SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Northern Assurance Building, Manchester

Environmental noise survey report

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Version	Date	Comments	Author	Reviewer
A	28 Jan 16		Jose M. Gonzalez	Mark Howarth
B	18 Feb 16	Plant assessment included	James Atha	Una Brown

Summary

Sandy Brown Associates LLP (SBA) has been commissioned by OBI property to provide acoustic advice in relation to the proposed office development at the Northern Assurance Building, Princess Street, Manchester.

The proposed project consists of refurbishment works to the offices and the addition of new plant items.

An environmental noise survey has been carried out to determine the existing background sound levels in the area and setting appropriate plant noise limits in line with the requirements of Manchester City council.

An environmental noise survey was performed between 11:40 on 20 January 2016 and 09:10 on 25 January 2016.

The lowest background sound levels measured during the survey were $L_{A90,15min}$ 53 dB during the daytime, $L_{A90,15min}$ 55 dB during the evening, and $L_{A90,15min}$ 52 dB at night.

Based on the requirements of Manchester City Council and on the results of the noise survey, the cumulative noise level from plant at 1m from the worst affected window of the nearby noise sensitive premises is to be at least 5 dB below the minimum background noise level measured.

An assessment of the initial external plant selections indicates that providing the proposed visual screen is solid with a weight of at least 10 kg/m^2, the calculated plant noise egress levels would be in line with the requirements of Manchester City Council.

If plant items contain tonal or attention catching features, the limits should not exceed 5 dB below the minimum external noise level in octave bands.

Contents

1 Introduction 5
2 Site description 5
3 Method 7
4 Measurement results 7
5 Assessment criteria 9
6 Conclusion 11
Appendix A 12
Survey details 12
Appendix B 15
Results of unattended measurements at Location L 15

1 Introduction

Sandy Brown Associates LLP (SBA) has been commissioned by OBI property to provide acoustic advice in relation to the proposed office development at the Northern Assurance building, Princess Street, Manchester.

As part of this, an environmental noise survey is required, the purpose of which is to establish the existing background sound levels in the vicinity of nearby noise sensitive premises and to set appropriate limits for noise egress from building services plant.

The background noise levels measured during the survey are used as the basis for setting limits for noise emission from building services plant. These limits are set in accordance with the requirements of Manchester City Council.

An initial assessment of the proposed external plant items has been carried out and outline mitigation measures have been advised.

2 Site description

2.1 The site and its surrounding

The site location in relation to its surroundings is highlighted in pink in Figure 1. The site is located in Manchester City Centre, and currently contains 6 floors office accommodation above a ground floor restaurant (Piccolino) . It is bounded by Victoria Building to the west, Albert Square to the south, Pearl Assurance House to the east and Clarence House to the north.

