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ROSE PLACE, LIVERPOOL

Noise Exposure Assessment

Report **12682-NEA-01**

Prepared on 17 October 2017

Issued For

Impel Contracts Ltd

6th Floor

19 Old Hall Street

Liverpool

L3 9JQ

committed to CSCS Platinum award

ISO 17025

ISO 9001

Institute of Acoustics sponsoring organisation

Contents

List of Attachments

1.0 INTRODUCTION

Clement Acoustics has been commissioned by Impel Contracts Ltd to assess the suitability of the site at Rose Place, Liverpool for residential development in accordance with the National Planning Policy Framework published on 27 March 2012 (replacing Planning Policy Guidance 24).

Proposals are to demolish existing commercial units and construct a large mixed commercial and residential building.

This report presents the results of environmental noise surveys undertaken in order to measure prevailing background levels and outlines any necessary mitigation measures.

2.0 SITE DESCRIPTION

The proposed development currently consists of commercial warehouses, with plans to demolish these and construct a large mixed commercial and residential building. The site is in a predominantly commercial area facing on to Rose Place, a street largely populated by commercial units and warehouses. The site is bound by St Anne Street to the north and west, Rose Place to the south and commercial warehouses to the east.

At the time of the survey, the background noise climate was dominated by road traffic noise from St Anne Street.

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Procedure

A noise survey was undertaken at one position on the proposed site as shown in Figure 12682-SP1. The location was chosen based on accessibility and in order to obtain representative noise levels due to the main observed noise sources around the site.

The microphone was mounted on a security fence at the corner of Rose Place and St Anne Street. The position was considered not to be free-field, and a correction for reflections has therefore been applied. Noise levels at Position 1 were dominated by road traffic noise during collection and installation of equipment. Additional manual measurements were also taken at the south east corner of the proposed site in order to assess noise propagation through the site.

Continuous automated monitoring was undertaken for the duration of the survey between 14:00 on 18 August 2017 and 15:00 on 21 August 2017.

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

The measurement procedure generally complied with BS 7445:1991: '*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.

- 1 No. Svantek Type 977 Class 1 Sound Level Meter,
- 1 No. Svantek Type 971 Class 1 Sound Level Meter,
- Norsonic Type 1251 Class 1 Calibrator.

4.0 CRITERIA

4.1 Internal Noise Criteria

BS 8233:2014: '*Guidance on sound insulation and noise reduction for buildings*' describes recommended acceptable internal noise levels for residential spaces during daytime and night-time hours. These levels are shown in Table 4.1.

Activity	Location	Design range $L_{eq,T}$ dB Daytime (07:00-23:00)	 Night-time (23:00-07:00)
Resting	Living Room	35 dB(A)	-
Dining	Dining Room/Area	40 dB(A)	-
Sleeping	Bedroom	35 dB(A)	30 dB(A)

Table 4.1: BS8233 recommended internal background noise levels

The latest revision of the document does not include a recommended maximum internal noise level. However, in order to provide a suitably robust assessment, the guidance of the previous document (1999 revision) will be used, which is based on WHO recommendations.

BS 8233:1999 states that for reasonable standards in a bedroom at night, individual noise events should not normally exceed a maximum noise level L_{Amax} of 45 dB(A).

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

5.0 RESULTS

5.1 Environmental Noise Survey

The $L_{Aeq: 10min}$, $L_{Amax: 10min}$, $L_{A10: 10min}$ and $L_{A90: 10min}$ acoustic parameters were measured throughout the duration of the survey.

Measured levels are shown as a time history in Figure 12682-TH1.

	Ambient Noise Level $L_{eq,T}$	Typical Maximum Noise Level L_{max}
	POSITION 1	
Daytime [07:00 - 23:00]	61 dB(A)	-
Night-time [23:00 - 07:00]	58 dB(A)	72 dB(A)

Table 5.1: Site average noise levels for daytime and night time

The levels presented in Table 5.1 are as expected considering the urban site location in close proximity to a main road. Provided adequate mitigation measures are put in place during the design and construction phase of the development, recommended internal noise levels can be achieved. Outline mitigation measures are described in Section 6 of this report.

