



Trinity Academy, Barnsley, Temporary Building

Noise Assessment

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Comments

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1. Introduction

Waterman Infrastructure & Environment Ltd (hereafter '*Waterman*') was appointed by The Department of Education ('the Client') to undertake a noise assessment in support of the planning application being submitted to Barnsley Metropolitan Borough Council (hereafter '*the Council*') for a temporary new school building and associated playing fields and outdoor space on land adjacent to Keresforth Close, Barnsley S70 (hereafter '*the Site*').

Since current road traffic flows have been reduced across the U.K. due to the current health crisis associated with Covid-19, noise emissions from local and major road networks have also decreased. As such environmental noise survey data has been referenced from a recent noise impact assessment carried out at an adjacent site prior to the March 2020 lockdown.

This report provides recommendations and mitigation measures to provide suitable amenity for the future school occupants and to protect the amenity of nearby existing residents.

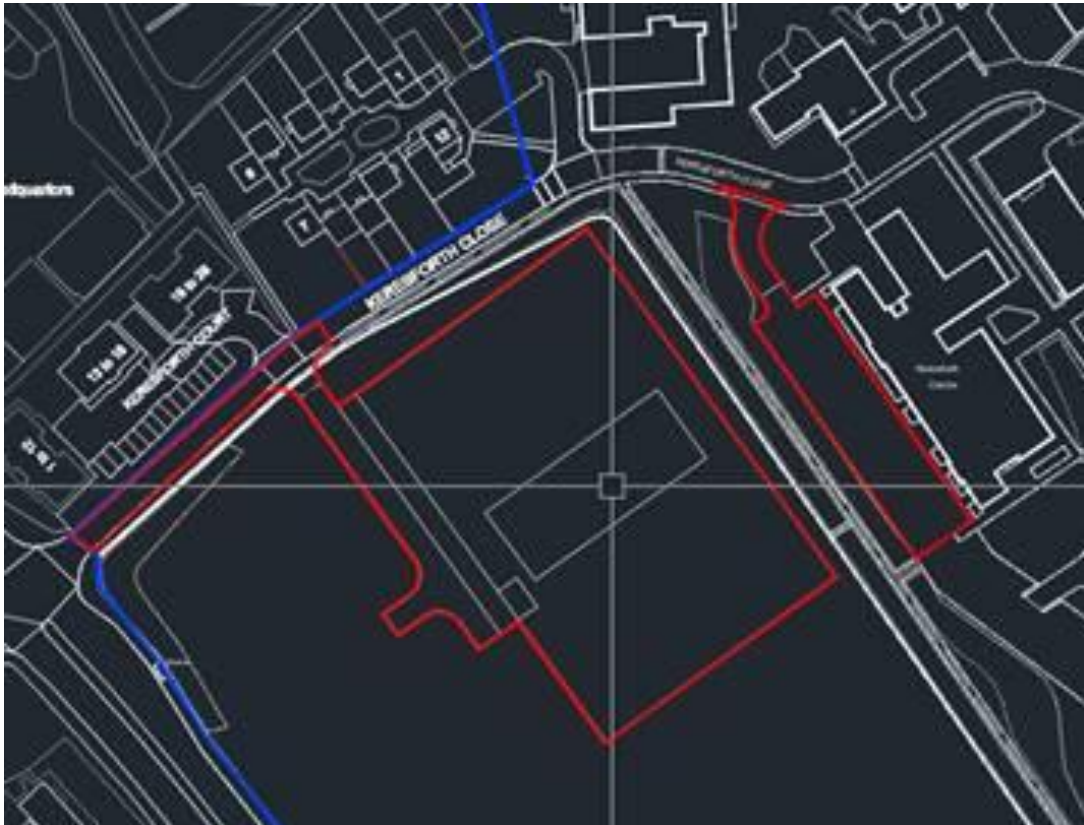
A glossary of the acoustic terminology used within this report is presented as Appendix A.

