Report VA5446.240807.NIA

Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Noise Impact Assessment

04 October 2024

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Contents

Attachments

Report Version	Author	Approved	Changes	Date
NIA	Steven Liddell	Ben Alexander	-	07/08/2024
NIA1.2	Steven Liddell	Jamie Duncan	Include railway noise	01/10/2024

1. Introduction

An application is to be submitted for the conversion of Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing from commercial (office) to residential use under Class MA of the General Permitted Development Order.

Venta Acoustics has been commissioned by DBH Worthing Ltd to undertake an assessment of the current environmental noise impact on the site and provide recommendations of acoustic mitigation, where required, in support of an application for planning permission.

An environmental noise survey has been undertaken to determine the noise levels incident on the site. These levels are then used to undertake an assessment of the likely impact in accordance with relevant standards and guidance.

A previous assessment considered only noise from surrounding businesses. Adur & Worthing Councils have stated that in their opinion noise from the adjacent railway line is to be considered as commercial noise and assessed accordingly.

While commercial noise is generally assessed following the methodology in BS4142: 2014 *Methods for rating and assessing industrial and commercial sound,* the standard explicitly excludes the assessment of from the passage of vehicles on public roads and railway systems. As such, the standard approach of assessing railway noise against the requirements of BS8233: 2014 *Guidance on sound Insulation and noise reduction for buildings* and the WHO guidance is used here.

2. Guidance and Legislation

2.1 Permitted Development – Class MA

Class MA of the General Permitted Development Order provides the following requirements.

Conditions

MA.2. *(1) Development under Class MA is permitted subject to the conditions*

(2) Before beginning development under Class MA, the developer must apply to the local planning authority for a determination as to whether the prior approval of the authority will be required as to—

> *(a) transport impacts of the development, particularly to ensure safe site access;*
>
> *(b) contamination risks in relation to the building;*
>
> *(c) flooding risks in relation to the building;*
>
> *(d) impacts of noise from commercial premises on the intended occupiers of the impacts of noise from commercial premises on the intended occupiers of the development;*

(e) (e)where—

(I)the building is located in a conservation area, and

(ii) the development involves a change of use of the whole or part of the ground floor,

the impact of that change of use on the character or sustainability of the conservation area;

(f) the provision of adequate natural light in all habitable rooms of the dwellinghouses;

(g) the impact on intended occupiers of the development of the introduction of residential use in an area the authority considers to be important for general or heavy industry, waste management, storage and distribution, or a mix of such uses; and

(h) where the development involves the loss of services provided by—

(i) a registered nursery, or

(ii)a health centre maintained under section 2 or 3 of the National Health Service Act 2006(4),the impact on the local provision of the type of services lost.

(3) An application for prior approval for development under Class MA may not be made before 1 August 2021.

(4) The provisions of paragraph W (prior approval) of this Part apply in relation to an application under this paragraph as if in the introductory words in sub-paragraph (5), for "and highways impacts of the development" there were substituted "impacts of the development, particularly to ensure safe site access".

(5) Development must be completed within a period of 3 years starting with the prior approval date.

(6) Any building permitted to be used as a dwellinghouse by virtue of Class MA is to remain in use as a dwellinghouse within the meaning of Class C3 of Schedule 1 to the Use Classes Order and for no other purpose, except to the extent that the other purpose is ancillary to the use as a dwellinghouse.".

Part 3, paragraph W(10)(b) of the GPDO states that the local planning authority must, when determining an application, have regard to the National Planning Policy Framework so far as relevant to the subject matter of the prior approval as if the application were a planning application.

2.2 The National Planning Policy Framework (2023)

The revised *National Planning Policy Framework* (NPPF), published in December 2023, sets out the Government's planning polices for England, superseding all previous planning policy statements and guidance.

In respect of noise, the NPPF states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing developments from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution.

Hence, Paragraph 191 states that *planning policies and decisions should also ensure new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life
b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason

In regards to the term adverse impact, reference is made to the Noise Policy for England:

2.3 Noise Policy Statement for England (2010)

The Noise Policy Statement for England (NPSE) sets out the long term vision of Government noise policy: to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

This vision is supported by the following aims:

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life.*

The terms "significant adverse" and "adverse" are related to the following concepts:

- No Observed Effect Level (NOEL) - the level below which no effect on health and quality of life can be detected.
- Lowest Observed Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.

The guidance acknowledges that it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations, but will be different for different noise sources, receptors and times.

In order to enable assessment of impacts in line with these requirements, reference should be made to other currently available guidance.

2.4 BS4142:2014+A1:2019

British Standard BS4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* describes a method for rating and assessing sound of an industrial and/or commercial nature, which includes sound from fixed installations comprising mechanical and/or electrical plant and equipment;

The assessment methodology considers the Specific Sound Level, as measured or calculated at a potential noise sensitive receptor, due to the source under investigation. A correction factor is added to this level to account for the acoustic character of the sound as follows:

Tonality – A correction of up to 6dB depending on the prominence of tones;

Impulsivity - A correction of up to 9dB depending on the prominence of impulsivity;

Other sound characteristics - A 3dB correction may be applied where a distinctive acoustic character is present that is neither tonal nor impulsive;

Intermittency - A 3dB correction may be applied where the specific sound has identifiable on/off conditions.

An estimate of the impact of the source is obtained by subtracting the typical background noise level from the corrected Specific Sound Level.

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB could be an indication of an adverse impact, depending on the context.

The lower the rating level is relative to the measured background sound level, the less likely it is that there will be an adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound having a low impact, depending on the context.

2.5 WHO Guidelines for Community Noise (1999)

The guidance in this document details suitable noise levels for various activities within residential and commercial buildings.

The relevant sections of this document are shown in Table 2.1.

Criterion	Environment	Design range $L_{Aeq,T}$ dB
Maintain speech intelligibility and avoid moderate annoyance, daytime and evening	Living Room	35 dB
Prevent sleep disturbance, night time	Bedrooms	30 dB

Table 2.1 – Excerpt from WHO **[dB ref. 20µPa]**

This guidance also states:

> *For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times a night (Vallet & Vernet 1991).*

2.6 BS8233:2014

BS8233 *Guidance on sound insulation and noise reduction for buildings* provides guidance as to desirable internal ambient noise levels for different areas within residential buildings.

The relevant section of the standard is shown below in Table 2.2.

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq, 16 hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16 hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16 hour}$	30 dB $L_{Aeq, 8 hour}$

Table 2.2 – Excerpt from BS8233:2014 - Indoor ambient noise levels for dwellings [dB ref. 20µPa]

2.7 NANR45 Proposed Criteria for the Assessment of Low Frequency Noise Disturbance

The guidance in this document offers a method for the assessment of low frequency noise, including the provision of a spectral reference curve. Where measured levels exceed the 1/3 octave band values in the reference curve, the document states that this "*may indicate a source of LFN that could cause disturbance.*"

The values of the reference curve are reproduced in Table 2.3

Frequency (Hz)	10	12.5	16	20	25	31.5	40	50	63	80	100	125	160
dB, L_{eq}	92	87	83	74	64	56	49	43	42	40	38	36	34

Table 2.3 – NANR45 LFN reference curve

3. Site Description

As illustrated on attached site plan VA5446/SP1, the site is currently a multistorey office building with associated parking to the south. The site is bounded by Shaftesbury Avenue to the east and Durrington-on-Sea railway station to the north. To the east of the site is a new multi-home residential development currently under construction.

Commercial noise sources in the area are limited. To the east, on the opposite side of Shaftesbury Avenue, is the Worthing Leisure Centre, with two churches to the southeast. Commercial noise from these sources was not evident during the site visits or from the survey data.

To the north, on the opposite side of the railway, is an NHS office with a power substation facing towards the site.

The surrounding area is otherwise residential in nature, with existing dwellings near all commercial premises. This supports the suitability of the locality for residential use.

4. Environmental Noise Survey

4.1 Survey Procedure & Equipment

In order to establish the noise levels at the site, a noise survey was carried out between Friday 19th and Tuesday 23rd July 2024, at first floor level at the locations shown in site plan VA5446/SP1. These locations were chosen to be representative of the noise level at the front are rear of the building.

