

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Met Police Net Zero

*Noise survey and plant noise egress assessment
Ruislip*

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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 Ruislip 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 13:32 on 26 October 2023 and 12:47 on 1 November 2023.

The representative background sound levels measured during the survey were $L_{A90,15\text{ min}}$ 50 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 rating noise level at 1 m from the worst affected windows of the nearby noise sensitive premises does not exceed $L_{Aeq,10\text{min}}$ 48 dB during the day, and $L_{Aeq,10\text{min}}$ 37 dB during the night.

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

The proposed plant consists of three outdoor units located in the existing carpark. The units are proposed to operate at full capacity during day, and “low noise mode” during the night-time period (23:00-07:00).

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

As long as the equipment operates at the proposed low noise mode during the night-time period and is free of any substantial tonal or impulsive features, the design is expected to comply with the relevant rating 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 Ruislip 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 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). The noise measurement location (L) and nearest noise sensitive receptors (1 and 2) are indicated. The proposed plant location is highlighted in pink.

Neighbouring roads adjacent to the site are Manor Road to the north, High Street Road to the east, King Edwards Road to the south and Church Avenue to the west.

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

2.2 Adjacent premises

The adjacent premises to the site are primarily residential (east and west) and offices (north and south).

The nearest noise sensitive premises to the proposed location for the new external plant units is 1 Manor Road (approximately 36 m to the west) denoted by Location 1 and 18A High Street (approximately 45 m to the east) denoted by Location 2 in Figure 1. Despite 18A High Street being further away from the proposed plant location, 1 Manor Road is better screened by existing buildings. As such, this assessment has reviewed noise levels to 18A High Street (Location 2).

3 Development proposal

As part of required works for Net Zero Carbon reconfiguration, new building services plant will be installed at Ruislip Metropolitan police station. It is understood that the plant is to be located in the 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. This is discussed in Appendix C.

4.2 Local Authority criteria

Hillingdon Council states within *Development Control for Noise Generating and Noise Sensitive Development* that the rating noise level must be 5 dB below the background level (L_{A90}) at the 1m from the nearest dwelling or premises for residential purpose.

5 Noise survey method

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 13:32 on 26 October 2023 and 12:47 on 1 November 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 in particular to the north of the site. Less significant noise sources included noise from distant existing building services within the building beneath the logger at 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 (e.g., 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)	Night (23:00 – 07:00)
	$L_{Aeq,16h}$ (dB)	$L_{Aeq,8h}$ (dB)
Thursday 26 October 2023	-	50
Friday 27 October 2023	57	51
Saturday 28 October 2023	57	52
Sunday 29 October 2023	56	50
Monday 30 October 2023	57	49
Tuesday 31 October 2023	58	51
Average	57	51

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.

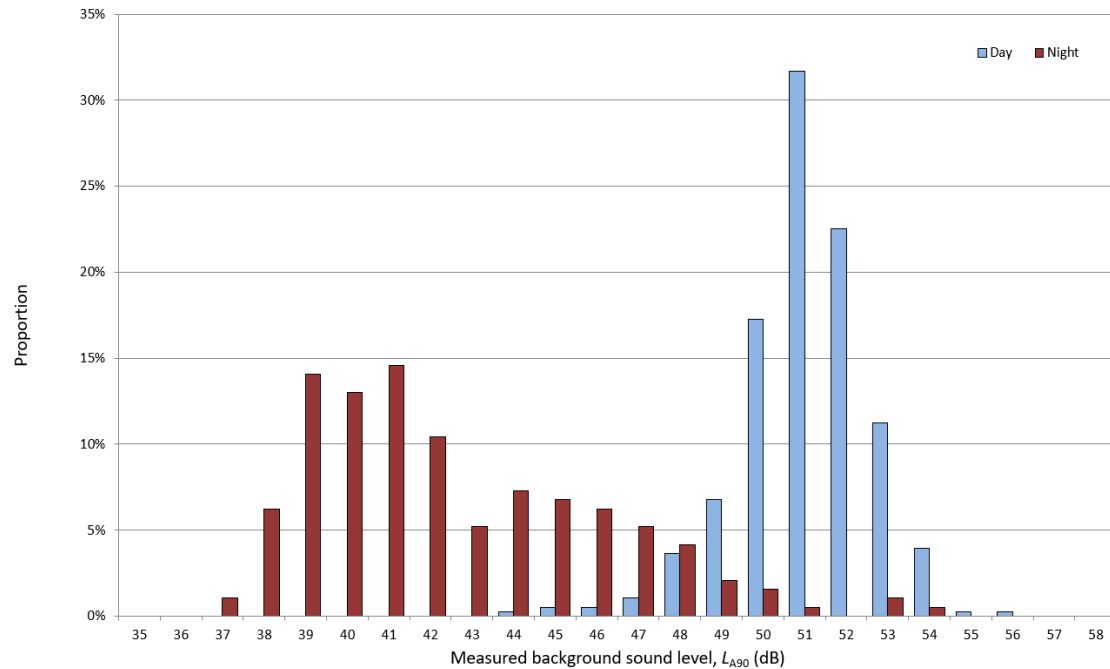


Figure 3 Statistical analyses of day and nighttime noise measurements at Location 'L'

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 50 dB during the day and $L_{A90,15min}$ 39 dB at night.

