

# SANDY BROWN

*Consultants in Acoustics, Noise & Vibration*

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## Maple House Phase 2, London

*Noise survey and plant noise assessment*

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

**Sandy Brown Ltd**

Registered in England & Wales

No. 13227735

**post@sandybrown.com**

**www.sandybrown.com**

Registered Office: 55 Charterhouse Street, London EC1M 6HA

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Version	Date	Comments	Author	Reviewer
A	4 Aug 23		Philip Owen	Edward Farrer
B	9 Feb 24		Mihalis Bourzoukos	Edward Farrer

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## Summary

Sandy Brown has been commissioned by Cushman & Wakefield to provide acoustic advice in relation to the proposed development at 149 Tottenham Court Road, W1T 7NF, London.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was performed between 14:51 on 30 June 2023 and 14:36 on 7 July 2023.

The representative background sound levels measured during the survey were:

- $L_{A90,15min}$  52 dB during the day and  $L_{A90,15min}$  50 dB at night at measurement location 1
- $L_{A90,15min}$  60 dB during the day and  $L_{A90,15min}$  54 dB at night at measurement location 2.

Based on the requirements of the Camden Council 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  $L_{Aeq,15min}$  45 dB during the day, and  $L_{Aeq,15min}$  43 dB during the night. These have been corrected relative to the measured free-field background sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

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.

An assessment of the noise emissions from the proposed roof top building services plant indicates full compliance with the noise limits.

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## 1 Introduction

Sandy Brown has been commissioned by Cushman & Wakefield to provide acoustic advice in relation to the proposed redevelopment of Maple House, 149 Tottenham Court Road, W1T 7NF, 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, the proposed limits for noise emissions from building services plant and an assessment of the noise emissions from the rooftop 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. Maple House is located on Tottenham Court Road.

The dominant noise source in the vicinity is road traffic from Tottenham Court Road.



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

## 2.2 Adjacent premises

Maple House is shown in red, with the position of the unattended noise loggers shown as markers 1 and 2 in Figure 1.

To the north of the site is University College Hospital (highlighted in orange), to the east and south are residential properties 30-40 Grafton Way (highlighted in yellow), commercial/office premises to the west (highlighted in blue) and University College London Hospital Children's Emergency Department to the south (highlighted in green).

## 3 Development proposals

Maple House is being redeveloped to include commercial offices, which will typically be fully operational 08:00 and 19:00 between Monday and Friday. However, some building services plant associated with the building will be operational 24/7 to support essential systems.

## 4 Building services noise egress criteria

### 4.1 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 sound 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.

### 4.2 Local Authority criteria

Appendix 3 of the London Borough of Camden's Local Plan states noise emission from building services plant should be 10 dB below the existing background noise level, increasing to 15 dB for noise that contains audible tonal elements. The noise criteria only apply at residential properties.

## 5 Noise survey method

### 5.1 Unattended measurements

Unattended noise monitoring was undertaken at the site over 8 days.

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

The unattended measurements were taken over 15 minute periods between 14:51 on 30 June 2023 and 14:36 on 7 July 2023.

The measurement position used during the survey is indicated in Figure 1, denoted by the numbers 1 and 2. A photograph showing the measurement locations is provided in Figure 2 and Figure 3 respectively. The measurements completed at location 1 are representative of the conditions experienced at 30-40 Grafton Way, the nearest residential properties.



Figure 2 Photograph showing the logger at location 1



Figure 3 Photograph showing the logger at location 2

## 5.2 Weather conditions

Weather conditions during the survey are described in Appendix A.

# 6 Noise survey results

## 6.1 Observations

The dominant noise source during the survey was road traffic from Tottenham Court Road. Other notable noise sources included the building services plant associated with the surrounding buildings and particularly University College Hospital.

## 6.2 Noise measurement results

### 6.2.1 Unattended measurement results

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

Ambient noise levels measured during the unattended survey are presented in Table 1 (location 1) and Table 2 (location 2).

All measurements were completed in free field conditions.



