

SANDY BROWN

Consultants in Acoustics, Noise & Vibration

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Heckmondwike Grammar School

Planning noise report

London, Manchester, Edinburgh, Birmingham, Belfast Leeds, Bristol

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Summary

Sandy Brown has been commissioned by E3 Cube Ltd to provide acoustic advice in relation to the proposed plant equipment installation in conjunction with the second-floor extension at the Heckmondwike Grammar School.

An environmental noise survey has been carried out to determine the existing background sound levels in the area. The noise survey was performed between 12:00 hrs on 26 June 2024 and 08:00 hrs on 1 July 2024. The representative background sound levels measured during the survey were $L_{A90,15min}$ 48 dB during the day and $L_{A90,15min}$ 35 dB at night.

Based on the requirements of the Kirklees Council, BS 4142 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} 46 dB during the day, and L_{Aeq} 33 dB during the night.

These limits are cumulative and apply to 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.

At this stage, plant noise limits have been set to aid with the procurement of plant items that would be compliant with the plant noise egress limit.

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1 Introduction

Sandy Brown has been commissioned by E3 Cube Ltd to provide acoustic advice in relation to the proposed plant equipment installation in conjunction with the second-floor extension at Heckmondwike Grammar School, Heckmondwike, WF16 0AH (hereby referred to as 'the site').

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 the building services plant.

This report presents the survey method and results, and a plant noise egress assessment.

2 Qualifications of assessors

All technical staff at Sandy Brown hold suitable qualifications in acoustics and the relevant level of membership in the Institute of Acoustics.

Sandy Brown is an independent acoustic consultancy that is a member of the Association of Noise Consultants and a sponsor member of the Institute of Acoustics. It is registered under the Association of Noise Consultants scheme for Approved Document E pre-completion testing (company number 141) which qualifies it as a compliant test body for acoustics.

3 Site description

3.1 The site and its surroundings

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

The project involves the construction of a second-floor extension to the existing Heckmondwike Grammar School building to replace a temporary building. The extension will provide an office, classrooms, circulation areas, a new lift as well as a plant room. The footprint of the Grammar School buildings is shown highlighted in green in Figure 1.

The site is surrounded to the north, northeast, south and southwest by existing residential properties, highlighted in blue. A playing field/sports pitch associated with the school sits adjacent to the site to the east.

Some industrial/commercial buildings also perimeter the site to the northeast and to the west. These are highlighted in red in Figure 1.



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

Pictures were taken on site of the unattended measurement position 'L' are provided in Figure 2 and attended measurement positions 1 and position 2 in Figure 3.

