

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

023446-R05-A

15 November 2023

Met Police Net Zero

*Noise survey and plant noise egress assessment
Bexleyheath*

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	15 Nov 23		Paul Monaghan	Andrew Long

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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 Bexleyheath Police Station.

An environmental noise survey has been carried out to determine the existing sound levels in the area. The noise survey was performed between 12:05 on 25 October 2023 and 13:20 on 30 October 2023.

The representative background sound levels measured during the survey were $L_{A90,15\text{ min}}$ 54 dB during the day and $L_{A90,15\text{ min}}$ 51 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 $L_{Aeq,15\text{ min}}$ 52 dB during the day, and $L_{Aeq,15\text{ min}}$ 49 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, and a back-up generator that would only run in power outages or during maintenance.

An initial assessment of the proposed plant items associated with the development has been carried out.

The proposed external plant items are expected to comply with the relevant noise limits.

Contents

1	Introduction	5
2	Site description	5
3	Development proposal.....	6
4	Building services noise egress criteria	6
5	Noise survey method	7
6	Noise survey results	8
7	Plant noise assessment	9
8	Conclusion.....	12
	Appendix A	13
	Survey details	13
	Appendix B	16
	Results of unattended measurements at Location 'L'	16
	Appendix C	18
	BS 4142 corrections for attention catching features	18

1 Introduction

Sandy Brown has been commissioned by the Metropolitan Police to provide acoustic advice in relation to the proposed development at Bexleyheath Police Station.

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 in order to determine 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). An indicative region showing the location of the proposed plant deck is highlighted in yellow

Neighbouring roads adjacent to the site are Mayplace Road West to the north, Tower Road to the east and Arnsberg Way to the south and west.

The site lies within the jurisdiction of The London Borough of Bexley (LBB).

2.2 Adjacent premises

The adjacent premises to the site are primarily residential, with the exception of the commercial premises (shopping centre) to the west.

The nearest noise sensitive premises to the proposed location for the new external plant units is 9-10 Tower Road (approximately 43 m to the southeast) 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 Bexleyheath Metropolitan police station. 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, is applied.

4.2 Local authority criteria

The following planning condition is typically applied as confirmed by Richard Angerson, LBB:

'The cumulative noise rating levels from all fixed external plant shall be 5 dB below the representative background level when measured at any nearby residential façade. Measurements shall be undertaken in accordance with the methodology specified in 'BS4142: 2014 +A1-2019: Methods for rating industrial and commercial sound'.

Prior to the first operation of the plant/equipment, a detailed acoustic report prepared by a suitably qualified acoustician, demonstrating how the plant/machinery complies with this condition, shall be submitted to and approved in writing by the Local Planning Authority. All installed plant and acoustic attenuation measures shall be retained and maintained thereafter in accordance with the manufacturer's recommendations.'

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 12:05 on 25 October 2023 and 13:20 on 30 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 and passing pedestrians on the surrounding roads. Some intermittent construction noise (ie, drilling) was taking place to the south of Location 'L' during the initial setup of the noise monitoring equipment.

Less significant noise sources included noise from existing building services plant on the site which was well screened from 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 the rooftop level and greater than 3 m from any vertical reflective surfaces (eg, building facades). As such, these measurements are considered to have been taken in 'free-field' conditions.

Table 1 Ambient noise levels measured during the unattended survey

Date	Day (07:00 – 23:00) $L_{Aeq,16h}$ (dB)	Night (23:00 – 07:00) $L_{Aeq,8h}$ (dB)
Wednesday 25 October 2023	-	55
Thursday 26 October 2023	58	54
Friday 27 October 2023	57	54
Saturday 28 October 2023	59	54
Sunday 29 October 2023	58	54
Average	58	54

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.