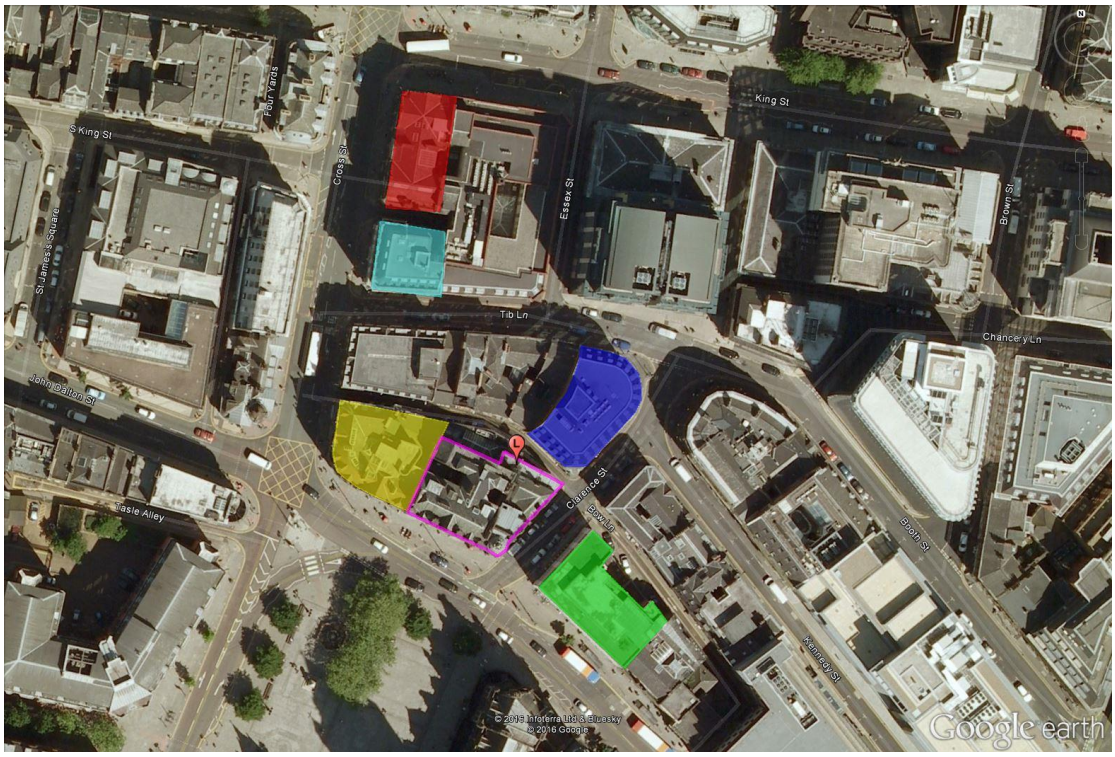


Figure 1 Site map indicating unattended (L) measurement location (courtesy of Google Earth Pro)

2.2 Adjacent premises

The area is predominantly commercial and office accommodation. The nearest office accommodation is the adjoining Victoria Building to the west, Pearl Assurance House to the east and Clarence house to the north, these are highlighted in yellow, green and blue respectively in Figure 1.

It is understood that the nearest residential properties s are located approximately 67 m to the north on 37 Cross Street, these are highlighted in red in Figure 1.the residential properties are screened from the development site by Phoenix House, this building is highlighted in light blue in Figure 1.

3 Method

Details of the equipment used the noise indices and the weather conditions during the survey are provided in Appendix A. Further information on the specific survey method is provided in this section.

3.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 5 days to determine the existing background sound levels in the vicinity of nearby noise sensitive premises.

The unattended measurements were performed over 15 minute periods between 11:40 on 20 January 2016 and 09:10 on 25 January 2016. The equipment was installed by Jose M. Gonzalez and collected by Jake Howarth.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'.

The monitoring microphone was located on a tripod and positioned on the rooftop of floor five of the Northern Assurance Building approximately 2.5 m from the facade of the building and approximately 13 m above local ground level.

The microphone location was chosen to be reasonably representative of the noise levels experienced by the nearest noise sensitive premises.

4 Measurement results

4.1 Observations

The dominant noise sources observed at the site during the survey consisted of

- building services plant from the ground floor restaurant and from nearby buildings
- Staff outside the restaurant back door.

Less significant noise sources included road traffic, a distant pneumatic breaker and pedestrians passing by.

4.2 Unattended measurement results

The results of the unattended noise measurements are summarised in the following tables. A graph showing the results of the unattended measurements is provided in Appendix B.

The day and night time ambient noise levels measured during the unattended survey are presented in Table 1.

Table 1 Ambient noise levels measured during the survey

Date	Daytime (07:00 – 19:00)	Evening (19:00 – 23:00)	Night (23:00 – 07:00)
	$L_{Aeq,12h}$ (dB)	$L_{Aeq,4h}$ (dB)	$L_{Aeq,8h}$ (dB)
Wednesday 20 January 2016	59[1]	58	55
Thursday 21 January 2016	60	58	56
Friday 22 January 2016	59	60	56
Saturday 23 January 2016	59	60	57
Sunday 24 January 2016	58	58	55
Monday 25 January 2016	61[1]	-	-
Average	59	59	56

[1] Measurement not made over full period due to monitoring start and end time, the measurement on 20 January 2016 was over 11 hours, and on 25 January 2015 over 2 hours; not included in the average

The minimum background sound levels measured during the unattended survey are given in Table 2.

