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Proposed Residential Development, Former Methodist Church, Barnsley Road, Darton, Barnsley, S75 1LS

Noise Assessment Report

For:
White Agus Partnership

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1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by White Agus Partnership to perform a noise assessment in relation to a proposed conversion of the Former Methodist Church, Barnsley Road, Darton, Barnsley, S75 1LS (hereafter referred to as ‘the site’) to provide new residential accommodation.

This report details:

- The guidelines and British standards applicable to the project regarding noise and acoustics
- The methodology and results of a baseline noise survey conducted at the site
- Recommendations for suitable facade, glazing, and ventilation sound insulation performance requirements to satisfy appropriate internal noise criteria within the dwellings

This report should be suitable for submission to Barnsley Metropolitan Borough Council (BMBC) in relation to the planning application for the site.

This report has been prepared for White Agus Partnership for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties referring to the report should consult White Agus Partnership and ENS as to the extent to which the findings may be appropriate for their use.

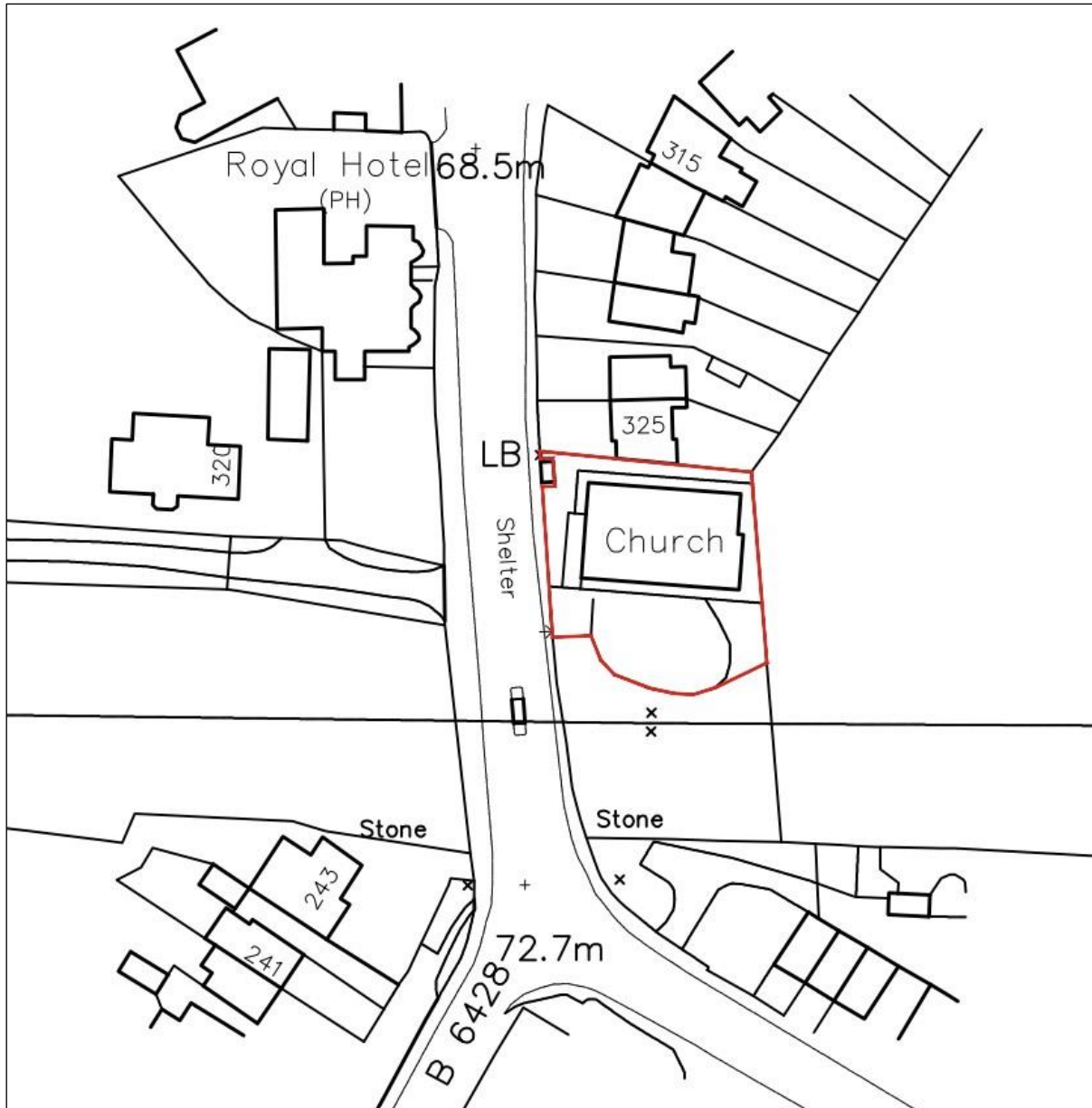
This report is necessarily technical in nature, as such a glossary of the acoustic terms used in the main body of the text is contained in Appendix A.