7 Plant noise assessment

7.1 Basic limits

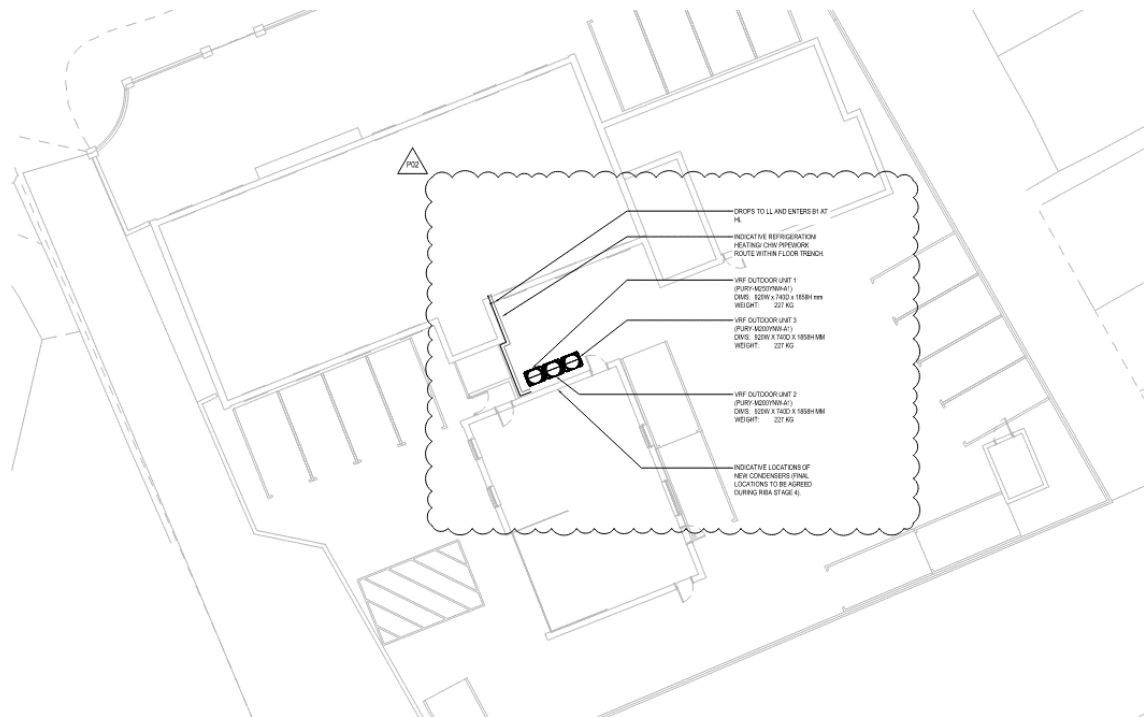
Based on the above criteria and the measurement results, the cumulative rating noise level from the operation of all new plant should not exceed the limits set out in Table 2.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. Despite 1 Manor Road (Location 1) being closer than 18A High Street (Location 2), 1 Manor Road is better screened by existing buildings. As such, this assessment has reviewed noise levels to 18A High Street.

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)	48
Night (23:00-07:00)	37

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

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



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The following proposed noise-generating plant items are proposed:

- 2 no. PURY-M200YNW-A Compressor units (running 100% capacity during the daytime period and low noise mode during night-time period)
- 1 no. PURY-M250YNW-A Compressor unit (running 100% capacity during the daytime period and low noise mode during night-time period)

Sound power level data for the proposed 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)								
	Octave band centre frequency (Hz)								dBA
	63	125	250	500	1000	2000	4000	8000	
PURY-M250YNW-A									
Typical	95	82	82	79	73	69	64	59	80
Low noise mode	93	80	80	77	71	67	62	57	78
PURY-M200YNW-A									
Typical	71	66	66	64	59	54	49	42	65
Low noise mode	69	64	64	62	57	52	47	40	63

7.3 Assessment

Based on the data provided, an assessment of the predicted sound pressure level at Location 2 has been carried out, taking into account:

- Sound Power Levels as per Table 3.
- Distance attenuation of 45 m
- 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 sound pressure level 1 m from the nearest facade 18A High Street is presented in Table 4.

Table 4 Predicted sound pressure level at Location 'R'

Receptor	Time of day	Predicted sound pressure level (dB)
18A High Street (Location 2)	Day (07:00-23:00)	41
	Night (23:00-07:00)	37

The predicted noise level at Location 2 complies with both the day and night period limits.

8 Conclusion

The representative background sound levels from the noise survey were $L_{A90,15min}$ 50 dB during the day, and $L_{A90,15min}$ 39 dB during the night.

