SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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2 Prince of Wales Road, London

Plant noise egress report

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

post@sandybrown.com
www.sandybrown.com

Sandy Brown Ltd
Registered in England & Wales No. 13227735

Registered Office: 55 Charterhouse Street, London EC1M 6HA

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A	27 Sep 22		Daniel Shaw	Matthew Robinson
B	29 Sep 22	Updated Figure 5	Daniel Shaw	Matthew Robinson
C	26 Jan 23	Updated plant layouts	Daniel Shaw	Matthew Robinson

Summary

Sandy Brown has been commissioned to provide acoustic advice in relation to the proposed development at 2 Prince of Wales Road, 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 15:30 on 16 June 2022 and 09:30 on 23 June 2022.

The representative background sound levels measured during the survey were $L_{A90,15min}$ 45 dB during the daytime and $L_{A90,15min}$ 36 dB at night. Based on the London Borough of Camden Council requirements, the limits for noise egress from plant are $L_{Aeq,15min}$ 35 dB during the daytime and $L_{Aeq,15min}$ 26 dB at night.

The proposed plant items are predicted to meet the daytime limits. A setback in duty of at least 10 dB is required to meet the night-time limits. This is expected to be acceptable given the building is unlikely to be occupied during the night.

Contents

1 Introduction

Sandy Brown has been commissioned to provide acoustic advice in relation to the proposed development at 2 Prince of Wales Road, London.

As part of this, an environmental noise survey has been carried out to establish the existing sound levels on and around the site.

This report presents the survey method and results, plant noise egress limits, and an assessment of the proposed items of plant.

2 Site description

2.1 The site and its surrounding

The site location in relation to its surroundings is shown highlighted red in Figure 1. The site currently houses offices for Camden Community Law Centre. The site is bound by Prince of Wales Road to the south, Grafton Yard to the west, and is close to Kentish Town Road to the east.

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

2.2 Adjacent premises

The site is surrounded by a mix of residential and commercial premises. To the west is a residential development, highlighted in blue. To the south at 1 Prince of Wales Road is an mixed residential development highlighted yellow, while to the north and east is a mix of ground floor commercial retail and upper floor residential, highlighted green.

3 Development proposals

The development includes the proposed renovation of the existing cinema building into mixed flexible office spaces. As part of this, new ventilation, heating and cooling plant is proposed.

3.1 Hours of operation

The commercial uses proposed as part of the development will operate during normal daytime hours, with events occasionally lasting into the late evening. No late night usage is proposed.

3.2 Potential noise sources

The potential noise sources associated with the scheme can be broadly divided into two categories:

- Building services plant
- Internal activity in commercial units.

The potential impact of these sources has been assessed and mitigation measures have been proposed to minimise impact on existing noise sensitive premises around the development.

4 Assessment criteria

4.1 NPPF and NPSE

The National Planning Policy Framework, July 2021 (NPPF) sets out the UK government's planning policies for England. It supersedes previous guidance notes such as PPG24. No specific noise criteria are set out in the NPPF, or in the Noise Policy Statement for England (NPSE) to which it refers.

The NPPF states:

> *'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> - *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life.*
> - *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.'*

and

> *'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'*

The NPSE states that its aims are as follows:

> *'Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
>
> - *Avoid significant adverse impacts on health and quality of life*
> - *Mitigate and minimise adverse impacts on health and quality of life and*
> - *Where possible, contribute to the improvement of health and quality of life.'*

4.2 Noise egress

4.2.1 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 the nearest 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.

4.2.2 Local Authority criteria

Camden Local Plan 2017 requires noise egress to be assessed in line with BS 4142, with noise rating levels to be 10 dB below the typical background noise levels. Where tonality is present at the receptors, the limits should be reduced by 5 dB.

5 Noise survey method

The survey included unattended and attended noise measurements.

5.1 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 15 minute periods between 15:30 on 16 June 2022 and 09:30 on 23 June 2022. The equipment was installed and collected by Paul Monaghan.

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 noise levels across the site and at the nearest noise sensitive premises.

The microphone was positioned approximately 1.2-1.5 m above ground and at least 0.5 m from vertical surfaces, ie, facade conditions.

Figure 2 Photograph showing unattended equipment at measurement location A

5.2 Attended measurements

Attended sample measurements were taken by Paul Monaghan at 1 location near the site. This are indicated in Figure 1 as positions 1. The measurements were carried out on 16 June 2022, over 15 minute periods.