Continuous 5-minute samples of the L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} sound pressure levels were undertaken at each of the measurement locations.

The weather during the survey period was generally dry with light winds. The background noise data is not considered to have been compromised by these conditions.

Measurements were made generally in accordance with ISO 1996 2:2017 *Acoustics - Description, measurement and assessment of environmental noise – Part 2: Determination of sound pressure levels*.

The following equipment was used in the course of the survey:

Manufacturer	Model Type	Serial No	Calibration	
			Certificate No.	Date
NTi Class 1 Integrating SLM	XL2	A2A-12202-E0	UCRT23/1146	1/2/23
NTi Class 1 Integrating SLM	XL2	A2A-15993-E0	1504971-2	28/3/23
Larson Davis calibrator	CAL200	19816	1509201-5	19/7/24

Table 4.1 – Equipment used for the survey

The calibration of the sound level meters was verified before and after use with no significant calibration drift observed.

4.2 Results

The measured sound levels are shown as time-history plots on the attached charts VA5446/TH1-4 for position 1 and VA5446/TH5-8 for position 2.

At position 1 (north), the sound levels are dominated by train pass-by events. The background sound level is determined by a source with a 100Hz tone, assumed to be associated with the railway infrastructure.

At position 2 (southeast), the sound levels are primarily determined by traffic on Shaftesbury Road.

The average noise levels for the Daytime and Night-time periods, as measured at the automated monitoring position were:

Monitoring Period	$L_{Aeq, T}$		Typical[1] $L_{A90,5min}$	
	Position 1 (North)	Position 2 (South)	Position 1 (North)	Position 2 (South)
07:00 – 23:00	56 dB	50 dB	46 dB	36 dB
23:00 – 07:00	51 dB	43 dB	44 dB	27 dB

Table 4.2 – Average ambient and typical background noise levels

[1] The typical L_{A90} value is taken as the 10th percentile of all L_{A90} values measured during the relevant period.

Typical maximum L_{Amax} levels, not exceeded more than 10-15 times per night, were measured to the 75dB due to train pass by events.

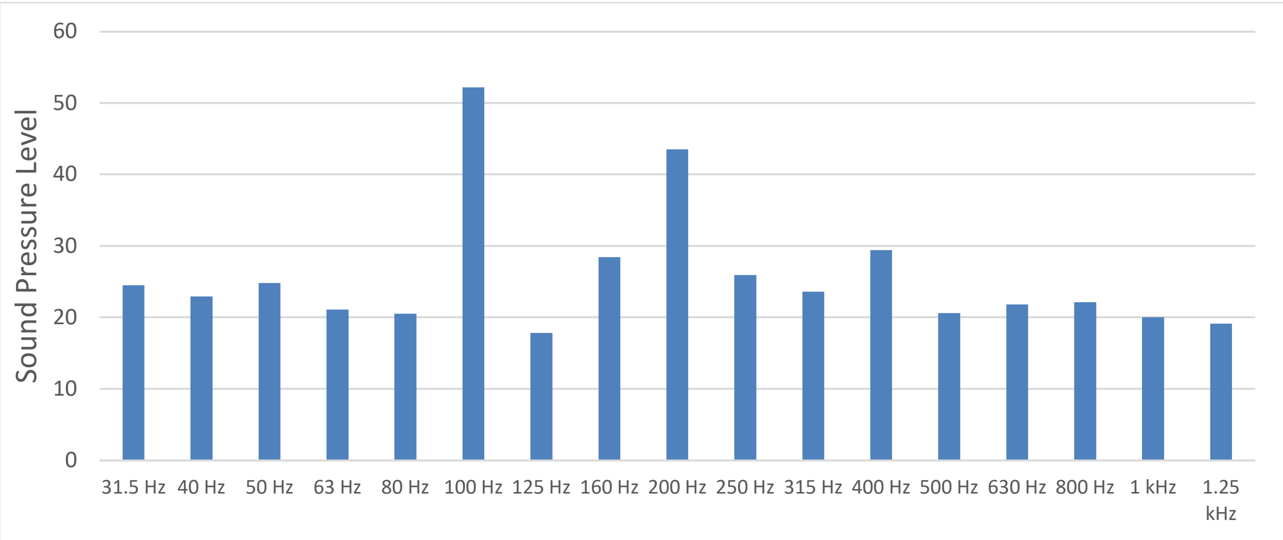
5. Commercial Noise Impact Assessment

The noise sources impacting the site are traffic, rail and infrastructure noise. In addition to the surveys and investigations undertaken during this assessment, the noise assessment report submitted as part of the application for the neighbouring large scale residential development has been reviewed and it was noted that no existing or proposed commercial noise sources are identified.

The tonal sound identified adjacent to the railway will be assessed.

5.1 Source Noise Levels

The tonal noise is approximately L_{Aeq} 45dB at the monitoring location, corresponding to a level of 39dB(A) at the building façade. This will be compared against the night-time background sound level. The spectrum is shown below.



5.2 Acoustic Character Correction

The subjective method of allocating corrections to the sound source has been used following the methodology provided in BS4142:2014 and summarised in section 2.4.

Noise Source	Subjective Description	Allocated Corrections
Substation	Clearly tonal element	Tonality: +6dB Impulsivity: 0dB Intermittency: 0dB

Table 5.1 – Acoustic character corrections

These penalties are applied to the specific noise level in section 5.3 to obtain the rating level.

5.3 Rating Level and Assessment

The rating level at the assessment location is compared against the relevant background noise level to assess the notional significance of the noise impact as follows. This applies outside the building.

Table 5.2 shows the assessment on the most affected façade of the new dwellings.

Results		Relevant Clause	Commentary
Specific Sound Level	L_{Aeq} 39dB		
Acoustic feature correction	+6 dB	9.2	+6 dB for tonality
Rating level	L_{Ar} 45 dB	9.2	
Night-time background sound level	L_{A90} 27 dB	8	Measured to the south
Excess of rating over background sound level	+18 dB	11	
Assessment indicates adverse impact		11	Depending on context

Table 5.2 – BS4142 Assessment

5.4 Context

The site is located adjacent to the railway line and the tonal sound was not noted to be clearly prominent during the day.

The BS4142 standard aims to cover a wide variety of situations under the same base assessment methodology and so has some inherent shortcomings. To allow for this, the guidance encourages consideration of the site context as a means of adapting the base assessment to specific scenarios.

The base assessment methodology is considered to be weighted towards the more sensitive case of assessing industrial noise upon an existing residential receiver. The introduction of a new residential use provides an opportunity to provide appropriate mitigation against the noise sources. This would allow appropriate internal noise levels to be achieved such that the commercial noise source is not considered to be disruptive.

6. Internal Noise Assessment

To mitigate the tonal sound, the sound insulation performance of the building glazing will be specified to control the Rating level (including BS4142 penalties) to below the recommended values in BS8233. This hybrid approach of assessing commercial noise with a BS4142 penalty against the BS8233 criteria (over a shortened assessment period) is endorsed in the ProPG (Professional

Practice Guidance on Planning and Noise prepared by the Institute of Acoustics, the Chartered Institute of Environmental Health and the Association of Noise Consultants).

The internal levels will also be assessed against the NANR 45 criteria curve.

6.1 Internal Noise Assessment

A review of the architectural drawings for the proposed scheme has been undertaken with the intent of achieving the internal noise levels from average and maximum noise levels stated in BS8233 and the WHO Guidelines.

6.1.1 Sound Reduction Performances of Building Elements

It has been assumed that all the non-glazed elements, i.e. walls and roof systems, will be capable of providing the following minimum sound insulation performance, when tested in accordance with BS EN ISO 10140-2:2021 *Acoustics - Laboratory measurement of sound insulation of building elements – Part 2: Measurement of airborne sound insulation*.