Based on the requirements of the Local Authority, the relevant plant rating noise limits at the worst affected existing noise sensitive premises are L_{Aeq} 48 dB during the day, and L_{Aeq} 37 dB during the night.

These rating 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 to arrive at the rating level.

An initial assessment of the proposed plant items associated with the development has been carried out for day and night-time periods based on the two different modes of operation.

As long as the equipment operates at the proposed low noise mode during the night-time period (23:00-07:00) and is free of any substantial tonal or impulsive features, the design is expected to comply with the relevant noise limits.

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-52/00264531	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 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

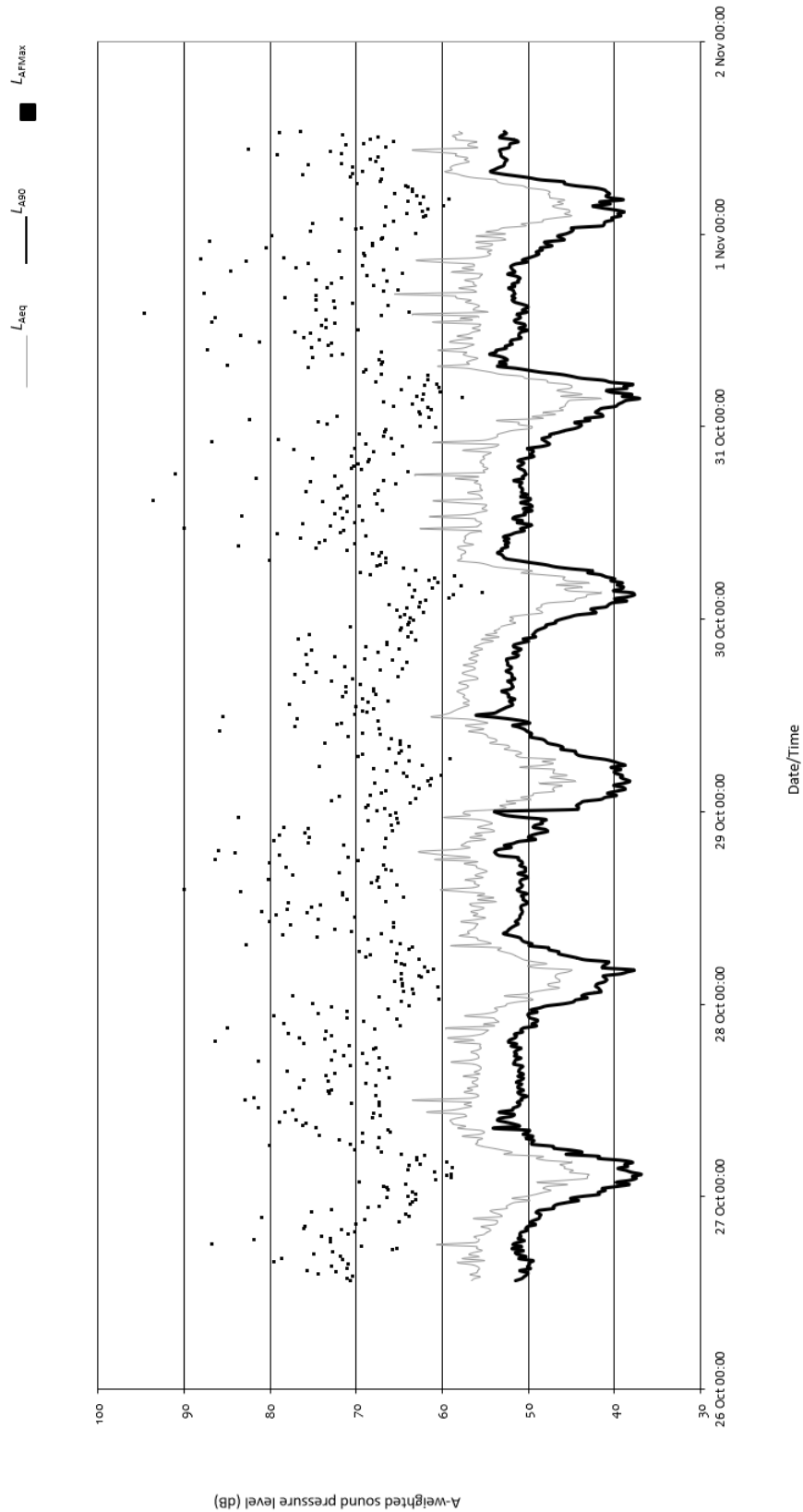
During the unattended noise measurements, weather reports for the area indicated that temperatures varied between 3°C at night and 17°C during the day, and the wind speed was less than 5 m/s.

These weather conditions are considered suitable for obtaining representative measurements.

Appendix B

Results of unattended measurements at Location 'L'

Ruislip MET Police Net Zero
Results of noise logging survey at Ruislip Police Station
26 October 2023 to 1 November 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.