



BERNARD TAYLOR PARTNERSHIP LIMITED

1198 STOCKPORT ROAD, MANCHESTER

NOISE ASSESSMENT FOR PLANNING PURPOSES

23 September 2022

AEC REPORT: P4587/R1a/NRS

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1.0 INTRODUCTION

- 1.1 Acoustic & Engineering Consultants Limited (AEC) has been instructed by Bernard Taylor Partnership Ltd (BTP) to undertake a noise assessment for the conversion of a single dwelling into three apartments at 1198 Stockport Road, Manchester.
- 1.2 This report details the baseline noise levels measured on site, presents the assessment criteria, and discusses the implications on the building design to achieve acceptable internal noise levels to meet the Local Authority requirements.
- 1.3 Acoustic terminology is discussed in brief in Appendix A.

2.0 BACKGROUND AND SITE DESCRIPTION

- 2.1 The proposed site is bound by Stockport Rod (A6) to the east and residential properties to the north and south, as identified on the attached Figure 1.
- 2.2 Stockport Road is a busy arterial road connecting Stockport and Manchester city centre.
- 2.3 Approximately 20m to the south-west of the site is A6 Tyres (vehicle repair shop) whose operational hours are presented below:
 - Monday to Friday – 0830h to 1700h;
 - Saturday – 0930h to 1430h.
- 2.4 Beyond A6 Tyres, around 150m to the west of the site are four railway lines.
- 2.5 The proposed scheme includes the conversion of 3-storey property into three apartments, as identified on the attached Figure 2.

3.0 NOISE MEASUREMENTS

- 3.1 AEC undertook attended daytime noise level measurements on Wednesday 23 March 2022 between approximately 0900 and 1230h. Night-time noise levels were measured on Thursday 24 March 2022 between approximately 0500 and 0700h.
- 3.2 All measurements were undertaken under free-field conditions in general accordance with BS7445-1: 2003 '*Description and measurement of environmental noise. Guide to quantities and procedures*'.
- 3.3 A full measurement procedure is presented in Appendix B, Table B1, and the measured data is presented in Tables B2 and B3. Measurements were undertaken at three locations around the development site identified as A to C on the attached Figure 1.
- 3.4 A comment on the attended measurement locations and the main sources of noise are presented below.
- 3.5 Location A was selected to measure noise levels affecting the eastern elevation of the site facing Stockport Road. During both daytime and night-time periods, the main source of noise was road traffic on Stockport Road.
- 3.6 Locations B and C were selected to measure noise levels affecting the western and northern elevation of the site.
- 3.7 During both the daytime and night-time periods, the main source of noise was road traffic (partially screened) on Stockport Road even though train pass bys were just audible (not contributing to the measured ambient noise levels). Noise from activities associated with A6 Tyres was not audible at this location.
- 3.8 A summary of the daytime and night-time measured noise levels at each location is presented in Table 3.1

Table 3.1 – Summary of the Measured Free-Field External Noise Levels

Measurement Location	Noise Level, dB			
	Daytime		Night-time	
	L _{Aeq,T}	L _{A10,T}	L _{Aeq,T}	L _{Amax,F}
A	72	76	68-72	86
B	49	51	-	-
C	-	-	51	69

- 3.9 The highest maximum noise level measured at all three locations was due to vehicle movements on Stockport Road.

4.0 BASIS OF ASSESSMENT

National Planning Policy Framework

- 4.1 Current national planning policies are set out in the National Planning Policy Framework (NPPF) published by the Department for Communities and Local Government in March 2012 and revised in February 2019.
- 4.2 The planning policies which relate specifically to noise, were updated in July 2021, and are presented in paragraphs 174, 185 and 187 which are reproduced below:

“174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- (e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.*

185. 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:

- (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.*

187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

- 4.3 Further to the above, the Governments 'Planning Practice Guidance' (PPG) published on 6 March 2014 and updated on 22 July 2019 states:

"Noise needs to be considered when development may create additional noise, or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced). When preparing plans, or taking decisions about new development, there may also be opportunities to make improvements to the acoustic environment. Good acoustic design needs to be considered early in the planning process to ensure that the most appropriate and cost-effective solutions are identified from the outset."

