

35-43 GREYFRIARS ROAD, READING

NOISE IMPACT ASSESSMENT

Report 9787-NIA-02-RevA

Prepared on 30 January 2018

Issued For:
Boulton Brooks (Greyfriars) Ltd
Broadway House
32-35 Broad Street
Hereford
HR4 9AR



Contents

1.0	INTRODUCTION	1
2.0	SITE DESCRIPTION	1
3.0	ENVIRONMENTAL NOISE SURVEY	1
3.1	Procedure	1
3.2	Equipment	2
4.0	RESULTS	2
4.1	Environmental Noise Survey	2
5.0	NOISE EMISSIONS CRITERIA	3
5.1	External Noise Emissions	3
6.0	NOISE IMPACT ASSESSMENT	4
6.1	Proposed Activities	4
6.2	Noise Impact Assessment	4
7.0	CONCLUSION	5

List of Attachments

9787-SP1	Indicative Site Plan
9787-TH1	Environmental Noise Time History
Appendix A	Glossary of Acoustic Terminology
Appendix B	Acoustic Calculations

1.0 INTRODUCTION

Clement Acoustics Ltd has been commissioned by Boulton Brooks (Greyfriars) Ltd to investigate and assess the suitability of the site at 35-43 Greyfriars Road, Reading for development to include an outdoor roof terrace area.

This report presents the results of a background noise survey and break out assessment followed by an assessment of the anticipated noise emission levels and outlines any necessary mitigation measures.

2.0 SITE DESCRIPTION

Proposals are to develop an area of the roof to create a roof terrace area for the amenity of future tenants of the commercial offices within the building. The location of this the terrace is shown in the attached site plan 9787-SP1. The height of the roof is approximately 12m above street level.

The nearest residential receivers have been identified as the house to the west of the building (Receiver 1) at a distance of approximately 11m, screened by the building envelope and the west facing rear windows of the residential flats to the north in the adjacent building, at a distance of approximately 15m, as shown in the attached site plan 9787-SP1. These nearest noise sensitive receivers have been identified and confirmed by the client.

The area comprises residential dwellings and commercial units. The noise profile of the area is dominated by noise from commercial plant units and traffic noise from surrounding roads.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

In order to assess existing background noise levels in the area, an environmental noise survey was undertaken in the location shown in indicative site plan 9787-SP1. The choice of this position was based both on accessibility and on collecting representative noise data in relation to the existing site.

Continuous automated monitoring was undertaken for the duration of the survey between 16:00 on 26 January and 17:30 on 27 January 2015. Weather during the survey was dry with light winds, therefore suitable for measurement of environmental noise.

Noise levels at the noise monitoring position were predominately influenced by ambient traffic noise from surrounding roads.

The measurement procedure generally complied with BS7445:2003. *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.

- 1 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 and are shown as a time history in Figure 97879787-TH1.

In order to protect the amenity of nearby noise sensitive receivers, minimum existing background noise levels were calculated for daytime and night-time hours during the period of the survey.

It is understood that the terrace is intended to provide amenity for tenants of the commercial offices within the building. It will therefore be assumed that it will only be used during daytime hours.

Minimum measured background levels for these periods are shown in Table 4.1.

	Minimum background noise level L _{A90} : 5min dB(A)
Daytime (07:00 - 23:00)	46
Night-time (23:00 - 07:00)	40

Table 4.1: Minimum background noise levels

5.0 NOISE EMISSIONS CRITERIA

5.1 External Noise Emissions

In order to assess the likely impact of the bar activities at nearby residential windows, we would suggest the comparison of anticipated noise emission levels to the minimum measured background noise levels (L_{A90}) and provide a rating of impact according to BS4142:2014: 'Method for rating industrial noise affecting mixed residential and industrial areas'.

British Standard 4142:2014 can be seen as a good guide for assessing the suitability of noise emissions to residential receivers from commercial sounds. In a BS 4142 assessment, corrections are applied to measured noise levels in order to calculate a noise rating level for the effects of the source on nearby noise sensitive receivers.

This assessment will compare noise emissions to the daytime measured background noise level of 46 dB(A).

