ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

ADT 4035

22 April 2026

Barnsley Hospital NHS Foundation Trust
Gawber Rd
BARNSLEY
S75 2EP

BARNSLEY HOSPITAL AIR HANDLING UNIT INSTALLATION

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

ACOUSTIC CONSULTANCY REPORT ADT 4035/ENIA

evision	Date	Issued By	Checked by	Revision Notes
-	17 April 2026	Andrew Lockwood	-	first issue

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TABLE OF CONTENTS

1.0 SUMMARY

Planning permission is being sought for the installation of two new air handling units on the roof of the Accident and Emergency Department at Barnsley Hospital.

Acoustic Design Technology Limited have undertaken an environmental noise survey to determine the existing ambient noise levels in the vicinity.

Cadna 2025 3D noise mapping software has been used to predict how noise would radiate from the new units to the surrounding area.

Application of British Standard BS 4142:2014+A1:2019 results in a low initial estimate of impact, and the initial assessment of impact is not adversely affected by the context.

The conclusion of this report is therefore that the noise emissions from the proposed air handling units should be acceptable.

2.0 AUTHORSHIP

This report has been produced by the following personnel:-

Name	Role	Professional Status	Qualifications	Consultancy Experience
Andrew Lockwood	Director	Corporate member of the Institute of Acoustics	Degree in Engineering Acoustics	from 1986

3.0 BASIS OF ASSESSMENT

3.1 Site Location

Barnsley Hospital is located to the north-west of the town centre, in an otherwise predominantly residential area.

3.2 Proposed Development

Planning permission is being sought for the installation of two air handling units on the roof of the Accident and Emergency Department, at the locations indicated on the attached site plan 4035/SP1.

3.3 Nearest Noise Sensitive Properties

The closest residential properties to the proposed plant are on the opposite side of Gawber Road to the north, and in Oakham Place to the west. These have been grouped into two noise sensitive areas (NSA) as indicated on the attached site plan 4035/SP1.

A satisfactory noise impact at the defined NSA should ensure a satisfactory noise impact at other noise sensitive areas which are either further away and / or acoustically screened from the proposed air handling units.

3.4 Assessment Criteria

The primary guidance on the control of noise emissions from new buildings of a commercial or industrial nature is to be found in BS 4142:2014+A1:2019 (hereafter referred to as BS 4142).

3.5 Strategy for Noise Impact Assessment

Based on the information in Sections 3.1 to 3.4 above, the strategy for the noise impact assessment has been broken down into the following stages:

i. undertake an environmental noise survey to obtain baseline noise data, as described in Section 4.0 below

ii. predict the noise levels at the nearest NSA resulting from the operation of the proposed air handling units

iii. assess the impact of the noise emissions using the methodology of BS 4142 as described in Section 5.0 below

4.0 ENVIRONMENTAL NOISE SURVEY

4.1 Purpose

The purpose of the survey was to obtain representative background noise levels during the most sensitive period of plant operation.

4.2 Scope of Survey

Unattended noise monitoring was undertaken from 14:00 hours on Tuesday 14 April 2026 till 14:00 hours the following day.

4.3 Procedure

A single measurement position was selected at the front of the Accident and Emergency unit as indicated on the attached site plan 4035/SP1. The microphone was mounted on some temporary scaffolding, approximately 2 metres external to the façade of the building.

The noise levels were logged continuously for the duration of the survey period, using the 01dB Fusion sound level meter set to store the octave band and 'A' weighted 100ms short-term L_{eq} for subsequent post processing.

The background measurements at this location are judged to be representative of the background noise levels at the two identified NSA.

4.4 Results

The logged data has been post processed to determine $L_{Aeq,T}$ $L_{A90,T}$ and L_{Amax} levels for each 5 minute period, and these are presented on graph 4035/TH1.

Additionally, the logged data has been statistically analysed according to the method described in Section 8.1.4 of BS 4142:2014, to determine the typical daytime and nighttime background noise levels as follows:-

Location	Day (07:00 – 23:00)	Night (23:00 – 07:00)
Position 1	52	42

Please refer to Appendix B for explanation of the noise units and the A-weighting term used in this report.

4.5 Instrumentation

The instrumentation used, and the field calibration values before and after the survey are detailed in Appendix A of this report.