Table 2 Minimum background sound levels measured during the survey

Date	Daytime (07:00 – 23:00)	Evening (19:00 – 23:00)	Night (23:00 – 07:00)
	$L_{A90,15min}$ (dB)	$L_{A90,15min}$ (dB)	$L_{A90,15min}$ (dB)
Wednesday 20 January 2016	56[1]	55	53
Thursday 21 January 2016	55	56	53
Friday 22 January 2016	56	57	53
Saturday 23 January 2016	54	57	53
Sunday 24 January 2016	53	55	52
Monday 25 January 2016	55[1]	-	-

[1]Measurement not made over full period due to monitoring start and end time, the measurement on 20 January 2016 was over 11 hours, and on 25 January 2016 over 2 hours.

The lowest background sound levels measured during the survey were $L_{A90,15min}$ 53 dB during the daytime, $L_{A90,15min}$ 55 dB during the evening and $L_{A90,15min}$ 52 dB at night. The corresponding octave band levels are provided in Table 3.

Table 3 Minimum measured background noise levels in octave bands

	Minimum measured background noise levels (dB) Octave band centre frequency (Hz)						
	63	125	250	500	1k	2k	4k
Daytime (07:00 – 19:00)	54	57	52	51	49	43	35
Evening (19:00 – 23:00)	58	59	55	52	50	43	37
Night time (23:00 – 07:00)	51	50	51	51	48	42	35

5 Assessment criteria

5.1 Noise egress

5.1.1 Local Authority criteria

Manchester City Council (MCC) stipulates the following criteria in regards to plant noise emissions:

a) Achieve a noise level (L_{Aeq}) of at least 5 dB below the background noise levels (L_{A90}) at the nearest noise sensitive location at the quietest time the equipment will be in operation; and
b) Not contain any discernible tonal characteristics at the nearest noise sensitive location at the quietest time the equipment will be in operation.

Where the product data suggests there may be a tonal element to the noise (i.e. the octave band noise data shows a peak at a particular frequency) it will be required to demonstrate that noise from the equipment will be at least 5 dB below the background noise level (L_{90}) in each octave band at the nearest noise sensitive location at the quietest time the equipment will be in operation.

5.1.2 Plant noise limits

Based on the above criteria and the measurement results, the cumulative noise level resulting from the operation of all new plant at 1 m from the most affected windows of the nearest noise sensitive premises should not exceed 5 dB below the minimum broadband (L_{A90}) external noise level. On this basis, the broadband plant noise egress limits are set out below:

- L_{Aeq} 48 dB during the daytime (0700 to 1900)
- L_{Aeq} 50 dB during the evening (1900 to 2300)
- L_{Aeq} 47 dB during the night-time (2300 to 0700).

Where an item of plant contains tonal characteristic, the limits should not exceed 5 dB below the minimum eternal noise level in octave bands. These limits are set out in Table 4.

Table 4 Plant noise limits at 1m from the nearest noise sensitive premises

	Maximum sound pressure level at 1m from noise sensitive premises (dB) Octave band centre frequency (Hz)						
	63	125	250	500	1k	2k	4k
Daytime (07:00 – 19:00)	49	52	47	46	44	38	30
Evening (19:00 – 23:00)	53	54	50	47	45	38	32
Night time (23:00 – 07:00)	46	45	46	46	43	37	30

5.2 Noise egress assessment

5.2.1 Plant proposals

Six external condenser units are proposed on a roof terrace at level 5 as indicated in Figure 2.

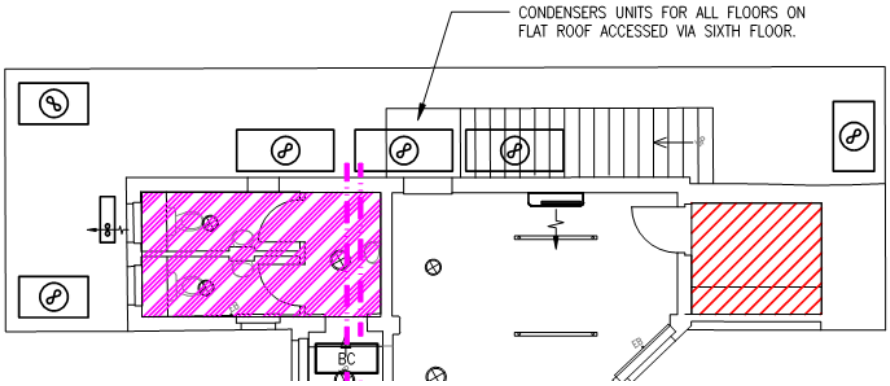


Figure 2 Locations of external condenser units

It is understood that these are proposed to consist on PUHY-EP250YKM-A units which each have a sound pressure level of L_{Aeq} 60 dB at 1m.