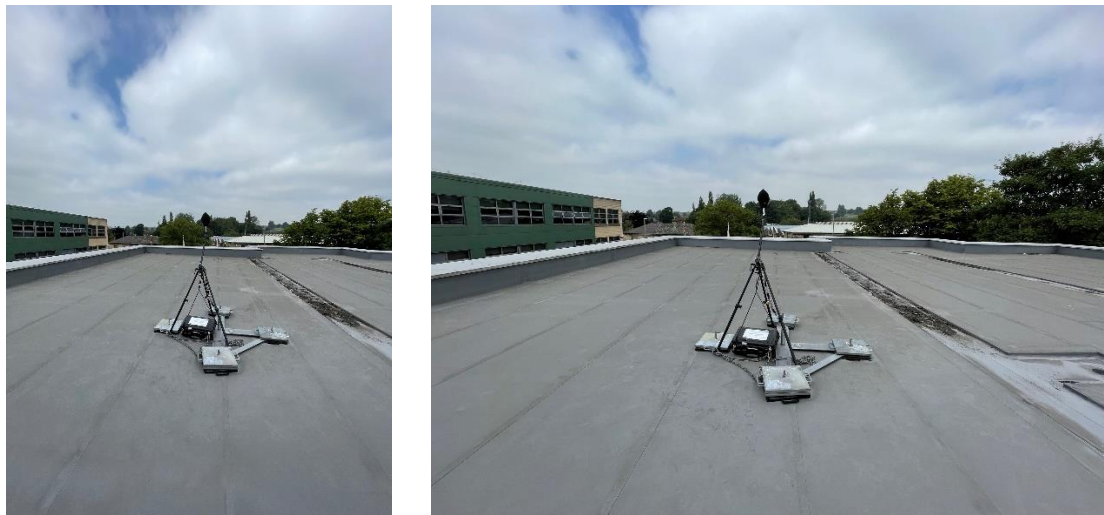


Figure 2 Photographs taken at measurement location L



Figure 3 Photographs taken at measurement position 1 and measurement position 2

3.2 Adjacent premises

The nearest or most affected NSP (noise sensitive premises) to the site are the residential properties opposite to the north on High Street (No. 60A and No. 79) as well as the residential properties opposite to the south on Grove Road (No. 1 and No. 2).

The surrounding school buildings could be considered an NSP however, as it is in conjunction with the proposed plant equipment, suitable facade and glazing requirements are assumed to have been made to control noise ingress of the plant equipment.

4 Development proposals

The location of the internal plant atmospheric terminations is given in Figure 4. The AC unit is to be installed within an existing compound on the east of the site. This is highlighted in pink in Figure 1.

The proposed plant equipment is in conjunction with the second-floor extension and is to comprise of;

- 1 x AC Unit (within existing plant compound),
- 6 x HVR terminations (east facade – highlighted in blue),
- 4 x HVR terminations (west facade – highlighted in green),

- 2x HRU terminations and 1 x WC extract termination (south facade – highlighted in orange).



Figure 4 Site location plan of proposed plant atmospheric terminations

4.1 Hours of operation

It is expected that typically the second-floor extension will operate between 09:00 and 16:30 hrs on weekdays.

There are no hall or events spaces proposed as part of the extension, it is therefore not anticipated that any evening or weekend events will be held within the space. The proposed plant equipment is assumed to only operate during the daytime operational periods of Heckmondwike Grammar School.

5 Industrial/Commercial noise egress criteria

5.1 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.

5.2 Local Authority criteria

Kirklees Council provides guidance in relation to plant noise emissions in 'noise-design advice' dated May 2007 and states the following in relation to plant noise egress:

'New Industrial or Commercial Use near to Residential Use

1.1 This advice aims to protect the present and future occupiers of residential properties from your new industrial or commercial noise.

Developers should carry out an assessment in accordance with BS4142 to determine the rating level of the new development. It is recommended that during normal daytime hours (0700 to 2300 hours), the BS4142 rating level, measured over 1 hour, should be 5dB below the background (LA90). During the night-time period (2300 to 0700 hours), the BS4142 rating level, measured over 5 minutes should be 5dB below the background (LA90).

The assessment should be carried out at the site boundary or at the nearest noise sensitive premises, depending on the circumstances. These noise levels are intended to ensure that existing noise sensitive premises and land which may be used for noise sensitive development in future does not become blighted by noise.

To aid regeneration, in certain circumstances, a higher rating level may be accepted provided the need is justified.'

6 Noise survey method

The survey included a single unattended measurement position and two attended measurement positions.

6.1 Unattended measurement

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 12:00 hrs on 26 June 2024 and 08:00 hrs on 1 July 2024, at approximately 1.5 metres above the rooftop level (approx. 95 m relative to ground)

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.

This location was chosen due to the NSP being on a residential street with no secure place to leave the measurement equipment without trespassing, also to be without influence from school students that pass the NSPs at several points throughout the day.

The measurement location is assumed reasonably representative of noise levels at the site and outside the nearest noise sensitive premises.

6.2 Attended measurements

Attended sample measurements were taken at 2 locations around the Heckmondwike Grammar School. These are indicated in Figure 1 as positions 1 and 2. The measurements were carried out on 26 June 2024. Three measurements, 5 minutes in duration were taken at each location.

