

# SANDY BROWN

*Consultants in Acoustics, Noise & Vibration*

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## Met Police Net Zero

*Noise survey and plant noise egress assessment  
Croydon*

London, Manchester, Edinburgh, Birmingham, Belfast, Leeds

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## **Disclaimer**

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## Summary

Sandy Brown has been commissioned by the Metropolitan Police to provide acoustic advice in relation to the proposed development at Croydon Custody Centre.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was performed between 12:56 on 27 September 2023 and 11:11 on 3 October 2023.

The representative background sound levels measured during the survey were  $L_{A90,15\text{ min}}$  42 dB during the day and  $L_{A90,15\text{ min}}$  39 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  $L_{Aeq,10\text{min}}$  35 dB during the day, and  $L_{Aeq,10\text{min}}$  32 dB during the night.

These limits are cumulative, and apply with all plant operating under normal conditions.

The proposed plant consists of an elevated plant deck that would run 24/7.

An assessment of the proposed plant items associated with the development has been carried out. As long as the recommended mitigation measures are incorporated within the design, the plant items are expected to comply with the relevant noise limits.

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## 1 Introduction

Sandy Brown has been commissioned by the Metropolitan Police to provide acoustic advice in relation to the proposed development at Croydon Custody Centre.

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.

The report also includes an assessment of the currently proposed plant items and provides recommendations for attenuation measures to be implemented to ensure compliance with the noise limits set.

## 2 Site description

### 2.1 The site and its surrounding

The site location in relation to its surroundings is shown in Figure 1.



Figure 1 Aerial view of site (courtesy of Google Earth Pro) indicating location of the noise logger (L), approximate plant location in pink and the nearest noise sensitive receptor (R).

Neighbouring roads adjacent to the site are Windmill Road to the north, Union Road to the east, Willis Road to the south and Thornhill Road to the west.

The site lies within the jurisdiction of The London Borough of Croydon.

## 2.2 Adjacent premises

The adjacent premises to the site are primarily residential, with the exception of the commercial premises (car services) to the south and west (supermarket and church).

The nearest noise sensitive premises to the proposed location for the new external plant units is 127 Windmill Road (approximately 35 m to the north) denoted by Location 'R' in Figure 1.

## 3 Development proposal

As part of required works for Net Zero Carbon reconfiguration, new building services plant will be installed at Croydon Custody Centre. It is understood that the plant is to sit on a raised steel frame above existing carparking spaces.

## 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, may be applied. This is discussed further in Appendix C.

## 4.2 Local Authority criteria

It is understood that the Local Authority require noise associated with plant serving the proposed building to be controlled such that it does not increase the background level when measured at the nearest existing residential premises.

In effect, this means that the noise from any new plant should be controlled to be at least 10 dB below the existing background noise level.

## 5 Noise survey method

Unattended noise monitoring was undertaken at the site over 6 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 12:56 on 27 September 2023 and 11:11 on 3 October 2023.

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.

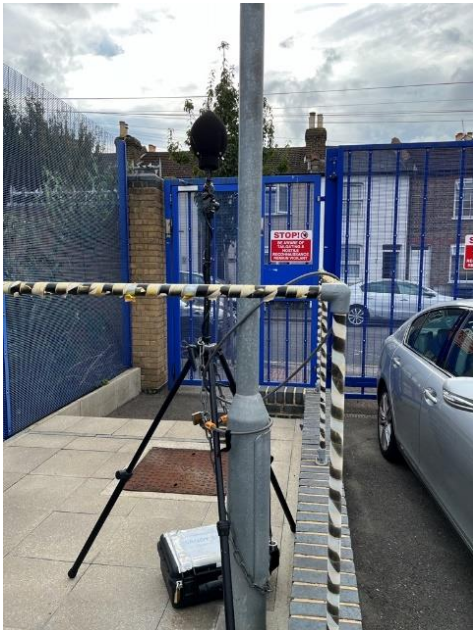


Figure 2 Photograph of unattended noise monitoring equipment at Location 'L'

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

## 5.1 Weather conditions

Weather conditions during the survey are described in Appendix A.

## 6 Noise survey results

### 6.1 Observations

The dominant noise sources observed at the site during the survey were from road traffic, sirens and passing pedestrians on the surrounding roads. Some intermittent school noise could be heard to the south of Location 'L' during the initial setup of the noise monitoring equipment.

Less significant noise sources included noise from distant existing building services plant to the north of Location 'L'.

### 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.

Measured minimum background sound levels are given in Table 1.

The noise monitoring equipment was positioned approximately 1.5 m above ground level and at least 3 m from any vertical reflective surfaces (eg, building facades). As such, these measurements are considered to be taken in 'free-field' conditions.