1.2 Site Description

The site is located in Barnsley and is accessed via Barnsley Road (A637). The surrounding area is predominantly residential in character, including a new-build residential site to the rear of the development site.

A plan showing the site (boundary shown in red) in relation to its surroundings is provided in Figure 1.1.

Figure 1.1: Location of Proposed Development



2 Policy Context and Assessment Guidance

2.1 National Planning Policy Framework

The National Planning Policy Framework (NPPF)¹ was updated in 2021 and sets out the Government's planning policies for England and how these are expected to be applied.

Where issues of noise impact are concerned the NPPF provides brief guidance in paragraph 174 where it states that planning policies and decisions should contribute to and enhance the natural and local environment by:

'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of.....noise pollution'.

Paragraph 185 advises that:

'Planning policies and decisions should also ensure that 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.....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'.

The NPPF also refers to the 2010 DEFRA publication, the Noise Policy Statement for England (NPSE) which reinforces and supplements the NPPF.

2.2 Noise Policy Statement for England

The Noise Policy Statement for England² (NPSE) sets out the long-term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development. This long-term 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
- Where possible, contribute to the improvement of health and quality of life

The NPSE describes the following levels at which noise impacts may be identified:

- NOEL – No Observed Effect Level. This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise
- LOAEL – Lowest Observed Adverse Effect Level. This is the level above which adverse effects on health and quality of life can be detected
- SOAEL – Significant Observed Adverse Effect Level. This is the level above which significant adverse effects on health and quality of life occur

¹ National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2021)

² Government Department for Environment, Food and Rural Affairs. Noise Policy Statement for England (2010)

According to the explanatory notes in the statement, where a noise level falls between the lowest observable adverse effect level (LOAEL) and a level which represents a significant observable adverse effect level (SOAEL):

‘...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.’

2.3 Planning Practice Guidance on Noise

Planning Practice Guidance³ (PPG) is an online resource which provides additional guidance and elaboration on the NPPF. It advises that the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur
- Whether or not an adverse effect is occurring or likely to occur
- Whether or not a good standard of amenity can be achieved

In line with the Explanatory Note of the NPSE, the PPG references the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

‘...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation’.

The PPG also provides general advice on the typical options available for mitigating noise, suggesting that Local Plans may include noise standards applicable to proposed developments within the Local Authority’s administrative boundary, although it states that:

‘Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed’.

With regard to the mitigation of extant environmental noise at a proposed residential development, the guidance states that:

‘... consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations’.

2.4 Assessment Guidance

ProPG Planning and Noise: New Residential Development

‘ProPG Planning and Noise: New Residential Development’ (ProPG)⁴ recommends compliance with indoor noise level targets in residential dwellings based on the guidance contained in BS8233 (see Table 2.1).

ProPG states within note 7 to the table recommending compliance with BS8233:

³ Planning Practice Guidance on Noise: <http://planningguidance.planningportal.gov.uk/blog/guidance/noise/>

⁴ ProPG Planning and Noise: New Residential Development, Association of Noise Consultants, Institute of Acoustics and the Chartered Institute of Environmental Health (2017)

‘Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal L_{Aeq} levels start to exceed the internal L_{Aeq} target levels by more than 5 dB, the more that most people are likely to regard them as “unreasonable”.....Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as “unacceptable”.