Table 1 Ambient noise levels measured during the unattended survey at location 1

Date	Day (07:00 – 23:00)	Night (23:00 – 07:00)
	$L_{Aeq,16h}$ (dB)	$L_{Aeq,8h}$ (dB)
Friday 30 June 2023	– <sup>[1]</sup>	53
Saturday 1 July 2023	54	52
Sunday 2 July 2023	53	52
Monday 3 July 2023	61	51
Tuesday 4 July 2023	56	53
Wednesday 5 July 2023	58	52
Thursday 6 July 2023	59	52
Friday 7 July 2023	– <sup>[1]</sup>	–
Average	57	52

<sup>[1]</sup> Measurement not made over full period due to monitoring start and end time

Table 2 Ambient noise levels measured during the unattended survey at location 2

Date	Day (07:00 – 23:00)	Night (23:00 – 07:00)
	$L_{Aeq,16h}$ (dB)	$L_{Aeq,8h}$ (dB)
Friday 30 June 2023	– <sup>[1]</sup>	65
Saturday 1 July 2023	67	64
Sunday 2 July 2023	66	64
Monday 3 July 2023	66	62
Tuesday 4 July 2023	69	65
Wednesday 5 July 2023	68	64
Thursday 6 July 2023	69	63
Friday 7 July 2023	– <sup>[1]</sup>	65
Average	68	64

<sup>[1]</sup> Measurement not made over full period due to monitoring start and end time

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.

Day and night statistical analysis of representative values for the site are given in Figure 4 (location 1) and Figure 5 (location 2).

