



Building Services Plant Noise Commissioning Report

Orchard House SEND School

Varley Street, Manchester

M40 8EF

Stroma Built Environment Ltd.

SBE Ref: OPP-092896 – AC - 4v1

I. Revision History

Revision	Date	Description	
1v1	30/09/2025	First Issue	
		Compiled By	Authorised By
		Matt Jones MIOA Senior Acoustic Consultant	Tom Chaffer MIOA Associate Director

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1. Introduction

- 1.1 Stroma Built Environment (SBE) has been appointed by Kier Construction – Liverpool (Client) to provide acoustic consultancy services for the Orchard House SEND School in Manchester, M40 8EF regarding satisfying Planning Condition 21 set by Manchester City Council (MCC). This planning condition relates to noise emissions from new items of building services plant.
- 1.2 SBE have previously assessed the building services noise emissions, however, MCC require confirmatory measurements in order to discharge the condition fully. This report, therefore, details measurements of the building services plant noise emissions taken on site and at the nearby NSRs.
- 1.3 An assessment of the measurements taken against the requirements of Planning Condition 21 is also presented in this report.
- 1.4 This document has been prepared for the sole use, benefit and information of the Client for the purposes set out in the document or instructions commissioning the works. The liability of SBE in respect of the information contained herein will not extend to any third party.
- 1.5 This report is limited to addressing the specific acoustic issues contained herein and is based on information and drawings provided by the client.
- 1.6 Whilst every effort has been made to ensure that this report is easy to understand, it is technical in nature. A glossary of terminology is included in Appendix II.

2. Standards and Requirements

Manchester City Council - Planning Condition Requirements

2.1 It is understood that MCC has set a planning condition relating to noise-emitting building services plant associated with the new development.

2.2 Planning Condition 21 States:

“a) Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5 dB L_{Aeq} below the typical background (L_{A90}) level at the nearest noise sensitive location. Prior to commencement of the use hereby approved the scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site.”

“b) Prior to occupation of the development a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of nonconformity with the recommendations in the report shall be detailed along with any measures required to ensure compliance with the agreed noise criteria.”

BS 4142:2014+A1: 2019 ‘Methods for rating and assessing industrial and commercial sound’

2.3 BS 4142 describes a method for assessing the adverse impact from noise sources that are of an industrial nature (e.g. fans, pumps, chillers, air handling units etc.). The assessment methodology is based upon determining a ‘rating level’ for the equipment being assessed, which is the level of noise from the item or items of plant being assessed (measured as an L_{Aeq}).

2.4 The rating level is then compared with the underlying background noise level (measured as a L_{A90}) in the absence of noise from the item or items of plant being assessed. The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

2.5 BS 4142 states that a penalty should be added for any plant which gives rise to noise features that may increase disturbance such as tonal, impulsive or intermittent characteristics. Generally, a rating penalty for a sound should be based on a subjective assessment of its characteristics.

3. Site Description and Noise Survey

- 3.1 The development site is located at vacant land in between Sawley Road and James Street. Development proposals are for the construction of a new Special Educational Needs (SEN) school building with an external play area and car park with associated admin and ancillary spaces.
- 3.2 The closest noise sensitive receptors (NSR) to the site have been identified as residential properties along Sawley Road, northwest of the site. These are displayed in Figure 1 below.