- 4.4 In addition, the guidance indicates that, whilst noise can override other planning concerns, it is important to look at noise in the context of the wider characteristics of a development proposal, its likely users, and its surroundings, as these can have an important effect as to whether or not noise is likely to pose a concern.

Determining and Assessment of External Noise Levels

- 4.5 BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' (BS8233) describes how noise levels can be determined and assessed from different sources in chapters 6.2 to 6.7.
- 4.6 In relation to road traffic noise, BS8233 states that the noise from road traffic can be determined using the Department of Transport, Welsh Office, document 'Calculation of Road Traffic Noise' (CRTN) issued in 1988. CRTN presents the shortened measurement procedure which can be used to convert the arithmetic mean of the measured $LA_{10,T}$ levels (measured over 3 consecutive hours during the period 1000h to 1700h) into an 18-hour LA_{10} level by subtracting 1dB.
- 4.7 BS8233 suggests that the conversion of the $LA_{10,18h}$ to $LA_{eq,16h}$ can be achieved by the (approximate) relationship of $LA_{eq,16h} = LA_{10,18h} - 2dB$. Therefore, the daytime ambient noise level can be determined by subtracting 3dB from the arithmetic mean of the $LA_{10,T}$ levels measured on-site over 3 consecutive hours (between 1000 and 1700h).

Internal Noise Level Limits

- 4.8 Manchester City Council (MCC) has outlined their requirements for noise assessments to accompany planning applications in 'Planning & Noise – Technical Guidance' (2015) (PNTG).
- 4.9 Section 3.6.1.1 of this document states *"Manchester City Council has adopted the following internal limits for residential properties:*
- *Bedroom (night-time – 23.00 – 07.00) 30dBL_{Aeq} (individual noise events should not normally exceed 45dBL_{Amax, F} by more than 15 times);*
 - *Living Rooms (daytime – 07.00 – 23.00) 35dBL_{Aeq}."*

- 4.10 These levels are based on guidance presented in BS8233 and The Association of Noise Consultants (ANC) document Professional Practice Guidance (ProPG) on Planning and Noise '*New Residential Development*' (2017).

Ventilation and Control of Overheating

- 4.11 The ventilation specifications presented in BS8233 and ProPG are based on achieving the requirements of Approved Document F (ADF) '*Ventilation*' (2010) of the Building Regulations only.
- 4.12 ADF requires that continuous whole dwelling (background) ventilation be provided to limit the accumulation of moisture and other pollutants originating within a building. This is typically achieved either via a partially opened window, or by a whole building ventilation system through the provision of trickle ventilators or mechanical ventilators. ADF states that '*The ventilation provisions will not necessarily meet cooling needs*'.
- 4.13 ProPG also notes that the attenuation of external to internal noise levels provided by a window partially open for whole dwelling (background) ventilation is no more than 15dB.
- 4.14 Therefore, for habitable rooms to have whole dwelling ventilation via a partially open window, external noise levels outside habitable rooms should not exceed 50dB_{L_{Aeq,16h}} during the daytime, and 45dB_{L_{Aeq,8h}} and 60dB_{L_{Amax,F}} at night.
- 4.15 In relation to purge ventilation, ProPG suggests that as this should only occur occasionally (e.g., to remove odour from painting and decorating or from burnt food), the internal desired noise levels are not generally applicable. Therefore, internal noise levels due to windows being opened for purge ventilation has not been discussed further.
- 4.16 To provide guidance on the relationship between internal noise levels and the control of overheating in residential properties, the ANC issued '*Acoustic ventilation and Overheating – Residential Design Guide*' (AVO) in January 2020. It is important to note that this is a design guide only and not a statutory document and the Local Authority may have their own requirements.
- 4.17 At this stage AEC are unaware of any specific Local Authority requirements in relation to acceptable internal noise level limits in habitable rooms with windows open to aid with the control of overheating. Therefore, this indicative assessment is based on the guidance presented in AVO.
- 4.18 Table 3.3 of AVO presents guidance for allowable noise from transportation sources whilst windows are open for the control of overheating. With reference to this document AEC would propose that windows can be utilised in the control of overheating provided that the resultant internal ambient noise levels are below approximately 50dB_{L_{Aeq,16h}} during the daytime, and 42dB_{L_{Aeq,8h}} and 65dB_{L_{Amax,F}} during the night-time.
- 4.19 These internal noise levels are the upper end of the medium risk category for adverse effects. Where these internal noise levels would be exceeded, AVO states that "*noise causes a material change in behaviour (e.g., having to keep windows closed most of the time)*". In this situation, AEC would suggest alternative means for the control of overheating are considered, which do not rely on open windows.

