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Proposed Residential Development, Michaels Estate, Grimethorpe, Barnsley, S72 7DU

Noise Assessment Report

For:
JRB Designs Ltd.

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1 Introduction

1.1 Overview

Environmental Noise Solutions Ltd (ENS) has been commissioned by JRB Designs Ltd. to perform a noise assessment in relation to the proposed new residential premises at Michaels Estate, Grimethorpe, Barnsley, S72 7DU (hereafter referred to as ‘the site’).

It is proposed that a new one bedroom single storey dwelling is built on the site.

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, and;
- An assessment of noise from the adjacent car wash premises at the proposed development.

This report has been prepared for JRB Designs Ltd. 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 JRB Designs Ltd. and ENS as to the extent to which the findings may be appropriate for their use.

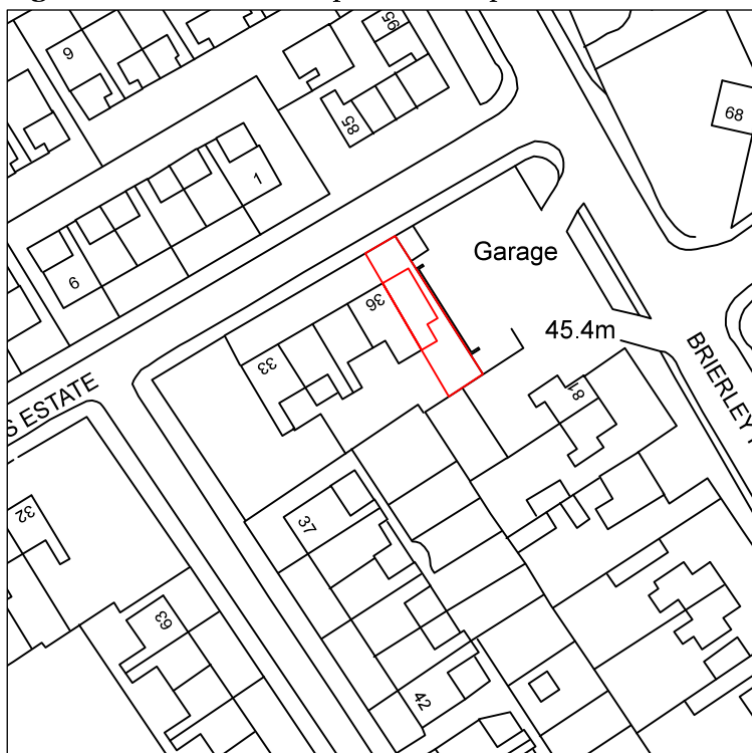
This report is necessarily technical in nature, as such a glossary of the acoustic terms used in the main body of the text is contained in Appendix A.

1.2 Site Description

The site is bound by Michaels Estate to the north, residential premises to the north on the opposite side of Michael’s Estate, to the south and west. To the east of the site is an existing garage/car wash.

A plan showing the site 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 2019 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 170 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 180 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

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):

¹ National Planning Policy Framework. Ministry of Housing, Communities and Local Government (2019)

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

‘...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

British Standard 8233

British Standard 8233:2014 ‘Guidance on Sound Insulation and Noise Reduction for Buildings’ (BS8233)⁴ 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.

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

⁴ British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings. BSI (2014)

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.'

For traditional external areas that are used for amenity space, such as gardens, BS8233 states that:

'.....it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.'

Building Regulations - Approved Document F

Building Regulations Approved Document F 'Ventilation' (2010 version incorporating 2013 amendments)⁵ 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.

British Standard 4142

BS4142⁶ presents methods for rating and assessing the potential impact of commercial and industrial sound upon noise sensitive receptors.

A BS4142 assessment involves the determination of a rating noise level, $L_{Ar,Tr}$ (dB), for the operation of plant. The assessment may include character corrections for tonality and impulsiveness, if these acoustic features are present, and comparing this rating level to the background noise level, L_{A90} (dB) at the nearest sensitive receptors.

⁵ The Building Regulations 2010 Approved Document F 'Ventilation' (2013)

⁶ British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound, BSI (2019)

3 Noise Survey and Results

3.1 Overview

In order to quantify the external noise affecting the proposed development site and to measure the key existing noise sources affecting the site, noise monitoring was carried out on Tuesday 12th January 2021.

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

- Position 1 – 5 m from the curb of Michael's Estate on the site
- Position 2 – 12 m from the curb of Michael's Estate on the site

All measurements were undertaken using two Bruel & Kjaer 2250 Type 1 integrating sound level meters. Each meter was connected to a windshield covered microphone positioned 1.5 m above the ground.