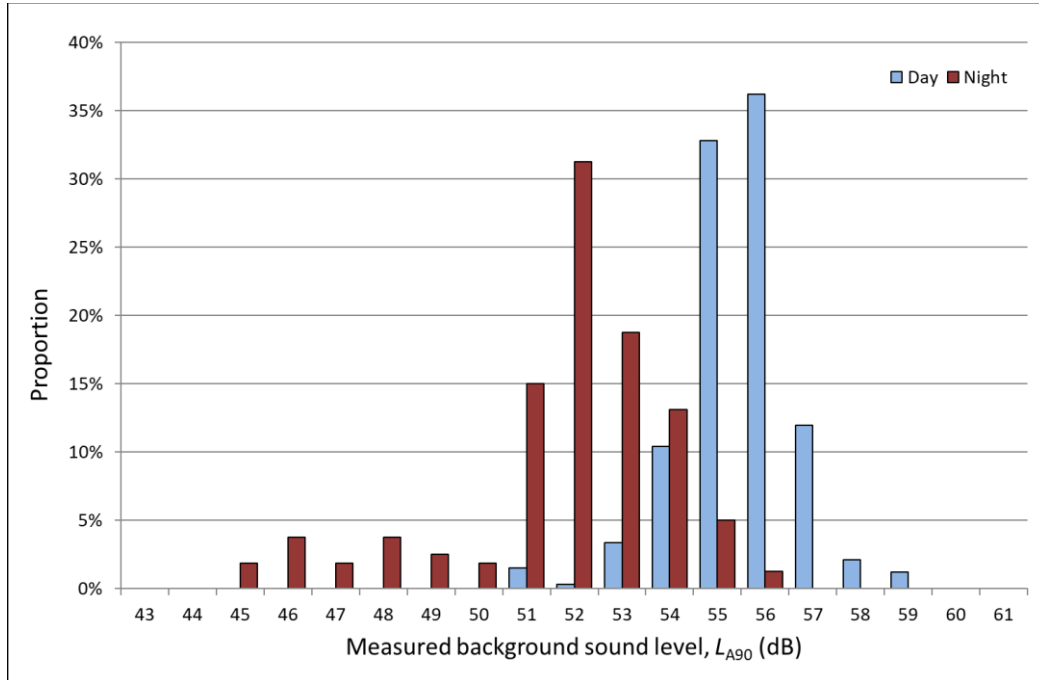


Figure 3 Statistical analyses of day and nighttime noise measurements at Location 'L'

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 54 dB during the day and $L_{A90,15min}$ 51 dB at night.

7 Plant noise assessment

7.1 Basic limits

Based on the above criteria and the measurement results, the cumulative rating 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 Tower 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 rating ^[1] sound pressure level at 1 m from noise sensitive premises, $L_{Aeq,10min}$ (dB)
Day (07:00-23:00)	52
Night (23:00-07:00)	49

[1] Corrections for attention catching features may need to be applied to the specific sound pressure level to arrive at the rating level. These may be significant and will need to be considered as the building services design progresses. This is discussed in Appendix C.

All building services plant will be designed to achieve the rating noise limits set out in Table 2..

7.2 Proposed plant items

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

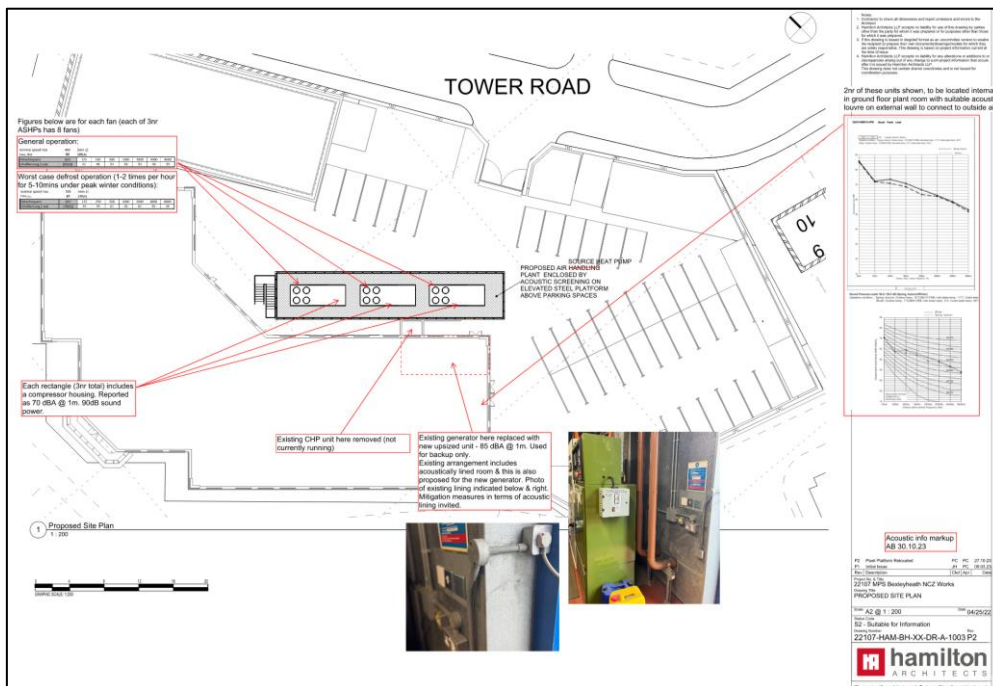


Figure 4 Scale drawings showing the location of the proposed plant deck and additional back-up plant

It is understood that the proposed external noise-generating plant items are to be installed on a plant deck with a mesh base and louvred walls, and include:

- 3 No Air Source Heat Pump (ASHP) units
- 3 No Compressor units

Sound power level data for some units has been provided by the mechanical engineers (TB&A) and is presented in Table 3.

Table 3 Sound power level data for each unit

Unit	Sound power level (dB)								dBA
	Octave band centre frequency (Hz)								
	63	125	250	500	1000	2000	4000	8000	
ASHPs		49	55	61	63	62	55	46	68
Compressors	86	72	74	71	67	63	58	53	73

7.3 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
- Distance attenuation of 43 metres
- Receiver facade reflection of 3 dB

It is not possible to undertake a subjective assessment at design stage, but the proposed equipment is not expected to display any substantial tonal or impulsive features when assessed at the receptor location. Based on this, the predicted rating sound pressure level 1 m from the nearest facade of 9-10 Tower Road is presented in Table 4.