It should be noted that the guidance of the latest revision of BS4142:2014 detailed in Section 8.1 of the standard is as follows:

"The objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."

By using the minimum measured background noise levels shown in Table 4.1, a particularly robust assessment will therefore be achieved.

BS4142 states that a noise rating 5 dB above the background noise level is likely to be an indication of an adverse impact. If the difference is of 10 dB or more, then this is stated as likely to be an indication of a significant adverse impact. Where the rating level does not exceed the background noise level, this is stated as an indication of the sound source having a low impact.

6.0 NOISE IMPACT ASSESSMENT

6.1 Proposed Activities

It is understood that proposals are to utilise external areas for smoking / general use during the day. In order to make an assessment of representative worst case levels, known data for an equivalent scenario will be used. Manual measurements were taken of a similarly sized dining, drinking and smoking area used by a bar (this will present a particularly onerous assessment as noise levels on the terrace are likely to be significantly lower in reality than this example). The loudest typical noise levels measured are as shown in Table 6.1.

Source	Sound Pressure Level (dB) in each Frequency Band, calculated at 1m								dB(A)
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	
Drinking/Smoking Patio	66	67	59	63	71	70	62	49	75

Table 6.1: Loudest Measured Noise Levels from Terrace

These levels will be used to calculate the impact of noise from the roof terrace to nearby noise sensitive receivers.

For all calculated levels shown below, full formulae used and spectral calculations are shown in Appendix B.

6.2 Noise Impact Assessment

Residential windows have been identified at the locations shown in attached site plan 9787-TH1. The closest windows are located approximately 9 m from the centre of the terraced area.

With noise emissions at the above levels, and taking into consideration attenuation due to screening and distance, noise emissions levels at nearest residential windows due to roof terrace use would be as shown in Table 6.2. Levels have been calculated using the measured noise levels and the formula shown in Appendix B.

Receiver	Minimum Operating Hours Background Noise Level L90	Noise Level at Receiver (due to activities on terrace)
Receiver 1	46 dB(A)	36 dB(A)
Receiver 2	46 dB(A)	39dB(A)

Table 6.2: Noise levels and criteria at Receiver

As shown in Table 6.2 and Appendix B, transmission of noise to the nearest sensitive windows due to the effects of the events and activities would provide a noise rating level of -10 dB at Receiver 1 and -7dB at Receiver 2 when compared to the minimum background noise level. This would be classed as an indication of 'low impact' as defined in the standard.

A noise rating of 5-10 dB below the minimum background would generally be considered an indication of inaudibility.