At each position, the microphone was mounted on a tripod approximately 1.5 m above the ground level and at least 1 m from any other reflective surface.

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

6.3 Weather conditions

Weather conditions during the survey are described in Appendix A.

7 Noise survey results

7.1 Observations

The dominant noise sources observed at the site during the survey were from the surrounding school buildings as well as noise from the outdoor playing field/sports pitch opposite. Traffic

noise from High Street was also dominant with only 1 lane in use due to repair works taking place.

Less significant noise sources included light road noise from Grove Road and noise from existing plant equipment associated with the school.

7.2 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 2

Table 1 Ambient noise levels measured during the unattended survey

	Day (07:00 - 23:00)	Night (23:00 - 07:00)
Date	$L_{Aeq,16hour}$ (dB)	$L_{Aeq,8hour}$ (dB)
Wednesday 26 June 2024	_[1]	46
Thursday 27 June 2024	53	49
Friday 28 June 2024	53	48
Saturday 29 June 2024	54	48
Sunday 30 June 2024	53	49
Monday 1 July 2024	_[1]	-

[1] Measurement was not made over a full period due to monitoring start and end times, not included in the average.

Table 2 Minimum background sound levels measured during the unattended survey

	Day (07:00 – 23:00)	Night (23:00 – 07:00)
Date	$L_{A90,15min}$ (dB)	$L_{A90,15min}$ (dB)
Wednesday 26 June 2024	39 ^[1]	30
Thursday 27 June 2024	42	38
Friday 28 June 2024	44	33
Saturday 29 June 2024	38	33
Sunday 30 June 2024	37	35
Monday 1 July 2024	46 ^[1]	

[1] Measurement was not made over a full period due to monitoring start and end times.

The lowest background sound levels measured during the survey were $L_{A90,15min}$ 37 dB during the day and $L_{A90,15min}$ 30 dB at night.

Day and night statistical analysis of representative values for the site are given in Figure 5.