Maximum noise levels shown in Table 5.1 are deemed to be 'not normally exceeded' as required for maximum internal noise level specification purposes.

5.2 Manual Measurements

Manual measurements were undertaken at the position shown in site plan 12682-SP1.

Measured ambient noise levels are summarised in Table 5.2, with a description of observed noise sources.

Location and Time	Comments	Measured Ambient Noise Level at Measurement Position $L_{Aeq,T}$	Corresponding Level at Survey Position $L_{Aeq,T}$
Manual Measurement [*21 August 2017, 14:55 - 15:05*]	Measurement taken at the south east corner of the proposed site. Road traffic noise from St Anne Road and occasional traffic on Rose Place	52 dB(A)	60 dB(A)

Table 5.2: Average noise levels for manual measurements

As shown in Table 5.2, noise levels away from St Anne Street are noticeably quieter than those measured at the survey positions. A reduced glazing schedule will therefore be proposed for windows without line of sight to St Anne Street.

Based on levels shown in Table 5.2 and the subjective impression on site, measurements taken from the survey position are considered suitably robust for all other facades.

6.0 NOISE EXPOSURE ASSESSMENT

6.1 External Building Fabric - Non Glazed Elements

It is currently assumed that the non-glazed external building fabric elements of the proposed development would be comprised of masonry. This would contribute towards a significant reduction of ambient noise levels in combination with a good quality window configuration, as shown in Section 6.2.

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 6.1 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 6.1: Non-glazed elements assumed sound reduction performance

6.2 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 4.1.

Calculations will be based on bedrooms, which have more onerous requirements particularly during night-time hours.

Calculations have been based on mostly bedrooms 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 BS 8233:2014 criteria for internal noise levels in a bedroom at all affected facades.

As a more robust assessment, L_{Amax} spectrum values of night-time peaks have also been considered and incorporated into the glazing calculation in order to cater for the interior limit of 45 dB L_{Amax} for individual events, as specified in BS 8233:1999 and WHO guidance.

The minimum sound reduction index (SRI) value required for all glazed elements to be installed is shown in Table 6.2. The performance is specified for the whole window unit, including the frame and other design features.

The recommend location for each glazing type is indicated on the attached site plan.

Glazing Type	Required Sound Insulation for Glazed Elements	Required Sound Insulation for Ventilation
Type A **[*St Anne Street*]**	Required Sound Reduction: R_w 32 dB Typical Glazing Configuration[1]: *5mm glass/6mm gap/5mm glass*	Required Sound Reduction: $D_{n,e,w}$ 27 dB Typical Ventilator[1]: *Acoustic Trickle Ventilator*
Type B **[*All Other Glazing*]**	Required Sound Reduction: R_w 31 dB Typical Glazing Configuration[1]: *4mm glass/12mm gap/4mm glass*	Required Sound Reduction: $D_{n,e,w}$ 23 dB Typical Ventilator[1]: *Generic Trickle Ventilator*

Table 6.2: Required glazing performance

[1] *The typical configurations shown are for indicative purposes only. Certificated performances should be sought from the manufacturer(s)*

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.

No further mitigation measures would be required to achieve recommended internal noise levels.