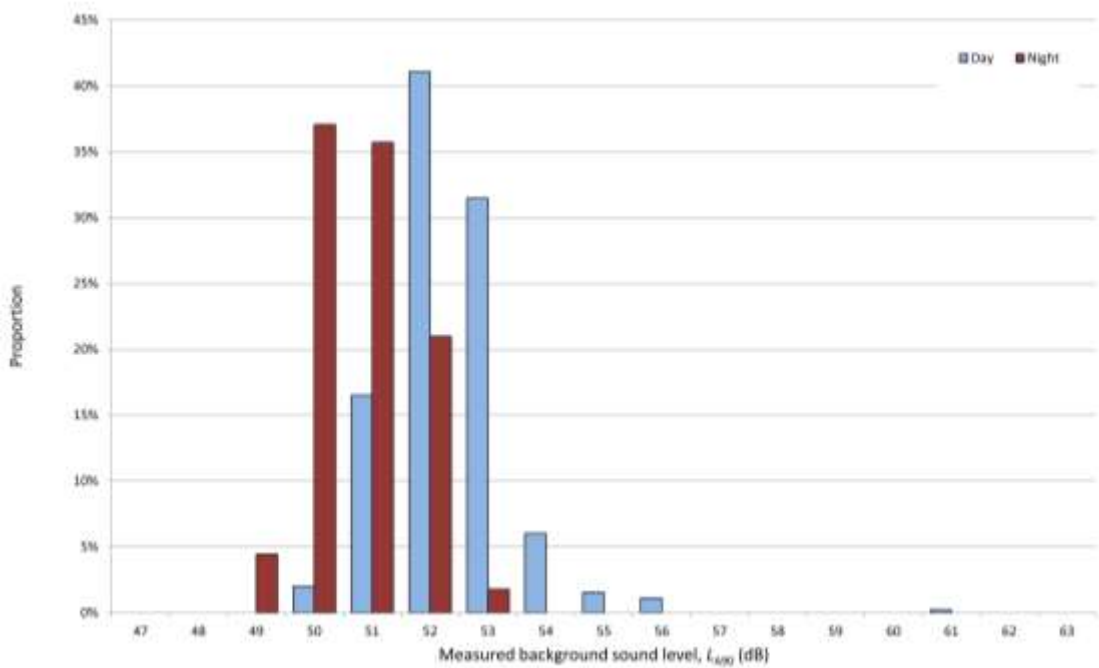


Figure 4 Statistical analysis of measured background sound levels at location 1

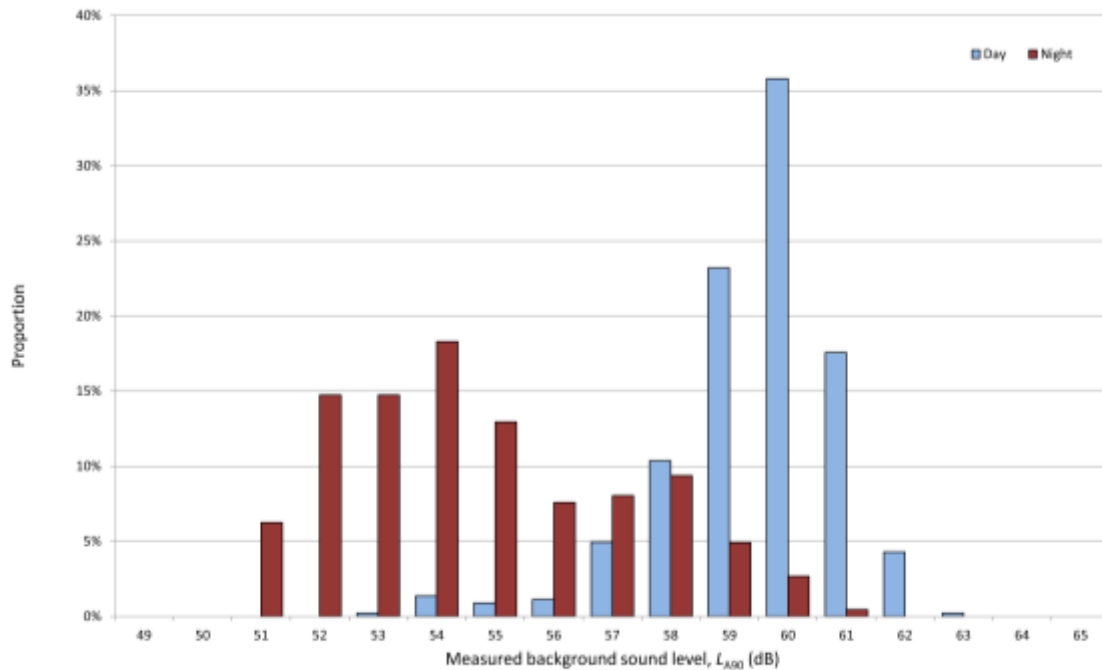


Figure 5 Statistical analysis of measured background sound levels at location 2

From this analysis, the representative background sound levels measured during the survey were  $L_{A90,15min}$  52 dB during the day and  $L_{A90,15min}$  50 dB at night at measurement location 1.

The representative background sound levels measured during the survey were  $L_{A90,15min}$  60 dB during the day and  $L_{A90,15min}$  54 dB at night at measurement location 2.

## 6.3 Basic limits

Based on the above criteria and the 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 windows of 30-40 Grafton Way, the nearest residential receptor. These have been corrected relative to the measured free-field background sound levels at measurement location 1 by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

Table 3 Plant noise limits at 1 m from the nearest noise sensitive premises (30-40 Grafton Way)

Time of day	Maximum sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,15min}$ (dB)
Day (07:00-23:00)	45
Night (23:00-07:00)	43

[1] The limits set out in Table 3 do not include any attention catching features. A 5 dB penalty would apply if the noise includes acoustic features

## 7 Plant noise assessment

The Level 7 external roof top plant area is to include 42 condensing units, as illustrated in Figure 6. A further 16 condensing units and one air handling unit will be housed in the Level 8 internal plant room with louvres at the front and rear. The rear louvres will be 300 mm deep acoustic louvres.

An impervious 2.6 m high screen surrounding the Level 7 roof plant area will be constructed with sound absorbing treatment facing the units.

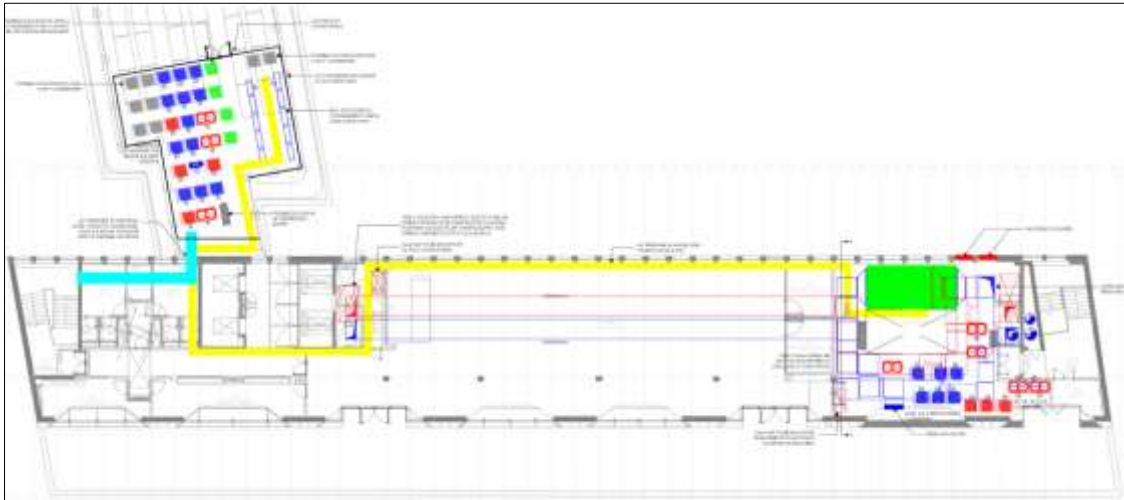


Figure 6 Building services plan showing Level 7 roof plant area (top left) and Level 8 plant room (far right)

### 7.1 Proposed plant selections

The manufacturer sound level data for the units used in the assessment are in Table 4 and Table 5. The sound levels for the condensing units are for their standard cooling mode.