At this position the microphone was mounted on a tripod approximately 1.2 m above the ground level and at least 3 m from any other reflective surface. Details of the equipment used and the noise indices measured are provided in Appendix A.

Dominant noise sources occurring during the measurements were noted.

5.3 Weather conditions

Weather conditions during the survey are described in Appendix A.

6 Noise survey results

6.1 Observations

The dominant noise sources observed during the survey were road traffic noise from Prince of Wales Road and Kentish Town road, with road works also taking place on Kentish Town Road.

6.2 Noise measurement results

6.2.1 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 minimum background sound levels measured during the unattended survey are presented in Table 1

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

Table 1 Ambient noise levels measured during the survey for location A

Date	Daytime (07:00- 23:00)	Night (23:00- 07:00)
	$L_{Aeq,\ 16\ hour}$ (dB)	$L_{Aeq,\ 8\ hour}$ (dB)
Thursday 16 June 2022	-	56
Friday 17 June 2022	62	56

Date	Daytime (07:00- 23:00) $L_{Aeq,\ 16\ hour}$ (dB)	Night (23:00- 07:00) $L_{Aeq,\ 8\ hour}$ (dB)
Saturday 18 June 2022	59	60
Sunday 19 June 2022	59	53
Monday 20 June 2022	60	55
Tuesday 21 June 2022	61	53
Wednesday 22 June 2022	60	54
Average	60	55

In line with BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial noise*, 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 location A are given in Figure 3 and Figure 4.