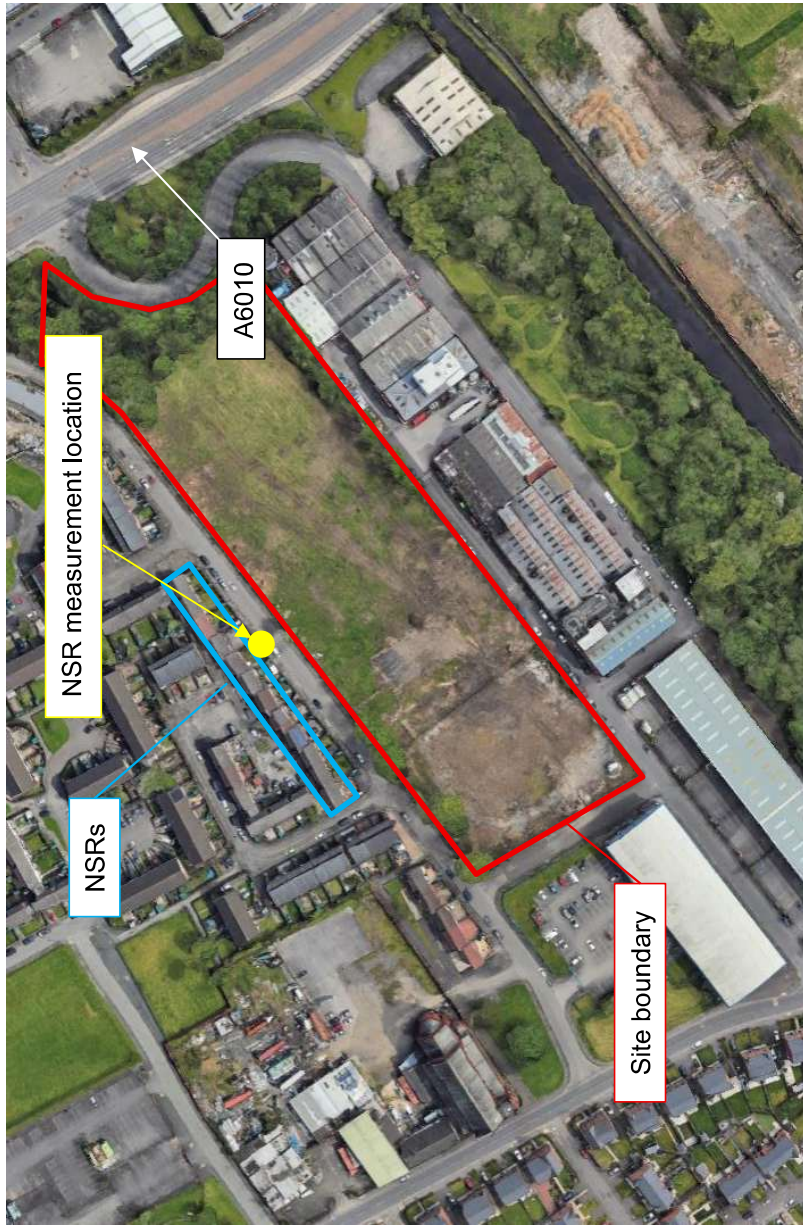


Figure 1: Site plan showing site boundary, noise measurement locations, and NSR location

Previously Measured Noise Data

- 3.3 SBE have previously conducted a noise survey of the site and surrounding area before the new building services plant items were installed. The full details of the survey can be found in the SBE report, *OPP-092896 AC - 1v1 - Orchard House SEND School - Building Services Plant Noise Impact Assessment*, dated 1st August 2025. This report also details the predicted building services noise emissions assessment.
- 3.4 From the results of the noise survey, the typical background noise level at the NSRs was also calculated. This was calculated using the histogram method outlined in BS4142:2014. The histograms are shown in our previous report. The unattended measurements are shown graphically in Appendix I.

3.5 Planning Condition 21 requires the building services plant noise emissions to be at least 5 dB below the typical background noise level. The typical background noise levels and planning condition noise level limits are shown in Table 1 below.

Table 1: Representative background noise level and noise level limit

Parameter	Representative background noise level (dB L_{A90})	Planning condition noise level limit (dB L_{A,r,T_r})
Daytime	50	≤ 45
Night-time	50	≤ 45

Plant Noise Measurements

- 3.6 SBE attended site on Friday 26th September 2025 to measure the noise emissions from the new items of building services plant. Measurements were taken at the location shown on Figure 1.
- 3.7 Weather conditions were suitable for environmental noise measurement. The temperature varied from between 8 - 10°C, there was approximately 20% cloud cover throughout and the wind speed was 4m/s or less.
- 3.8 The majority of the building services plant is housed in a plant room on the eastern façade of the building. As such, measurements were taken at the NSR nearest to the plant room at the end of the front garden; approximately 10m from the façade of the NSR.
- 3.9 To assess the noise impact of the new building services plant, noise measurements were taken with and without the plant items operating. This was done between 06:00 and 08:00 to capture both the night-time and daytime periods. The site is still an active construction site, so measurements could not be taken later in the day due to the high levels of construction noise. Similarly, the mechanical services engineer was only available from 06:00, so the night-time measurements had to be captured then.
- 3.10 Observations were that the building services noise emissions are not audible at any of the NSRs. As measurements could not be taken before 06:00, the SBE operative went to the NSRs at approximately 00:30 on 26th September 2025 at one of the quietest points in the night and the building services noise emissions were still not audible. The building services were confirmed to be running during the night.
- 3.11 The measurements of the building services noise levels are shown in Table 2.