- 4.20 AVO states that where transportation is the main source of noise, *“it is assumed that a partially open window will provide an outside-to-inside level difference of 13dB and is considered representative of typical domestic rooms with simple façade openings of around 2% of the floor area”*.
- 4.21 Considering the above, it is considered acceptable to control summertime heating via opening windows where external free-field noise levels are no greater than those presented in the following Table 4.1.

Table 4.1 – External Free-Field Noise Level Limits for the Control of Overheating via Openable Windows

Activity	Location	Noise Level Limit, dB		
		Daytime 0700 – 2300h	Night-Time 2300 – 0700h	
		$L_{Aeq,16h}$	$L_{Aeq,8h}$	$L_{Amax,F}$
Resting	Living Room	63	-	-
Dining	Dining Room/Area	63	-	-
Sleeping (daytime resting)	Bedroom	63	55	78

- 4.22 The limits presented in Table 4.1 are subject to agreement with the Local Authority and may be subject to change.

External Noise Level Limits

- 4.23 For traditional external areas that are used as an amenity space, such as gardens and patios, BS8223 states that it is desirable that ambient noise levels should be not exceed $50dB_{LAeq,16h}$ during the daytime, with an upper limit of $55dB_{LAeq,16h}$.
- 4.24 Furthermore, PNTG provides a limit for $50dB_{LAeq,16h}$ to stop ‘*moderate annoyance*’, and an upper limit of $55dB_{LAeq,16h}$ for ‘*serious annoyance*’.

5.0 ASSESSMENT OF PROPOSED DEVELOPMENT

- 5.1 As stated in Section 3.0, the noise climate affecting the site during both the daytime and night-time periods at all locations was road traffic on Stockport Road.
- 5.2 In relation to night-time noise levels, it is generally agreed that the most critical periods for sleep disturbance are during the periods between 2300 and 0100h and 0500 and 0700h. In addition, based on AEC's experience, the ambient noise level generally reduces between from 0100 to 0500h when there is less road traffic.
- 5.3 Therefore, the ambient noise level measured between 0500 and 0700h has been used in this assessment. In addition, as the maximum noise levels were relatively consistent, the highest maximum noise level measured at each location during the night-time period has been used in the assessment.
- 5.4 The noise level affecting each elevation of the proposed development has been determined based on the noise levels measured around the site and taking into account distance attenuation and screening where appropriate.
- 5.5 Based on the noise levels presented in Table 3.1, the free-field daytime and night-time ambient noise level affecting the eastern façade of the site overlooking Stockport Road would be around 70dB_{L_{Aeq},16h} and 68dB_{L_{Aeq},8h}, respectively. The night-time free-field maximum noise level affecting the eastern façade would be around 84dB_{L_{Amax},F}.
- 5.6 The free-field daytime and night-time ambient noise level affecting the western façade of the site would be around 49dB_{L_{Aeq},16h} and 47dB_{L_{Aeq},8h}, respectively. The night-time free-field maximum noise level affecting the western façade would be around 69dB_{L_{Amax},F}.
- 5.7 The free-field daytime and night-time ambient noise level affecting the northern façade of the site would be around 53dB_{L_{Aeq},16h} and 51dB_{L_{Aeq},8h}, respectively. The night-time free-field maximum noise level affecting the northern façade would be around 69dB_{L_{Amax},F}.

Glazing and Ventilation Requirements

- 5.8 As stated in Section 4.0, for habitable rooms to have whole dwelling ventilation provided via a window partially open, external noise levels should not exceed 50dB_{L_{Aeq},T} during the daytime and 45dB_{L_{Aeq},T} and 60dB_{L_{Amax},F} at night.
- 5.9 It is understood that whole dwelling (background) ventilation will be provided using trickle vents in all habitable rooms.
- 5.10 The minimum sound insulation performances of the glazing and ventilators to meet the required internal noise level limits for each noise source have been calculated based on the measured noise spectra and the provided drawings. The minimum sound insulation performances are presented in Table 5.1, below.

