

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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200 Gray's Inn Road

Plant noise assessment

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Version	Date	Comments	Author	Reviewer
A	17 Aug 18		Andrew Mulligan	Daryl Prasad
B	14 Jan 19	Additional plant added	Zac Fox	Daryl Prasad

Summary

Sandy Brown has been commissioned by The Great Ropemaker Partnership and Bloomsbury Project Management Ltd to provide acoustic advice in relation to the installation of new mechanical plant at 200 Gray's Inn Road, London, WC1X 8XZ.

An environmental noise survey has been carried out to determine the existing background sound levels in the area and to set appropriate plant noise limits in line with the requirements of the Local Authority.

The noise survey was performed between 11:17 on 10 August 2018 and 14:32 on 14 August 2018.

The representative background sound levels measured during the survey were $L_{A90,15min}$ 50 dB during the daytime and $L_{A90,15min}$ 49 dB at night.

Based on the requirements of the London Borough of Camden and on the results of the noise survey, 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 $L_{Aeq,15min}$ 40 dB during the daytime, and $L_{Aeq,15min}$ 39 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 penalty based on the type and impact of those features will be applied, and the limits will be more stringent than those set.

The proposed plant noise has been assessed and deemed to comply with the requirements of the London Borough of Camden.

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1 Introduction

Sandy Brown has been commissioned by The Great Ropemaker Partnership and Bloomsbury Project Management Ltd to provide acoustic advice in relation to the installation of new mechanical plant at 200 Gray's Inn Road, London, WC1X 8XZ.

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.

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.

2 Site description

2.1 The site and its surrounding

The site location in relation to its surroundings is shown in Figure 1. 200 Gray's Inn Road is highlighted in red. The location of the proposed plant is highlighted in orange. The nearest noise sensitive premises are highlighted in green. In the same figure, the unattended survey location is denoted by the letter "A".

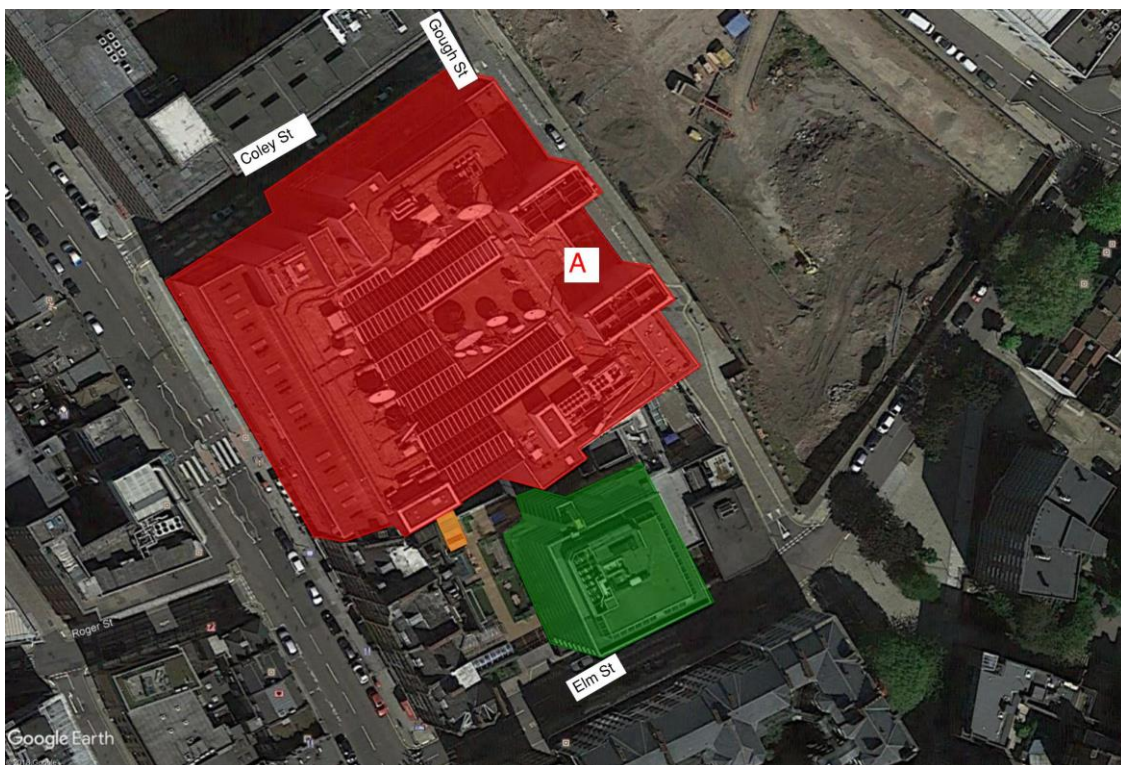


Figure 1 Site map (courtesy of Google Earth Pro)

2.2 Adjacent premises

200 Gray's Inn Road is an office building. It is surrounded by other office premises to the north and south with mixed use across Gray's Inn Road to the east. A new mixed-use development at Mount Pleasant is under construction to the East from the site, across Gough Street.