Table 2: Measured building services noise levels

Measurement start time (hh:mm)	Duration (mm:ss)	Measurement description	Measured ambient noise level (dB $L_{Aeq,T}$)	Measured background noise level (dB $L_{A90,T}$)
06:13	16:00	Building Services ON	50	47
06:33	15:03	Building Services OFF	50	48
07:33	15:39	Building Services ON	52	49
08:00	15:33	Building Services OFF	52	48

- 3.12 Table 2 shows that the measured ambient noise level did not change when the building services were running. As the building services were not audible when running, it is safe to assume that the specific sound level of the building services is at least 10 dB lower than the ambient noise level. On this basis, the specific sound level of the new building services plant is 40 dB $L_{Aeq,T}$.
- 3.13 From observations, there were no obvious characteristics, such as tonality or impulsivity, from the building services plant noise emissions that warrant any BS 4142 feature corrections. As such, the rating level of the new building services plant is 40 dB $L_{A,T}$.
- 3.14 Therefore, the rating level of the new building services plant noise emissions meets the required Planning Condition 21 noise level of less than 45 dB $L_{A,T}$. Planning Condition 21 can be discharged fully.

4. Conclusion

- 4.1 Stroma Built Environment (SBE) has been appointed by Kier Construction – Liverpool (Client) to provide acoustic consultancy services for the Orchard House SEND School in Manchester, M40 8EF with regard to satisfying Planning Condition 21 set by Manchester City Council.
- 4.2 The purpose of this report is to report on measurements and observations taken of the noise emissions from the newly installed items of building services plant.
- 4.3 Observations from site were that the noise emissions from the building services plant were not audible at the NSRs throughout the daytime and night-time periods. Measurements taken show that the prevailing ambient noise level did not change with the building services operating. In addition, the specific noise level of the building services plant meets the requirements of Planning Condition 21.
- 4.4 As such, Planning Condition 21 may be discharged fully.