Table 5.1 – Outline Requirements of Glazing and Ventilation to Achieve Internal Noise Levels in Habitable Rooms

Elevation (overlooking)	Daytime / Night-time	Sound Insulation Performance	
		Glazing	Ventilator
Eastern (Stockport Road)	Daytime	41dBR _w / 35dBR _w + C _{tr}	41dBD _{n,e,w}
	Night-time	44dBR _w / 38dBR _w + C _{tr}	46dBD _{n,e,w}
Western (Rear Garden)	Daytime and Night-time	29dBR _w / 25dBR _w + C _{tr}	33dBD _{n,e,w}
Northern (Residence)	Daytime and Night-time		

- 5.11 Example glazing build-ups, to achieve the required sound insulation performances presented in Table 5.1, are provided in Table 5.2 below. Consideration of frames and seals is more critical where the glazing acoustic performance requirement is 40dBR_w or higher. In these instances, consideration should be given to secondary glazed systems or alternative means of controlling noise break-in.

Table 5.2 – Example Glazing Constructions

Sound Insulation Performance	Example Construction
44dBR _w / 38dBR _w + C _{tr}	10mm Glass / 16mm Thermal Cavity / 8.8mm Lami Glass
41dBR _w / 35dBR _w + C _{tr}	6mm Glass / 16mm Thermal Cavity / 8.8mm Lami Glass
29dBR _w / 25dBR _w + C _{tr}	4mm Glass / 6-16mm Thermal Cavity / 4mm Glass

- 5.12 In order to verify the octave band sound insulation performance data of the glazing build-ups and ventilators installed, post verification testing will be undertaken by AEC or others.
- 5.13 All background ventilation sound insulation requirements have been based on the use of a single ventilator per room. If more than one unit is required, such as may be required to satisfy Building Control requirements, the performance of each unit might need to be increased.

Control of Overheating

- 5.14 If it is determined by others that there is a need to control overheating within the development, a comparison between the noise levels presented above and those presented in Table 4.1, indicates that the control of overheating can be achieved via a partially opened window to all habitable rooms, except the living rooms on the eastern façade, where alternative means of summertime cooling is required.

External Envelope

- 5.15 To maintain the sound insulation performance of the external envelope, the remainder of the façade construction should have a sound insulation performance of at least 10dB higher than the glazing.
- 5.16 This would be achieved with 2 layers of standard masonry.

Noise Level in External Amenity Areas

- 5.17 The daytime ambient noise level in the garden areas would be around 49dBL_{Aeq,16h} due to road traffic on Stockport Road.
- 5.18 This is below the desirable limit in BS8233, ProPG and PNTG, and therefore, should be acceptable to MCC.