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 11:17 on 10 August 2018 and 14:32 on 14 August 2018. The equipment was installed by Daryl Prasad and collected by Andrew Mulligan.

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

The measurements were made are assumed to be free-field without the influence of a facade.



Figure 2 Unattended survey at Location A

4 Measurement results

4.1 Observations

The dominant noise sources observed at the site during the survey consisted construction works at Mount Pleasant and nearby mechanical plant noise. Less significant noise sources included road traffic on Coley Street and Gray's Inn Road.

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. The measurements are assumed to be free field without the influence of a facade.

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Table 1 Ambient noise levels measured during the survey

Date	Daytime (07:00 – 23:00)	Night (23:00 – 07:00)
	$L_{Aeq,16h}$ (dB)	$L_{Aeq,8h}$ (dB)
Friday 10 August 2018	-	51
Saturday 11 August 2018	64	51
Sunday 12 August 2018	53	50
Monday 13 August 2018	67	51
Average	61	51

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)	Night (23:00 – 07:00)
	$L_{A90,15min}$ (dB)	$L_{A90,15min}$ (dB)
Friday 10 August 2018	-	49
Saturday 11 August 2018	50	49
Sunday 12 August 2018	49	49
Monday 13 August 2018	50	49

The lowest background sound levels measured during the survey were $L_{A90,15min}$ 49 dB during the daytime and $L_{A90,15min}$ 49 dB at night.

In line with BS 4142:2014, for the purpose of analysis and establishing representative background sound levels, day and night time typical levels have been quantified using statistical analysis from the continuous logging measurements.

Daytime and night time statistical analysis of representative values for the site are given in Figure 3 and Figure 4.

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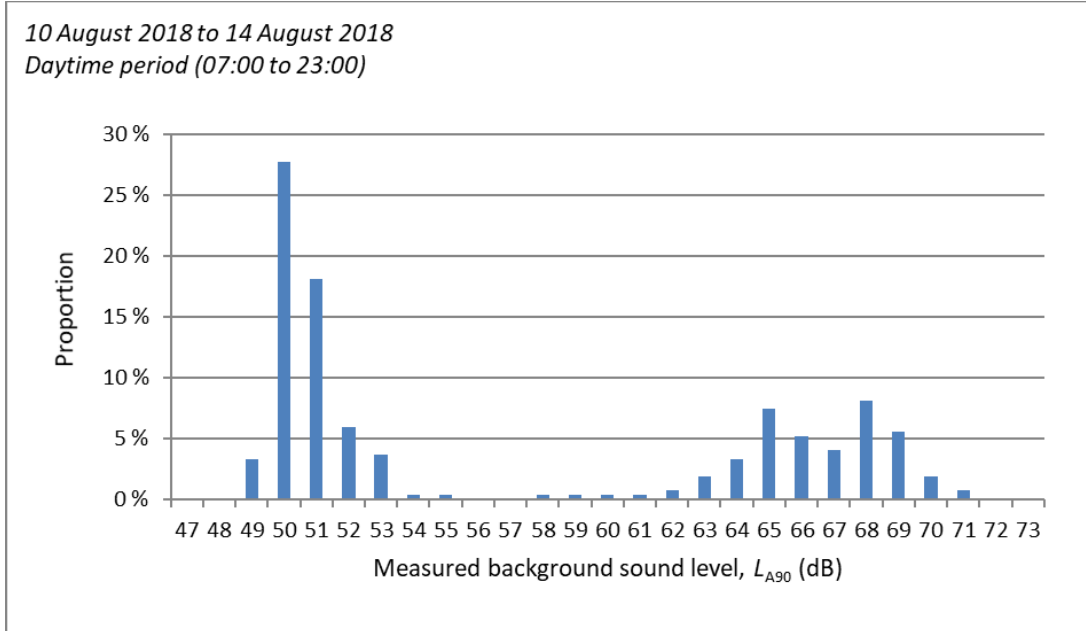


Figure 3 Statistical analysis of day time background sound level at 200 Gray's Inn Road

