SANDY BROWN

Consultants in Acoustics, Noise & Vibration

16017-R01-A

29 February 2016

Vodafone King's Cross MTX

Environmental noise assessment report

55 Charterhouse Street, London EC1M 6HA T: +44 (0)20 7549 3500
Piccadilly House, 49 Piccadilly, Manchester M1 2AP T: +44 (0)161 771 2020
2 Walker Street, Edinburgh EH3 7LB T: +44 (0)131 235 2020 **post@sandybrown.com**
35 St Paul's Square, Birmingham B3 1QX T: +44 (0)121 227 5020 **www.sandybrown.com**

Sandy Brown Associates LLP
Registered in England & Wales No. OC 307504 Registered Office: 55 Charterhouse Street, London EC1M 6HA

Version	Date	Comments	Author	Reviewer
A	29 Feb 16		Eugénie Sainte Cluque	Jason Swan

Summary

Sandy Brown Associates LLP (SBA) has been commissioned by Ridge and Partners LLP to provide acoustic advice in relation to the proposed condenser replacement at 233-241 Gray's Inn Road, Kings Cross, London WC1X 8RB.

An environmental noise survey has been carried out to determine the existing background noise levels in the area and setting appropriate plant noise limits in line with the requirements of London Borough of Camden.

The noise survey was performed between 10:53 on 13 January 2016 and 15:08 on 18 January 2016.

The representative background sound levels measured during the survey were $L_{A90,15min}$ 46 dB during the day, $L_{A90,15min}$ 47 dB during the evening and $L_{A90,15min}$ 44 dB during the night.

Based on the requirements of the London Borough of Camden and on the results of the noise survey (assuming a 3 dB facade correction), all plant must be designed such that the cumulative noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed L_{Aeq} 44 dB during the day, L_{Aeq} 45 dB and L_{Aeq} 42 dB during the night.

These limits are cumulative, and apply with all plant operation under normal conditions. If plant items contain tonal or attention catching features, a 5 dB penalty will be applied, and the limits will be more stringent than those set.

The replacement condensers have been assessed and the predicted noise levels nearest noise sensitive receivers are L_{Aeq} 40 dB and L_{Aeq} 38 dB. This complies with the London Borough of Camden's noise requirements.

Contents

1 Introduction

Sandy Brown Associates LLP (SBA) has been commissioned by Ridge and Partners LLP to provide acoustic advice in relation to the replacement rooftop condensers upgrade at 233-241 Gray's Inn Road, Kings Cross, London WC1X 8RB.

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

This report presents the survey method, results of the environmental noise survey, and a discussion of acceptable limits for noise emission from building services plant. An assessment of the cumulated noise levels from the proposed plant units to the nearest noise sensitive receivers is also provided.

2 Development proposal

The existing rooftop condensers are to be replaced with new condensers and located in the same roof top enclosure. It is understood that the works involve replacing the barrier to the south of the enclosure with a louvre to allow better airflow around the condensers.

3 Site description

3.1 The site and its surrounding

The site location in relation to its surroundings is shown in Figure 1. The site highlighted in red in a four storey commercial building.

The survey location is denoted by the letter 'L' in the same picture.

The site overlooks Gray's Inn Road to the east and Harrison Street to the south.

Figure 1 Site map (courtesy of Google Earth Pro)

3.2 Adjacent premises

The site is adjacent to residential properties in all directions. They are highlighted in green in Figure 1. The Beauty Academy is situated to the north (blue in the same figure) and commercial buildings are situated to the east (yellow).

4 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.

4.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 6 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 10:53 on 13 January 2016 and 15:08 on 18 January 2016. The equipment was installed and collected by Eugénie Sainte Cluque.

The measurement position used during the survey is indicated in Figure 1, denoted by the letter 'L'. A photograph showing the measurement location is provided in Figure 2. This

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

At this location the microphone was installed on a tripod approximately 1.5 m from the roof-top and generally more than 3 m away from any vertical surface significant in terms of influencing the measured noise levels. As such the noise levels at this location are considered free-field levels.