Table 4 Sound levels for condensing units in the Level 7 plant area

Units	Type	Sound power level	Sound pressure level at 1m
		dBA	dBA
10	Mitsubishi PURY-EP350YNM-A	81	62
18	Daikin RXYQQ10U	79	57
2	Daikin RXYQQ8U	78	57
1	Daikin REYQ8T7Y1B	78	57
8	Mitsubishi PUZZM250YKA	-	59
1	Mitsubishi PU-P6YGAA	-	57
1	Mitsubishi PUH-P3YGA	-	51
2	Daikin RXM35R9	-	49
1	Mitsubishi PUHZ-ZRP35VKA1	-	46

Table 5 Sound levels for items in the Level 8 plant room

Units	Type	Sound power level	Sound pressure level at 1m
		dBA	dBA
3	Mitsubishi PURY-EP350YNM-A	81	62
3	Mitsubishi PURY-EP300YNM-A	80	61
3	Daikin RXYQQ10U	79	57
2	Daikin RXM35R9	-	49
1	AHU Exhaust	67 <sup>[1]</sup>	-

<sup>[1]</sup> Inclusive of integral attenuation

It is noted that sound data for 3 units in the plant room are not available. Given the number of similar items the omissions would not influence the results from the calculations completed.

Based on the exhaust sound levels, breakout from the AHU's casing is expected to be significantly lower and not contribute to overall plantroom sound levels, therefore it has been scoped out of the assessment.

### 7.2 Assessment

An environmental noise model has been created using CadnaA 2023 MR2. The environmental noise model completes calculations in accordance with ISO 9613-2 *Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation* which accounts for distance attenuation, screening and reflections.

Calculations have been completed for the Level 7 roof top plant area including contributions from the Level 8 plant room air handling louvres. Images from the model are shown in Figure 7 and Figure 8 View south to north of calculated sound pressure levels at the facade of 30-40 Grafton Way.

The calculations indicate a sound pressure level up to  $L_{Aeq}$  45 dB at 1 m from the rear facade of 30-40 Grafton Way when all plant is operating simultaneously.

With the mitigation measures mentioned in section 7 the predictions indicate compliance with the proposed day limits in Table 3. The night limits, which are 2 dB lower, are also expected to be met due to a significantly smaller number of units expected to operate during the night.