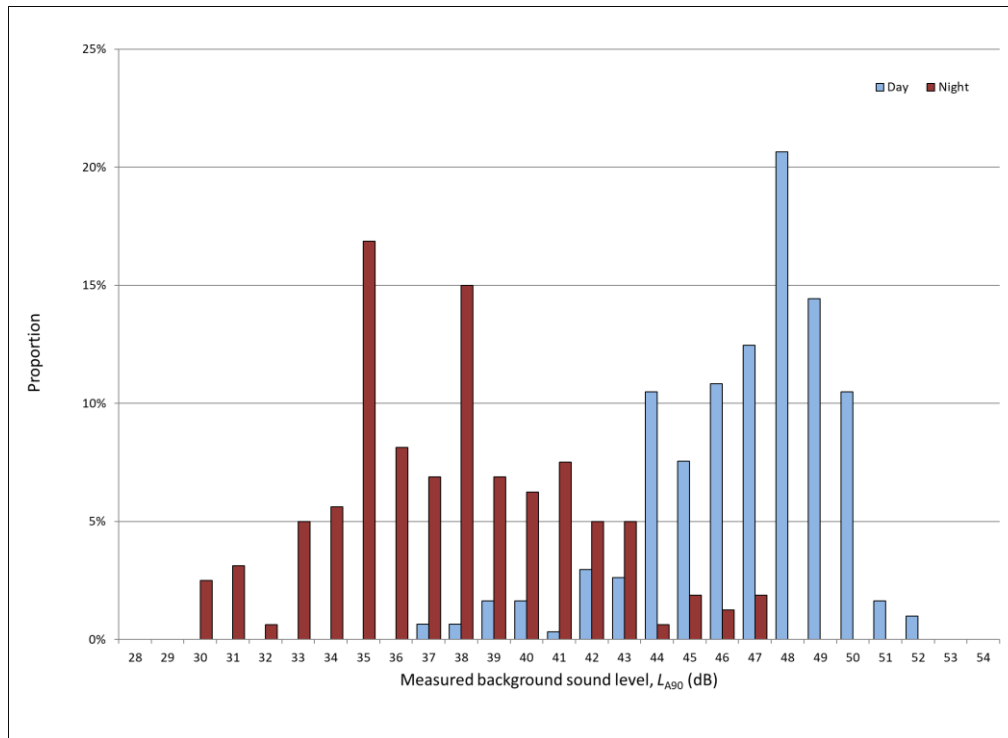


Figure 5 Statistical analysis of unattended measurement

From this analysis, the representative background sound levels measured during the survey were $L_{A90,15min}$ 44 dB during the day and $L_{A90,15min}$ 35 dB at night.

7.3 Attended measurement results

Noise levels and key sources recorded during the attended measurements are summarised in Table 3.

Table 3 Noise levels and key noise sources from attended measurements

Position	Start time	Sound pressure levels (dB)			Noise sources
		$L_{Aeq,5min}$	$L_{AFmax,5min}$	$L_{A90,5min}$	
1	12:30	70	85	56	Standing traffic due to road works with occasional passing pedestrians. Max noise levels resulting from passing HGVs.
	12:35	71	86	60	
	12:40	71	84	57	
2	12:47	60	74	50	Traffic noise with passing pedestrians including shouting students. Max noise levels resulting from passing HGVs and noise from PE lessons taking place playing field.
	12:52	70	86	48	
	12:57	59	69	49	

8 Plant noise egress

8.1 Residential 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 4.

The limits apply at 1 m from the worst affected windows of the nearest noise sensitive premises and are presented as facade levels. 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). In this case these limits would apply at the residential properties on High Street and Grove Road.

Table 4 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)
Day (07:00-23:00)	42
Night (23:00-07:00)	33

^[1] The limits set out in Table 4 do not include any attention catching features. Penalty corrections for attention catching features may be significant and will need to be considered as the building services design progresses. This is discussed in Appendix C.

8.2 Plant noise limits

8.2.1 Proposed Plant

The location of the internal plant terminations is given in Figure 4. The AC unit is to be installed within an existing compound on the east of the site. This is highlighted in pink in Figure 1 and given in more detail in Figure 6.