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Table 1 Ambient noise levels measured during the unattended survey

Date	Day (07:00 – 23:00)	Night (23:00 – 07:00)
	$L_{Aeq,16h}$ (dB)	$L_{Aeq,8h}$ (dB)
Wednesday 27 September 2023	-	47
Thursday 28 September 2023	51	46
Friday 29 September 2023	51	46
Saturday 30 September 2023	50	44
Sunday 1 October 2023	49	44
Monday 2 October 2023	50	46
Average	50	46

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

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

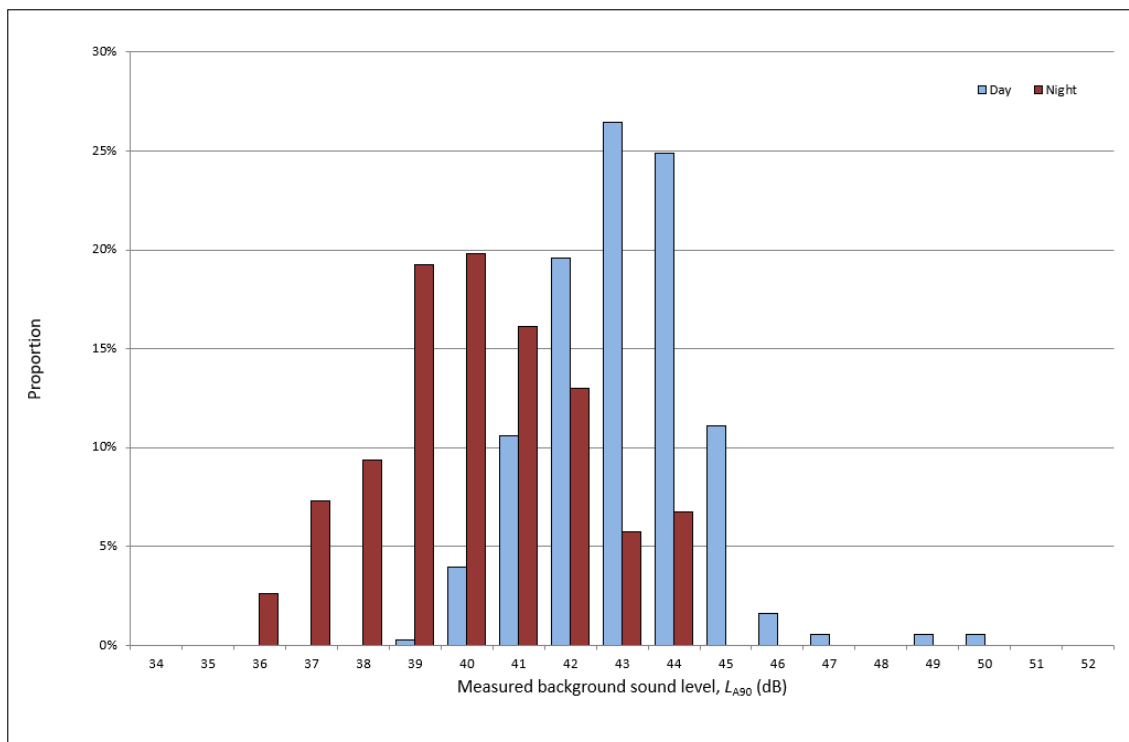


Figure 3 Statistical analyses of day and nighttime noise measurements at Location 'L'

From this analysis, the representative background sound levels measured during the survey were  $L_{A90,15min}$  42 dB during the day and  $L_{A90,15min}$  39 dB at night.

## 7 Plant noise assessment

### 7.1 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 2.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. The nearest noise sensitive receptors have been identified as the residences along Windmill Road, indicated as Location 'R' in Figure 1.

Table 2 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, $L_{Aeq,10min}$ (dB)
Day (07:00-23:00)	35
Night (23:00-07:00)	32

All building services plant will be designed to achieve the noise limits set out above.

### 7.2 Proposed plant items

A scale drawing showing the locations of the proposed plant items is presented in Figure 4.