6.0 SUMMARY AND CONCLUSIONS

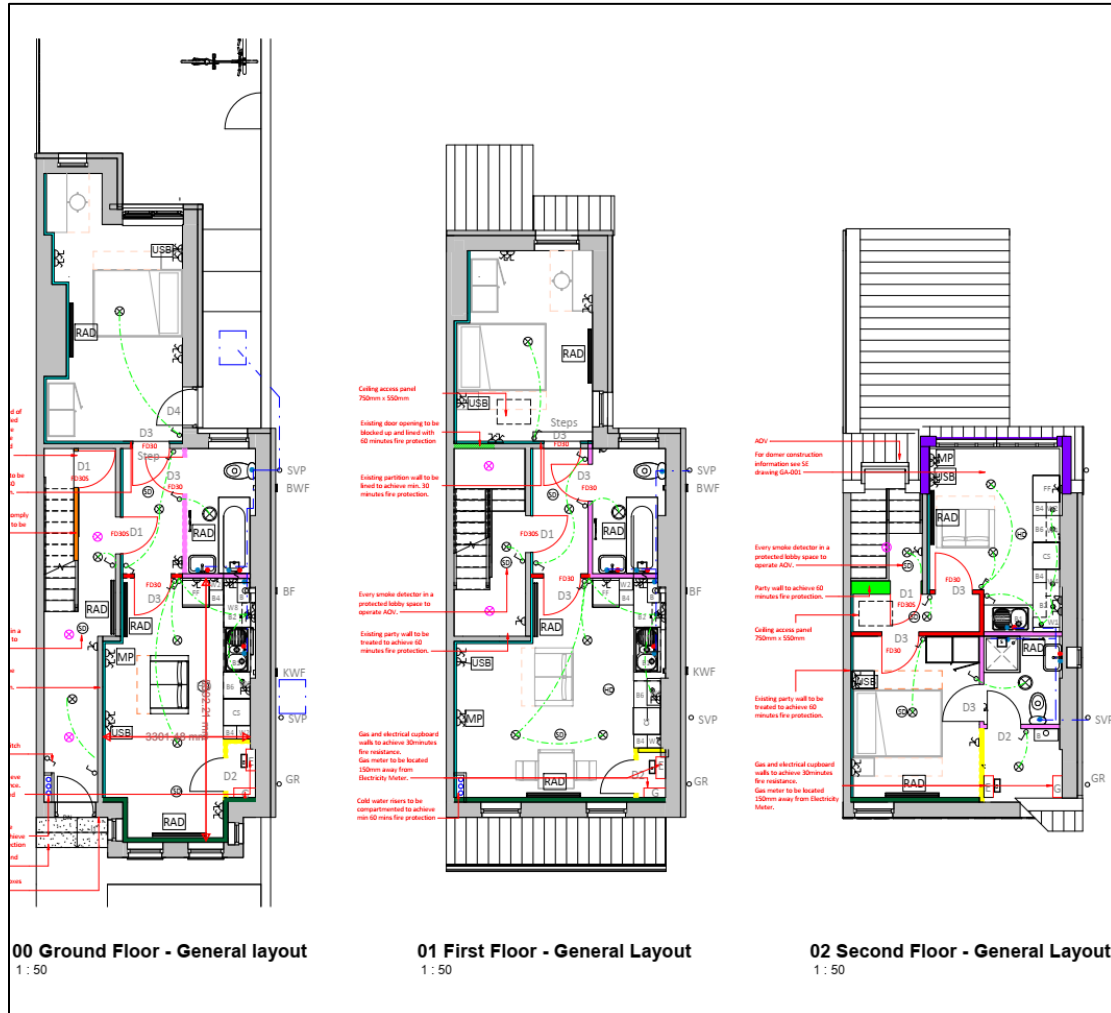
- 6.1 Acoustic & Engineering Consultants Limited (AEC) has been instructed by Bernard Taylor Partnership Ltd (BTP) to undertake a noise assessment for the conversion of a single dwelling into three apartments at 1198 Stockport Road, Manchester.
- 6.2 Manchester City Council (MCC) has outlined their requirements for noise assessments to accompany planning applications in '*Planning & Noise – Technical Guidance*' (2015) (PNTG) and these limits are used in the assessment.
- 6.3 A daytime and night-time noise survey was undertaken by AEC in March 2022 and the main noise source in the area was road traffic on Stockport Road.
- 6.4 The measured noise levels are presented in Section 3 and assessed in Section 5. In summary, the determined free-field ambient noise levels external to the different facades of the development due to road traffic did not exceed 72dBL_{Aeq,16h} and 72dBL_{Aeq,8h}, during the daytime and night-time, respectively.
- 6.5 Based on the measured noise levels affecting the proposed development site, the sound insulation requirements of the glazing, ventilation and building envelope have been determined and are presented in Section 5. In brief, alternative means of whole dwelling (background) ventilation would need to be provided to all habitable rooms on all elevations of the development.
- 6.6 The sound insulation performances of the glazing and acoustic trickle vents to meet the internal noise level limits are presented in Table 5.1.
- 6.7 Based on this assessment, noise should not be considered a determining factor in relation to any planning permission being sought.

FIGURE 1 – Site Location Plan Identifying Monitoring Locations



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FIGURE 2 – Proposed Floor Plans



APPENDIX A – Acoustic Terminology in Brief

Sound Description

Sound is produced by mechanical vibration of a surface, which sets up rapid pressure fluctuations in the surrounding air. The rate at which the pressure fluctuations occur determines the pitch or *frequency* of the sound. The frequency is expressed in Hertz (*Hz*), that is, cycles per second. The human ear is sensitive to sounds from about 20 Hertz to 20,000 Hertz. Although sound can be of one discrete frequency - a 'pure tone' - most sound is made up of many different frequencies.