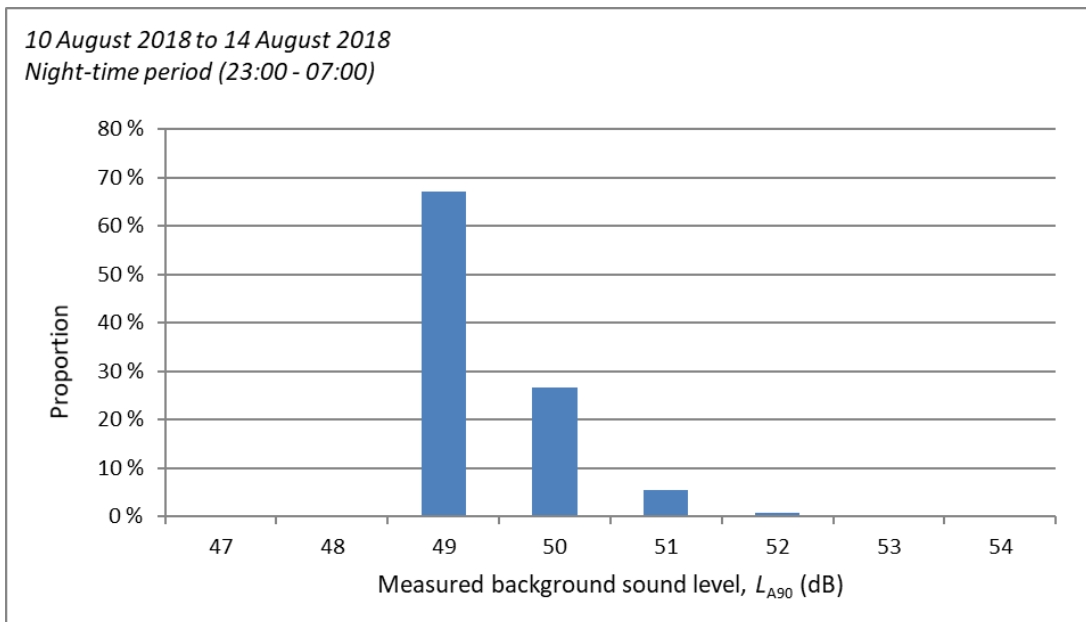


Figure 4 Statistical analysis of night time background sound level at 200 Gray's Inn Road

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 50 dB during the daytime and $L_{A90,15min}$ 49 dB at night.

5 Building services noise egress limits

5.1 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.

5.2 Local Authority criteria

London Borough of Camden states in *Camden Development Policies – Section 3, DP 28* 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	10 dB(A) < L_{A90}
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 m external to a sensitive facade	15 dB(A) < L_{A90}
Noise that has distinct impulse (bangs, clicks, clatters, thumps) at 1 m external to a sensitive facade	15 dB(A) < L_{A90}

5.3 Limits

5.3.1 Basic 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.

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

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises ($L_{Aeq,15min}$ dB)
Daytime (07:00-23:00)	40
Night-time (23:00-07:00)	39

The limits set out in Table 4 do not include any attention catching features. The penalties for attention catching features are 5 dB as highlighted in Table 3.

5.4 Assessment

The proposed plant is to include two new condensers and one toilet extract fan. Octave band sound power levels for the plant are shown in Table 5.

Table 5 Plant sound power levels, dB re 10^{-12} W

	Octave-band centre frequency (Hz)						
	63	125	250	500	1000	2000	4000
Condenser unit RZASG100MV1	77	73	73	69	62	56	53
Condenser unit REYQ12T	-	71	70	69	65	59	54
Condenser unit REYQ16T	-	77	76	74	70	63	59
Toilet extract fan ACQ10012D	54	57	63	59	60	54	49

The plant is to be located in an existing light well to the south of 200 Gray's Inn Road. The locations of the proposed plant are shown in Figure 5.