Additionally, with regard to individual noise events, ProPG states:

‘Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB $L_{Amax,F}$ more than 10 times a night.’

ProPG acknowledges that the internal target noise levels may only be practically achieved with windows closed in certain areas (e.g. in urban areas or sites adjacent to transportation noise sources) and states that:

‘In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide ‘whole dwelling ventilation’ in accordance with Building Regulations Approved Document F (e.g. trickle ventilators in the open position).

It should also be noted that the internal noise level guidelines are generally not applicable under ‘purge ventilation’ conditions as defined by Building Regulations Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food).’

British Standard 8233

British Standard 8233:2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’ (BS8233)⁵ provides recommendations for the control of noise both in and around buildings and suggests criteria and limits appropriate to their function. For dwellings, the main considerations are:

- Bedrooms - the effect of noise upon sleep
- Other habitable rooms - the effect of noise upon resting, listening and communicating

It is desirable that the internal ambient noise level does not exceed the guideline values as replicated in Table 2.1.

Table 2.1: Indoor Ambient Noise Levels for Dwellings - BS8233:2014

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

BS8233 states:

‘If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level. If applicable, any room should have adequate ventilation (e.g. trickle ventilators should be open) during assessment.’

⁵ British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings, BSI (2014)

Building Regulations - Approved Document F

Building Regulations Approved Document F 'Ventilation' (2010 version incorporating 2013 amendments)⁶ states:

'For mainly naturally ventilated buildings, it is common to use a combination of ventilators (e. g. for dwellings it is common to use intermittent extract fans for extract ventilation, trickle ventilators for whole dwelling ventilation and windows for purge ventilation).

...Purge ventilation throughout the building to aid the removal of high concentrations pollutants and water vapour released from occasional activities such as painting and decorating and or accidental releases such as smoke and burnt food or spillage of water. Purge ventilation is intermittent i.e. required only when such activities occur. Purge ventilation provisions may also be used to improve thermal comfort, although this is not controlled under Building Regulations.'

It is therefore evident that, whilst ventilation may also provide a means to aid thermal comfort, this is not controlled under Building Regulations.

⁶ The Building Regulations 2010 Approved Document F 'Ventilation' (2013)

3 Noise Survey and Results

3.1 Overview

In order to quantify the external noise affecting the proposed development site, noise monitoring was carried out on Wednesday 18th and Thursday 19th August 2021.

The adopted noise monitoring positions (shown in Appendix B) were as follows:

- Position 1 – 1m from the west facade of the existing building on the site overlooking the A637
- Position 2 – 1m from the east (rear) facade of the existing building on the site

3.2 Equipment

All measurements were undertaken using Bruel & Kjaer 2250 Type 1 integrating sound level meters. Each meter was connected to a windshield covered microphone.

The calibration of each measurement system was verified immediately before and after the survey period using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration levels greater than 0.5 dB was noted.

Measurements consisted of A-weighted broadband parameters including L_{Aeq} , L_{A10} , L_{A90} and L_{AFmax} together with linear octave band data.

The weather conditions during the survey were appropriate for noise monitoring.

3.3 Survey Results

Table 3.1 presents a summary of the noise data for each measurement session, at each measurement position, rounded to the nearest decibel.

Table 3.1: Summary of Noise Measurement Data

Position	Date / Time	$L_{Aeq,T}$ (dB)	$L_{A90,15min}$ (dB)	$L_{A10,T}$ (dB)	L_{AFmax}^A (dB)	Notes
1	19/08/2021 11:45 – 14:45	68	58 – 64	71	96	Noise climate was dominated by road traffic along the A637.
1	18/08/2021 23:00 – 01:00	58	40 – 44	60	84	
2	19/08/2021 14:45 – 15:45	54	47 – 49	55	72	
2	19/08/2021 01:00 – 01:30	41	34	42	60	
Note A: Highest maximum noise event measured during period						

3.4 Analysis

Maxima

An analysis has been undertaken to determine the maximum noise levels time that would not be expected to be exceeded more than 10 times per night at Positions 1 and 2. The results of this analysis are 76 dB L_{AFmax} and 59 dB L_{AFmax} , respectively.