1.1 Site Context

The Site is located within Kingstone which forms the south-western suburban extent of Barnsley. Barnsley town centre is situated c. 1.2km north-east of the Site.

The site is bounded by Broadway to the south-west, residential properties to the north, the main Trinity School Building would be constructed to the north-east of the site of the temporary school. A site context plan is shown in Figure 1.

Figure 1: Site Location Plan



1.2 Proposed Development

The Proposed Development consists of the erection of a temporary modular school building with associated access road, parking, external play areas and associated works.

2. Assessment Criteria

2.1 Acoustic Criteria for Schools

2.1.1 Internal Ambient Noise Levels

To provide school buildings with an acoustic environment that is conducive to both teaching and learning, recommended upper limits for internal ambient noise levels (IANLs) are provided within BB93. The objective of these limits is to provide suitable IANLs for:

- clear communication of speech between teacher and student, and between students; and
- for study/work activities requiring concentration.

The limits include the noise contribution from both external sources such as road traffic noise, and from internal sources such as building services plant. If a room is to be naturally ventilated, the windows are assumed to be open for calculation purposes.

Limits relevant to this assessment have been reproduced as **Table 1** below.

Table 1: BB93 Requirements for Internal Ambient Noise Levels

Room	Upper Limit IANL (dB $L_{Aeq,30mins}$) for New Build Developments ¹
Teaching space intended specifically for students with special hearing and communication needs	30
Classrooms	35
Study rooms; Interviewing / counselling rooms; Medical rooms; Resource areas; Science laboratories; D&T and Art rooms; Indoor sports hall; Dance studio; Gym; Offices, Staff rooms	40

Note 1 – where natural ventilation is adopted a 5dB relaxation on internal noise levels is permissible.

Additionally, in order to protect students from regular discrete noise events, e.g., aircraft or trains, indoor ambient noise levels should not exceed 60 dB $L_{A01,30mins}$. This is achieved by default for spaces with IANLs up to 40 dB $L_{Aeq,30min}$, but requires assessment in spaces with higher IANL limits, e.g., 45 and 50 dB $L_{Aeq,30min}$.

To determine the suitability of the Site for school development, external noise levels will be assessed against the IANL criteria, which for teaching spaces is 35 to 40dB $L_{Aeq,T}$. It should be noted that where natural ventilation is permitted and provided the classrooms are not for SEN use a relaxation of the internal noise levels of 5dB is permitted.

2.1.2 External Noise Levels

While the current version of BB93 does not provide ambient noise level limits for external school areas, in the absence of criteria the previous version of BB93 states that unoccupied playgrounds, playing fields, and other outdoor areas should not normally exceed 55dB $L_{Aeq,30min}$. The previous version also states that there should be at least one outdoor teaching area where noise levels are below 50dB $L_{Aeq,30min}$. If this is not possible then acoustic screening should be used to reduce the noise levels as much as practicable.

2.2 Fixed External Plant & Building Services

The primary source of guidance in determining the significance of sound of an industrial and/or commercial nature on residential receptors, is provided in BS 4142:2014 +A1:2019 – ‘Methods for Rating and Assessing Industrial and Commercial Sound’¹.

BS 4142 states that the potential impact from fixed external plant is based on the noise level difference between the source, known as the ‘specific sound’ level ($L_{Aeq,T}$), compared with the ‘background sound’ level ($L_{A90,T}$) that exists in the absence of the source in question. Where the sound contains any acoustic characteristics such as tonality, impulsiveness and intermittency then the specific sound level is adjusted in-line with BS 4142 advice to determine the rating level ($L_{Ar,Tr}$).

Typically, the greater the difference between the rating level and the background sound level the greater the potential of an adverse impact. BS 4142 states:-

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

At this stage in the design, specific details of the type, number and configuration of building services plant are not known. Consequently, it is not possible to undertake a quantitative noise assessment at this time. In light of this, noise limits have been recommended based on the results of the baseline noise survey and guidance provided in BS4142, having regard to the requirements of Barnsley Metropolitan Borough Council.