Appendix I. Noise Survey Time History Plot

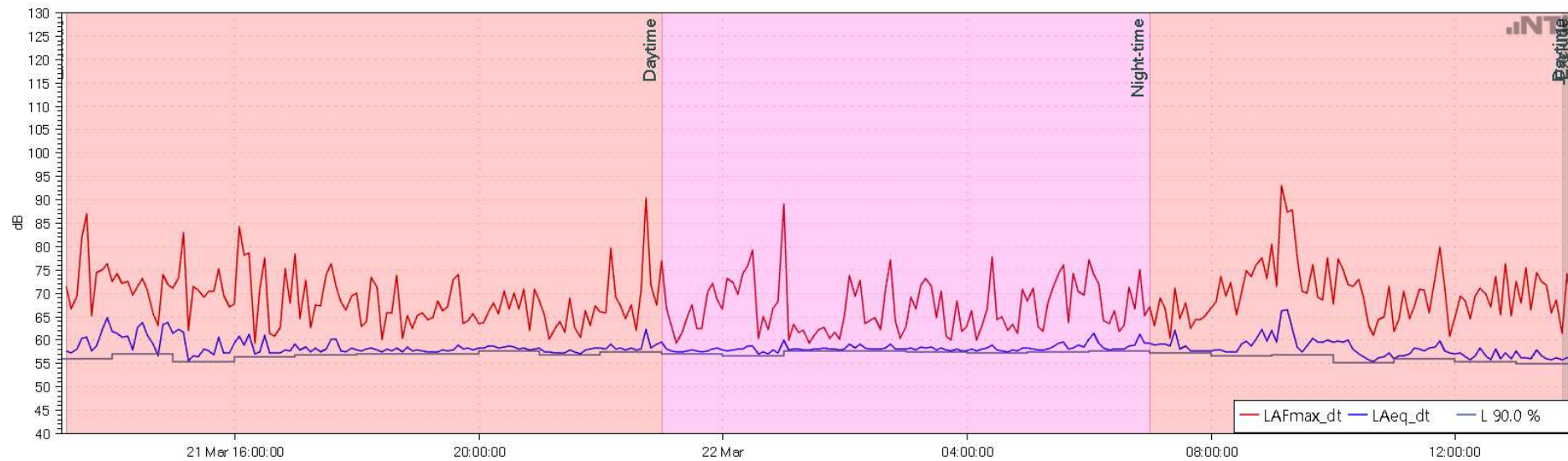


Figure 2: LT1 time history plot

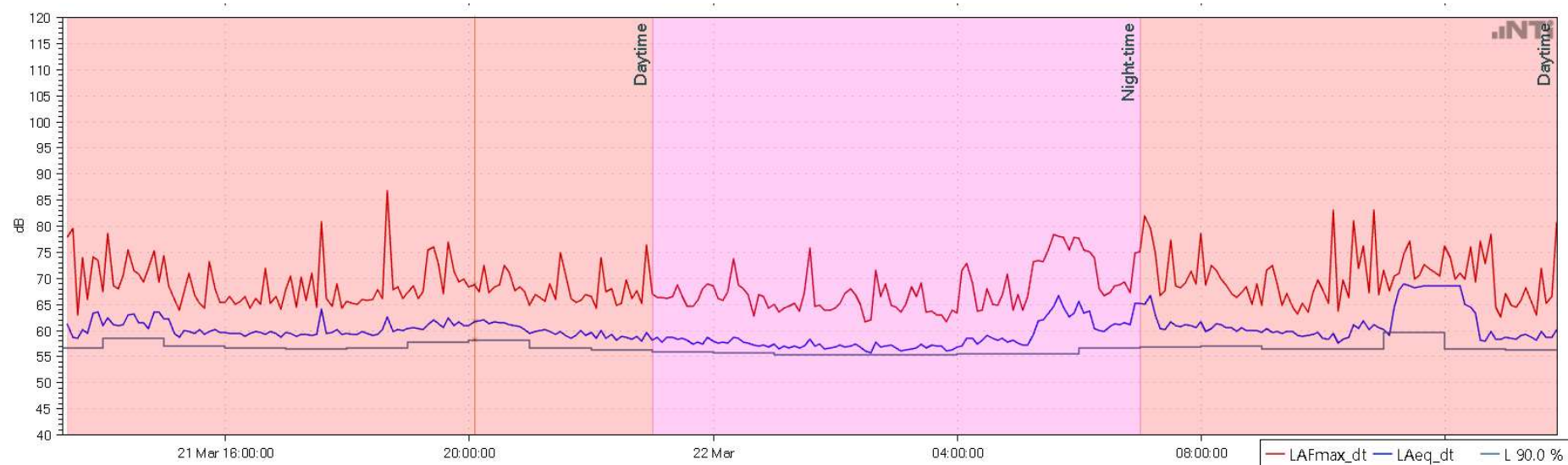


Figure 3: LT2 time history plot

Appendix II. Acoustic Glossary

Sound pressure level and the decibel, dB

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. The decibel is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Frequency and hertz, Hz

Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz. The human range of hearing is commonly accepted to be 20 Hz to 20,000 Hz. Additionally, an octave can be used to describe the interval between a frequency in Hz and either half or double that frequency.

Frequency weighting

Different weighting networks can be applied to a given sound level in each stated octave band by a specified amount, in order to better represent the response of the human ear. The most commonly used weighting network is the 'A' weighting, and the letter 'A' will be included within a descriptor to indicate that the value has been 'A' weighted, e.g. $L_{Aeq,T}$ or L_{A90} . An 'A' weighted noise level may also be written as dB(A). Other weightings less commonly used are 'C' and 'D' weighting.

Noise indices

When a noise level varies with time, the measured 'A' weighted dB level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple 'A' weighted dB value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The various indices used are described as below:

$L_{Aeq,T}$	The 'A' weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period, T
L_{Amax}	The maximum 'A' weighted noise level that was recorded during the monitoring period.
L_{A10}	The 'A' weighted noise level that was recorded for at least 10% of the monitoring period.
L_{A90}	The 'A' weighted noise level that was recorded for at least 90% of the monitoring period, usually taken as the underlying 'background' noise level.

Sound level difference, D

The sound level difference between two internal spaces, or between internal and external spaces. The 'D' value is used to denote the differences at each third octave or octave band, with a single figure 'weighted' value to

describe an overall performance. Note that the 'D' value will always describe an in-situ or on-site acoustic performance. All values are described using the decibel.

D_w	Single figure weighted sound level difference, simply the measured source noise level minus receiver noise level, not adjusted to reference conditions
$D_{nT,w}$	Weighted normalised sound level difference – a single, weighted sound insulation value, normalised to a reference reverberation time using the measured reverberation time in the receive room
$D_{nT,w} + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise
$D_{nf,w}$	Overall flanking normalised level difference - A parameter that defines the flanking transmission of sound from room to room where a dividing partition or floor construction abuts a flanking building element common to both rooms, such as the building façade or ceiling
$D_{n,e,w}$	Element normalised level difference. A level difference level derived transmission through the small technical element only, irrespective of area. This value is used to represent the sound insulation of façade ventilators.
$D_{n,e,w} + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise

Sound reduction index, R

This describes the sound transmitted through a material or building element, such as a wall, door or window. It is measured in a laboratory with suppressed flanking transmission. The 'R' value is used to denote the differences at each third octave or octave band, with a single figure 'weighted' value to describe an overall performance. All values are described using the decibel.