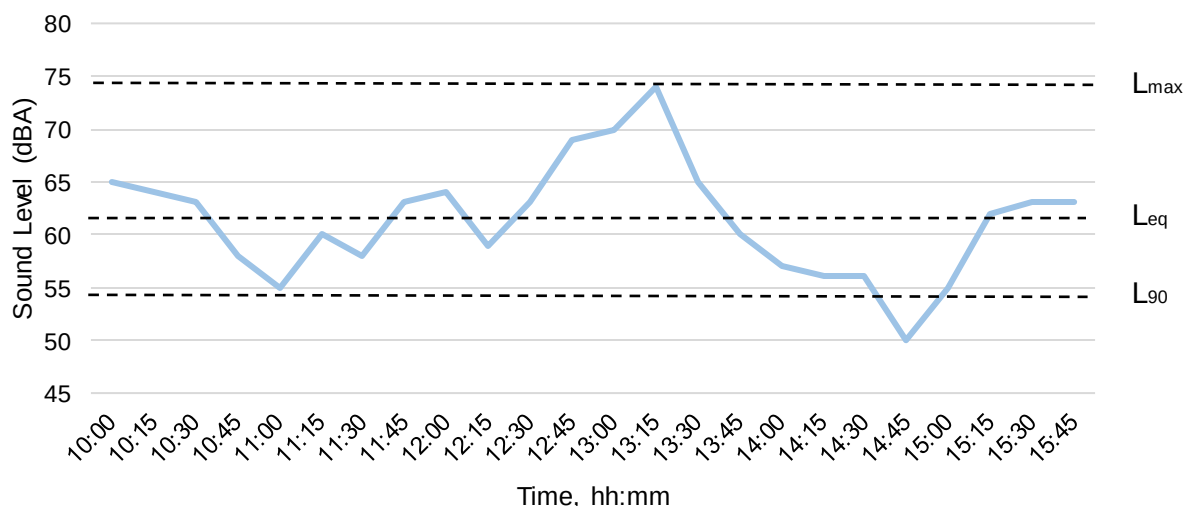
The human ear is more sensitive to some frequencies than others, and modern instruments can measure sound in the same subjective way. This is the basis of the A-weighted sound pressure level *dBA*, normally used to assess the effect of noise on people. The *dBA* weighting emphasises or reduces the importance of certain frequencies within the audible range.

Sound Units

In order to assess environmental noise, measurements are carried out by sampling over specific periods of time, such as fifteen minutes or one hour, the statistically determined results being used to quantify various aspects of the sound.

The figure below shows an example of sound level varying with time. Because of this time variation, the same period of sound can be described by several different levels. The most common of these are described below. It should be noted that in many instances in the main body of text, the unit will be preceded by a *dB* descriptor in the report e.g. $L_{Aeq,T}$ could be written $dBL_{Aeq,T}$.