¹ British Standards Institution. British Standard 2019, BS 4142:2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’. BSI

3. Baseline Conditions

3.1 Sensitive Receptors

The nearest sensitive receptors (SR) to the Site boundary were identified, they are described in **Table 2** and presented as **Figure 2**.

Table 2: Potential Sensitive Receptors

SR (Figure 4)	Description	Approximate Distance from Site Boundary (m)
1	Residential properties	50m

Figure 2: Location of Noise Sensitive Receptors



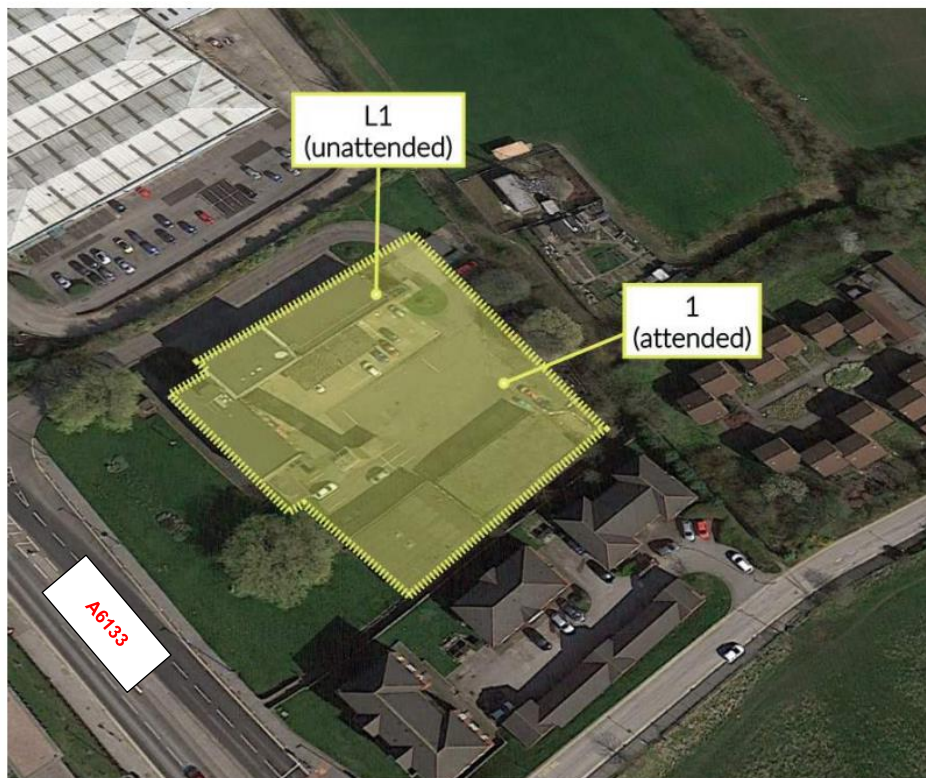
3.2 Baseline Noise Monitoring

Reduced noise levels associated with reduced traffic flows due to the Covid-19 health pandemic in the U.K. means that acoustic designs based on current noise levels could potentially underperform when road traffic levels increase in the future.

It is proposed that noise data from a previous noise impact assessment adjacent to the proposed Site is used for robustness in addition to readily available noise mapping data from Extrium noise mapping view (<http://extrium.co.uk/noiseviewer.html>) and Site Suitability Indicator (<https://ssi.noiseconsultants.co.uk/>) both presented in Section 3.3 below.

A noise impact assessment of Barnsley Fire Station located at 56 Broadway, Barnsley S70 6QZ approximately 100m to the north of the proposed Site was carried out by Hoare Lea and submitted in December 2019 (*Report 20191134 REP-1011589-05-AM-20190904-Noise Impact Assessment-Rev2 rec 20 1 20*). As detailed in the report, a noise survey was undertaken between Thursday 8th and Saturday 10th August 2019 and included a mix of unattended ('Position L1') and attended ('Position 1') noise measurements, recording noise parameters $L_{Aeq,5min}$, $L_{Amax,5min}$, $L_{A10,5min}$ and $L_{A90,5min}$ under dry and 'no wind' conditions. It should be noted that only Position L1 (unattended) noise data will be used for this report as Position 1 noise measurements are understood to have been specific attended measurements of drills at the existing fire station. Position L1 was located on the roof of the fire station approximately 80m from the A6133 dual carriageway. The Barnsley Fire Station noise survey locations are presented in **Figure 3**.

