

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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30 Lincoln's Inn Field

Noise survey and plant noise egress limits

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

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Summary

Sandy Brown has been commissioned by The Honourable Society of Lincoln's Inn to provide acoustic advice in relation to the proposed refurbishment at 30 Lincoln's Inn Field, London.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was carried out between 12:06 on 27 January 2022 and 10:01 on 3 February 2022.

The representative background sound levels measured during the survey were $L_{A90,5min}$ 51 dB during the daytime and $L_{A90,5min}$ 47 dB at night.

Based on the requirements of the Local Authority 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 $L_{Aeq,5min}$ 41 dB during the daytime, and $L_{Aeq,15min}$ 37 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, a penalty based on the type and impact of those features will be applied, and the limits will be more stringent than those set.

At this stage, no information is available in relation to the proposed plant. This will need to be assessed as the design progresses.

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1 Introduction

Sandy Brown has been commissioned by The Honourable Society of Lincoln's Inn to provide acoustic advice in relation to the proposed refurbishment works at 30 Lincoln's Inn Field, London.

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 and results, and a discussion of acceptable limits for noise emissions 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.

The site is located on the corner of two roads (Newman's Row and Whetstone Park) and one pedestrian passage (Great Turnstile).



Figure 1 Aerial view of site (courtesy of Google Earth Pro)

2.2 Adjacent premises

The nearest non-residential uses (highlighted in red) are Queen's Court Law at 29 Lincoln's Inn Fields to the west and The English Studio (language school) at 10 Great Turnstile to the north.

The nearest residential uses (highlighted in blue) are apartments located within 13 Great Turnstile to the north.

3 Building services noise egress criteria

3.1 Standard guidance

BS 4142:2014:+A1:2019 *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 nearby noise sensitive premises.

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.

3.2 Local Authority criteria

The site is located within the jurisdiction of the London Borough of Camden (LBC), which considers residential spaces, schools and hospitals to be noise sensitive. Appendix 3 of London Borough of Camden Local Plan (2017) states that:

"Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion."

4 Noise survey method

The survey included unattended noise measurements.

4.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 7 days.

Details of the equipment used and the noise indices measured are provided in Appendix A.

The unattended measurements were taken over 5-minute periods between 12:06 on 27 January 2022 and 10:01 on 3 February 2022. The equipment was installed and collected by Serena Joyes.

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.

The microphone was placed 1.5 m above a third-floor balcony on the north-west corner of the building, approximately 1m from the facade of the building.

This location was chosen to be reasonably representative of noise levels at the site and outside the nearest noise sensitive premises.



Figure 2 Photograph of logger at position 'L'

4.2 Weather conditions

Weather conditions during the survey are described in Appendix A.

5 Noise survey results

5.1 Observations

The dominant noise sources observed at the site during the survey was traffic along surrounding roads.

Less significant noise sources included plant noise from an adjacent building and faint construction activity.

5.2 Noise measurement results

5.2.1 Unattended measurement results

A graph showing the results of the unattended measurements is provided in Appendix B.

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

Measured minimum background sound levels are given in Table 2. The results are considered to be facade levels.

Table 1 Ambient noise levels measured during the unattended survey

Date	Daytime (07:00 – 23:00)	Night (23:00 – 07:00)
	$L_{Aeq,16h}$ (dB)	$L_{Aeq,8h}$ (dB)
27 January 2022	-	52
28 January 2022	58	52
29 January 2022	55	52
30 January 2022	53	52
31 January 2022	57	51
1 February 2022	57	53
2 February 2022	59	53
Average	57	52

Table 2 Minimum background sound levels measured during the unattended survey

Date	Daytime (07:00 – 23:00)	Night (23:00 – 07:00)
	$L_{A90,5min}$ (dB)	$L_{A90,5min}$ (dB)
27 January 2022	47 ^[1]	45
28 January 2022	49	46
29 January 2022	46	45
30 January 2022	46	43
31 January 2022	47	46
1 February 2022	48	45
2 February 2022	48	46

^[1] Measurement not made over full period due to monitoring start and end time.

The lowest background sound levels measured during the survey were $L_{A90,5min}$ 46 dB during the daytime and $L_{A90,5min}$ 43 dB at night.

In line with BS 4142:2014+A1:2019, representative background sound levels have been determined using statistical analysis of the continuous measurements.

Daytime and night-time statistical analysis of representative values for the site are given in Figure 3 and Figure 4. From this analysis, the representative background sound levels measured during the survey were $L_{A90,5min}$ 51 dB during the daytime and $L_{A90,5min}$ 47 dB at night.