Example of Sound Varying with Time



Unit Type	Acoustic Unit	Description
Ambient Sound Level	$L_{Aeq, T}$	The equivalent continuous (A-weighted) sound level. It may be thought of as the “average” sound level over a given time, T. It is used for assessing noise from various sources: industrial and commercial premises, construction sites, railways and other intermittent noises and can be considered as the “ambient” noise level.
Percentile Level	L_{A1}	The (A-weighted) sound level exceeded for 1% of a measurement period. It is the value generally used to indicate a ‘typical’ maximum noise level.
	L_{A10}	The (A-weighted) sound level exceeded for 10% of a measurement period. It is the value often used to describe traffic noise.
	L_{A90}	The (A-weighted) sound level exceeded for 90% of a measurement period. It is the value often used to describe background noise.
Maximum Sound level	L_{Amax}	The maximum (A-weighted) sound level measured during a given time. ‘Fast’ or ‘Slow’ meter response should be cited.
Free-field Level	-	This refers to the sound level measured outside, away from reflecting surfaces.
Façade Level	-	This refers to the sound level measured outside, at 1m from a hard-reflecting surface, typically 3dB greater than the free-field level.
Sound reduction index	R_w	Single number rating used to describe the <u>laboratory</u> airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
Apparent sound reduction index	R'_w	Single number rating used to describe the sound reduction index of an on-site construction over a range of frequencies, typically 100-3150Hz.
A road traffic spectrum adaptation term	C_{tr}	Referenced to demonstrate the to the low frequency sound insulation performance of building elements. Makes reference to the A-weighted urban traffic noise spectrum.
Sound Level Difference	D	Difference between the sound pressure level in the source room and the sound pressure level in the receiving room.
Weighted Level Difference	D_w	Single number rating used to describe the on-site airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
Weighted standardized level difference	$D_{nT,w}$	Single number rating used to describe the on-site airborne sound insulation performance properties of a material or building element over a range of frequencies, typically 100-3150Hz, which is calculated in terms of a standardized reverberation time of 0.5 seconds.
Element normalized level difference	$D_{n,e,w}$	Single number rating used to describe the sound insulation performance of small elements.

APPENDIX B – Noise Survey Details

Table B1 – Measurement Procedure

Date & Time of Survey:	Wednesday 23 March 2022, 0900 to 1215h. Thursday 24 March 2022, 0500 to 0700h.					
Personnel:	Naveen Ramesh Simha (AEC).					
Equipment Used:	Cirrus CR:171B Real Time Analyser (AEC Kit 3).					
Calibration:	The sound level analysers, which conforms to BS EN 61672-1: 2013 ' <i>Electroacoustics – Sound level meters - Part 1 Specifications</i> ' for Class 1 Type Z meters, was in calibration and check calibrated before and after the measurement periods using a Brüel & Kjær type 4231 (94dB) calibrator. There was no significant drift of calibration. Calibration certificates are available on request.					
Weather Conditions:	Date	Period	Wet/Dry	Temp°C	Wind Speed & Direction	Cloud Cover
	23/03/2022	Day	Dry	17°C	Northward and 2m/s	30%
	24/03/2022	Night	Dry	7°C	Southward and 1.5m/s	80%
Measurement Locations:	Measurements were undertaken at three locations around the development site. Identified as A and B on Figure 1 and described below. A – 2m from nearest carriageway of Stockport Road (A6). B – To the rear of the proposed site. C – To the rear of the proposed site.					
Measurement Details:	Measurements were undertaken over various periods in terms of L_{eq} , L_{10} , L_{90} , and L_{max} .					
Façade / Free-Field:	A to C - free-field.					
	Full results for the attended measurements are given in Tables B1 and B2.					
Measured Data:	Full 1/3 rd octave band centre frequency data was obtained for all measurements.					

TABLE B2 – Measured Daytime Noise Levels

Location	Period, h	Noise Level, dB				Comments
		L _{Aeq}	L _{A10}	L _{A90}	L _{Amax, F}	
A	0900 – 0915	73.4	77.0	62.4	83.3	Ambient noise level due to road traffic on the A6. Maximum noise level due to bus pass by on the A6.
	1000 – 1015	72.2	76.2	60.5	81.9	
	1100 – 1115	71.2	75.2	59.3	80.9	
	1200 – 1215	70.7	74.5	57.8	82.5	
B	0920 – 0935	48.8	50.5	44.8	67.8	Ambient noise level due to road traffic from the A6. Noise from train pass by was audible but not contributing to ambient levels. Noise from A6 Tyres was inaudible.
	1020 – 1035	47.8	49.9	43.7	65.6	
	1120 – 1135	49.4	51.6	44.7	66.1	

TABLE B3 – Measured Night-Time Noise Levels

Location	Period, h	Noise Level, dB			Comments
		L _{Aeq}	L _{A90}	L _{Amax, F}	
A	0500 – 0510	67.9	47.4	86.1	Ambient noise level due to road traffic on the A6. Maximum noise level due to bus pass by on the A6.
	0540 – 0550	68.6	49.5	84.1	
	0620 – 0630	72.3	59.6	85.7	
C	0515 – 0525	51.1	42.7	68.9	
	0552 – 0602	51.4	42.9	69.4	