Figure 3: Barnsley Fire Station Noise Survey in View of Proposed Trinity Academy Site Boundary and the A6133.



The report states that sound level meters were calibrated before and on completion with no significant drift detected.

The following text in italics has been reproduced from the Hoare Lea report.

Position L1: Rooftop level towards the north of the site

The following table shows the average measured ambient sound levels (L_{Aeq}), the measured background sound levels (L_{A90}) and the measured maximum sound levels (L_{Amax}) during the survey:

Table 3 Results of Hoare Lea Noise Survey

<i>Period</i>	<i>$L_{Aeq,T}$</i>	<i>$L_{Amax,T}$</i>	<i>$L_{A90,T}$</i>
Thursday (11:00 - 23:00)	54.9	63 - 82	40.3

<i>Period</i>	<i>$L_{Aeq,T}$</i>	<i>$L_{Amax,T}$</i>	<i>$L_{A90,T}$</i>
<i>Thursday night</i>	<i>47.9</i>	<i>57 - 85</i>	<i>36.0</i>
<i>Friday</i>	<i>52.9</i>	<i>62 - 82</i>	<i>43.2</i>
<i>Friday night (23:00 – 03:00)</i>	<i>44.8</i>	<i>57 - 61</i>	<i>35.6</i>

The daytime average noise level was $L_{Aeq,16hr}$ 53.8dB. The night-time average noise level was $L_{Aeq,8hr}$ 47.1dB.

Maximum noise levels for the night-time measurement period were reasonably consistent at L_{Amax} 55-73dB with only two peaks over the 2-day period higher than this, attributed to emergency vehicle sirens.

The typical lowest measured background level during the day was $L_{A90(1-hour)}$ 40dB, measured in the late evening on each day of the monitoring survey.

The typical lowest measured background level during times when use of the drill yard is most likely to occur (10:30 to 13:00 and 19:00 to 21:00) was $L_{A90(1-hour)}$ 44dB.