4.6 Weather Conditions

The weather conditions at the beginning and end of the survey period were dry and fairly calm, with similar conditions forecast for the duration of the survey. There is nothing in the logged data to suggest that the measurements were adversely affected by the weather.

4.7 Description of Existing Acoustic Environment

The hospital is surrounded by roads, and the site itself is also heavily trafficked during the day. It is therefore the sound of road traffic noise that largely controls the noise levels at the measurement position, and the nearby houses.

There are also many items of existing, noise-generating plant distributed around the hospital, and the noise emissions will be influencing the background noise levels in the vicinity of many of the surrounding residential properties.

5.0 NOISE IMPACT ASSESSMENT

5.1 Introduction

BS 4142 provides a methodology for assessing the likely impact of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The assessment involves comparing the *rating* level of the sound source with the typical *background* levels for the period of interest. The standard concludes that if the rating level does not exceed the background levels, the noise impact should be low, depending on the context.

Please refer to Appendix C for an explanation of the technical terms defined in the Standard.

5.2 Specific Sound Level

5.2.1 Computer Model

As the analysis is relatively complex, a computer model of the proposed installation has been constructed using Datakustik Cadna/A 2025 following the ISO 9613-2:2024 method, to predict how the sound would radiate from the new air handling units to the identified noise sensitive areas.

Within the model all buildings and barriers have been assumed to be acoustically reflective. As the ground is largely hard surfaces, no allowance has been made for any ground absorption.

5.2.2 Source Sound Levels

The manufacturer's published sound power levels for the two air handling units is set out on the attached plant noise schedule ADT 4035/PNS. In each case, the figures are for the fan outlet, as opposed to the air handling unit inlet or outlet.

There will inevitably be some attenuation of the fan noise levels inside the air handling units, as the air passes through the other internal components, such as the coils and filters. However, as the manufacturer has not been able to provide any attenuation data for the internal components, the losses have been ignored. Consequently, the predicted levels will be pessimistic.

It should be noted that the departments the units will serve only open between 07:00 and 22:00 hours. If the units were to operate outside these hours, it would be in set back mode, and would therefore be quieter.

5.3 Predicted Sound Levels

The scheduled plant noise levels have been input into the computer model, and the building evaluation feature of the software has been used to predict the resultant noise levels at a number of the nearby houses.

On the attached noise map 4035/NM1, the number in the white circle is the highest predicted incident noise level at any point on any façade of the related building. The smaller numbers in the coloured bands show the highest predicted noise level at any height at that point of the perimeter.

The following table summarises the predicted octave band levels corresponding to the highest predicted dB(A) level at the two NSAs.

Location	Octave Band Centre frequency (Hz)								$L_{Aeq,T}$ dB
	63	125	250	500	1k	2k	4k	8k	
NSA1	31	32	38	33	30	24	13	7	35
NSA2	29	27	39	33	29	32	16	0	37

For the purposes of a BS 4142 assessment, these levels are therefore the specific noise levels at the two NSAs.

5.4 Background Sound Level

The new air handling units would potentially operate at any time of the day or night. Reference to the table ins Section 4.4 shows that the typical nighttime background level is 42 dB L_{A90}, 10 dB(A) lower than during the day.

5.5 Rating Level

To convert the specific sound level into a rating level, corrections have to be applied for impulsivity, intermittency, tonality and other sound characteristics where such features are present. It is important to note that these distinctive features are determined at the assessment location, not at the plant noise source.

5.5.3 Tonality

BS 4142 contains detailed objective methods for determining tonality including narrow band analysis. In this case the manufacturers' noise data is only available in octave bands, so those methods are not usable. For the purposes of this assessment, clear tonality is defined as an $L_{eq,T}$ in one octave band rising 5 dB above the levels in both adjoining octave bands.

According to that definition, the predicted levels at both NSAs are marginally tonal, so a +3dB correction is appropriate.

5.5.4 Impulsivity

The noise emissions from plant of the type proposed for this development would not be impulsive in character, so no correction is required.

5.5.5 Other Sound Characteristics

There are no additional sound characteristics which would warrant the addition of an extra correction.

5.5.6 Intermittency

As the air handling units would run continuously, no correction is required for intermittency.

5.6 Initial Assessment of Impact

The initial assessment of impact for the night time period (23:00 – 07:00 hours) is set out in the following table.