5.2.2 Predicted noise egress levels

Calculations have been carried out to predict the noise egress levels outside the nearby noise sensitive premises. The calculations take into account distance attenuation and facade reflections and are based on all six units operating simultaneously.

The predicted level from the units outside the nearest noise sensitive facade is L_{Aeq} 52 dB. This exceeds the recommended plant noise egress limits by up to 5 dB (assuming no tonal elements).

5.2.3 Possible mitigation measures

It is understood that a visual screen is proposed to block the line of site between the nearby noise sensitive premises and the plant area.

On the basis that the screen is solid and provides a weight of at least 10 kg/m^2, this is expected to reduce the plant noise egress levels to be capable of meeting the recommended criteria (assuming no tonal elements).

6 Conclusion

A noise survey has been carried out to determine the existing background sound levels in the vicinity of the site and surrounding noise sensitive premises. The representative background sound levels were $L_{A90,15min}$ 53 dB during the day, $L_{A90,15min}$ 55 dB during the evening and $L_{A90,15min}$ 52 dB at night.

Based on the requirements of Manchester City Council and on the results of the noise survey, the cumulative noise level from plant at 1m from the worst affected window of the nearby noise sensitive premises is to be at least 5 dB below the minimum background noise level measured.

These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features the limits should not exceed 5 dB below the minimum external noise level in octave bands. These limits are set out in Table 4.

An assessment of the initial external plant selections indicates that providing the proposed visual screen is solid with a weight of at least 10 kg/m^2, the calculated plant noise egress levels would be in line with the requirements of Manchester City Council.

Appendix A

Survey details

Equipment

A Rion NL-52 sound level meter was used to undertake the unattended measurements. The calibration details for the equipment used during the survey are provided in Table A1.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Sound level meter	NL-52/01143564	Rion	6 May 17	08407
Microphone	UC-59/07377	Rion	6 May 17	08407
Pre-amp	NH-25/43581	Rion	6 May 17	08407
Calibrator	NC-74/34257023	Rion	6 May 17	08402

Calibration of the sound level meters used for the tests is traceable to national standards. The calibration certificates for the sound level meter used in this survey are available upon request.

The sound level meters and microphones were calibrated at the beginning and end of the measurements using their respective sound level calibrators. No significant deviation in calibration occurred.

Noise indices

The equipment was set to record a continuous series of broadband sound pressure levels. Noise indices recorded included the following:

- $L_{Aeq,T}$ The A-weighted equivalent continuous sound pressure level over a period of time, T.
- $L_{AFmax,T}$ The A-weighted maximum sound pressure level that occurred during a given period with a fast time weighting.
- $L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement period. Indicative of the background sound level.

The L_{A90} is considered most representative of the background sound level for the purposes of complying with any local authority requirements.

Sound pressure level measurements are normally taken with an A-weighting (denoted by a subscript 'A', eg L_{A90}) to approximate the frequency response of the human ear.

A more detailed explanation of these quantities can be found in BS7445: Part 1: 2003 *Description and measurement of environmental noise, Part 1. Guide to quantities and procedures.*