Building Element	Single figure weighted sound reduction index, dB
Masonry	R_w 51

Table 6.1 – Assumed sound reductions performances of non-glazed elements

6.1.2 Sound Reduction Performance of Windowsets and Vents

The monitoring data along with the architectural drawings have been used to calculate the required sound insulation performance for the windowsets (glazing and frame combination) and open ventilators for the building. These are summarised in Table 6.2 below.

Glazing Reference	Required Glazing SRI, dB	Ventilator Performance, dB
North Façade	R_w 27	$D_{n,e,w}$ 31
Other Facades	N/A – No commercial noise source	

Table 6.2 – Required minimum sound reduction indices for glazing and ventilators

The above sound insulation performances as expected to be achieved with standard building elements.

With the above glazing implemented, the noise levels due to the substation are expected to be around 9dB, with the 100Hz tone attenuated to around 22dB, well below the corresponding limit in the NANR45 curve. While Class MA excludes assessment of ventilation, if trickles vents were to be included in the windowset, the above levels would increase by approximately 5dB, but would remain well below the assessment criteria.

A low impact is therefore expected.

7. Noise From Train Passbys

The sound levels measured at monitoring location 1 (north) have been adjusted to the nearest façade and the resulting internal levels have been calculated on the basis of glazing specified in Table 6.2 above.

Metric	Expected Internal Sound Level
$L_{Aeq,16\ hours}$ (07:00-23:00)	23dB
$L_{Aeq,8hours}$ (23:00-07:00)	19dB
L_{Amax} – not exceeded more than 10 times per night (23:00-07:00)	37dB

Table 7.1 – Predicted internal sound levels

These levels are comfortably below the levels recommended in BS8233 and WHO, indicating a low impact.

8. Conclusion

A baseline noise survey has been undertaken by Venta Acoustics to establish the prevailing noise climate in the locality of Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing in support of a Class MA prior approval application for the proposed development of new residential dwellings.

The site is amongst other residential elements, both new and well-established.

Noise levels in the area are controlled by the railway line to the north and Shaftesbury Road to the east. There is no commercial noise noted at the site. However, the tonal sound identified to the north is assessed and it is found that with standard building elements internal noise levels would meet the recommendations of BS8233 and be below the low frequency NANR45 curve, indicating a low impact.

The sound from train pass-bys on the railway has also been assessed against the recommendations in BS8233 and WHO as requested by Adur & Worthing Councils and found to comfortably meet the stipulated internal levels with standard building elements installed.

The proposed scheme is not expected to experience a significant adverse noise impact and the site is considered acceptable for the proposed residential use.

Steven Liddell MIOA


Noise monitoring location 1
Noise monitoring location 2
Shaftesbury Ave
Worthing Leisure Centre
Church

Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Environmental Noise Time History: 1

North

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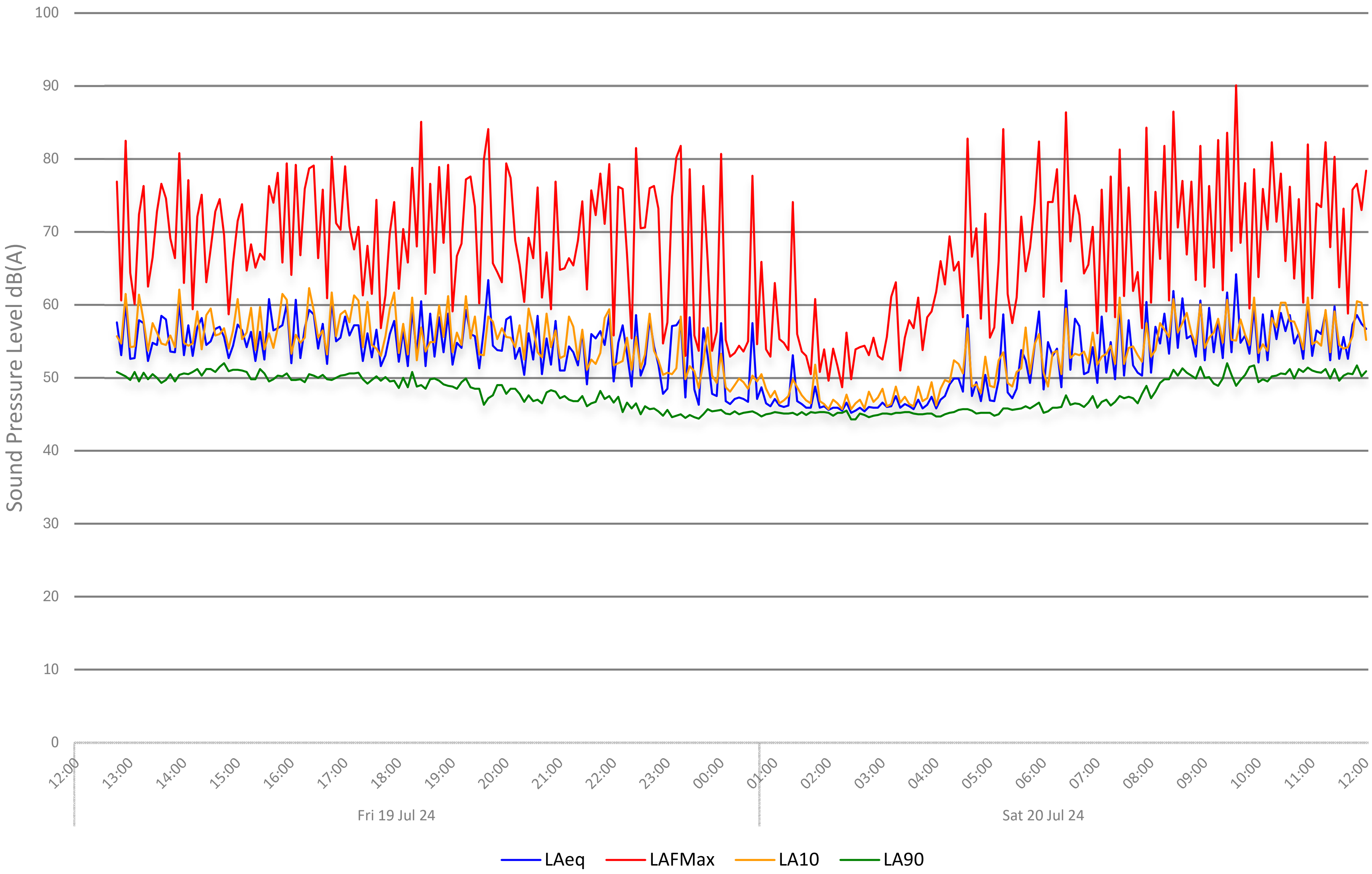
Figure VA5446/TH1