Road Traffic Noise Levels

The measurements undertaken during the daytime at Position 1 have been analysed using the Calculation of Road Traffic Noise (CRTN) shortened measurement procedure to determine the L_{10} (18 hour).

The CRTN shortened measurement procedure provides a calculation method to determine the $L_{10,18\text{ hour}}$ from the measured $L_{10,3\text{ hour}}$, as shown in Figure 3.1.

Figure 3.1: CRTN Shortened Measurement Procedure Equations

$$L_{10} (18\text{-hour}) = L_{10} (3\text{-hour}) - 1 \text{ dB(A)}$$

$$\text{where } L_{10} (3\text{-hour}) = \frac{1}{3} \sum_{10 \leq t \leq 14}^{t+2} L_{10} (\text{hourly})_t$$

The results of this analysis are provided in Table 3.2, along with the conversion to daytime $L_{Aeq,16 \text{ hour}}$ and night time $L_{Aeq, 8 \text{ hour}}$ levels following the method outlined in the TRL report, for which the equations are presented in Figure 3.2.

Figure 3.2: TRL Conversion Equations (Non-Motorway Roads)

$$L_{\text{day}} = 0.95 \times L_{A10,18h} + 1.44 \text{ dB} \quad (\text{Equation 1})$$

$$L_{\text{evening}} = 0.97 \times L_{A10,18h} - 2.87 \text{ dB} \quad (\text{Equation 2})$$

$$L_{\text{night}} = 0.90 \times L_{A10,18h} - 3.77 \text{ dB} \quad (\text{Equation 3})$$

$$L_{Aeq, 16 \text{ h}} = 10 \log_{10} \left[\frac{1}{16} \right] \left[12 \times 10^{L_{\text{day}} / 10} + 4 \times 10^{L_{\text{evening}} / 10} \right] \text{ dB}$$

Table 3.2: Calculated Daytime $L_{Aeq,16\text{hour}}$ and Night time $L_{Aeq,8\text{hour}}$ Levels

Position	Calculated $L_{A10,18\text{hour}}$	Calculated Daytime $L_{Aeq,16\text{hour}}$ (dB)	Calculated Night-time $L_{Aeq,8\text{hour}}$ (dB)
1	70	67	60

3.5 Coronavirus Travel Restrictions

Data produced by the Department for Transport (DfT)⁷, show that during the noise survey the overall traffic volumes were, relative to typical traffic flows, circa 98%. Using the methodology in the Calculation of Road Traffic Noise, a 2% reduction in traffic volumes equates to less than a 0.5 dB reduction in road traffic noise levels. Therefore the measured levels are considered to represent 'normal' traffic flows.

⁷ <https://www.gov.uk/government/statistics/transport-use-during-the-coronavirus-covid-19-pandemic>

4 Noise Assessment

4.1 Facade Sound Insulation Specification

Minimum sound reduction requirements for the glazing and ventilation have been determined on the assumption that the preferred ventilation strategy is for natural ventilation, with intermittent mechanical extract ventilation to the bathrooms/kitchens. Typical specifications for these systems are also provided in the following sections. Where natural ventilation is possible, but an alternative ventilation strategy is to be employed, alternative sound reduction performances may be appropriate for glazing.

Calculations have incorporated the measured external noise level data on site and the noise ingress calculation methodology outlined in BS8233.

The following has been assumed for assessment purposes:

- Facade locations and room dimensions based on site layout plan and general arrangement layouts⁸
- Room reverberation time of 0.5 seconds within a fully furnished room
- Provision of a single $\geq 5000 \text{ mm}^2$ trickle ventilator to each room. Where additional trickle ventilators are required, see Table 4.2
- Typical facade construction: minimum 200mm solid masonry; or, cavity blockwork wall formed of one layer of standard thickness brick either side of a minimum 50 mm cavity
- Typical ceiling construction e.g. tiled/slate roof with mineral wool insulation in void; ceiling comprising either: 25mm plaster; or, 2 no. layers of 12.5mm dense plasterboard

In order to satisfy the internal noise criteria, it is necessary to incorporate mitigation measures in the form of appropriate glazing and background ventilation with the minimum specifications presented in Table 4.1.