7.0 CONCLUSION

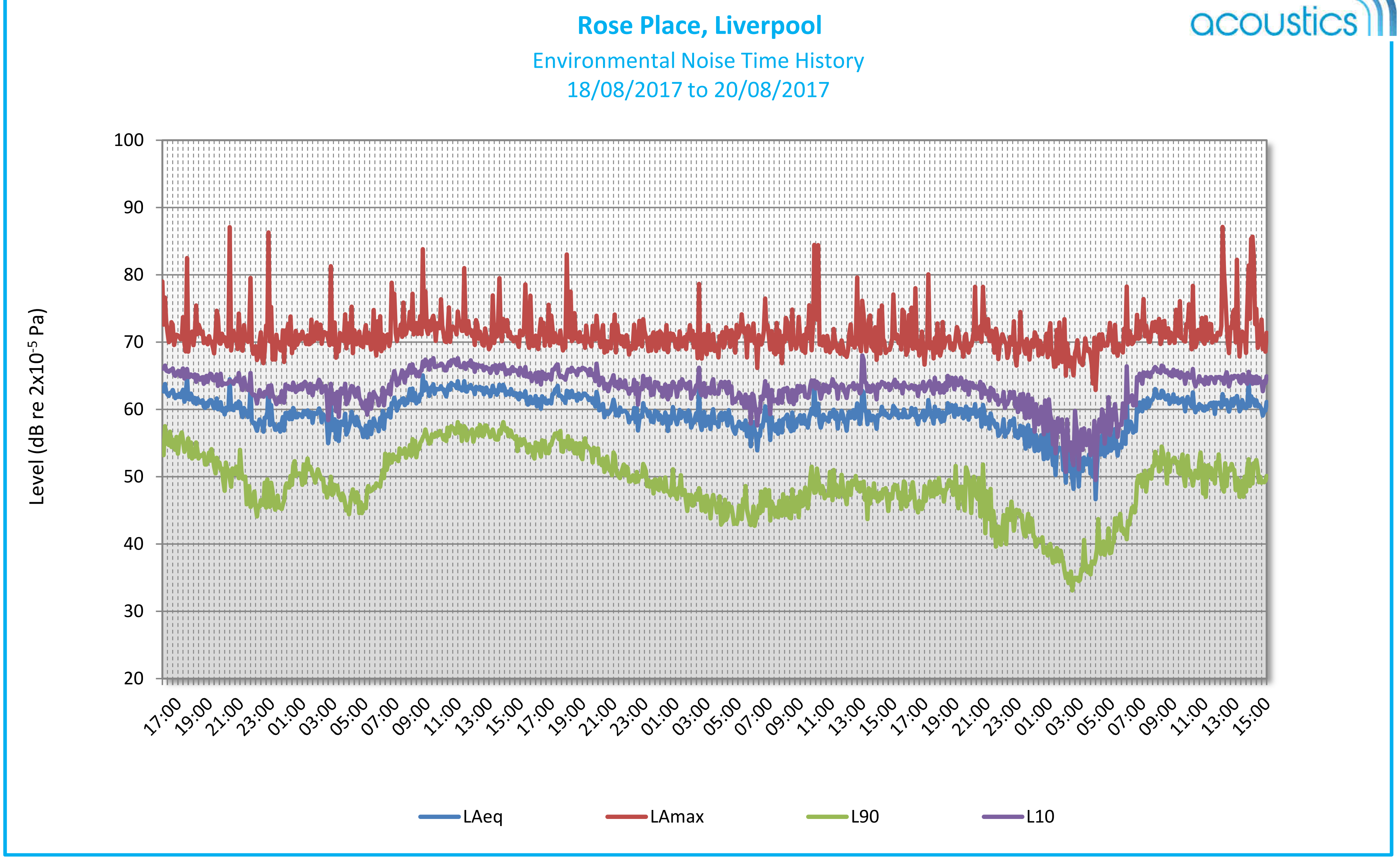
An environmental noise survey has been undertaken at Rose Place, Liverpool in order to measure ambient noise levels in the area.

Measured noise levels have 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 the use of appropriate ventilation have been recommended and should be sufficient to achieve recommended internal noise levels for the proposed development according to BS 8233:2014.

Report by	Checked by
Jamie Newton	**Duncan Martin MIOA**

12682-SP1 Indicative site plan indicating noise monitoring position and site surroundings **Date:** 17 October 2017


Rose Place, Liverpool
Environmental Noise Time History
18/08/2017 to 20/08/2017
Level (dB re 2x10-5 Pa)
100
90
80
70
60
50
40
30
20
17:00
19:00
21:00
23:00
01:00
03:00
05:00
07:00
09:00
11:00
13:00
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01:00
03:00
05:00
07:00
09:00
11:00
13:00
15:00
LAeq
LAmax
L90
L10

12682-TH1

APPENDIX A

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.