The measurement system calibration 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 noted weather conditions during the survey were dry and cloudy. Wind speeds were noted to be low. These weather conditions were therefore considered appropriate for noise monitoring.

3.2 Measurement 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 – Sample Measurement Positions

Position	Start Date / Time	Duration, T (hh:mm)	$L_{Aeq,T}$ (dB)	$L_{A90,T}$ (dB)	Notes
MP1	12/01/2021 13:51	00:15	52	44	Background noise levels at both positions were dominated by road traffic along Brierley Road, with ambient noise levels also influenced by car pass events along Michael's Estate.
	12/01/2021 14:06	00:15	51	41	
	12/01/2021 14:21	00:15	52	41	
	12/01/2021 14:36	00:15	51	41	
	12/01/2021 14:51	00:15	58	43	
	12/01/2021 15:06	00:15	54	42	
	12/01/2021 15:21	00:15	53	44	
	12/01/2021 15:36	00:15	52	44	
	12/01/2021 15:51	00:15	52	44	
	12/01/2021 16:06	00:15	54	46	
	12/01/2021 16:21	00:15	54	44	
	12/01/2021 16:36	00:15	52	44	
MP2	12/01/2021 14:04	00:15	54	43	
	12/01/2021 14:19	00:15	54	42	
	12/01/2021 14:34	00:15	53	43	
	12/01/2021 14:49	00:15	59	46	
	12/01/2021 15:04	00:15	56	44	
	12/01/2021 15:19	00:15	56	46	
	12/01/2021 15:34	00:15	55	46	
	12/01/2021 15:49	00:15	54	47	
	12/01/2021 16:04	00:15	57	48	
	12/01/2021 16:19	00:15	57	47	

3.3 Coronavirus Travel Restrictions

Data produced by the Department for Transport (DfT)⁷, show that during the time of the survey overall traffic volumes were circa 62% of typical flows. Using the methodology in the CRTN, a 38 % reduction in traffic volumes equates to a 2 dB reduction in noise levels – this correction has been robustly applied to the measured noise level across the application site to account for a potential increase in measured noise levels once traffic flows are back to ‘normal’.

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

4 Car Wash Noise

4.1 Overview

The proposed development is adjacent to an existing hand car wash to the north east on Brierley Road, approximately 10 m from the proposed nearest facade location of the development.

It was not possible to undertake measurements of typical activities at the car wash as a result of local lockdowns being enforced by the UK Government⁸ during the survey. However, ENS have previously undertaken noise measurements of similar activities that will be used to inform a reasonably worst-case assessment of noise egress to the proposed development site. The previously measured noise levels are detailed in Section 4.2.

The opening hours/hours of operation of the car wash are understood to be 09:00hrs – 19:00 hrs seven days per week.

4.2 Source Noise Levels

ENS has previously undertaken car wash facility measurements for a national car washing chain, the results of which have been used to undertake the assessment and are contained in Table 4.1 below. Noise emissions associated with washing were primarily associated with the high pressure lance nozzle, water impact on the vehicle body and intermittent compressor recharging. Vacuum measurements were undertaken at 1 metre equidistant to the vacuum tower and open vehicle door.

Table 4.1: Summary of Car Washing Facility Measurement Data

Activity	Measurement duration	dB(A)
Full wash cycle, consisting of low pressure foam application, high pressure rinse, low pressure wax	6 min 46 secs	64 @ 4 m
Vacuuming of car interior at 1 m from door/vacuum tower	38 secs	64 @ 1 m

4.3 Assessment

Based on the data contained in Table 4.1, using point source propagation and assuming a direct line of sight, the predicted noise levels at the worst affected windows of the proposed development associated with the operation of the car wash facility are detailed in Table 4.2. These calculations conservatively assume the continuous operation of the hand car wash for an entire one hour period. Furthermore, it is considered that applying BS4142 character corrections, whilst assessing the development to BS 8233 criteria, represents a robust assessment methodology.

Table 4.2: Predicted Noise Emission Levels at Receptor

Activity	Distance Attenuation (dB)	Predicted Noise Level, $L_{Aeq,1hour}$ (dB)
Car Wash Activity	8	56
Vacuum Activity	20	44
Combined Noise Level		56

⁸ <https://www.gov.uk/coronavirus>

In relation to screening of the site activity afforded by boundary treatment, BS 5228:2009 Part 1 (BS5228)⁹ states:

'In the absence of spectral data, as a working approximation, if there is a barrier or other topographic feature between the source and the receiving position, assume an approximate attenuation of 5 dB when the top of the plant is just visible to the receiver over the noise barrier, and of 10 dB when the noise screen completely hides the sources from the receiver. High topographical features and specifically designed and positioned noise barriers could provide greater attenuation'.