Initial Assessment of Impact – Night Time Period		
	NSA1	NSA2
Specific Sound Level $L_{Aeq,\ 15\ mins}$ (dB)	35	37
Tonality correction (dB)	+3	+3
Intermittency correction (dB)	0	0
Other distinctive character (dB)	0	0
Predicted Rating Level $L_{Ar,15\ mins}$ (dB)	40	40
Background level $L_{A90,15mins}$ (dB)	42	42
Excess of rating level over background sound level (dB)	-2	-2
Initial assessment of impact	low	low

The foregoing table therefore demonstrates that the initial assessment of impact is low at both NSA.

It should also be noted that, as previously mentioned in Section 5.3, these predictions are pessimistic, as they do not take into account the internal losses inside the air handling units.

5.7 Context

5.7.7 The Absolute Level of Sound

Predicted sound levels of no more than 38 dB(A) are low, and significantly below the typical nighttime noise levels, so the absolute level of sound does not adversely affect the context.

5.7.8 The Character and Level of the Specific and Residual Sound

As plant noise already contributes to the background noise levels in the vicinity, the additional noise from the proposed air handling units would not be incongruous.

5.7.9 The Sensitivity of the Receptor

The properties at the identified NSAs appear to be normal residential dwellings. There is therefore nothing to suggest that the occupants will be more sensitive to sound than usual.

The foregoing consideration of context does not identify anything that adversely affects the initial estimate of impact.

5.8 Conclusions

This assessment has demonstrated that when assessed following the methodology of BS 4142, the initial estimate of impact of the proposed plant installations should be low, depending on the context.

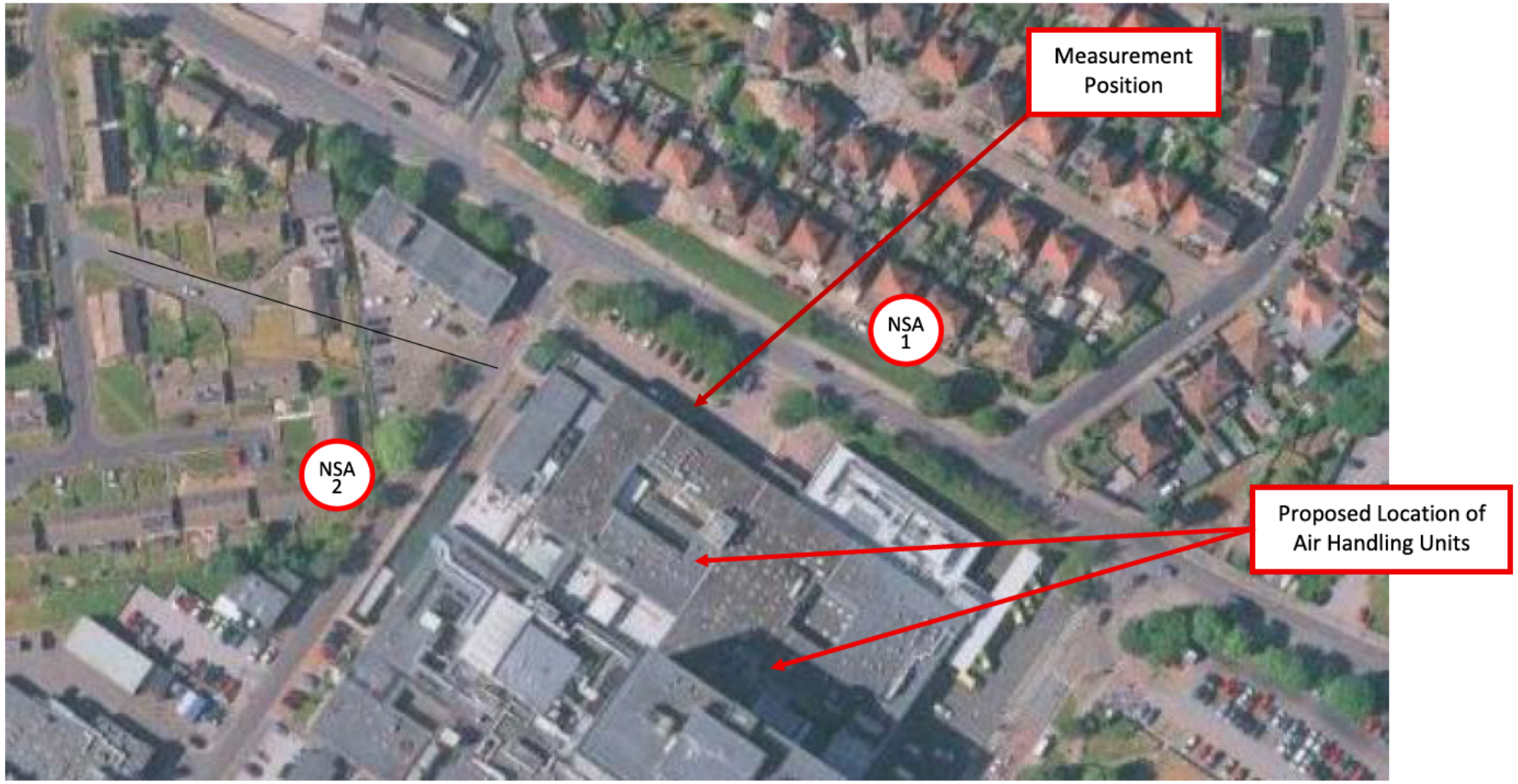
Furthermore, consideration of the context has shown that this need not affect the initial estimate of impact.