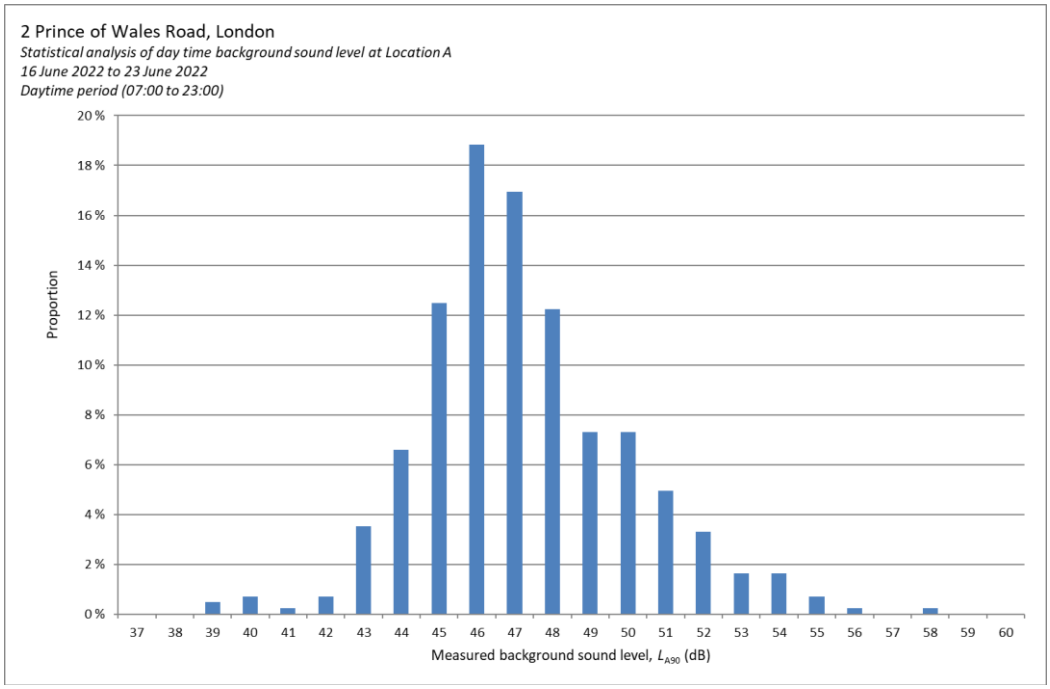


Figure 3 Statistical analysis of daytime background sound level at location A

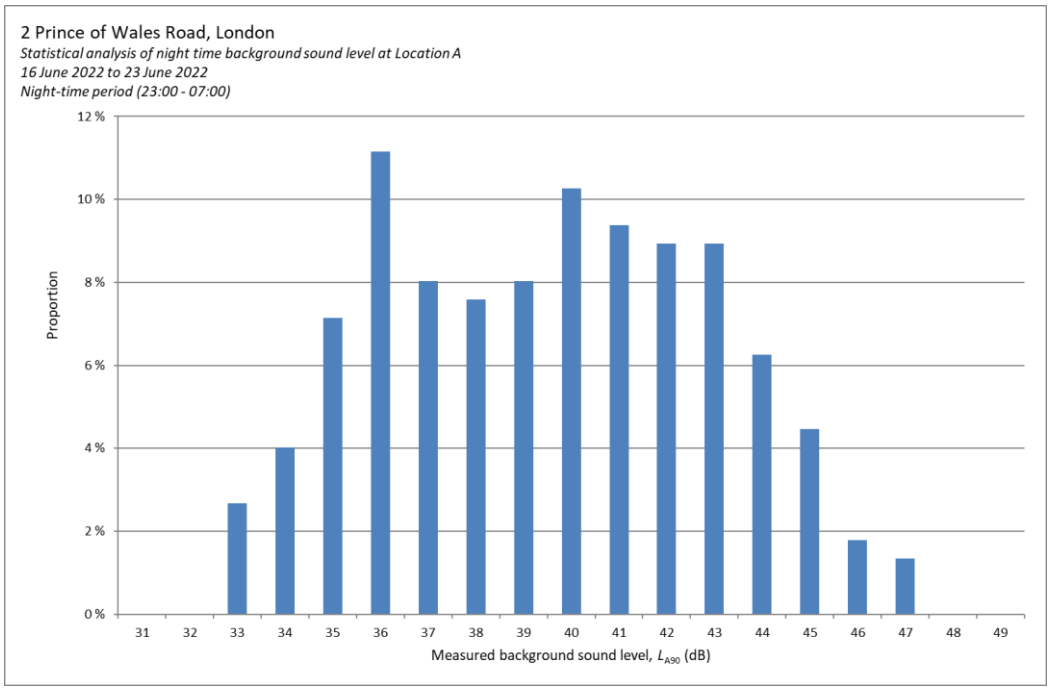


Figure 4 Statistical analysis of night-time background sound level at location A

From this analysis, the representative background sound levels (defined in this case as the mode of the background sound levels) measured for location A during the survey were $L_{A90,15min}$ 45 dB during the daytime and $L_{A90,15min}$ 36 dB at night.

6.2.2 Attended measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 2.

The microphone was positioned 1.2-1.5 m above ground and at least 3 m from vertical surfaces, ie, free field conditions.

Table 2 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,15min}$	$L_{AFmax,15min}$	$L_{A90,15min}$	
1	16:08	63	87	51	Road traffic, roadworks, passing pedestrians
	16:23	66	92	55	

7 Plant noise egress

7.1 Plant noise egress 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 worst affected windows of the nearest noise sensitive premises and are presented as facade levels. In this case these limits would apply at the surrounding existing and proposed residential receptors.

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, $L_{Aeq,15min}$ (dB)
Daytime (07:00 – 23:00)	35
Night-time (23:00 – 07:00)	26

[1] If the plant noise contains audible tonal elements the limits should be reduced by 5 dB.

Plant noise egress on external terraces and external publicly accessible areas should not exceed L_{Aeq} 55 dB.

7.2 Proposals

The plant room terminations are shown in the elevations in Figure 5 and Figure 6. The AHU is located in the large plant room terminating on the western facade, while the condensers are located in the plant room to the rear of the building, with the exhaust ducted to rooftop cowls and the intake through un-ducted louvres on the north and west facades. Other items of plant are also located within the rear plant room such as the Hydrokit units.

Two toilet extract fans are also located within the centre of the building, terminating onto the western facade.

Figure 5 Elevation view of proposed chiller exhaust turrets and intake vent – view north to south