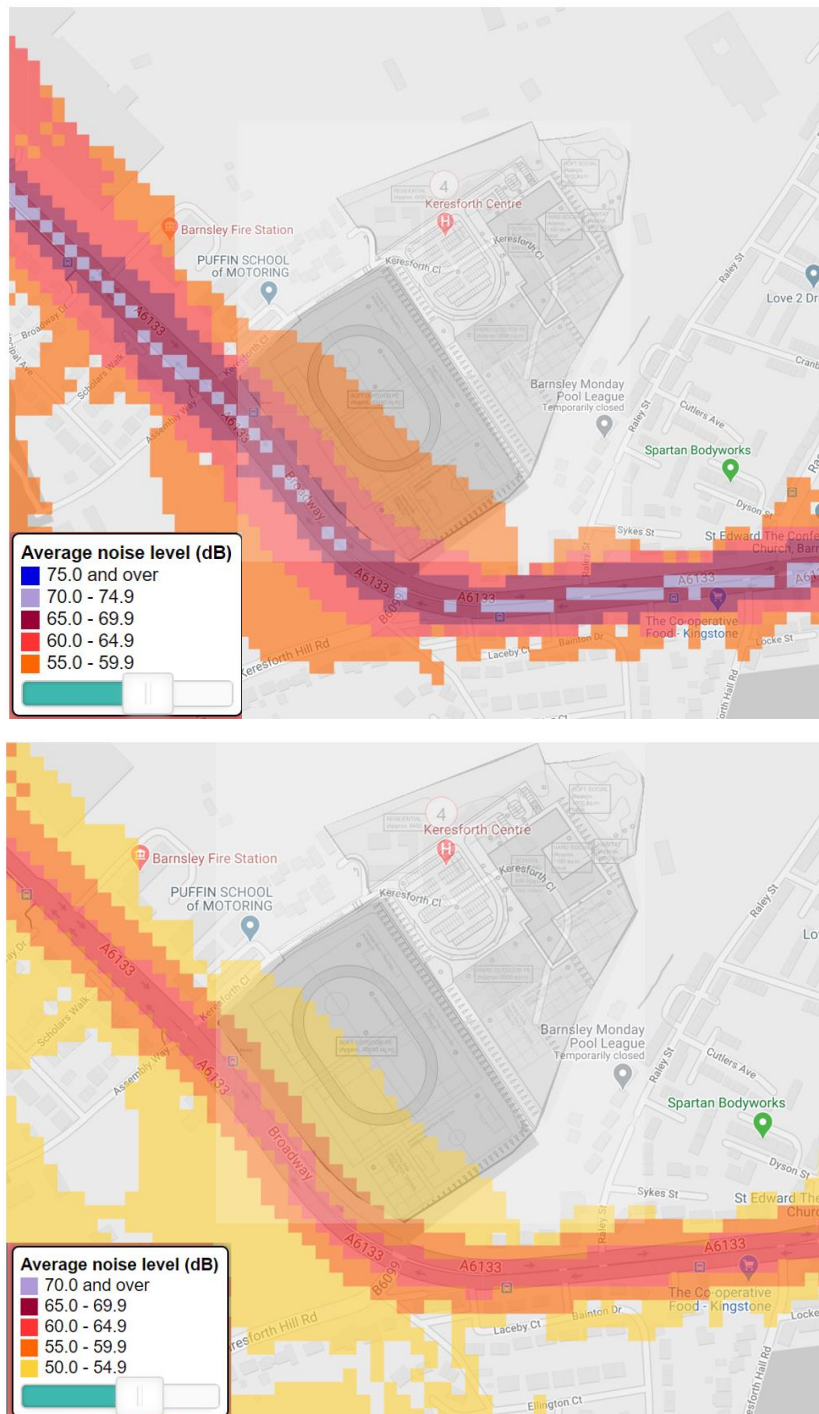
The lowest typical measured background level during the night was $L_{A90(15-min)}$ 39dB, measured between 00:00 and 02:00 on each night of the monitoring survey.

3.3 Environmental Noise Mapping Levels

3.3.1 Extrium Noise Viewer

The following images present the daytime $L_{Aeq,16hr}$ and night-time $L_{Aeq,8hr}$ road traffic noise levels as obtained via Extrium Noise Viewer. The strategic noise maps are based on the most recently published versions (2017) by Defra.

Figure 4: Extrium Day $L_{Aeq,16hr}$ (top) and Night $L_{Aeq,8hr}$ (bottom) Road Traffic Noise Levels.



4. Noise Assessment

4.1 School Assessment

4.1.1 Internal Noise Levels

With reference to Figure 4 the closest façade of the proposed temporary school building would be exposed to noise levels of between 50 and 55dB $L_{Aeq,16\text{ hour}}$. Guidance provided in BB93 states that where openable windows are provided a façade performance of circa 15dB can be expected. The guidance also states that where natural ventilation is proposed the required internal ambient noise levels as set out in Table 2 may be relaxed by 5dB providing a target internal noise level of 40dB $L_{Aeq,T}$.

Acoustic test data has been provided by the provider of the temporary school buildings and is provided as Appendix B. This data demonstrates that the facades of the modular build system would provide an acoustic performance of 32dB D_w . Such a performance would allow internal noise levels of between 18 and 23dB $L_{Aeq,T}$ to be achieved.

On the basis of the above and under normal conditions internal noise levels within classroom areas are expected to be in the region of 35 to 40dB $L_{Aeq,T}$ and as such would achieve the required internal noise levels as set out in BB93.