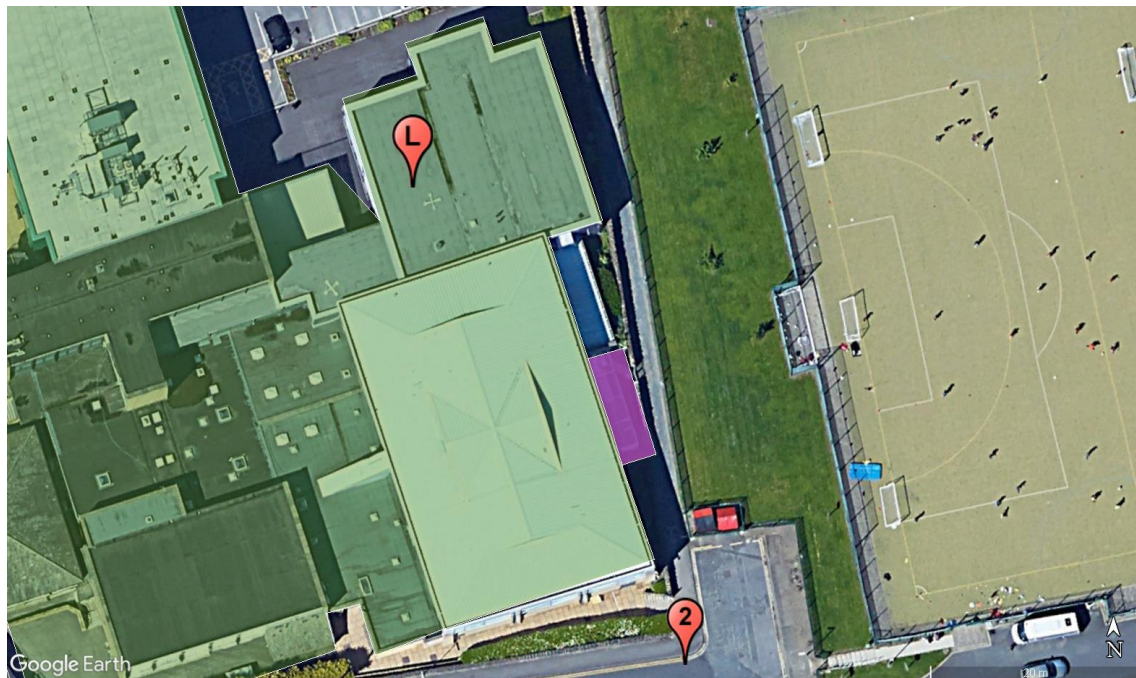


Figure 6 Location of existing external plant compound (courtesy of Google Earth Pro)

All building services plant will be designed to achieve the noise limits set out above, including any corrections for attention catching features. At this stage, plant noise limits have been set

to aid with the procurement of plant items that would be compliant with the plant noise egress limit as per Table 4.

Indicative limits have been calculated at 1 metre from the plant item/terminations with the plant item running at their loudest during the day.

- HVR atmospheric termination highlighted in blue in Figure 4 – L_{Aeq} 57 dB at 1 metre from the termination,
- HVR atmospheric termination highlighted in green in Figure 4 – L_{Aeq} 67 dB at 1 metre from the termination,
- HRU and toilet exhaust highlighted in orange in Figure 4 – L_{Aeq} 67 dB at 1 metre from the termination
- Condenser unit within existing compound highlighted in pink in Figure 1 and Figure 6 – L_{Aeq} 70 dB at 1 metre within the compound.

A more detailed analysis of plant noise egress will need to be undertaken once details of the procured plant items are available.

The predicted level does not include any corrections associated with attention catching features. The proposed plant items are not expected to have tonal or intermittency attention catching features discernible at the receiver location. As such no corrections for attention catching features have been applied.

9 Conclusion

The representative background sound levels measured during the survey were $L_{A90,15min}$ 44 dB during the day and $L_{A90,15min}$ 35 dB at 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} 42 dB during the day, and L_{Aeq} 33 dB during the night.

These limits are cumulative and apply to 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.

At this stage, plant noise limits have been set to aid with the procurement of plant items that would be compliant with the plant noise egress limit.

Appendix A

Survey details

Equipment

The unattended noise measurement was taken using a Rion NL 52 sound level meter.

Calibration details for the equipment used during the survey are provided in Table A1 and calibration certificates are included at the end of this appendix.

Table A1 Equipment calibration data

Equipment description	Type/serial number	Manufacturer	Calibration expiry	Calibration certification number
Attended measurement device				
Sound level meter	NL-52/00932326	Rion	24 Apr 26	TCRT23/1806
Microphone	UC-59/09251	Rion	24 Apr 26	TCRT23/1806
Pre-amp	NH-25/32354	Rion	24 Apr 26	TCRT23/1806
Calibrator	NC-74/34536129	Rion	24 Apr 26	TCRT23/1576
Unattended measurement device				
Sound level meter	NL-52/01143564	Rion	15 Dec 24	TCRT22/1766
Microphone	UC-59/10153	Rion	15 Dec 24	TCRT22/1766
Pre-amp	NH-25/43581	Rion	15 Dec 24	TCRT22/1766
Calibrator	NC-74/34257023	Rion	15 Dec 24	TCRT22/1765

^[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 BS 7445: 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 8 - 24°C with wind speeds between 1 and 7 m/s over the weekend. Rainfall did occur over 28 and 29 June 2024 however, this is deemed to have minimal impact on the measurement results.

