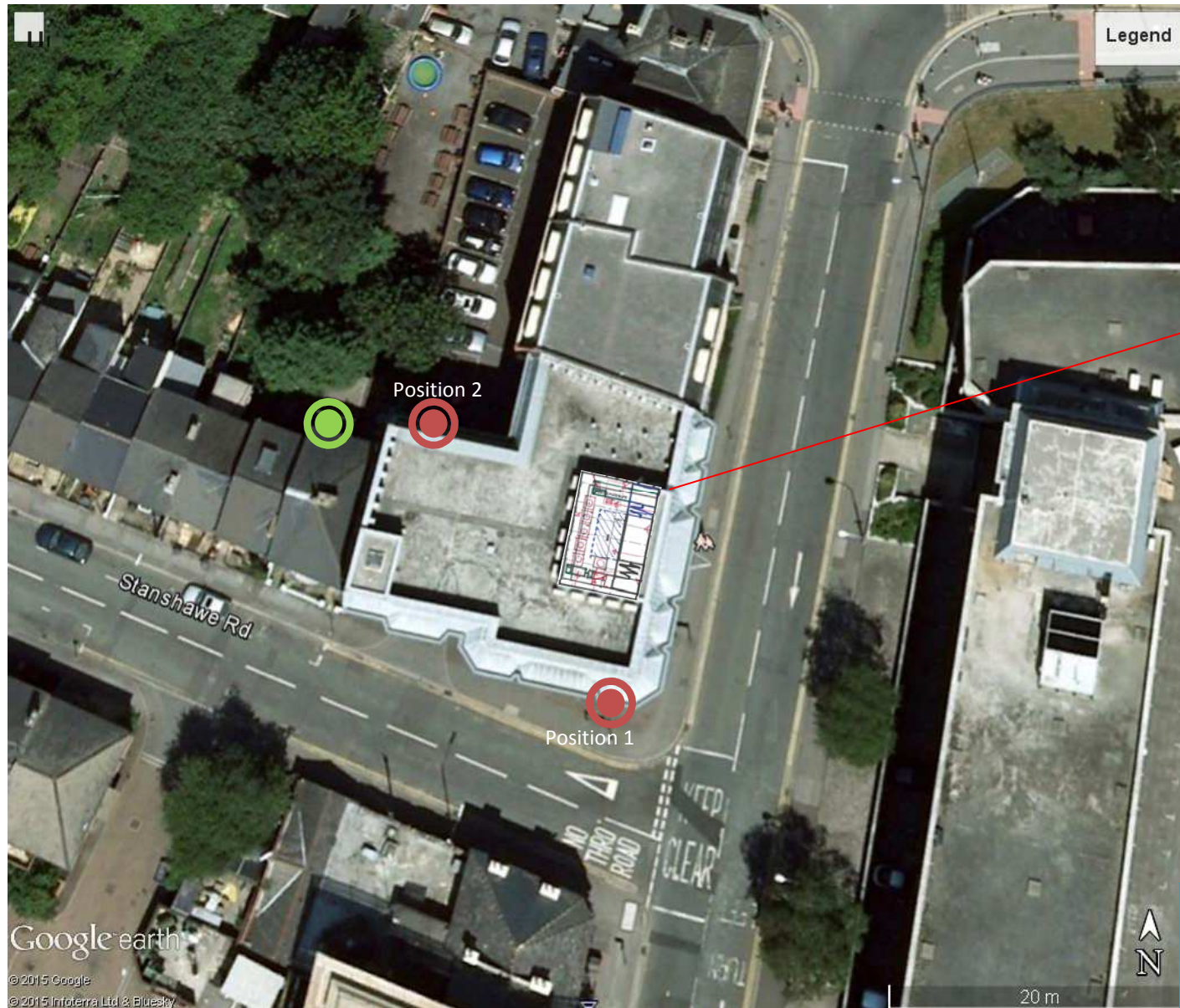
Calculations show that noise emissions from the proposed plant unit would meet the requirements of the local authority, without the need for any additional mitigation measures.

Measured noise levels have also allowed an assessment of the level of exposure to noise of the proposed development site to be made.

Outline mitigation measures including a glazing specification and ventilation have been recommended and should be sufficient to achieve acceptable internal noise levels for the proposed development according to BS8233:2014.