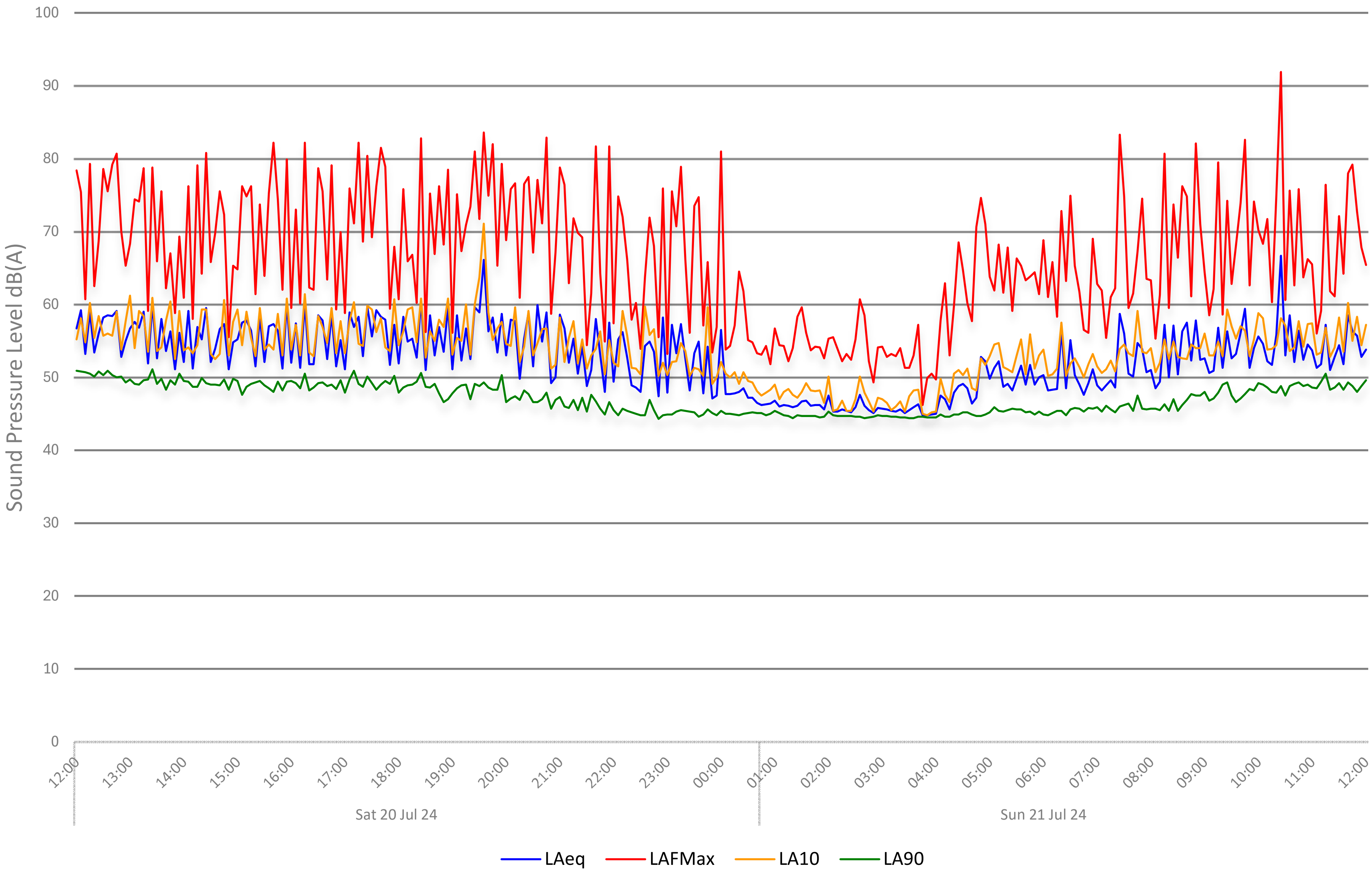


Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Environmental Noise Time History: 2

North

Figure VA5446/TH2

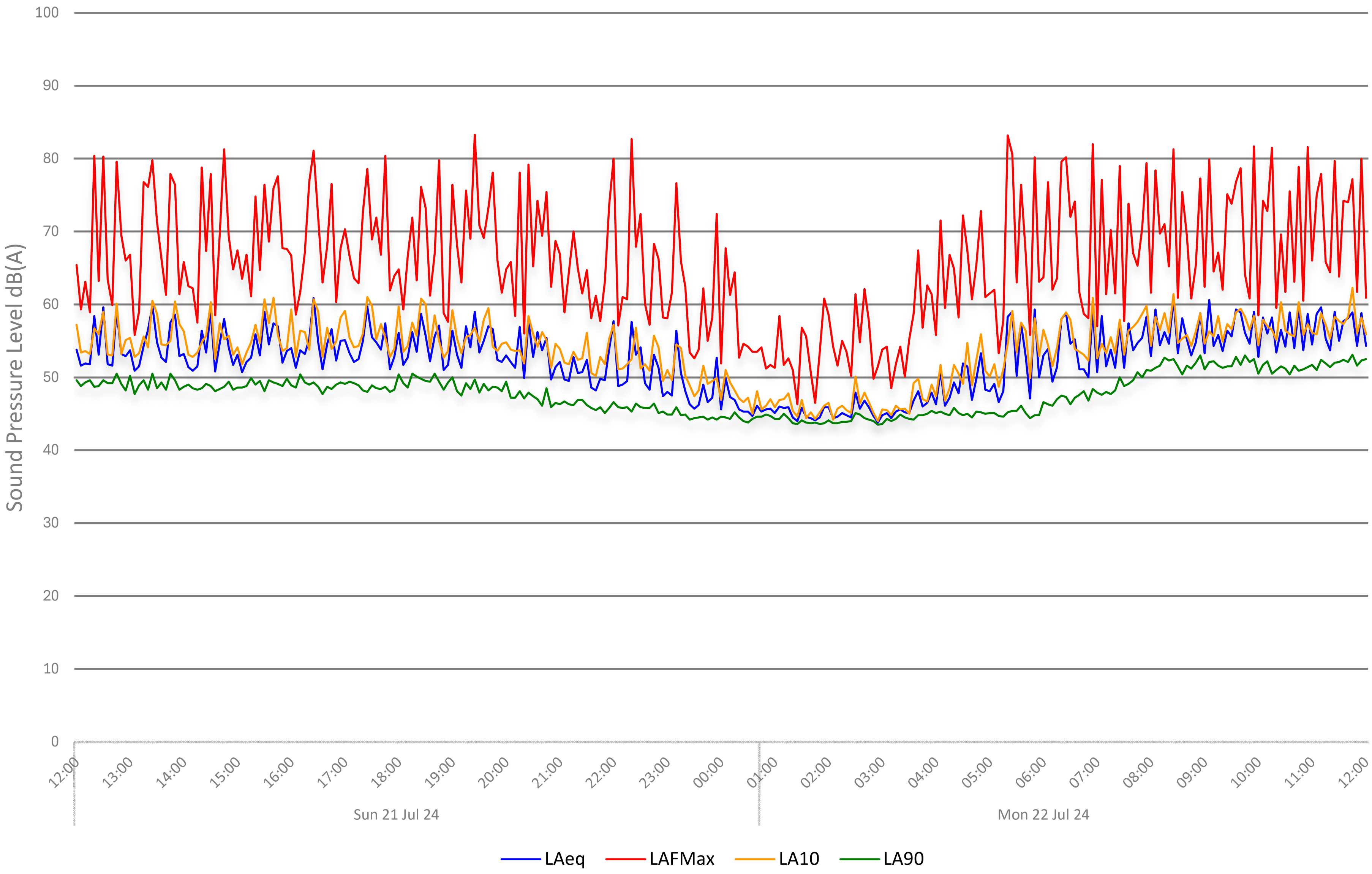


Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Environmental Noise Time History: 3