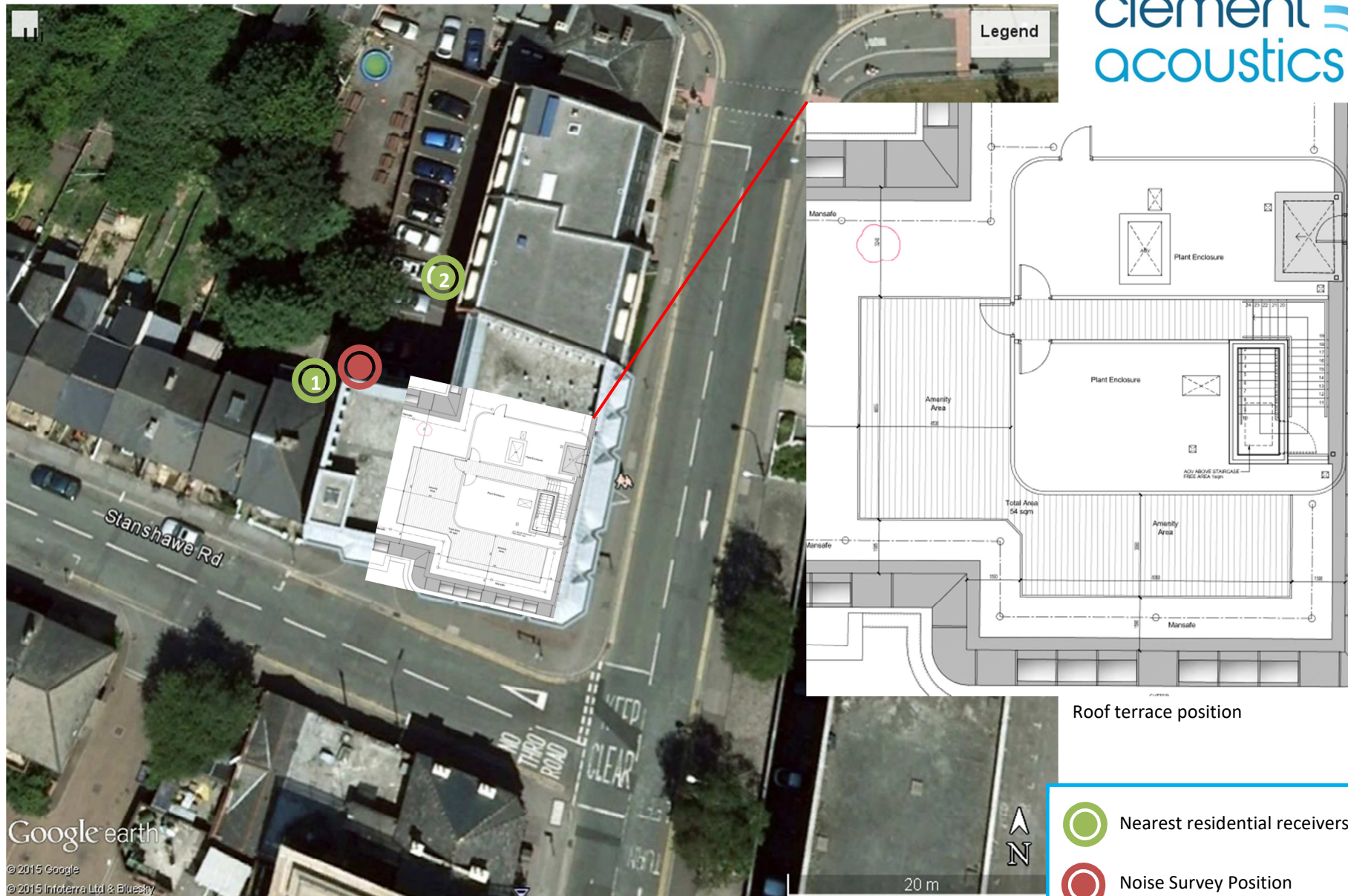
7.0 CONCLUSION

A noise survey has been undertaken at 35-43 Greyfriars Road, Reading. The results of the survey has enabled the assessment of noise propagation from a proposed roof terrace to the nearest residential receiver.

Calculations show that guidance from the relevant British Standard indicates that external noise levels are 'low impact' as specified in the standard.