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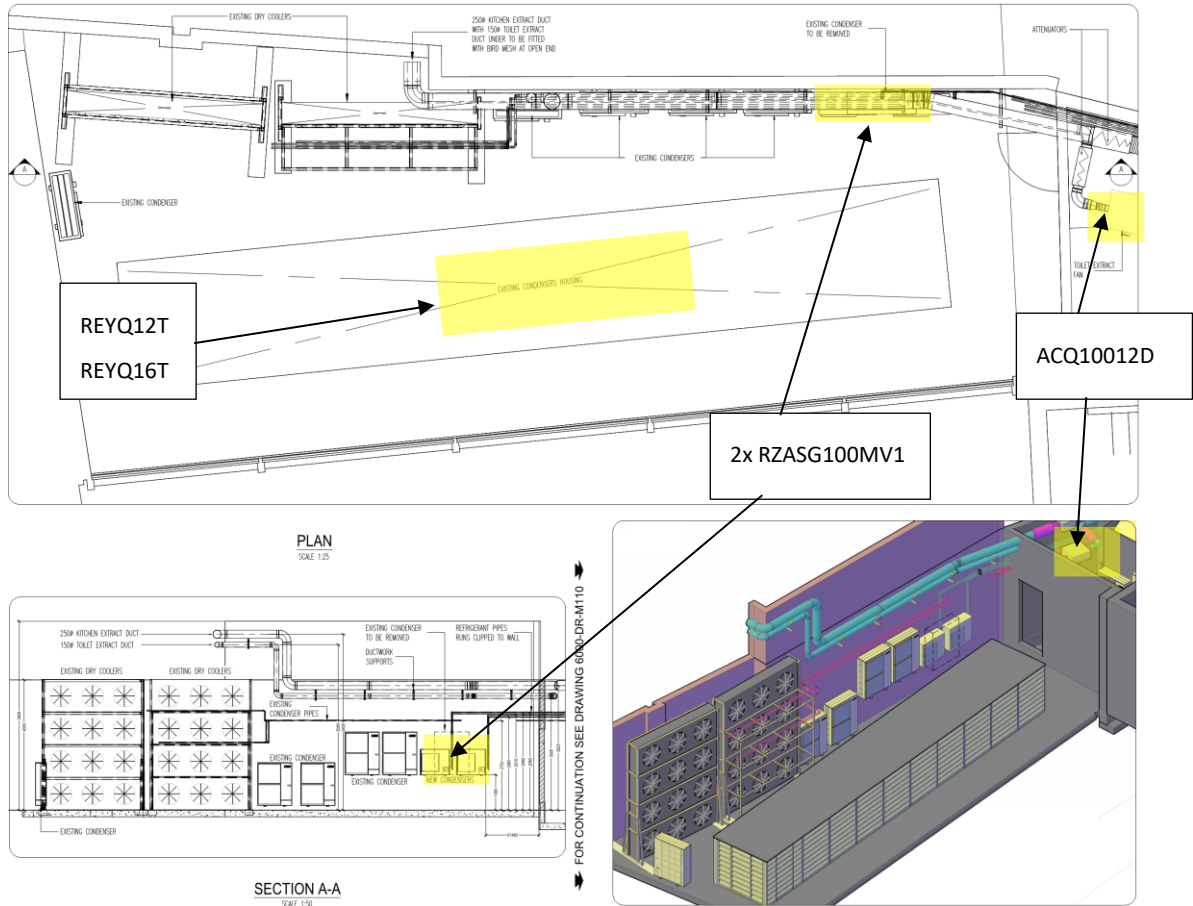


Figure 5 Plant locations, highlighted yellow

A full octave band assessment has been undertaken with the overall summary presented in Table 4. The predicted noise levels at the nearest noise sensitive receiver is L_{Aeq} 36 dB, and below the limits set out.

Table 6 Assessment of condenser unit's sound pressures level at nearest noise sensitive receiver

	Sound level L_{Aeq} dB
2 x Condenser units (RZASG100MV1) L_w	73
Extract fan (ACQ10012D) L_w	63
Condenser unit (REYQ12T)	70
Condenser unit (REYQ16T)	75
Combined sound power level of units	78
Distance attenuation (12 m)	-30
Barrier attenuation	-15
Facade correction	3
Level at nearest noise sensitive receiver	36

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 $L_{A90,15min}$ 50 dB during the day, and $L_{A90,15min}$ 49 dB during the night.

On the basis of the requirements of the Local Authority, the relevant plant noise limits at the worst affected existing noise sensitive premises would be L_{Aeq} 40 dB during the day, and L_{Aeq} 39 dB during the night.

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

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Appendix A

Survey details

Equipment

A RL-32 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-32/00623762	Rion	06 Oct 19	TCRT17/1653
Microphone	UC-53A/319234	Rion	06 Oct 19	TCRT17/1653
Pre-amp	NH-21/76670	Rion	06 Oct 19	TCRT17/1653
Calibrator	NC-74/36670	Rion	05 Oct 19	TCRT17/1651

Calibration of the sound level meters used for the tests is traceable to national standards. The calibration certificates for the sound level meter(s) 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 10 August 2018 and 14 August 2018, weather reports for the area indicated that temperatures varied between 18°C at night and 24°C during the day, and the average wind speed was less than 5 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location A

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200 Gray's Inn Road
Results of noise logging survey at 200 Gray's Inn Road
10 August 2018 to 14 August 2018