North

Figure VA5446/TH3

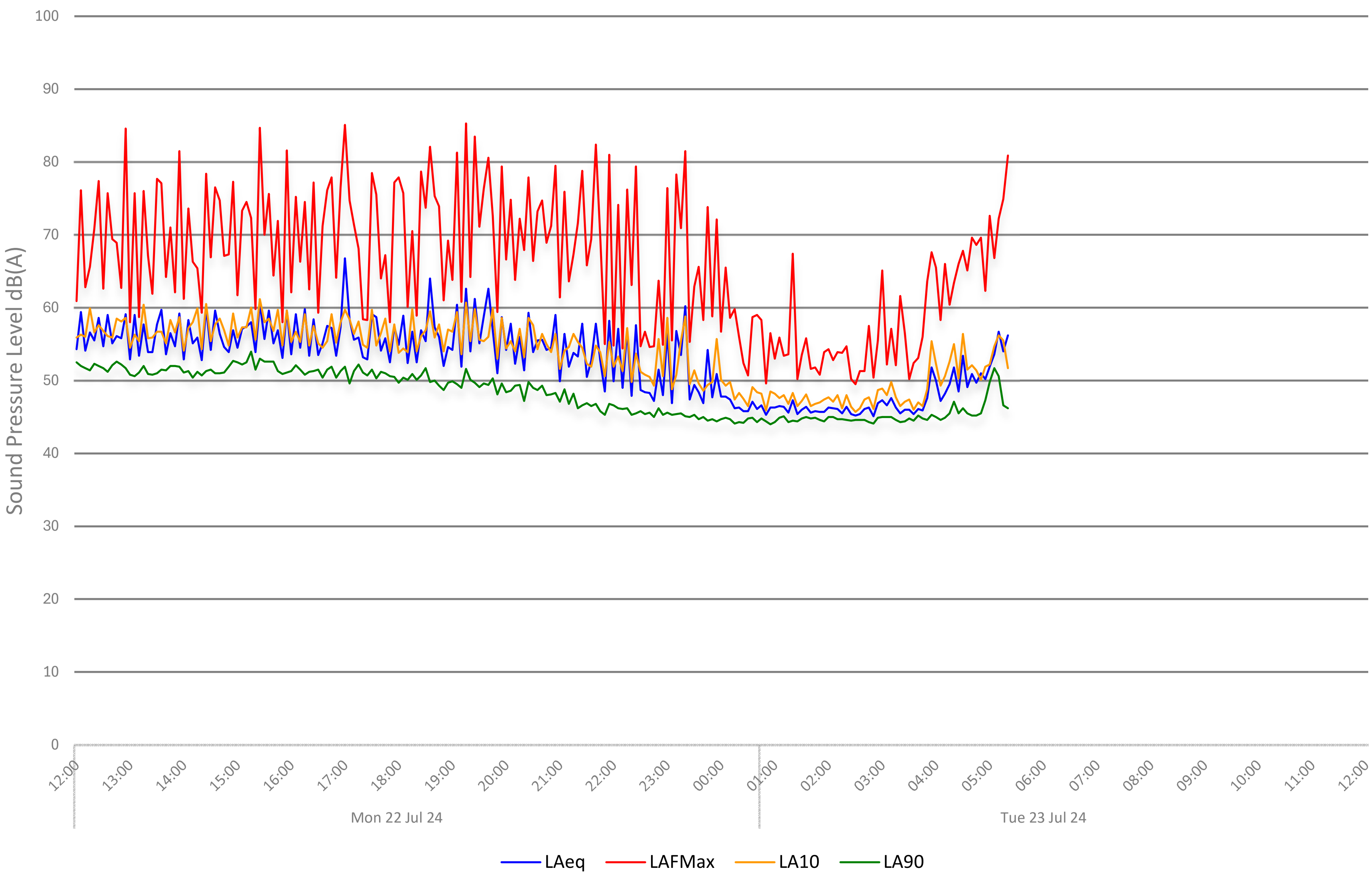


Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Environmental Noise Time History: 4

North

Figure VA5446/TH4

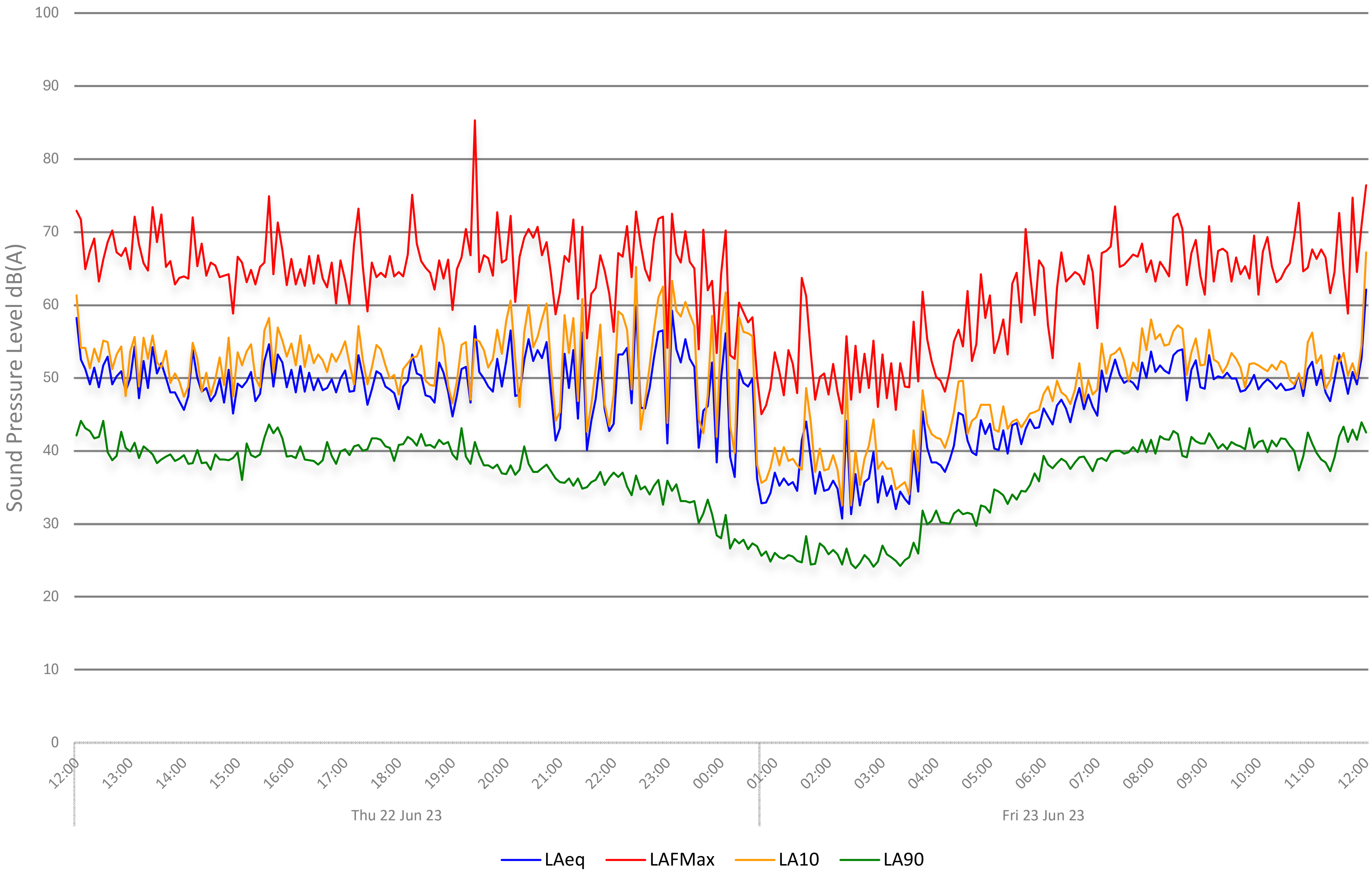


Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Environmental Noise Time History: 9