Table 4.1: Ventilation / Glazing – Minimum Required Sound Reduction Performance

Elevation	Room Type	Trickle Vents ^A , $D_{n,e,w}$ (dB)	Glazing, $R_w + C_{tr}$ (dB)
Rooms overlooking and/or with direct line of sight to the A637	All	36	29
Rooms at rear of house, fully screened from the A637	All	.B	.B
<i>Note A – Performance applies with the trickle vents in the 'open' position</i> <i>Note B – Suitable internal noise ambient levels can be achieved with the use of open windows based on a widely accepted reduction of external noise levels from a partially open window of 15 dB.</i>			

The glazing recommendations in Table 4.1 apply to the window within a sealed unit. It is the responsibility of the window supplier to ensure that the window frame does not compromise the performance of the glazing.

4.2 Guidance on Facade Sound Insulation Performances

When selecting a glazing system to satisfy the requirements outlined in Table 4.1, it is important to ensure that the $R_w + C_{tr}$ value is achieved (rather than simply the R_w value). Published R_w values are generally higher than corresponding $R_w + C_{tr}$ values; therefore, incorrect selection could result in an overestimation of sound reduction performance which in turn could result in higher internal noise levels.

The opening and free area of the ventilation unit should be checked by a mechanical service engineer before designs are finalised. Should the equivalent open area be insufficient to meet the minimum requirements of Part F of the Building Regulations, it may be necessary to increase the number of units

⁸ Drawing number 20-216 01 E Floor Plans (issued by White Agus Partnership and dated July 2021)

per habitable room. Where this applies, the performance of each individual ventilator needs to increase by the values given in Table 4.2.

Table 4.2: Minimum Performance Increases for The Presence of Additional Trickle Vents

Number of Ventilators Serving Room	Increase in Individual Vent Performance (dB)
1	0 (No increase in performance requirements over Table 4.1)
2	3
3	5
4	6

For guidance, example configurations of glazing and ventilators that are compatible with achieving the sound insulation performances are provided below:

Glazing:

- Sound insulation performances of up to 29 dB $R_w + C_{tr}$ can be achieved with the provision of a 8 mm/12 mm/4 mm double glazing configuration

Trickle ventilators:

- Sound insulation performances of up to 36 dB $D_{n,e,w}$ can be achieved with a standard over-frame-frame trickle vent such as the Greenwood 5000EAW.AC1.

5 Summary and Conclusions

A noise survey and assessment have been undertaken in relation to the proposed new residential development at the Former Methodist Church, Barnsley Road, Darton, Barnsley, S75 1LS.

Noise monitoring was carried out on Wednesday 18th and Thursday 19th August 2021 to determine the level of external noise affecting the proposed development.

Section 4 provides a noise mitigation strategy to protect potential future residents at the site from the existing noise climate using BS8233.

Appendix A – Abbreviations and Definitions

Sound Pressure Level (L_p)

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20 μPa to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where L_p = sound pressure level in dB; p = rms sound pressure in Pa; and p_0 = reference sound pressure (20 μPa).

A-weighting

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval, T , has the same mean-square sound pressure as a sound that varies with time. $L_{Aeq, 16h}$ (07:00 to 23:00 hours) and $L_{Aeq, 8h}$ (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

$L_{A10, T}$

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period, T . $L_{A10, 18h}$ is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

$L_{A90, T}$

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval, T . L_{A90} is typically taken as representative of background noise.

$L_{AF \max}$

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

Weighted Elemental Level Different ($D_{n,e,w}$)

Single number quantity which characterises the airborne sound insulation properties of a small building element (such as a vent) over a defined range of frequencies.

Weighted Sound Reduction Index (R_w)

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies (R_w is used to characterise the insulation of a material or product that has been measured in a laboratory).

Spectrum adaptation term (C_{tr})

The C_{tr} spectrum adaptation term increases the significance airborne sound insulation at low frequencies.

Appendix B – Measurement Positions