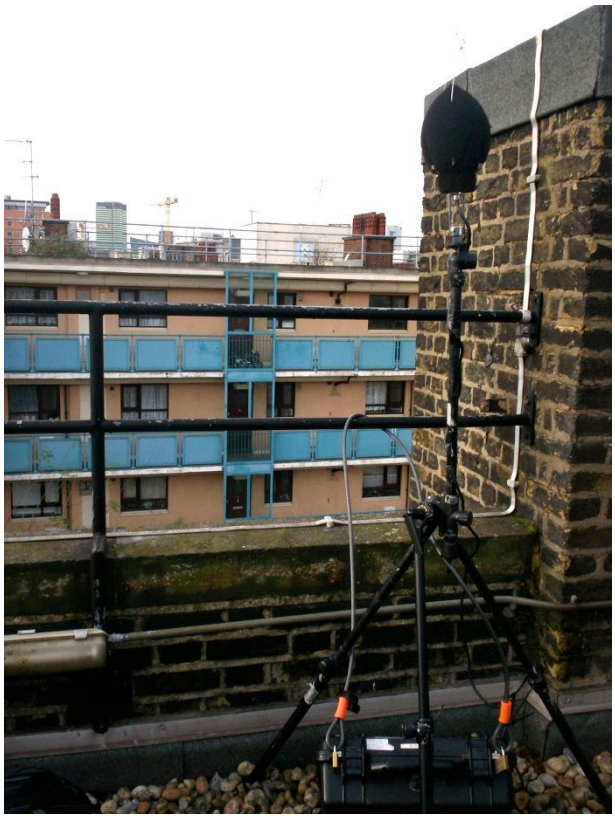


Figure 2 Sound level meter at unattended survey location L

5 Measurement results

5.1 Observations

During the installation and the collection of the equipment, the dominant noise sources observed at the site during the survey consisted of road traffic from Harrison Street and Gray's Inn Road.

Less significant noise sources included general building services.

5.2 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, evening 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 – Free-field levels

Date	Daytime (07:00 – 19:00) $L_{Aeq,12h}$ (dB)	Evening (19:00 - 23:00) $L_{Aeq,4h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Wednesday 13 Jan 2016	-*	54	51
Thursday 14 Jan 2016	55	53	50
Friday 15 Jan 2016	55	54	50
Saturday 16 Jan 2016	53	53	50
Sunday 17 Jan 2016	52	53	49

* Measurement not made over full period due to monitoring start and end time (the measurement on 13 January 16 was over 8 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 – Free-field levels

Date	Daytime (07:00 – 19:00) $L_{A90,15min}$ (dB)	Evening (19:00 - 23:00) $L_{A90,15min}$ (dB)	Night (23:00 – 07:00) $L_{A90,15min}$ (dB)
Wednesday 13 Jan 2016	50 *	49	46
Thursday 14 Jan 2016	50	49	45
Friday 15 Jan 2016	49	48	44
Saturday 16 Jan 2016	46	47	45
Sunday 17 Jan 2016	46	47	44
Monday 18 Jan 2016	50 *	-	-

* Measurement not made over full period due to monitoring start and end time

The lowest background sound levels measured during the survey were $L_{A90,15min}$ 46 dB during the daytime, $L_{A90,15min}$ 47 dB during the evening and $L_{A90,15min}$ 44 dB at night.

6 Building services noise egress limits

6.1 Standard guidance

Guidance for noise emission from proposed new items of building services plant is given in BS 4142: 2014 '*Methods for rating and assessing industrial and commercial sound*'.

BS 4142 provides a method for assessing noise from items such as building services plant against the existing background sound levels at the nearest noise sensitive.

BS 4142 suggests that if the noise level is 10 dB or more higher than the existing background sound level, it is likely to be an indication of a significant adverse impact. If the level is 5 dB above the existing background sound level, it is likely to be an indication of an adverse impact. If the level does not exceed the background level, it is an indication of having a low impact.

If the noise contains 'attention catching features' such as tones, bangs etc, a penalty, based on the type and impact of those features, is applied.

6.2 Local Authority criteria

London Borough of Camden states in *Camden Development Policies – Section 3, DP 28* that noise sensitive development includes housing, schools and hospitals as well as offices, workshops and open spaces.