South

Figure VA5446/TH9

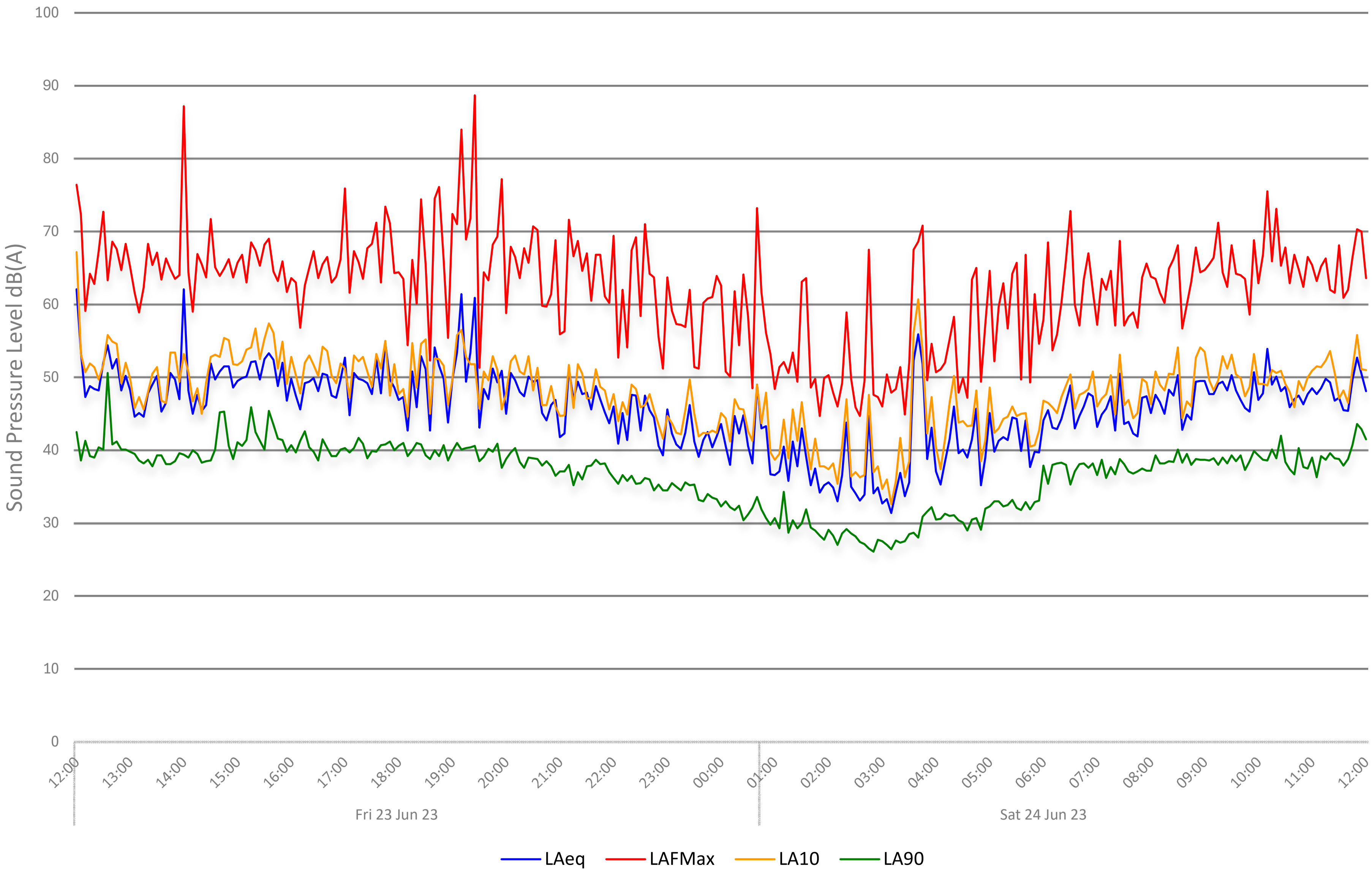


Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Environmental Noise Time History: 10

South

Figure VA5446/TH10



Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Environmental Noise Time History: 11

South

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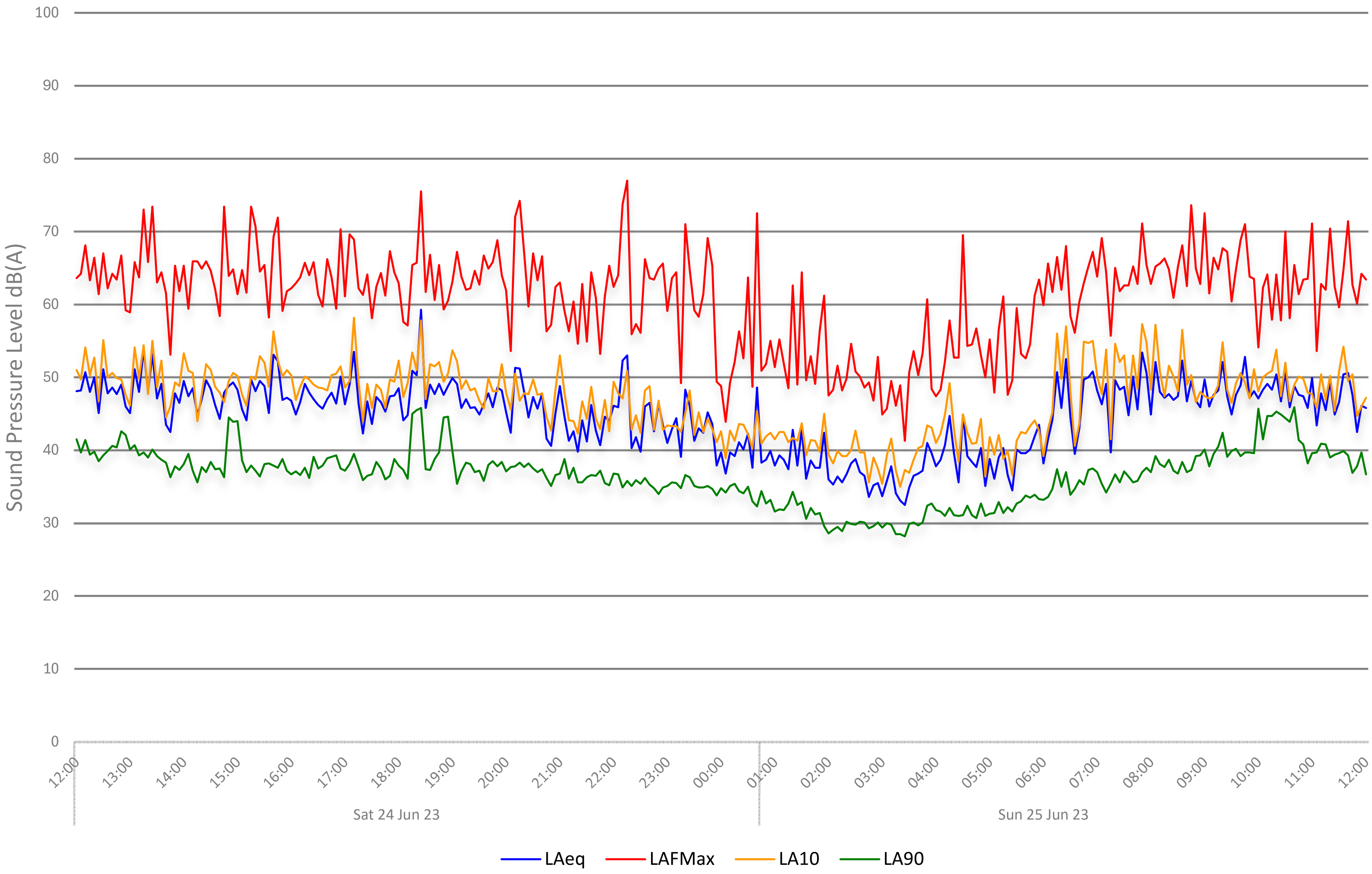
Figure VA5446/TH11



Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Environmental Noise Time History: 12