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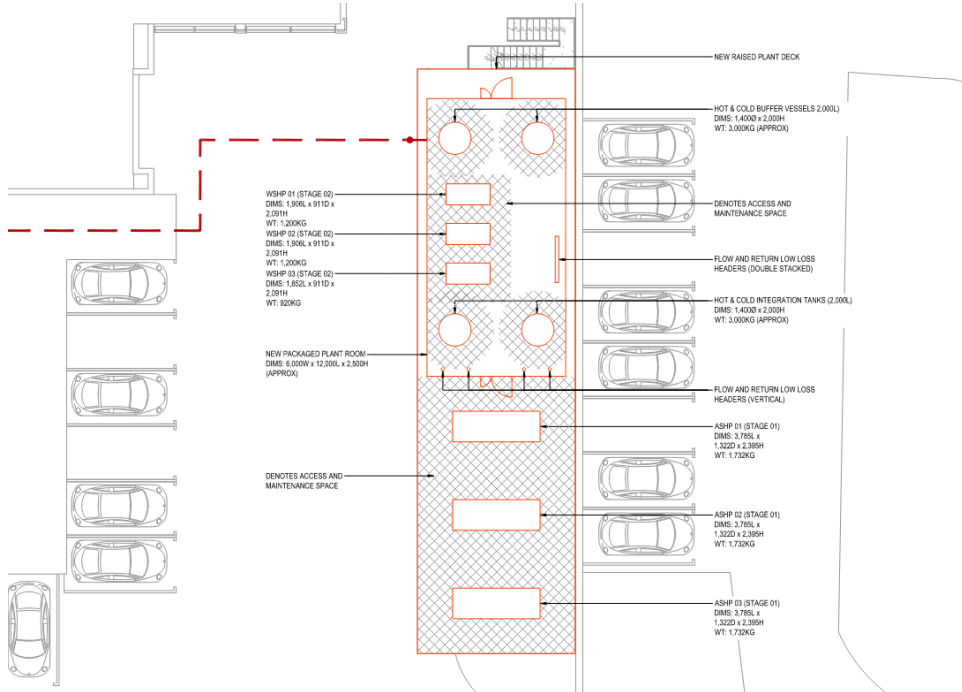


Figure 4 Scale drawings showing the location of the proposed plant deck

The following noise-generating plant items are proposed to be installed on a plant deck with a predominantly solid base and louvred walls:

- 3 x Air Source Heat Pumps (ASHP) outside within the plant deck (with only 2 running at a given time)
- An internal enclosure (including roof) with:
  - 2 x P100 Water Source Heat Pumps (WSHP) (with only 1 running at a given time)
  - 1 x P60 WSHP
  - 4 x water storage tanks. These are understood to be non-noise generating so have not been considered in this assessment.

Table 3 summarises the manufacturer Sound power level data provided by the mechanical engineers (TB&A).

Table 3 Sound power level data for each unit

Unit	Model	Sound power level (dB)								dBA
		Octave band centre frequency (Hz)								
		63	125	250	500	1000	2000	4000	8000	
WSHP	P100	77	67	80	74	71	68	74	79	82
WSHP	P60	69	59	78	72	73	68	69	75	79
ASHP	120.4	87	79	75	71	66	61	59	59	73

The WSHPs are proposed within a sealed enclosure on the plant deck, however, the enclosure construction has not been confirmed at this stage. As such, a reasonable maximum Sound Power Level specification for the enclosure has been established for the contractor to design to.

The enclosure and equipment within it shall be designed to achieve a Sound Power Level of  $L_{WA}$  65 dB. This applies at the perimeter of the enclosure including all openings such as doors or louvres (if required).

## 7.3 Attenuation requirements

### 7.3.1 Acoustic louvres

It is understood that an acoustic louvre is proposed to all four sides of the plant deck. Table 4 sets out the minimum insertion losses for these louvres. The acoustic louvre should extend a minimum of 500 mm above the top of the ASHPs.

Table 4 Acoustic louvre – required insertion losses

	Indicative depth	Required minimum insertion losses (dB)							
		Octave band centre frequencies (Hz)							
		63	125	250	500	1000	2000	4000	8000
Acoustic louvre	300mm	6	7	10	12	18	18	14	14

## 7.4 Assessment

Based on the data provided, an assessment of the predicted sound pressure level at Location 'R' has been carried out, taking into account:

- Sound Power Levels as per Table 3 and the  $L_W$  65 dBA enclosure specification
- Distance attenuation of 35 metres
- Louvre losses as per Table 4
- Receiver facade reflection of 3 dB

Based on this, the predicted sound pressure level 1 m from the nearest facade of 127 Windmill Road is presented in Table 5.

Table 5 Predicted sound pressure level at Location 'R'

Receptor	Predicted sound pressure level (dB)
127 Windmill Road (Location 'R')	32

The predicted noise level at Location 'R' complies with the night period limit.

## 8 Conclusion

The representative background sound levels from the noise survey were  $L_{A90,15min}$  42 dB during the day, and  $L_{A90,15min}$  39 dB during the night.

Based on the likely requirements of the Local Authority, the relevant plant noise limits at the worst affected existing noise sensitive premises are  $L_{Aeq}$  35 dB during the day, and  $L_{Aeq}$  32 dB during the night.

These limits are cumulative, and apply with all plant operating under normal conditions.