The same document also states that noise levels from plant and machinery above which planning permissions will not be granted. They apply to any time of the day, evening and night. These noise levels are presented in Table 3.

Table 3 London Borough of Camden, noise levels from plant and machinery above which planning permission will not be granted – day, evening and night

Noise description and location of measurement	Noise level
Noise at 1 m external to sensitive facade	5 dB(A) < L_{A90}
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 m external to a sensitive facade	10 dB(A) < L_{A90}
Noise that has distinct impulse (bangs, clicks, clatters, thumps) at 1 m external to a sensitive facade	10 dB(A) < L_{A90}

6.3 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 worst affected windows of the nearest

noise sensitive premises should not exceed the limits set out in Table 4. It should be noted that these limits include a 3 dB facade correction.

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

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises ($L_{Aeq,15min}$ dB)
Daytime (07:00-19:00)	44
Evening (19:00-23:00)	45
Night-time (23:00-07:00)	42

The limits set out in Table 4 do not include any attention catching features which may incur an additional 5 dB penalty.

6.4 Assessment

6.4.1 Hours of operation

It is understood that the condensers are to operate at all times.

6.4.2 Nearest noise sensitive receivers

The nearest noise sensitive receivers are the Beauty Academy 12 m to the north and the residential properties 19 m to the south of the site.

6.4.3 Proposed plant

Twenty four condenser units are proposed to be installed to replace the existing condensers installed on the roof top in the existing screen area. Figure 3 shows the condenser units (highlighted in green) in the existing enclosure (red). The parts of the enclosure proposed to be replaced by louvres are highlighted in blue.

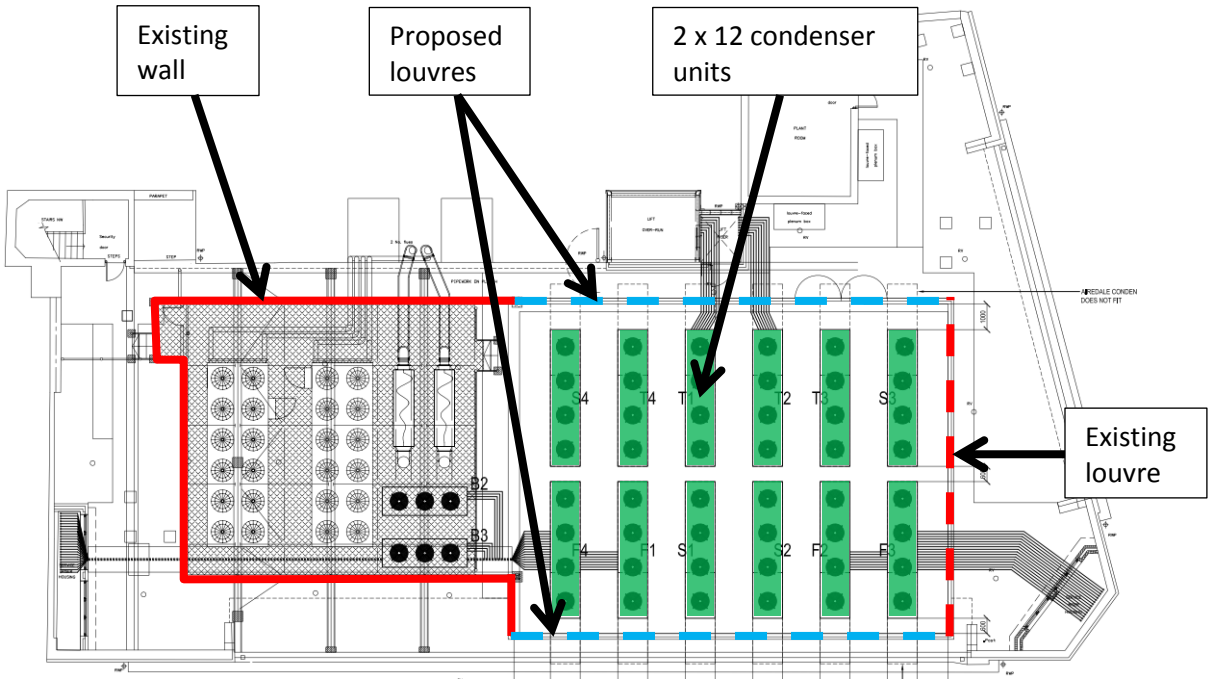


Figure 3 Condenser units (green) in enclosure (red), with proposed louvres (blue)

The proposed condenser units are Emerson MCM080-1. The manufacturer's noise data are presented in Table 5. The sound power levels per frequency bands are considered representative of a typical maximum roof level temperature level 39°C.