As noted in Section 5.2.2, the proposed air handling units would only generate these levels of noise between 07:00 and 22:00 hours; if they were to operate outside these hours, they would be quieter.

Nonetheless, this assessment has demonstrated that even if the units were to operate at full load during the nighttime period (23:00 – 07:00 hours), the impact should still be low.

The conclusion of this assessment is therefore that noise emissions from the proposed air handling units should be acceptable when assessed with reference to the relevant British Standard.

FOR ACOUSTIC DESIGN TECHNOLOGY



Notes

Description
Site Plan Showing Noise Monitoring and Proposed AHU Locations

Project
Barnsley Hospital Air Handling Unit installation

Date

Drawing No.
4035/SP1

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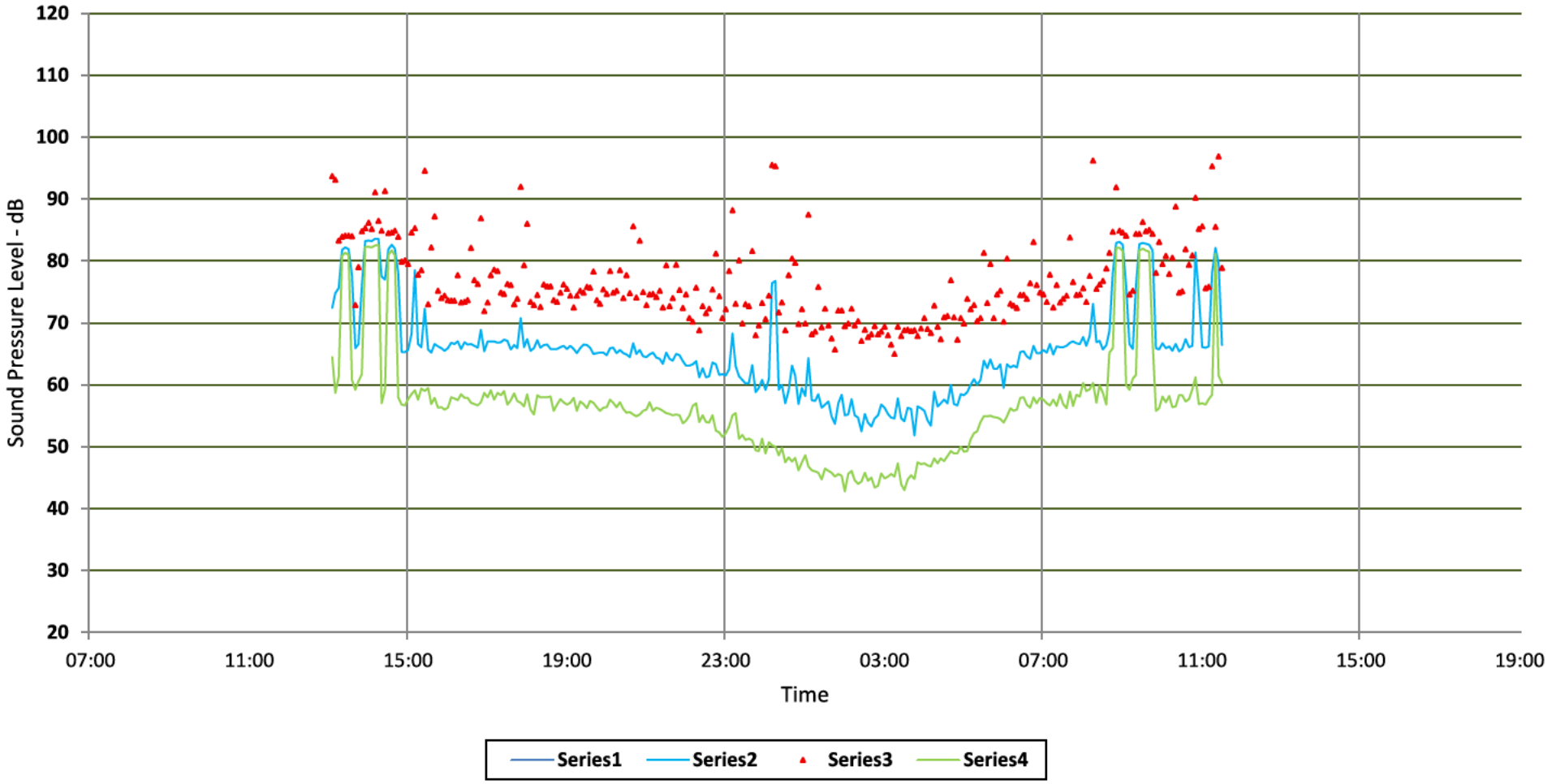