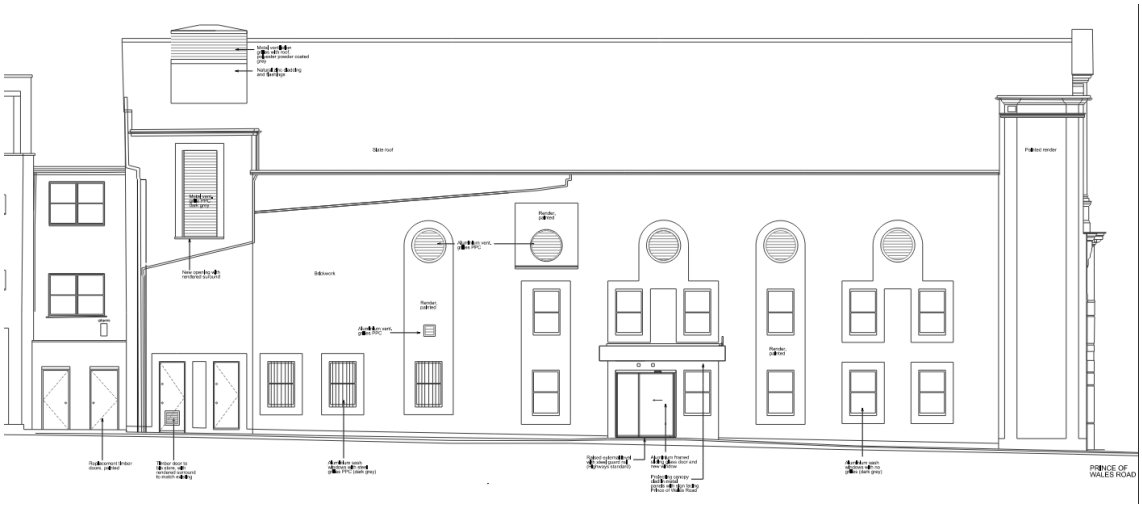


Figure 6 Elevation view of proposed chiller exhaust turrets and intake vent – view west to east

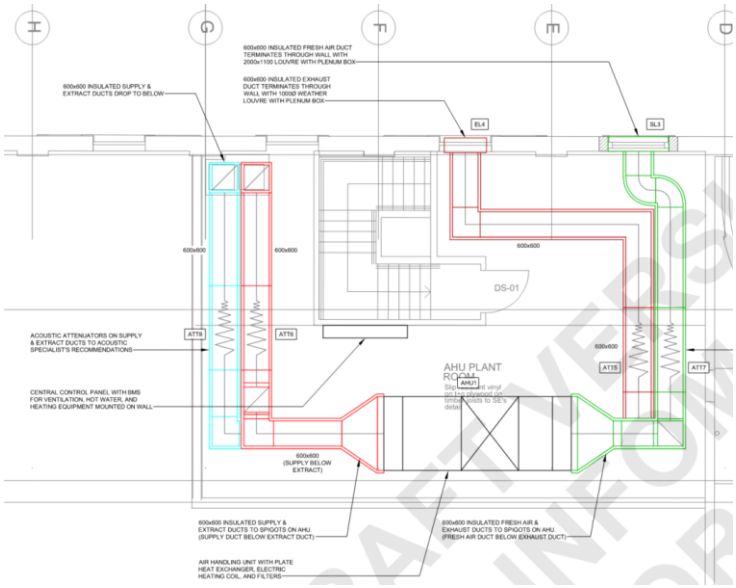


Figure 7 AHU ventilation layout

Plant selections and noise levels are set out below:

- Small condenser: LG ARUM180LTE5 L_{wA} 87 dB
- Large Condenser: LG ARUM241LTE5 L_{wA} 86 dB
- Hydrokits: 2No. LG ARNH08GK3A4 L_{Aeq} 46 dB each (unspecified distance, assumed 1 m)

Only broadband data is provided for the condensers. As such, a typical octave-band spectrum for a similarly sized Mitsubishi PURY P450 has been used for the calculations, adjusted to the values listed above.

Given the noise data only being for the units as a whole, it has been assumed that noise from the condensers is dominated by the exhaust to the top, with noise to the sides being at least 10 dB lower in each octave-band.

The proposed AHU is understood to be a Nuaire Boxer BPS B817V unit. Noise levels for this and the Vent-Axia toilet extract fans are presented in Table 4.

Table 4 Proposed AHU sound power levels

	Sound power level, L_w (dB) Octave-band centre frequency (Hz)							
Plant item	63	125	250	500	1000	2000	4000	8000
Nuaire Boxer BPS B817V								
AHU Intake – Open	61	53	66	58	56	52	39	29
AHU Exhaust – Open	73	72	82	86	85	81	77	75
AHU Breakout	72	62	71	66	57	46	40	30
Vent-axia 125 outlet	33	41	45	45	44	38	33	25
Vent-axia 250 outlet	53	54	52	52	48	47	39	28

Proposed attenuation measures are also set out in Table 5 below. Acoustic louvres are proposed to the condenser room inlets, with attenuators ducted to the condenser outlets. Attenuators are also ducted to atmospheric connections for the AHU.

Regenerated noise is to be suitably controlled such that overall noise levels do not increase.

Table 5 Insertion losses for proposed attenuation measures

	Attenuator/louvre insertion loss, D_i (dB) Octave-band centre frequency (Hz)							
	63	125	250	500	1000	2000	4000	8000
Acoustic louvre IAC SL-600	7	9	12	24	31	33	29	30
Attenuator IAC 7LFS	13	24	40	48	49	37	29	19

7.3 Assessment

Calculations of noise egress have been carried out, taking into account attenuation with distance, screening by and reflections from surrounding buildings, as well as reverberant noise build-up within the plant rooms.