South

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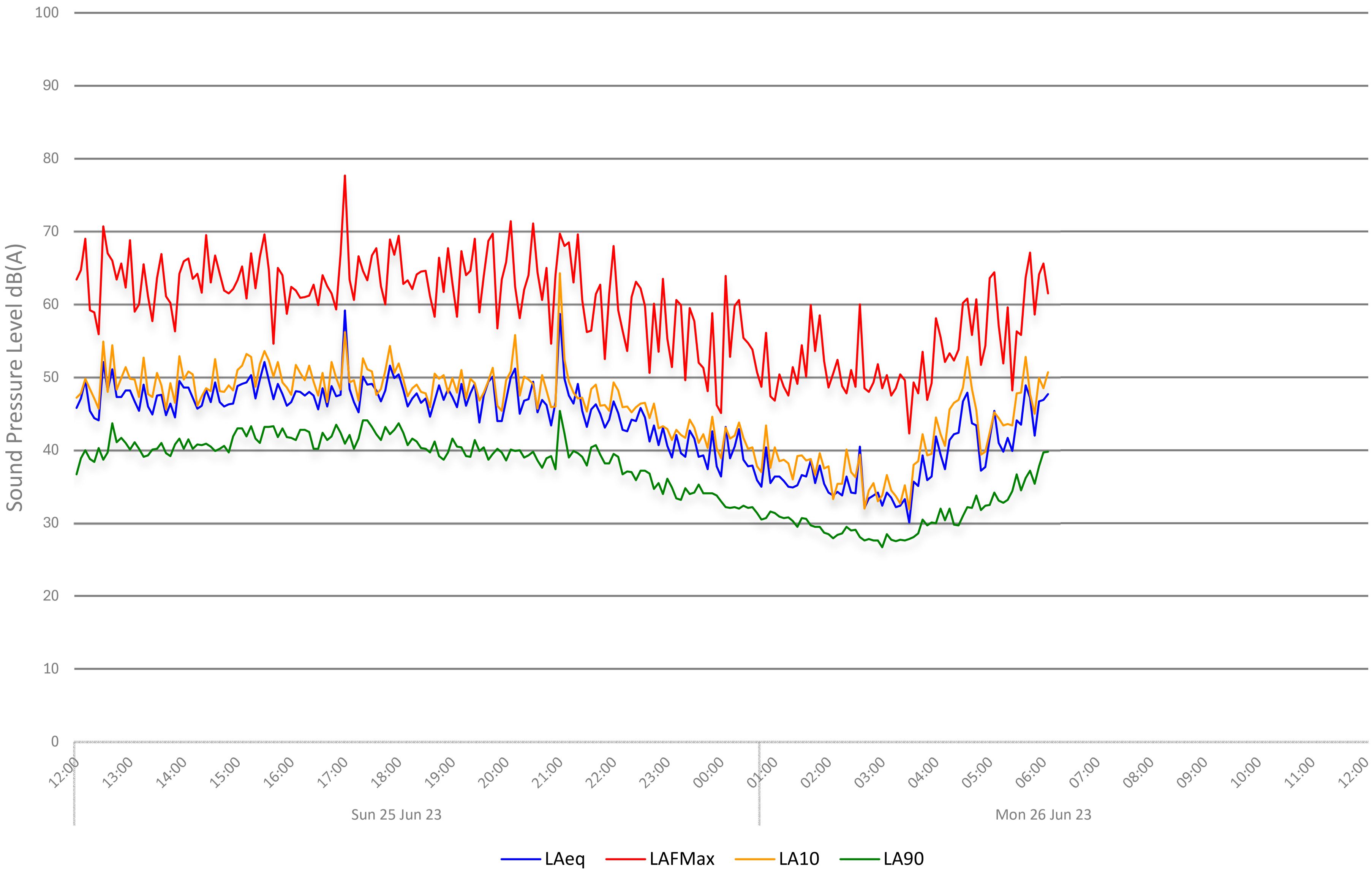
Figure VA5446/TH12



APPENDIX A

Acoustic Terminology & Human Response to Broadband Sound

1.1 Acoustic Terminology

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

Sound	Vibrations propagating through a medium (air, water, etc.) that are detectable by the auditory system.
Noise	Sound that is unwanted by or disturbing to the perceiver.
Frequency	The rate per second of vibration constituting a wave, measured in Hertz (Hz), where 1Hz = 1 vibration cycle per second. The human hearing can generally detect sound having frequencies in the range 20Hz to 20kHz. Frequency corresponds to the perception of 'pitch', with low frequencies producing low 'notes' and higher frequencies producing high 'notes'.
dB(A):	Human hearing is more susceptible to mid-frequency sounds than those at high and low frequencies. To take account of this in measurements and predictions, the 'A' weighting scale is used so that the level of sound corresponds roughly to the level as it is typically discerned by humans. The measured or calculated 'A' weighted sound level is designated as dB(A) or L_A.
L_{eq} :	A notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 8 hour, 1 hour, etc). The concept of L_{eq} (equivalent continuous sound level) has primarily been used in assessing noise from industry, although its use is becoming more widespread in defining many other types of sounds, such as from amplified music and environmental sources such as aircraft and construction. Because L_{eq} is effectively a summation of a number of events, it does not in itself limit the magnitude of any individual event, and this is frequently used in conjunction with an absolute sound limit.
L_{10} & L_{90} :	Statistical L_n indices are used to describe the level and the degree of fluctuation of non-steady sound. The term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as a typical maximum level. Similarly, L_{90} is the typical minimum level and is often used to describe background noise. It is common practice to use the L_{10} index to describe noise from traffic as, being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic flow.
L_{max} :	The maximum sound pressure level recorded over a given period. L_{max} is sometimes used in assessing environmental noise, where occasional loud events occur which might not be adequately represented by a time-averaged L_{eq} value.
D_{nT}	*Weighted Standardised Level Difference.* As defined in BS EN ISO 717-1, representing the *Weighted Level Difference*, when standardised for reference receiving room reverberant characteristics.
$D_{n,e}$	Normalised sound insulation of small building elements of fixed dimensions, such as vents, measured in an accredited laboratory test suite in accordance with the procedures laid down in BS EN ISO 10140-2:2010.
$D_{n,f}$	Flanking sound insulation of lightweight elements, such as curtain wall mullions, measured in an accredited laboratory test suite in accordance with the procedures laid down in ISO 10848-2:2006

1.2 Octave Band Frequencies

In order to determine the way in which the energy of sound is distributed across the frequency range, the International Standards Organisation has agreed on "preferred" bands of frequency for sound measurement and analysis. The widest and most commonly used band for frequency measurement and analysis is the Octave Band. In these bands, the upper frequency limit is twice the lower frequency limit, with the band being described by its "centre frequency" which is the average (geometric mean) of the upper and lower limits, e.g. 250 Hz octave band extends from 176 Hz to 353 Hz. The most commonly used octave bands are:

Octave Band Centre Frequency Hz	63	125	250	500	1000	2000	4000	8000

1.3 Human Perception of Broadband Noise

Because of the logarithmic nature of the decibel scale, it should be borne in mind that sound levels in dB(A) do not have a simple linear relationship. For example, 100dB(A) sound level is not twice as loud as 50dB(A). It has been found experimentally that changes in the average level of fluctuating sound, such as from traffic, need to be of the order of 3dB before becoming definitely perceptible to the human ear. Data from other experiments have indicated that a change in sound level of 10dB is perceived by the average listener as a doubling or halving of loudness. Using this information, a guide to the subjective interpretation of changes in environmental sound level can be given.

Change in Sound Level dB	Subjective Impression	Human Response
0 to 2	Imperceptible change in loudness	Marginal
3 to 5	Perceptible change in loudness	Noticeable
6 to 10	Up to a doubling or halving of loudness	Significant
11 to 15	More than a doubling or halving of loudness	Substantial
16 to 20	Up to a quadrupling or quartering of loudness	Substantial
21 or more	More than a quadrupling or quartering of loudness	Very Substantial

1.4 Earth Bunds and Barriers - Effective Screen Height

When considering the reduction in sound level of a source provided by a barrier, it is necessary to establish the "effective screen height". For example if a tall barrier exists between a sound source and a listener, with the barrier close to the listener, the listener will perceive the sound as being louder if he climbs up a ladder (and is closer to the top of the barrier) than if he were standing at ground level. Equally if he sat on the ground the sound would seem quieter than if he were standing. This is explained by the fact that the "effective screen height" is changing with the three cases above. In general, the greater the effective screen height, the greater the perceived reduction in sound level.

Similarly, the attenuation provided by a barrier will be greater where it is aligned close to either the source or the listener than where the barrier is midway between the two.

BS8233 Calculation of Noise Break-in

V2.4

Project Number: 5446

Project Name: Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Description: Facade North - Tonal Sound

Term	Term Description	Value
S_f	Façade area (incl. window) (m^2)	13.8
S_{wi}	Area of the windows (m^2)	3.8
S_{rr}	Area of the ceiling (m^2)	0.0
S_{ew}	Area of the external wall (m^2)	10.0
S	Area of facade and roof	13.8
x	Room Dimension x	6.0
y	Room Dimension y	6.0
z	Room Dimension z	2.3
RT	Receiving Room RT	Typical furnished bedroom: VA
K	Façade correction	0.0