Report by
Matt Markwick AMIOA

Checked by
Duncan Martin MIOA



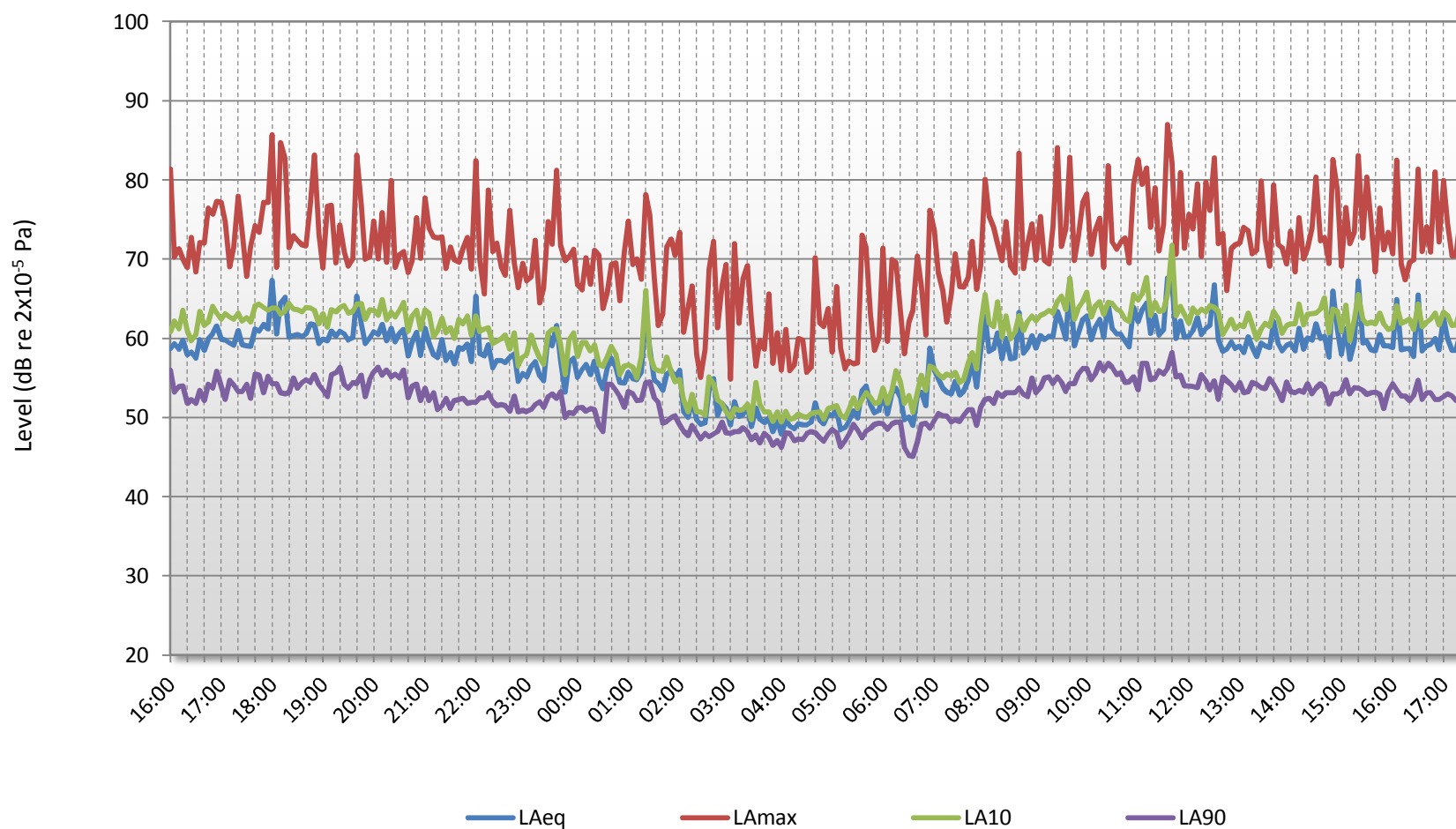
Detail of plant enclosure (plant under assessment marked in red – 6 units)

-  Nearest residential receiver
-  Noise Survey Positions

35-43 Greyfriars Road, Reading [Position 1, Front Facade]