Noise levels at the surrounding receptors are predicted be between L_{Aeq} 33-35 dB at the nearest noise sensitive receptors during the daytime, including 197 and 205 Kentish Town Road and the apartments facing Grafton Yard.

As such the daytime limits are predicted to be achieved.

A setback in duty of at least 10 dB is required to meet the night-time limits. This is expected to be acceptable given the building is unlikely to be occupied during the night.

8 Conclusion

A noise survey has been carried out at 2 Prince of Wales Road, London. The representative background sound levels measured during the survey were $L_{A90,15min}$ 45 dB during the daytime and $L_{A90,15min}$ 36 dB at night. Based on the London Borough of Camden Council requirements, the limits for noise egress from plant are $L_{Aeq,15min}$ 35 dB during the daytime and $L_{Aeq,15min}$ 26 dB at night.

The proposed plant items are predicted to meet the limits. A setback in duty of at least 10 dB is required to meet the night-time limits. This is expected to be acceptable given the building is unlikely to be occupied during the night.

Appendix A

Survey details

Equipment

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

The attended noise measurements were taken using a 2250 sound level meter on 16 June 2022.

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
Location A				
Sound level meter	NL52/00264550	Rion	29 Jul 22	TCRT20/1422
Microphone	UC-59/09698	Rion	29 Jul 22	TCRT20/1422
Pre-amp	NH-25/64675	Rion	29 Jul 22	TCRT20/1422
Calibrator	NC-74/34367631	Rion	29 Jul 22	TCRT20/1419
Location 1				
Sound level meter	2250/3011195	Brüel & Kjær	1 Apr 23	UCRT21/1443, UCRT21/1446
Microphone	4189/3086746	Brüel & Kjær	1 Apr 23	UCRT21/1443, UCRT21/1446
Pre-amp	ZC0032/25565	Brüel & Kjær	1 Apr 23	UCRT21/1443, UCRT21/1446
Calibrator	4231/3017676	Brüel & Kjær	31 Mar 23	UCRT21/1433

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

Detailed weather data for London has been taken from reports on timeanddate.com

During the attended noise measurements, the weather was generally clear and dry. Rainfall occurred in the morning of 19 and 22 June 2022, with some lighter showers in the evening of 18 June 2022 and the morning of 23 June 2022.