Notes	**Description** Time History Graph – Position 1	
	Project Barnsley Hospital Air Handling Unit installation	
	Survey Date 14 – 15 April 2026	**Drawing No.** 4035/TH1

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NOTES

DESCRIPTION	Predicted Noise Levels
PROJECT	Barnsley Hospital Air Handling Unit Installation
DATE	22 April 2026
DRAWING NO.	4035/NM1

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APPENDIX A

Instrumentation

Manufacturer	Type and / or Model	Serial Number	Last Laboratory Calibration	Calibrator Output (dB)	Initial Reading (dB)	Final Reading (dB)
01dB	Fusion 1 Class 1 Sound Level Meter	15131	July 2025		114.0	114.2
01dB	Fusion MCE3 Microphone	14038	July 2025			
Norsonic	Nor1251 Calibrator	34220	February 2025	113.98		

APPENDIX B

Acoustic Terminology

The annoyance produced by noise is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and any variations in its level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

A-weighting — The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the A-weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average person. It is also possible to calculate the A-weighted noise level by applying certain corrections to an un-weighted spectrum.

When the noise being measured has variable amplitude, such as traffic noise, it is necessary to qualify the basic dB unit. This may be done using a statistical index L_n dB, where n is any value between 0 and 100, and is the percentage of the sample time for which the stated level is exceeded. In defining the use of the index, both the value of n and the length of the sample period must be stated.

L_{10} — L_{10}, being the level exceeded for 10% of the time, has been shown to be a good indicator for traffic noise intrusion, and is used in assessing the effect of traffic noise on residential or commercial premises.

L_{90} — L_{90} is the level exceeded for 90% of the time, and is used as a measure of background noise level, as it excludes the effects of occasional transient levels, such as individual passing cars or aircraft.

In addition to the statistical noise indices defined above, the following noise units are also used to define variable amplitude noise sources:

$L_{eq,T}$ — $L_{eq,T}$ is defined as the notional steady sound pressure level which, over a stated period of time, would contain the same amount of acoustical energy as the actual fluctuating sound measured over the same period. In other words, it is a measure of the "average" noise level

L_{max} — L_{max} is the maximum time-weighted sound pressure level recorded over the stated time period

APPENDIX C

Definitions from BS 4142:2014+A1:2019

reference time interval, T_r

specified interval over which the specific sound level is determined (1 h during the day, and 15 min during the night)

specific sound level, $L_{Aeq,Tr}$

equivalent continuous A-weighted sound pressure level produced by the specific source at the assessment position produced over a given reference time interval, T_r

rating level, $L_{At,Tr}$

specific sound level plus any adjustment for the characteristic features of the sound

background noise level, $L_{A90,T}$

see Appendix B