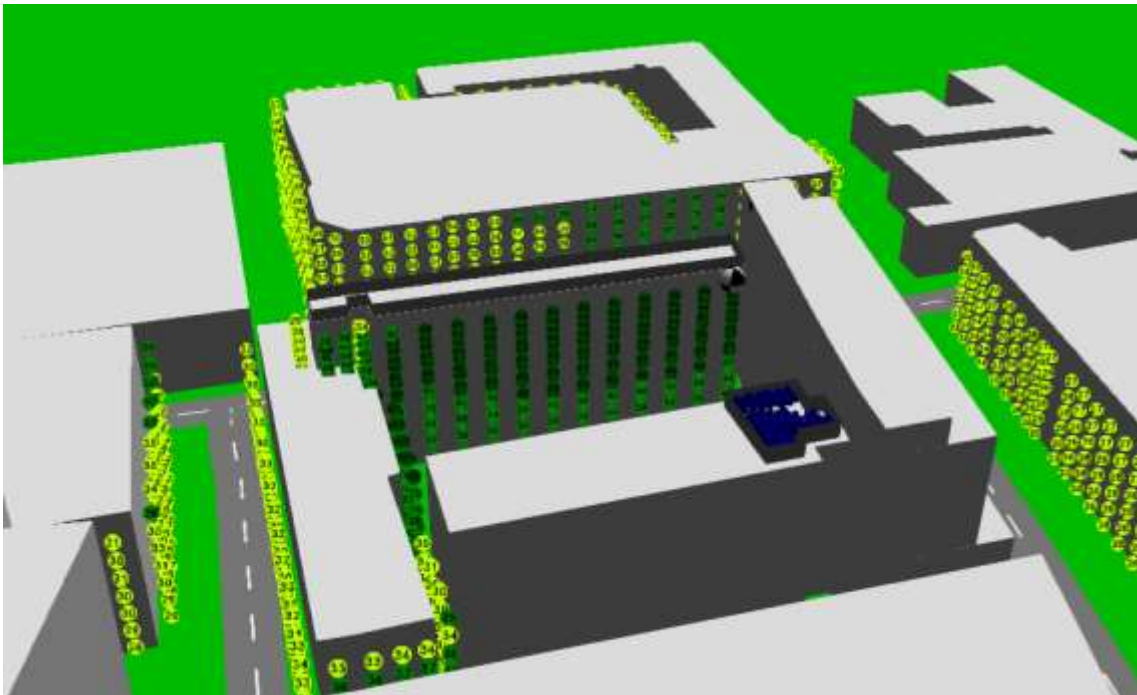


Figure 7 View north to south of calculated sound pressure levels at the facade of 30-40 Grafton Way

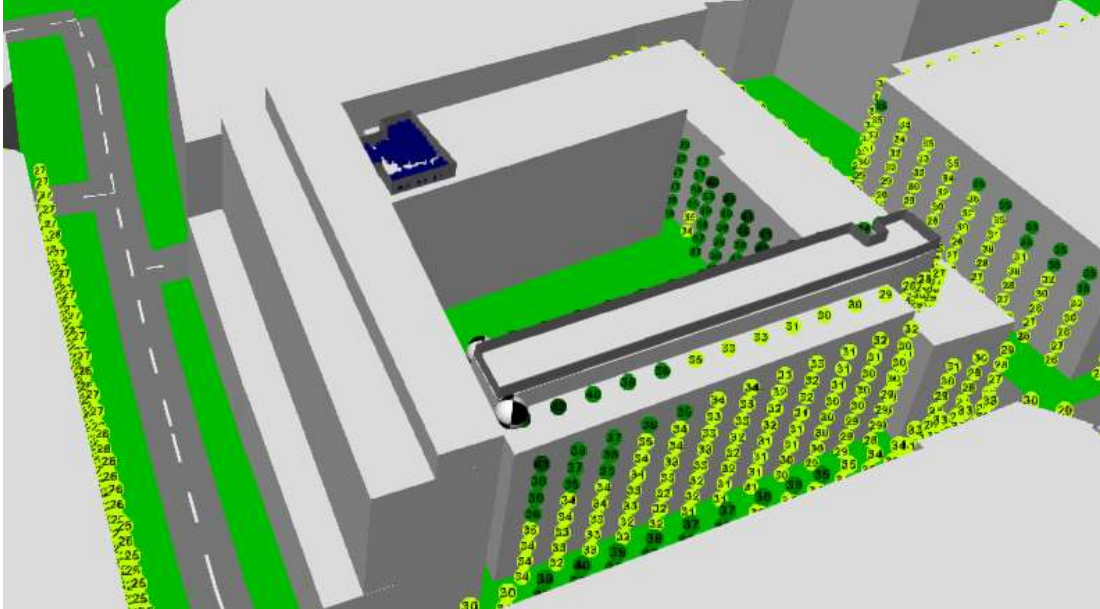


Figure 8 View south to north of calculated sound pressure levels at the facade of 30-40 Grafton Way

## 8 Conclusion

The representative background sound levels measured during the survey were  $L_{A90,15\text{min}}$  52 dB during the daytime and  $L_{A90,15\text{min}}$  50 dB at night at measurement location 1, which are representative of the nearest residential properties.

Based on the requirements of the Local Authority, the relevant plant noise limits at the worst affected existing noise sensitive premises are  $L_{Aeq}$  45 dB during the day, and  $L_{Aeq}$  43 dB during the night. These have been corrected relative to the measured free-field background sound levels by the addition of 3 dB (as per the guidance provided in BS 8233:2014 Section G.2.1).

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 5 dB more stringent than those set out above.

The assessment of plant noise emissions indicates that the current design would comply with the proposed limits.

## Appendix A

### Survey details



## Equipment

The unattended and attended noise measurements were taken using two Rion NL-52 sound level meters.