An assessment of the proposed plant items associated with the development has been carried out. As long as the recommended mitigation measures are incorporated within the design, the plant items are expected to comply with the relevant noise limits.

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## 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-52/00721067	Rion	3 Feb 25	TCRT23/1127
Microphone	UC-59/22135	Rion	3 Feb 25	TCRT23/1127
Pre-amp	NH-25/22173	Rion	3 Feb 25	TCRT23/1127
Calibrator	NC-75/35013646	Rion	25 Oct 24	TCRT22/1655

[1] 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 10°C at night and 23°C during the day, and the wind speed was less than 7 m/s and some precipitation.

These weather conditions are considered suitable for obtaining representative measurements.

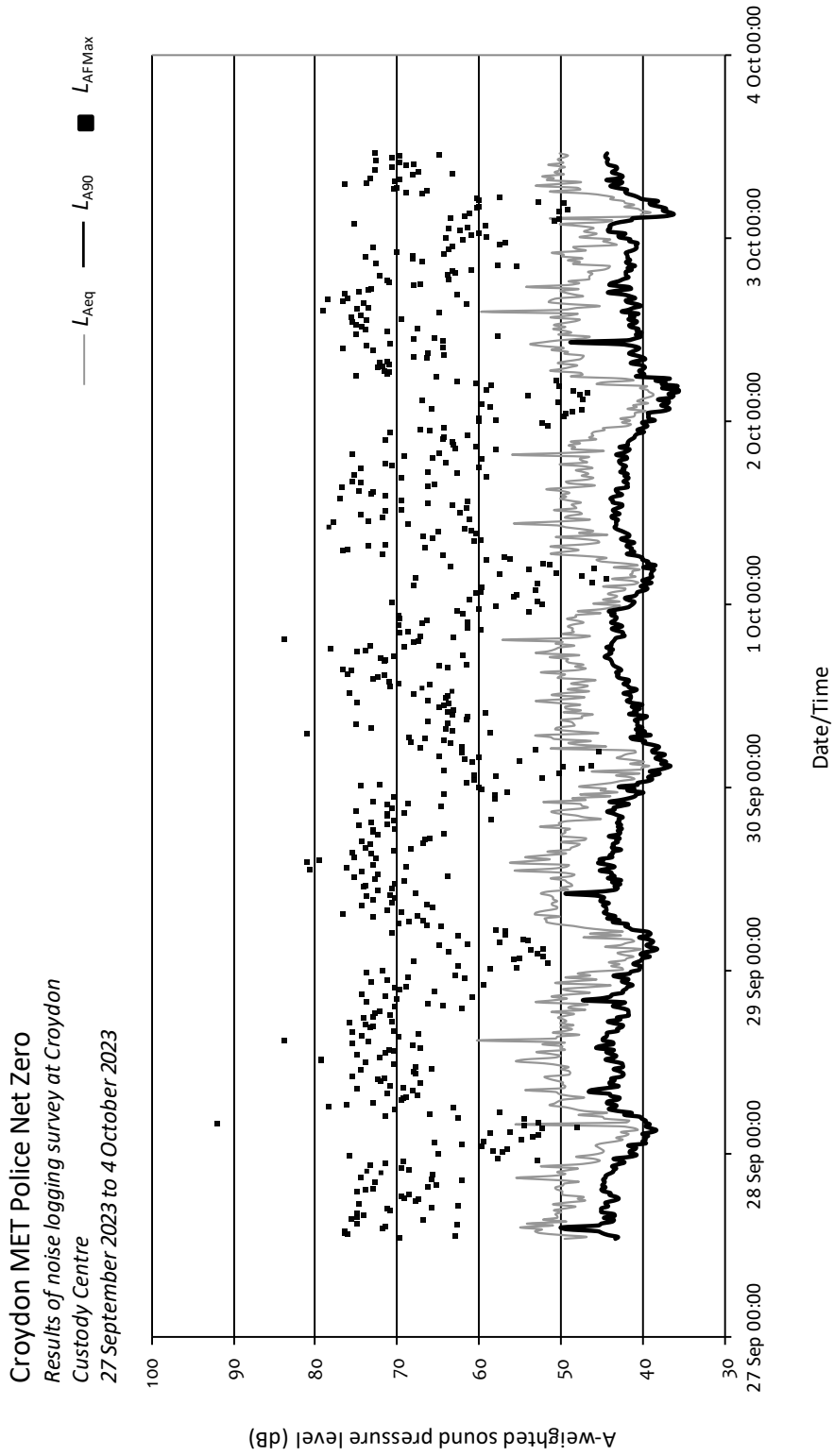


## Appendix B

### Results of unattended measurements at Location 'L'

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## 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.