There is an existing 2 metre high blockwork wall on the north eastern boundary of the site adjacent to the car wash area which extends along the highlighted area shown in blue in Figure 4.1. On this basis, a 10 dB correction for screening has been applied.

Figure 4.1: Extent of Blockwork Wall to North East of the Proposed Development (Blue)

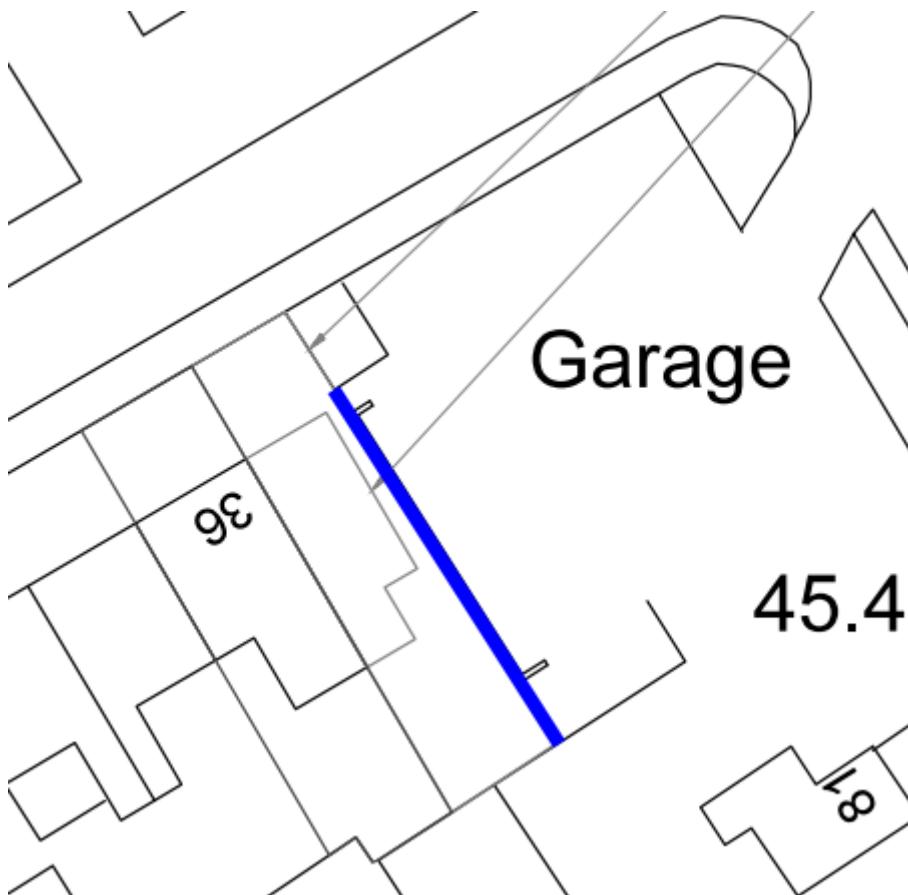


Table 4.3 details the calculation procedure based on the specific noise levels detailed above.

A +3 dB acoustic feature correction has been applied on the basis of the likely intermittent operation of the car wash, in line with the BS4142 acoustic feature correction penalties.

Table 4.3: Noise Assessment

Noise Parameter	Value	Comments
(A) Specific Noise Level	56 dB $L_{Aeq,T}$	Calculated operational noise level at receptor
(B) Acoustic Feature Correction(s)	+3 dB	Due to intermittent operation
(C) Screening	-10 dB	In accordance with BS5228
(D) Rating Level (A + B + C)	49 dB $L_{A,T,r}$	

⁹ British Standard 5228-1:2009+A1 2014 Code of Practice for Noise and Vibration Control on Construction and Open Site, BSI (2014)

Contextual Analysis

The proposed development site is located approximately 30 m from Brierley Road, the section of main road off the A6195 which runs through Grimethorpe. As such, the noise levels at the site are dominated by road traffic along Brierley Road, with some influence from car passes along Michael's Estate.