Table 5 Condenser units manufacturer's noise levels (SWL dB, ref 10^{-12} W) for typical maximum external temperature 39°C

Item	Octave band centre frequency (Hz)								Overall level dBA
	63	125	250	500	1k	2k	4k	8k	
Condensers SWL (dB)	60	70	70	64	61	58	52	44	67

6.4.4 Assessment results

We have undertaken an assessment of the proposed condenser units' cumulated noise emissions at 1 m to the top level of the residential building to the south of the site across Harrison Street and to the south facade of the Beauty Academy.

The predicted noise level at these locations are respectively L_{Aeq} 40 dB and L_{Aeq} 38 dB, and therefore in compliance with London Borough of Camden requirements as shown in Table 4.

The calculation tables are presented in Appendix C.

7 Conclusion

A noise survey has been carried out to determine the existing background noise levels in the vicinity of 233-241 Gray's Inn Road, Kings Cross, London WC1X 8RB and surrounding noise sensitive premises. The representative background sound levels were $L_{A90,15min}$ 46 dB during the day, $L_{A90,15min}$ 47 during the evening and $L_{A90,15min}$ 44 during the night.

On the basis of the requirements of the London Borough of Camden, the relevant plant noise limits at 1 m to the facade of worst affected existing noise sensitive premises would be $L_{Aeq,15min}$ 44 dB during the day, $L_{Aeq,15min}$ 45 during the evening and $L_{Aeq,15min}$ 42 during the night. These include a 3 dB facade correction.

These limits are cumulative, and apply with all plant operating under normal conditions. If plant items contain tonal or attention catching features, a 5 dB penalty will be applied, and the limits will be more stringent than those set out above.

An initial assessment of the proposed plant items associated with the development has been carried out. The results indicate that the proposed condenser replacements will comply with London Borough of Camden' noise requirements.

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-52/00242702	Rion	4 Jun 17	1506331
Microphone	UC-59/06185	Rion	4 Jun 17	1506331
Pre-amp	NH-25/32730	Rion	4 Jun 17	1506331
Calibrator	CAL200/4499	Larson Davis	4 Jun 17	1506327