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	27 Feb 25	TCRT23/1190
Microphone	UC-59/06185	Rion	27 Feb 25	TCRT23/1190
Pre-amp	NH-25/32730	Rion	27 Feb 25	TCRT23/1190
Calibrator	CAL200/4499	Larson Davis	24 Feb 25	TCRT23/1184
Sound level meter	NL-52/00264531	Rion	5 Jul 24	TCRT22/1430
Microphone	UC-59/09678	Rion	5 Jul 24	TCRT22/1430
Pre-amp	NH-25/64656	Rion	5 Jul 24	TCRT22/1430
Calibrator	NC-75/35013664	Rion	5 Jul 24	TCRT22/1427

[1] Calibration of the meters used for the measurements is traceable to national standards. Calibration certificates for the sound level meters 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 attended noise measurements, the weather was generally clear and dry and no rain occurred. Wind speeds were measured at each position and varied up to 4 m/s.

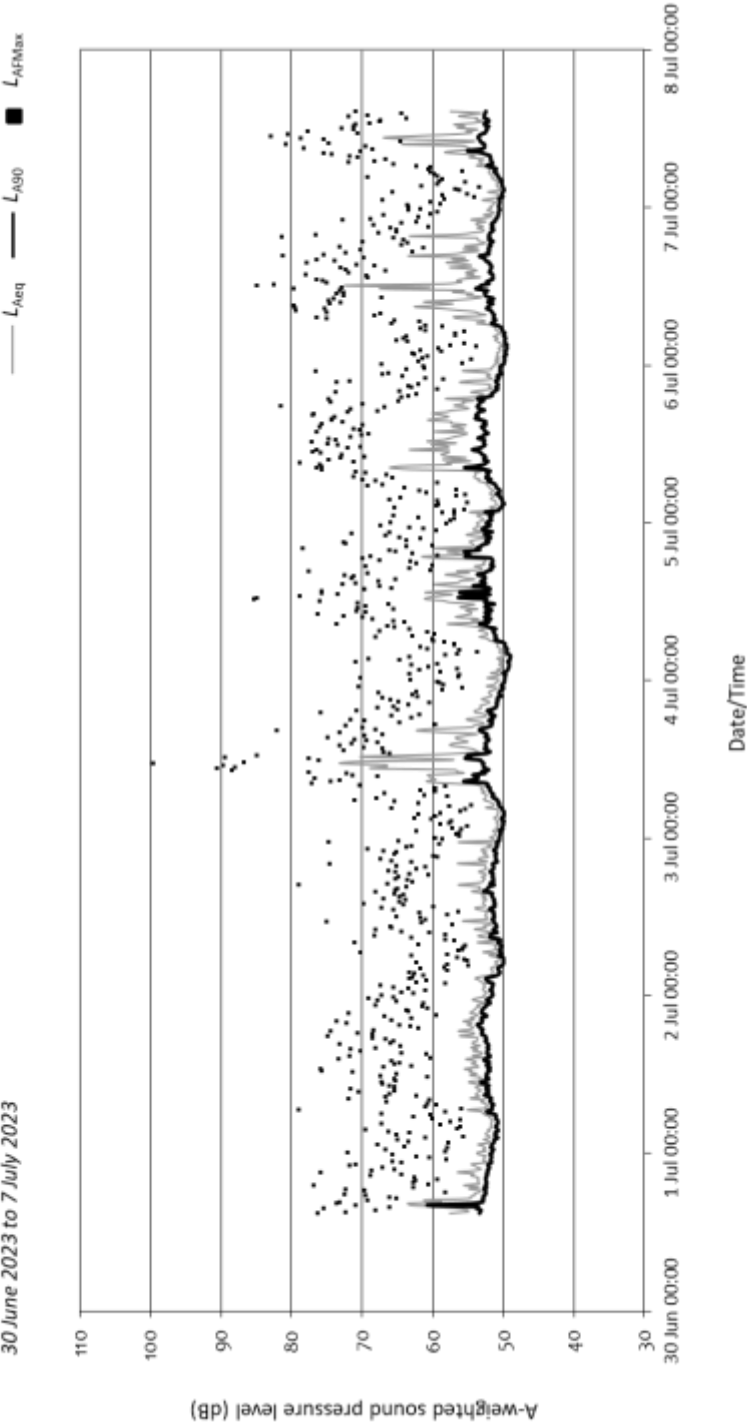
During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 10°C at night and 22°C during the day, and the wind speed was less than 10 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

## Appendix B

### Results of unattended measurements at location 1

Maple House Phase 2  
Results of noise logging survey at location 1  
30 June 2023 to 7 July 2023



## Appendix C

### Results of unattended measurements at location 2