	Term	Term Description	Description	Octave Band Centre Frequency 125	250	500	1000	2000	4000	dB(A)
A	$L_{eq,ff}$	Free-field L_{eq} outside room	Enter the Octave Band L_{eq} Data	52	43	31	30	23	17	39
	$D_{n,e}$	Insulation of the trickle vent	31dB Standard trickle vent in window (Paul Bassett's data)	23	26	29	30	33	33	
B		$\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}}$		0.00363	0.00182	0.00091	0.00072	0.00036	0.00036	
	R_{wi}	SRI of the window	Rw27 BS8233 Example - 6-12-6 insulated glass unit	26	29	33	28	24	100	
C		$\frac{S_{wi}}{S}10^{\frac{-Rwi}{10}}$		0.00070	0.00035	0.00014	0.00044	0.00111	0.00000	
	R_{ew}	SRI of the external wall	Rw51 Typical Cavity Wall	41	43	48	50	55	55	
D		$\frac{S_{ew}}{S}10^{\frac{-Rew}{10}}$		0.00006	0.00004	0.00001	0.00001	0.00000	0.00000	
	R_{rr}	SRI of roof/ceiling								
E		$\frac{S_{rr}}{S}10^{\frac{-Rrr}{10}}$		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
F		10log(B + C + D + E)		-24	-27	-30	-29	-28	-34	
	A	Equivalent Absorption Area		33	30	28	30	32	32	
G		10log(S/A)		-4	-3	-3	-3	-4	-4	
H	3	Correction Factor		3	3	3	3	3	3	
	L_{eq}	**Internal Noise Level**	(F + G + H)	27	16	1	0	-6	-18	**13 dB(A)**

VENTA ACOUSTICS

BS8233 Calculation of Noise Break-in

V2.4

Project Number: 5446

Project Name: Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Description: Facade North - Trains (Night Time)

Term	Term Description	Value
S_f	Façade area (incl. window) (m^2)	13.8
S_{wi}	Area of the windows (m^2)	3.8
S_{rr}	Area of the ceiling (m^2)	0.0
S_{ew}	Area of the external wall (m^2)	10.0
S	Area of facade and roof	13.8
x	Room Dimension x	6.0
y	Room Dimension y	6.0
z	Room Dimension z	2.3
RT	Receiving Room RT	Typical furnished bedroom: VA
K	Façade correction	0.0

	Term	Term Description	Description	Octave Band Centre Frequency 125	250	500	1000	2000	4000	dB(A)
A	$L_{eq,ff}$	Free-field L_{eq} outside room	Enter the Octave Band L_{eq} Data	55	47	42	42	33	29	46
	$D_{n,e}$	Insulation of the trickle vent	31dB Standard trickle vent in window (Paul Bassett's data)	23	26	29	30	33	33	
B		$\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}}$		0.00363	0.00182	0.00091	0.00072	0.00036	0.00036	
	R_{wi}	SRI of the window	Rw27 BS8233 Example - 6-12-6 insulated glass unit	26	29	33	28	24	100	
C		$\frac{S_{wi}}{S}10^{\frac{-Rwi}{10}}$		0.00070	0.00035	0.00014	0.00044	0.00111	0.00000	
	R_{ew}	SRI of the external wall	Rw51 Typical Cavity Wall	41	43	48	50	55	55	
D		$\frac{S_{ew}}{S}10^{\frac{-Rew}{10}}$		0.00006	0.00004	0.00001	0.00001	0.00000	0.00000	
	R_{rr}	SRI of roof/ceiling								
E		$\frac{S_{rr}}{S}10^{\frac{-Rrr}{10}}$		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
F		10log(B + C + D + E)		-24	-27	-30	-29	-28	-34	
	A	Equivalent Absorption Area		33	30	28	30	32	32	
G		10log(S/A)		-4	-3	-3	-3	-4	-4	
H	3	Correction Factor		3	3	3	3	3	3	
	L_{eq}	**Internal Noise Level**	(F + G + H)	30	20	13	12	4	-6	19 dB(A)

BS8233 Calculation of Noise Break-in - Maximum Events

V2.4

Project Number: 5446

Project Name: Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Description: Facade North - Trains (Night Time)

Term	Term Description	Value
S_f	Façade area (incl. window) (m^2)	13.8
S_{wi}	Area of the windows (m^2)	3.8
S_{rr}	Area of the ceiling (m^2)	0.0
S_{ew}	Area of the external wall (m^2)	10.0
S	Area of facade and roof	13.8
x	Room Dimension x	6.0
y	Room Dimension y	6.0
z	Room Dimension z	2.3
RT	Receiving Room RT	Typical furnished bedroom: VA
K	Façade correction	0.0

	Term	Term Description	Description	Octave Band Centre Frequency						
				125	250	500	1000	2000	4000	dB(A)
A	$L_{max,ff}$	Free-field L_{max} outside room	Enter the Octave Band L_{max} Data	67	61	59	64	58	52	66
	$D_{n,e}$	Insulation of the trickle vent	31dB Standard trickle vent in window (Paul Bassett's data)	23	26	29	30	33	33	
B		$\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}}$		0.00363	0.00182	0.00091	0.00072	0.00036	0.00036	
	R_{wi}	SRI of the window	Rw27 BS8233 Example - 6-12-6 insulated glass unit	26	29	33	28	24	100	
C		$\frac{S_{wi}}{S}10^{\frac{-Rwi}{10}}$		0.00070	0.00035	0.00014	0.00044	0.00111	0.00000	
	R_{ew}	SRI of the external wall	Rw51 Typical Cavity Wall	41	43	48	50	55	55	
D		$\frac{S_{ew}}{S}10^{\frac{-Rew}{10}}$		0.00006	0.00004	0.00001	0.00001	0.00000	0.00000	
	R_{rr}	SRI of roof/ceiling								
E		$\frac{S_{rr}}{S}10^{\frac{-Rrr}{10}}$		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
F		10log(B + C + D + E)		-24	-27	-30	-29	-28	-34	
	A	Equivalent Absorption Area		33	30	28	30	32	32	
G		10log(S/A)		-4	-3	-3	-3	-4	-4	
H	3	Correction Factor		3	3	3	3	3	3	
	L_{max}	**Internal Maximum Noise Level**	(F + G + H)	42	34	29	35	29	17	**37 dB(A)**

BS8233 Calculation of Noise Break-in

V2.4

Project Number: 5446

Project Name: Durrington Bridge House, Barrington Road, Goring-by-sea, Worthing

Description: Facade North - Trains - Day

Term	Term Description	Value
S_f	Façade area (incl. window) (m^2)	13.8
S_{wi}	Area of the windows (m^2)	3.8
S_{rr}	Area of the ceiling (m^2)	0.0
S_{ew}	Area of the external wall (m^2)	10.0
S	Area of facade and roof	13.8
x	Room Dimension x	6.0
y	Room Dimension y	6.0
z	Room Dimension z	2.3
RT	Receiving Room RT	Typical furnished bedroom: VA
K	Façade correction	0.0

	Term	Term Description	Description	Octave Band Centre Frequency 125	250	500	1000	2000	4000	dB(A)
A	$L_{eq,ff}$	Free-field L_{eq} outside room	Enter the Octave Band L_{eq} Data	56	50	49	49	40	36	52
	$D_{n,e}$	Insulation of the trickle vent	31dB Standard trickle vent in window (Paul Bassett's data)	23	26	29	30	33	33	
B		$\frac{A_0}{S}10^{\frac{-D_{n,e}}{10}}$		0.00363	0.00182	0.00091	0.00072	0.00036	0.00036	
	R_{wi}	SRI of the window	Rw27 BS8233 Example - 6-12-6 insulated glass unit	26	29	33	28	24	100	
C		$\frac{S_{wi}}{S}10^{\frac{-Rwi}{10}}$		0.00070	0.00035	0.00014	0.00044	0.00111	0.00000	
	R_{ew}	SRI of the external wall	Rw51 Typical Cavity Wall	41	43	48	50	55	55	
D		$\frac{S_{ew}}{S}10^{\frac{-Rew}{10}}$		0.00006	0.00004	0.00001	0.00001	0.00000	0.00000	
	R_{rr}	SRI of roof/ceiling								
E		$\frac{S_{rr}}{S}10^{\frac{-Rrr}{10}}$		0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	
F		10log(B + C + D + E)		-24	-27	-30	-29	-28	-34	
	A	Equivalent Absorption Area		33	30	28	30	32	32	
G		10log(S/A)		-4	-3	-3	-3	-4	-4	
H	3	Correction Factor		3	3	3	3	3	3	
	L_{eq}	**Internal Noise Level**	(F + G + H)	31	23	19	19	11	1	23 dB(A)