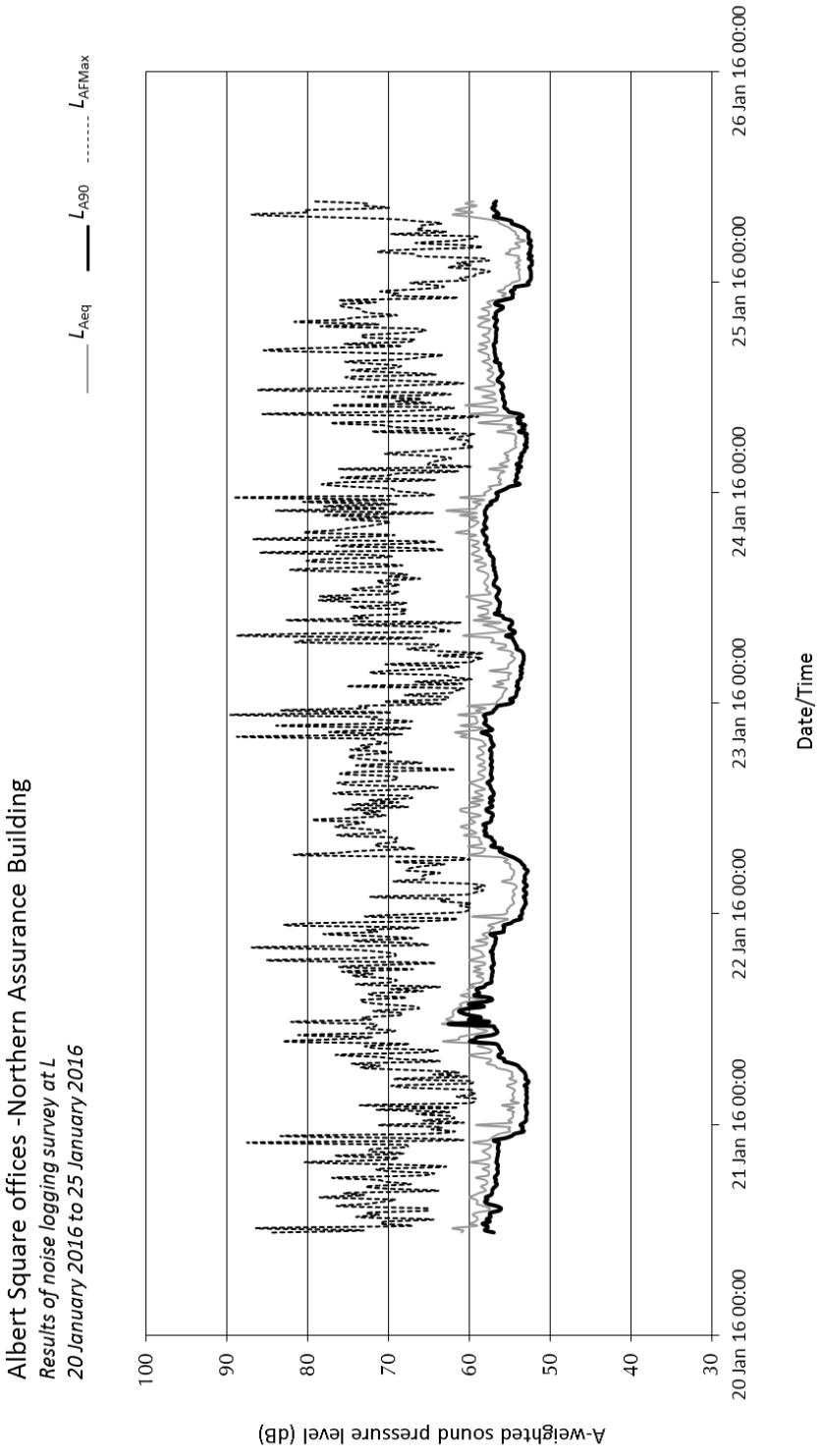
Weather conditions

During the unattended noise measurements between 20 January 2016 and 25 January 2016, weather reports for the area indicated that temperatures varied between -1°C at night and 14°C during the day, and the wind speed was less than 6.3 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location L


Albert Square offices -Northern Assurance Building
Results of noise logging survey at L
20 January 2016 to 25 January 2016
L_{Aeq}
L_{A90}
L_{AFMax}
A-weighted sound pressure level (dB)
100
90
80
70
60
50
40
30
20 Jan 16 00:00
21 Jan 16 00:00
22 Jan 16 00:00
23 Jan 16 00:00
24 Jan 16 00:00
25 Jan 16 00:00
26 Jan 16 00:00
Date/Time