Report by
Matt Markwick AMIOA

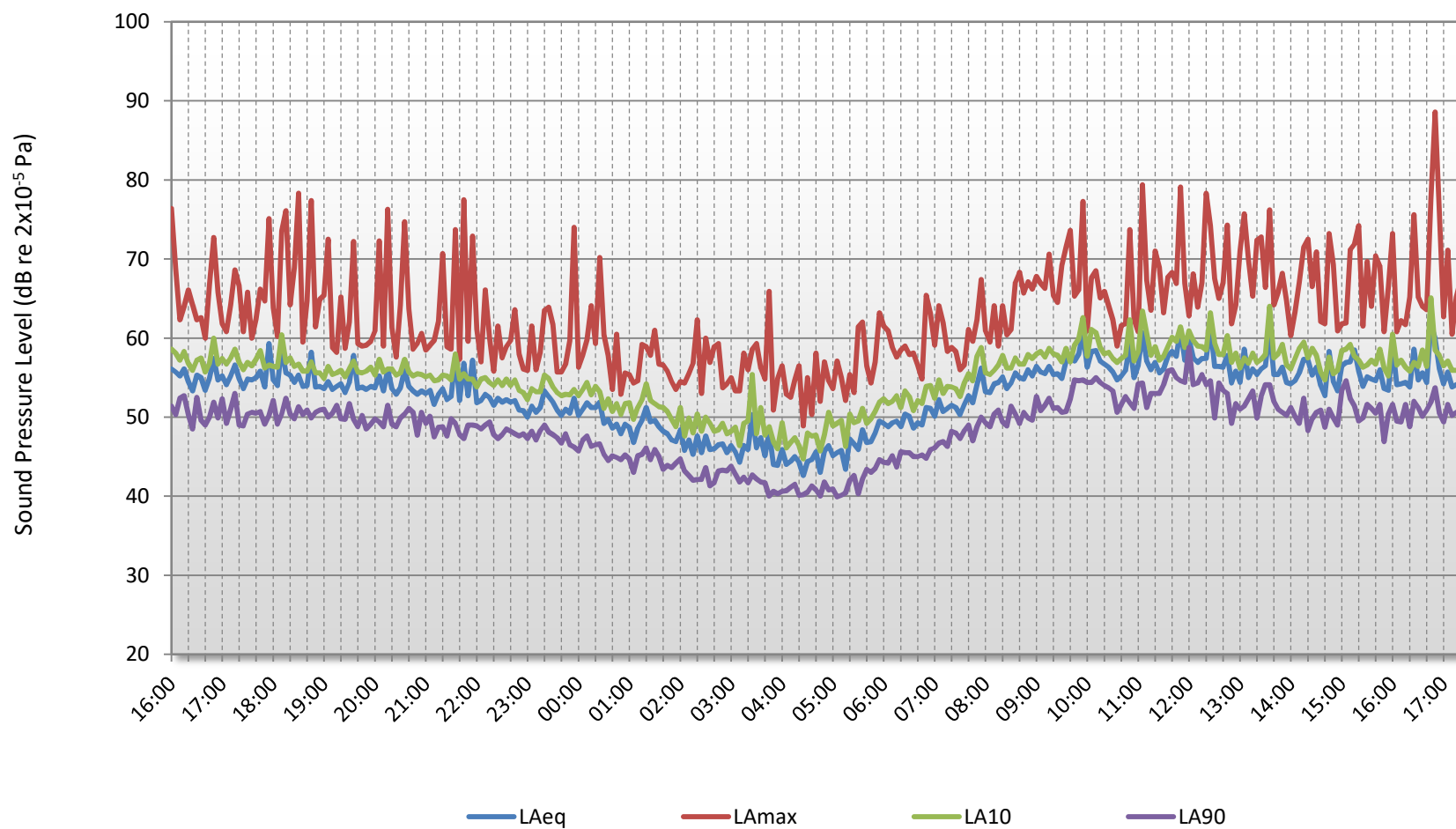
Checked by
John Smethurst MIOA



35-43 Greyfriars Road, Reading [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.

APPENDIX B

9787

35-43 GREYFRIARS ROAD, READING

EXTERNAL NOISE EMISSIONS CALCULATION

Receiver: Receiver 1

Source: Proposed Roof Terrace

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Measured sound pressure level (calculated to 1m)									
Representative source levels from drinking/smoking patio (dB)	66	67	59	63	71	70	62	49	75
Distance correction to receiver, dB (11m)	-21	-21	-21	-21	-21	-21	-21	-21	
Barrier attenuation due to screening by building envelope, (dB)	-6	-9	-11	-15	-17	-18	-18	-18	
Sound pressure level at receiver	39	38	27	28	33	31	23	10	36

Minimum Measured Background During Daytime Hours	46
--	----

Receiver: Receiver 2

Source: Proposed Roof Terrace

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Measured sound pressure level (calculated to 1m)									
Representative source levels from drinking/smoking patio (dB)	66	67	59	63	71	70	62	49	75
Distance correction to receiver, dB (15m)	-24	-24	-24	-24	-24	-24	-24	-24	
Barrier attenuation due to screening by building envelope, (dB)	-3	-4	-5	-7	-10	-14	-14	-14	
Sound pressure level at receiver	40	39	30	32	37	32	24	11	39

Minimum Measured Background During Daytime Hours	46
--	----