Table 4 Predicted rating sound pressure level at Location 'R'

Receptor	Predicted rating sound pressure level (dB)
9-10 Tower Road (Location 'R')	46

The predicted rating noise level at Location 'R' complies with the day and night period limits.

8 Conclusion

The representative background sound levels from the noise survey were $L_{A90,15min}$ 54 dB during the day, and $L_{A90,15min}$ 51 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} 52 dB during the day, and L_{Aeq} 49 dB during the night.

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

An initial assessment of the proposed plant items associated with the development has been carried out.

The proposed external 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-52/00264550	Rion	17 Aug 24	TCRT22/1514
Microphone	UC-59/09698	Rion	17 Aug 24	TCRT22/1514
Pre-amp	NH-25/64675	Rion	17 Aug 24	TCRT22/1514
Calibrator	NC-74/34367631	Rion	17 Aug 24	TCRT22/1509

[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 12°C at night and 25°C during the day, and the wind speed was less than 7 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

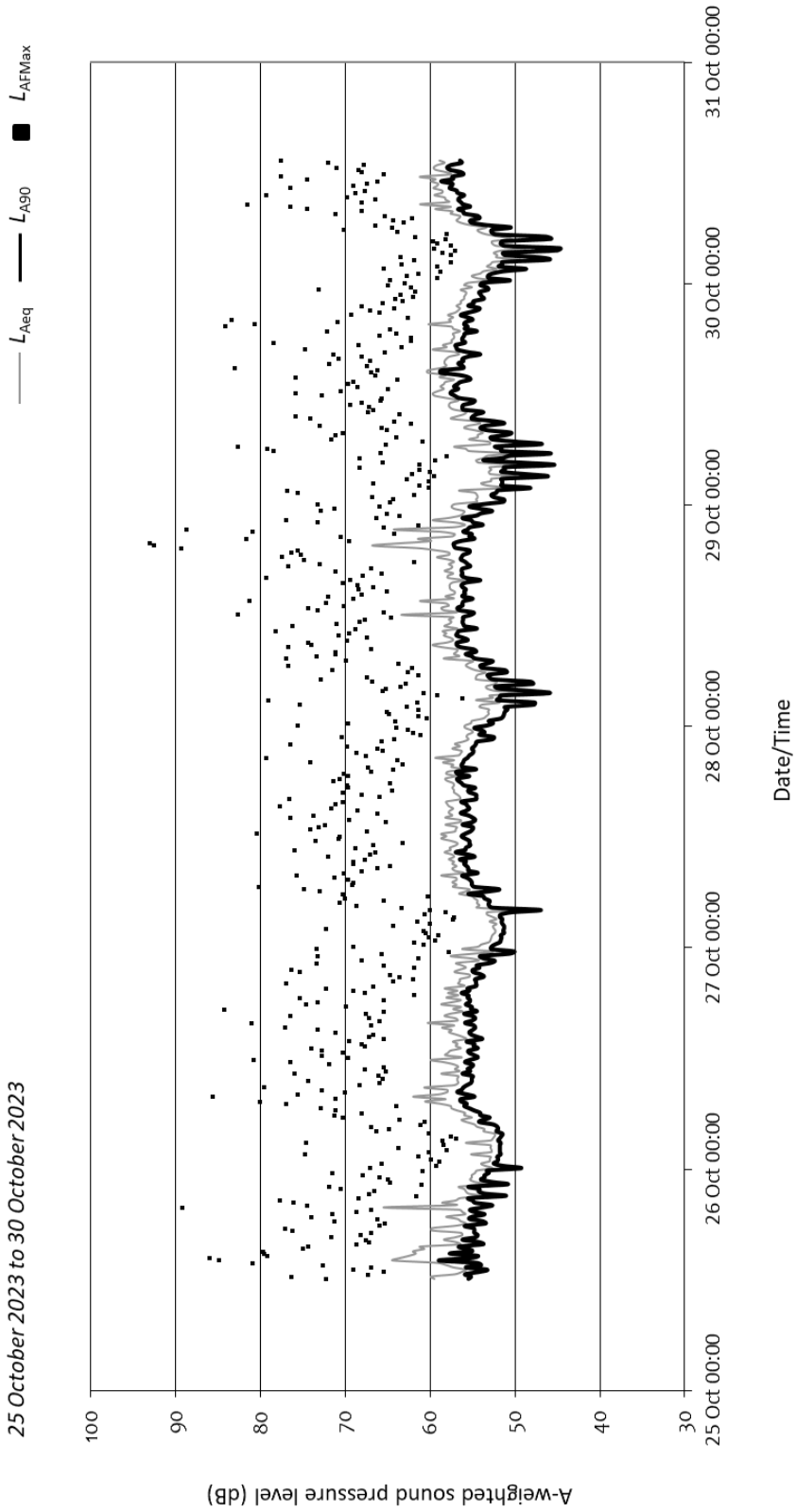
Appendix B

Results of unattended measurements at Location 'L'

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Met Police Net Zero - Bexleyheath
Results of noise logging survey at Location 'L'
25 October 2023 to 30 October 2023



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.