During the attended noise measurements, the weather was dry with sunshine. Temperatures were reported as 24°C with wind speeds between 2 and 3 m/s.

Appendix B

Results of unattended measurement at Location 'L'

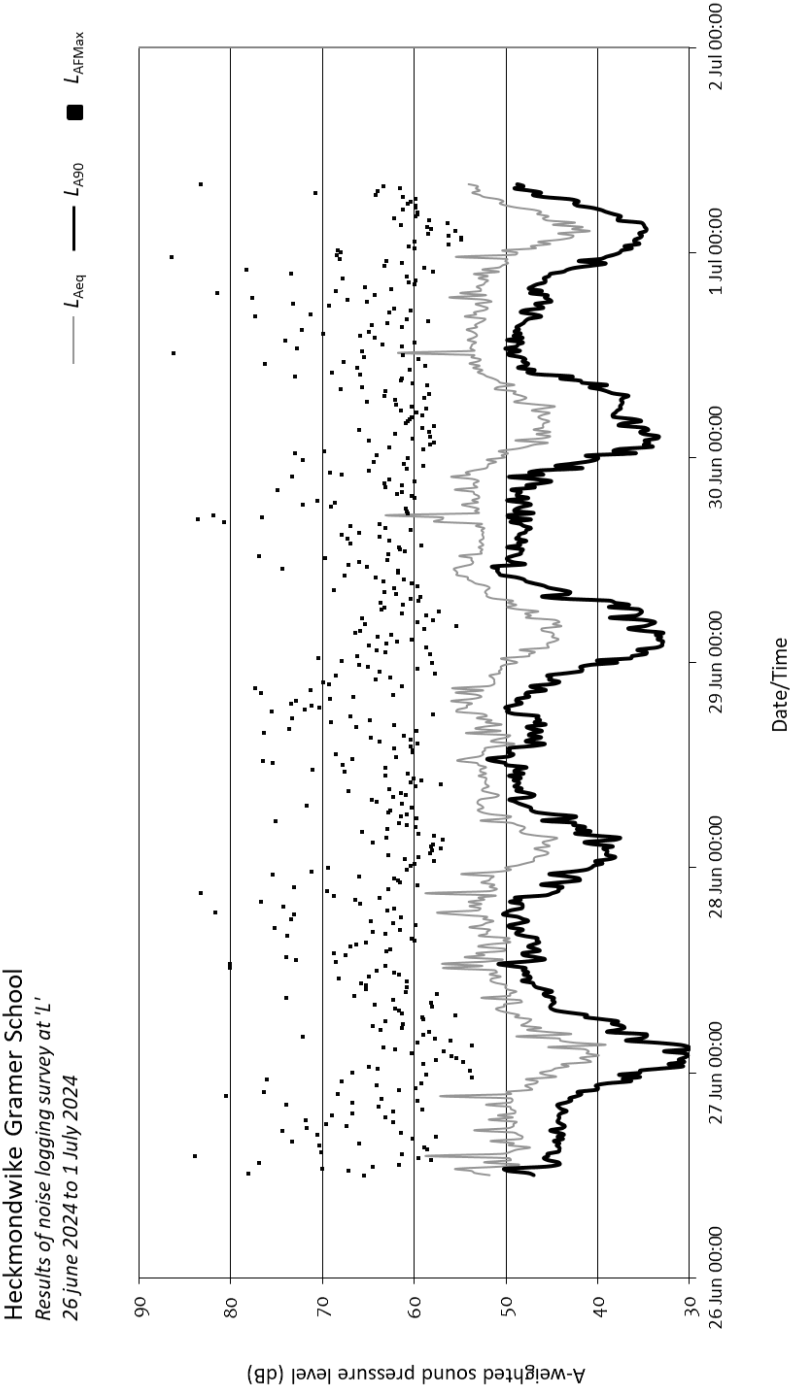


Figure B1 Unattended measurement results

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.