The results of the assessment indicate the operation of the car wash is likely to yield a rating level of 49 dB $L_{Ae,Tr}$ at the facade/in the garden of the proposed development. This rating level is below the BS8233 guideline limit of 50 dB for external noise levels in noisier environments. In addition, the calculated rating level is 4 dB below the lowest external ambient noise level of 53 dB $L_{Aeq,15min}$, accounting for a +2 dB correction for traffic flows.

The area in which the proposed development is located is predominantly residential, with other residential premises nearby to the car wash. Although the other residential premises nearby to the car wash benefit from slightly increased distance to the car wash e.g 18 m between car wash and no.81 Brierley Road, relative to the proposed development, they do not benefit from screening effects due to barriers such as the existing blockwork wall on the proposed development site. As such, the levels at these residential premises are likely to be higher than at the proposed development from the operation of the car wash. The comparison between the existing external ambient noise levels and the calculated rating level of the car wash, along with the proposed development likely to be less affected by noise from the car wash than other nearby noise sensitive residential receptors, is an indication that the proposed development is unlikely to be significantly adversely affected by the operation of the car wash.

Notwithstanding the consideration of external noise levels, it is important to consider the internal noise levels that would be realised within the proposed dwelling during the operation of the car wash. As such, an assessment is provided in Figure 4.2 and Figure 4.3 below to evaluate the internal noise levels within the dwelling based on the provision of standard thermal double glazing and standard trickle ventilators during the operation of the car wash.

The results of the internal ambient noise level assessment indicate that the noise levels would be readily compliant with the daytime internal ambient noise level criteria without the need for enhanced glazing or trickle vents for the control of noise ingress from the operation of the car wash.

Figure 4.2: Noise Ingress Calculation – Bedroom During Daytime

BRE Building Envelope Insulation

Switch to Reverberation Time Calculation

2) Select elements of facade structure, and enter corresponding internal surface area in m² OR enter number of vents.

1) Enter room dimensions or volume

Use dimensions

X m

Y m

Z m

Volume m³

OR

Use volume

36 m³

3) Enter reverberation time of the room.

0.5 seconds

4) Select exterior sound level type

Option (A) ☒ User defined spectrum

Car Wash Rating Level

View/Edit Data

Option (B) ☐ Spectrum shape

Select spectrum shape and enter free field exterior sound level, L_{Aeq} (considering only the octave bands between 125Hz and 2kHz)

L_{Aeq} 49 dB

ISO 717 - 1 (Ctr)

View Data

Internal sound level

L_{Aeq} 17.0 dB

Element	Material/Type	Surface area OR number of vents	Unit
Wall 1	Brick/block cavity	22	m ²
Wall 2	None		m ²
Window 1	4/ 12/ 4 double glazing	1.5	m ²
Window 2	None		m ²
Door	None		m ²
Roof/ Ceiling	None		m ²
Vent 1	Hit and miss trickle (4000mm ²)	1	
Vent 2	None		

View/Edit Data

Figure 4.3: Noise Ingress Calculation – Living Room During Daytime

BRE		Building Envelope Insulation		Switch to Reverberation Time Calculation		4) Select exterior sound level type	
1) Enter room dimensions or volume ☐ Use dimensions x m y m z m Volume m ³ OR ☒ Use volume 69 m ³		2) Select elements of facade structure, and enter corresponding internal surface area in m ² OR enter number of vents.		Surface area OR number of vents		Option (A) ☒ User defined spectrum Car Wash Rating Level View/Edit Data	
		Wall 1	Brick/block cavity	35	m ²	Option (B) ☐ Spectrum shape Select spectrum shape and enter free field exterior sound level, L_{Aeq} (considering only the octave bands between 125Hz and 2kHz) L_{Aeq} 49 dB ISO 717 - 1 (Ctr) View Data	
		Wall 2	None		m ²		
		Window 1	4/12/4 double glazing	3.3	m ²		
Window 2	None		m ²	Internal sound level L_{Aeq} 15.5 dB			
Door	None		m ²				
Roof/Ceiling	None		m ²				
Vent 1	Hit and miss trickle (4000mm ²)	1					
				View/Edit Data			
3) Enter reverberation time of the room.		0.5 seconds					

5 Summary and Conclusions

A noise survey and assessment have been undertaken in relation to the proposed new residential development at Michaels Estate, Grimethorpe, Barnsley, S72 7DU.

Noise monitoring was carried out on Tuesday 12th December 2021 to determine the level of external noise affecting the proposed development and to identify and quantify existing key noise sources affecting the site and the location of the proposed development.

Section 4 provides an assessment of noise from the adjacent car wash along for the consideration of protecting 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.

$L_{A90, T}$

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.

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