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.*

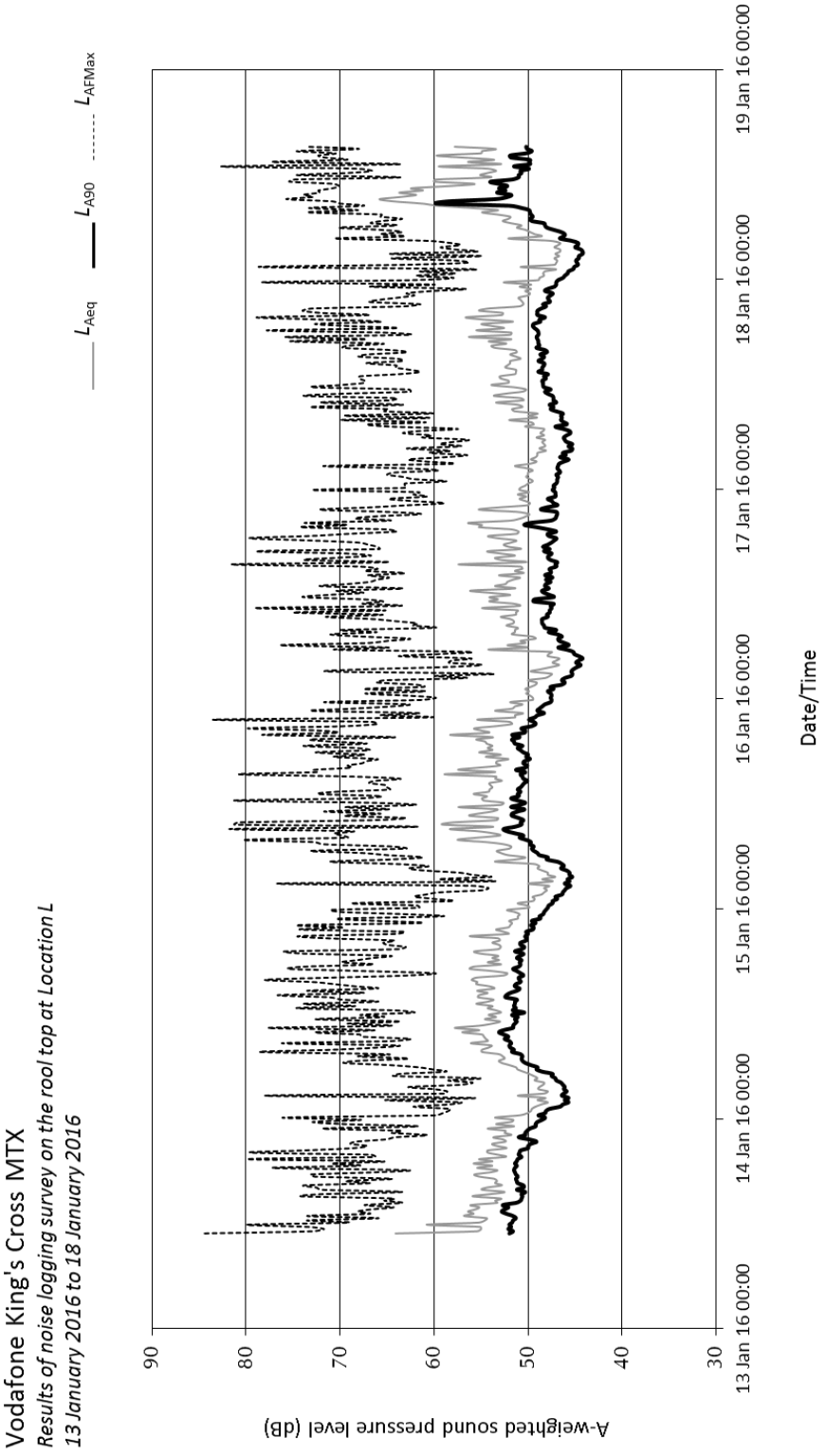
Weather conditions

During the unattended noise measurements between 13 January 2016 and 18 January 2016, weather reports for the area indicated that temperatures varied between 3°C at night and 5°C during the day, and the wind speed was less than 4 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location L


Vodafone King's Cross MTX
Results of noise logging survey on the rool top at Location L
13 January 2016 to 18 January 2016
L_{Aeq}
L_{A90}
L_{AFMax}
A-weighted sound pressure level (dB)
90
80
70
60
50
40
30
13 Jan 16 00:00
14 Jan 16 00:00
15 Jan 16 00:00
16 Jan 16 00:00
17 Jan 16 00:00
18 Jan 16 00:00
19 Jan 16 00:00
Date/Time

Appendix C

Noise calculations

Table C1 Calculation of cumulated condenser noise emissions at 1 m to the nearest window at the residential properties to the south of the site (L_{wA} dB ref 10^{-12} W and L_{pA} dB ref $2*10^{-5}$ Pa)

	Sound pressure level (dB)
24 condensers SWL L_{wA}	81
L_{wA} to L_{pA} (average r=28 m, Q=2)	-37
Barrier attenuation	- 7
Facade correction	+ 3
Total L_{Aeq} at residencies over Harrison Street	40

Table C2 Calculation of cumulated condenser noise emissions at 1 m to the nearest window at the Beauty Academy to the north of the site (L_{wA} dB ref 10^{-12} W and L_{pA} dB ref $2*10^{-5}$ Pa)

	Sound pressure level (dB)
24 condensers SWL L_{wA}	81
L_{wA} to L_{pA} (average r=22 m, Q=2)	-35
Barrier attenuation	- 11
Facade correction	+ 3
Total L_{Aeq} at the Beauty Academy	38