R_w	Weighted single figure sound reduction index
$R_w + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise
R'_w	The 'apparent sound reduction index', a field measurement to obtain the sound reduction index of a material or element, with all effects of site installation accepted.

Standardised impact sound pressure level, $L'_{nT,w}$

$L'_{nT,w}$ is the single figure used to characterise the impact sound pressure level in a receiving room, normalised to a reference reverberation time. Impact noise can be classified as (but is not limited to) the result of footfall impact on a separating floor to a habitable space below. All values are described using the decibel.

Reverberation time, T and T_{mf}

The reverberation time of a space is a measure of the rate at which sound decays, measured in seconds. It is defined as the time taken for the sound pressure level to reduce by 60 dB from its original impulse level.

Reverberation time is commonly quoted in terms of the mid-frequency reverberation time, T_{mf} , the arithmetic average of the reverberation times in the 500 Hz, 1 kHz and 2 kHz octave bands.

Absorption Coefficient

The acoustic absorption provided by a surface is defined as the sound absorption coefficient α , which denotes the fraction of sound energy absorbed between 0 (no absorption) and 1 (no reflection). The absorption coefficient of a material varies with the frequency of incident sound waves, therefore is considered for different frequencies.

Absorption Class

Based on the absorption coefficients, the overall sound absorption of a material is classified from Class A to Class E as defined in BS EN ISO 11654:1997, with Class A providing the highest level of acoustic absorption.

Noise rating, NR

The noise rating or NR system is commonly used in the design of noise emitted by internal building services systems. The system is frequency dependent, and was empirically derived to prevent disturbance to occupants in habitable or working areas from building services noise that exhibits 'tonal' elements, e.g. rumbles, whines, whistles etc. There is no direct relationship between the average 'A' weighted noise level in dB and the NR. However, as a guide, and assuming the absence of strong low frequency content in a given noise, the NR could generally be said to be 6 dB less than the average 'A' weighted dB value.

Privacy

Privacy is the addition of the level of sound insulation between two rooms and the background noise within a receiving room. It can be used to assess the level of privacy afforded in the 'receiving room' for speech from the 'source room'. The 'privacy factor' is a unit-less value that is the combination of the average 'A' weighted background noise level in dB and the weighted sound level difference (D_w) in dB.

Appendix III. SBE Acoustic Credentials

SBE have specialised in providing the UK Construction Industry with a range of acoustics services since 2006. Specialising in Building Acoustics, all SBE acousticians are members of the Institute of Acoustics.

SBE is accredited for on-site acoustic testing by United Kingdom Accreditation Service (UKAS) (Testing Laboratory Number 2731).

SBE meet the relevant acoustic requirements typically required in the UK, including for sound insulation testing as defined in Approved Document E for the purposes of testing for Part E to the Building Regulations 2010.

This report has been authorised by Ben Reed, Senior Acoustic Consultant, who meets the BREEAM requirements for a suitably qualified acoustician (SQA) as follows;

1. Holds a BEng(Hons) degree in Acoustics from the University of Salford
2. Has been an Acoustic Consultant for more than three year's (within the last five years). This experience includes a practical understanding of factors affecting acoustics in relation to construction and the built environment; including, acting in an advisory capacity to provide recommendations for suitable acoustic performance levels and mitigation measures.
3. Holds Membership of the Institute of Acoustics - MIOA membership.

This report has been read and reviewed and has been found to;

1. Represent sound industry practice
2. Be appropriate given the building being assessed and scope of works proposed
3. Avoid invalid, biased and exaggerated recommendations.

Appendix IV. Report Conditions

This document has been prepared for the sole use, benefit and information of the Client. The liability of Stroma Built Environment Ltd. in respect of the information contained herein will not extend to any third party unless prior agreement is obtained in writing from Stroma Built Environment Ltd.

This report is limited to addressing the specific acoustic issues contained herein. Advice has been provided for acoustic reasons only and it is recommended that appropriate expert advice be sought on all the ramifications, e.g. safety, fire, structural, CDM etc., associated with any proposals contained herein.

The in-situ performance of acoustic measures is influenced to a large extent by the quality of workmanship and compliance with the specifications on-site during construction, as such, Stroma Built Environment Ltd. accepts no liability for issues with acoustic performance arising from such factors.

Acoustic survey and testing work carried out for the project is representative of the prevailing conditions at the time of the work. Conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

In particular, it should be noted that where calculations are carried out that are based on assumptions regarding certain aspects where information has not been supplied, these are provided for indicative purposes only and should be treated as such.