Environmental Noise Time History

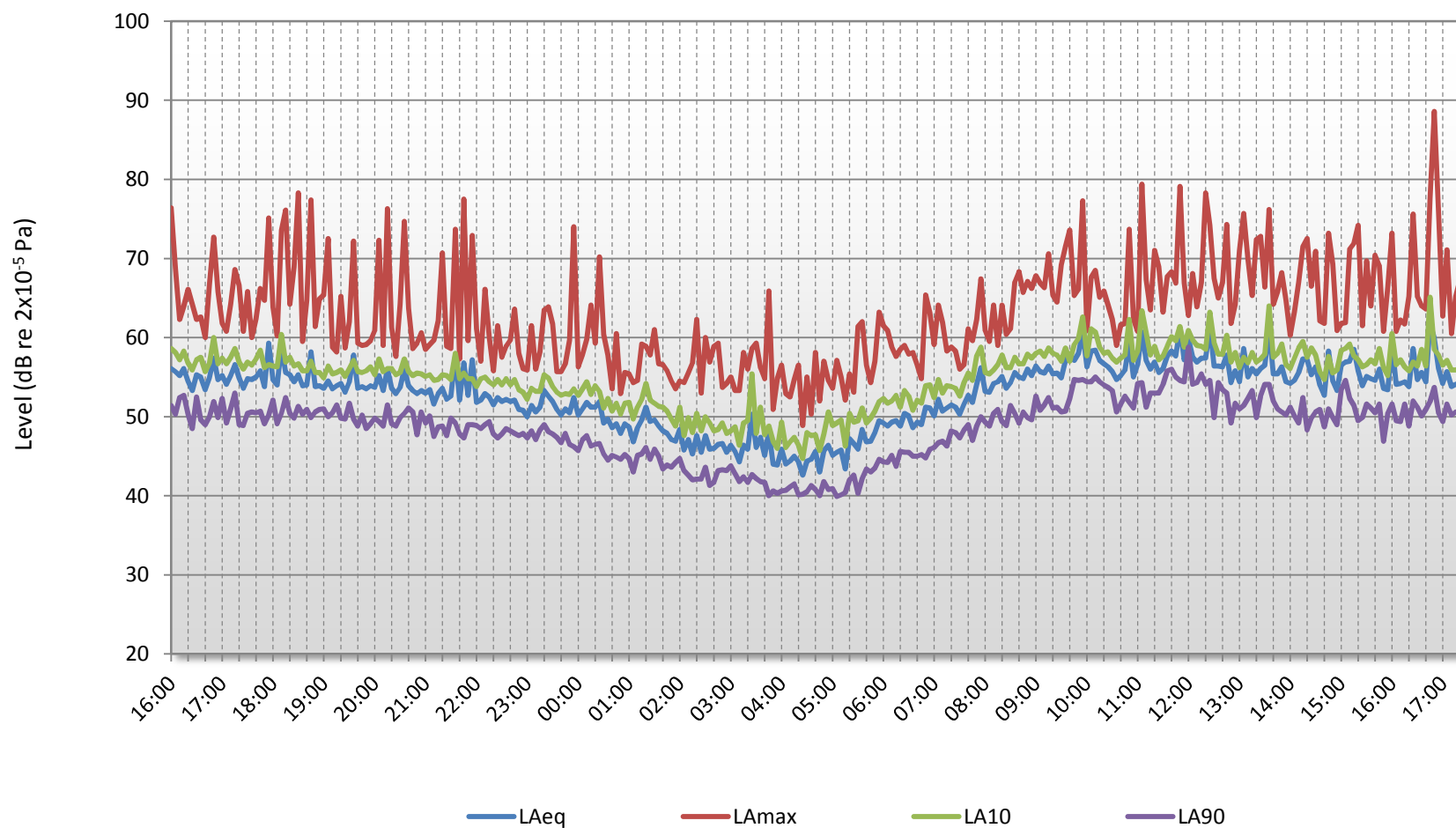
26 January to 27 January 2015



35-43 Greyfriars Road, Reading [Position 2, Rear Facade]

Environmental Noise Time History

26 January to 27 January 2015



GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq} . The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

Design Criterion	36
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