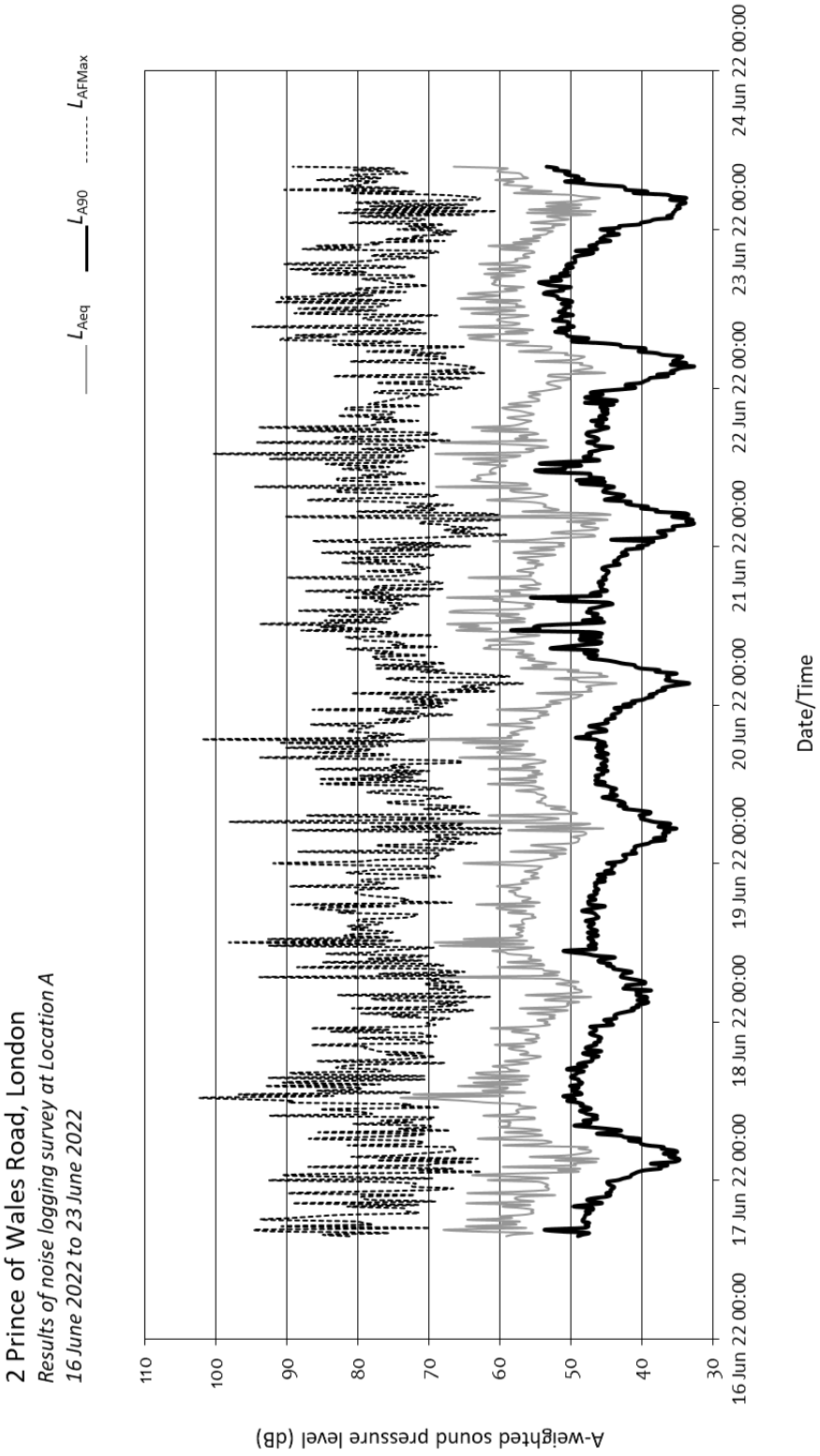
The wind speed varied between 2 m/s and 17 m/s. The wind direction was predominately westerly between 16 and 17 June 2022, with the wind direction being predominantly easterly for the remaining days.

Temperatures varied between 9°C at night and 31°C during the day.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at location A


2 Prince of Wales Road, London
Results of noise logging survey at Location A
16 June 2022 to 23 June 2022
L_{Aeq}
L_{A90}
L_{AFMax}
A-weighted sound pressure level (dB)
110
100
90
80
70
60
50
40
30
16 Jun 22 00:00
17 Jun 22 00:00
18 Jun 22 00:00
19 Jun 22 00:00
20 Jun 22 00:00
21 Jun 22 00:00
22 Jun 22 00:00
23 Jun 22 00:00
24 Jun 22 00:00
Date/Time

Appendix C

BS 4142 corrections for attention catching features

The following applies where plant noise is assessed in accordance with BS 4142:2014+A1:2019.

If the proposed plant noise contains attention catching features (such as tonal elements, whines, whistles, bangs etc), penalty corrections should be applied based on the type and impact of the features.

If appropriate, a subjective assessment of the plant features can be adopted. Where the plant noise contains tonal elements, the following corrections can be made depending on how perceptible the tone is at the noise receptor:

- 0 dB where the tone is not perceptible
- 2 dB where the tone is just perceptible
- 4 dB where the tone is clearly perceptible
- 6 dB where the tone is highly perceptible.

Where the plant noise is impulsive, the following corrections can be made depending on how perceptible the impulsivity is at the noise receptor:

- 0 dB where the impulse is not perceptible
- 3 dB where the impulse is just perceptible
- 6 dB where the impulse is clearly perceptible
- 9 dB where the impulse is highly perceptible.

For noise which is equally both impulsive and tonal, then both features can be accounted for by linearly summing the corrections for both characteristics.

If the plant has other distinctive characteristics, such as intermittency, then a 3 dB correction can be made.

If a subjective assessment of tonality is not appropriate, an objective assessment can be made by analysis of time-averaged, third-octave band sound pressure levels. A noise source is deemed to be tonal if the level in a third-octave band exceeds the level in adjacent third-octave bands by the level differences given below:

- 15 dB in the low frequency third-octave bands (25 Hz to 125 Hz)
- 8 dB in the mid frequency third-octave bands (160 Hz to 400 Hz)
- 5 dB in the high frequency third-octave bands (500 Hz to 10000 Hz).

If an objective assessment identifies the plant noise to be tonal then a 6 dB correction must be made.