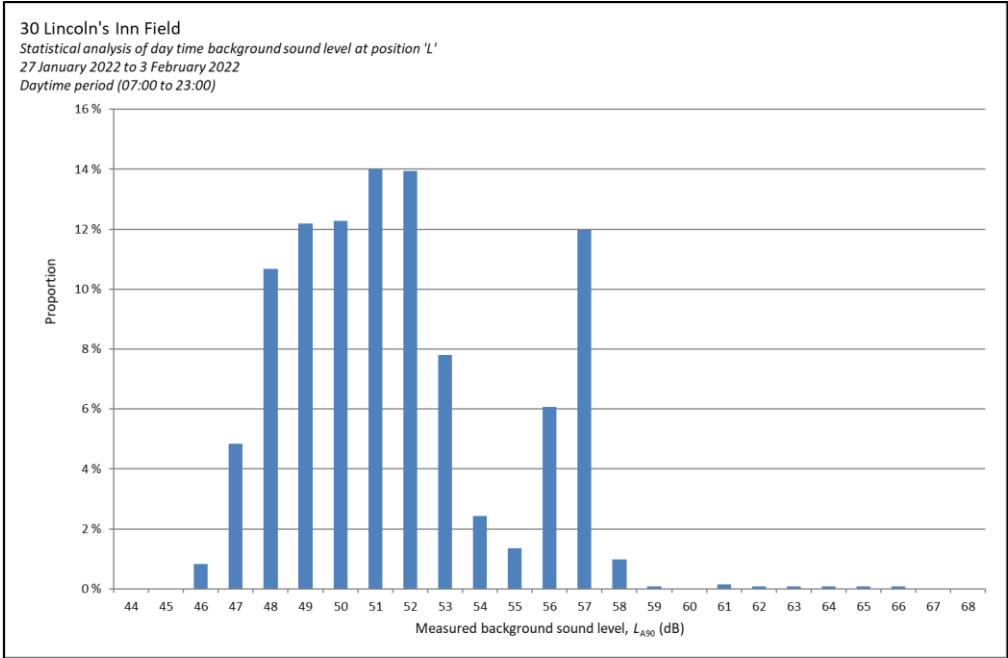


Figure 3 Daytime statistical analysis

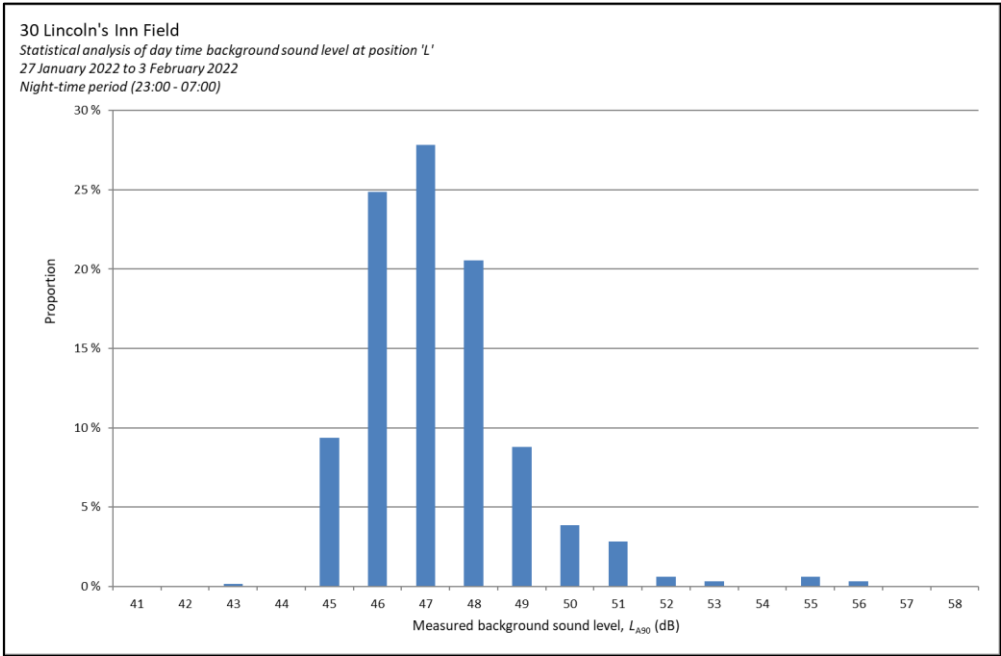


Figure 4 Night time statistical analysis

5.3 Basic limits

Based on the above criteria and measurement results, the cumulative noise level from the operation of all new plant should not exceed the limits set out in Table 3.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels.

Table 3 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, $L_{Aeq,5min}$ (dB)
Daytime (07:00-23:00)	41
Night-time (23:00-07:00)	37

^[1] The limits set out in Table 3 do not include any attention catching features. Penalty corrections for attention catching features may be significant and will need to be considered as the building services design progresses.

5.1 Plant noise assessment

All building services plant will be designed to achieve the noise limits set out above, including any corrections for attention catching features. At this stage, no information is available in relation to the proposed plant. This will need to be assessed as the design progresses.

6 Conclusion

The representative background sound levels from the noise survey were $L_{A90,15min}$ 51 dB during the day, and $L_{A90,15min}$ 47 dB during the night.

Based on the requirements of the Local Authority, the relevant plant noise limits at the worst affected existing noise sensitive premises are L_{Aeq} 41 dB during the day, and L_{Aeq} 37 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 penalty based on the type and impact of those features will be applied.

Appendix A

Survey details

Equipment

The unattended noise measurements were taken using a Rion NL-52 sound level meter.

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	22 Feb 23	TCRT21/1125
Microphone	UC-59/06185	Rion	22 Feb 23	TCRT21/1125
Pre-amp	NH-25/32730	Rion	22 Feb 23	TCRT21/1125
Calibrator	CAL200/4499	Larson Davis	19 Feb 23	TCRT21/1121

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

Calibration checks were carried out on the meters and their measurement chains at the beginning and end of the survey. No significant calibration deviation occurred.

Noise indices

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, T, 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.

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, weather reports for the area indicated that temperatures varied between -3°C at night and 15°C during the day, and the wind speed was less than 10 m/s.

No significant rain showers occurred.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location 'L'

30 Lincoln's Inn Field
Results of noise logging survey at position L
27 January 2022 to 3 February 2022