Notwithstanding the above it is recognised that the school buildings may be exposed to some short-term noise associated with the construction of the main school building. Noise levels associated with the construction of said school building have been predicted and are presented as Table 4 along with the likely internal noise levels which would be achieved in typical classroom areas.

Table 4 Predicted Construction Noise Levels

Parameter	Construction Phase		
	Enabling Works	Concreting	Superstructure Construction
Predicted External Construction Noise Level at Temporary Building Façade (dB $L_{Aeq,T}$)	62	61	60
Predicted Internal Construction Noise Level (dB $L_{Aeq,T}$) windows closed	30	29	28
BB93 Internal Noise Limit (dB $L_{Aeq,T}$)	35-40	35-40	35-40
Limit Achieved	Yes	Yes	Yes

With reference to Table 4 it can be seen that during the noisiest construction periods internal noise levels would be achieved with windows closed. With windows open there may be some short-term exceedances of the proposed criteria, however, such exceedances would be intermittent and relatively minor in magnitude and as such on balance it is considered that a suitable teaching environment would be provided in all classroom areas.

4.1.2 External Noise Levels

During the daytime period when the school would be operational noise levels would range from 60dB $L_{Aeq,30\text{ minute}}$ proximate to the Broadway reducing to <50dB $L_{Aeq,30\text{ minute}}$ adjacent to the school building. As such, although areas of the playing fields located to the south of the site would be exposed to noise levels of greater than 55dB $L_{Aeq, 30\text{ minute}}$ the majority of the playing fields and outdoor teaching areas would be exposed to noise levels which are in line with the requirements of BB93.

5. External Plant & Building Services Noise Limits

At this stage of the design process, the specific type, configuration or location of fixed plant and building services are not defined and therefore appropriate plant noise emission limits have been recommended.

Based upon BS4142 guidance, it is recommended that noise emissions from fixed mechanical plant and building services be limited to 5dB below background at the nearest identified noise receptors. Table 5 presents recommended plant noise limits for existing residential receptors adjacent to the proposed Site.

Table 5: Recommended Plant Noise Limits for Existing Receptors

Sensitive Receptors	Period	Measured Background Noise Level dB L_{A90}^1	Plant Noise Limit dB $L_{Ar,Tr}^2$
1	Day	40	35
	Night	39	34

Note: ¹ Based on measured background noise level. ² Rating noise level as defined in BS4142:2014.

Plant specification would be sufficiently flexible to ensure that suitably quiet, non-tonal plant can be procured and / or mitigation options such as screening (e.g. acoustic louvres) could be installed as necessary to ensure that the plant noise criteria is met.

6. Conclusions & Recommendations

An assessment of the suitability of the site for school use has been completed. The assessment indicates that the proposed temporary school building would be exposed to noise levels of circa 50dB $L_{Aeq,30 \text{ minutes}}$. Where noise levels of this magnitude are experienced installation of standard thermal double-glazed windows and ventilation via openable windows would be acceptable.

For those facades of the temporary school building which are exposed to construction noise the required internal criteria would be achieved with windows closed. Where windows are open there would be the potential for some short-term exceedances of the adopted criteria, however, given the nature of the development said exceedances are considered acceptable.

In light of the above the proposed development site is considered appropriate for the proposed use.

APPENDICES

A. Acoustic Glossary

Ambient sound	The totally encompassing sound in a given situation at a given time, usually composed of sound from all sources near and far.																		
Assessment period	The period in a day over which assessments are made.																		
A-weighting	A frequency weighting applied to measured or predicted sounds levels in order to compensate for the non-linearity of human hearing.																		
Background noise	Background noise is the term used to describe the noise measured in the absence of the noise under investigation. It is described as the average of the minimum noise levels measured on a sound level meter and is measured statistically as the A-weighted noise level exceeded for ninety percent of a sample period. This is represented as the L_{90} noise level (see below).																		
Broadband	Containing the full range of frequencies.																		
Decibel [dB]	The level of noise is measured objectively using a Sound Level Meter. This instrument has been specifically developed to mimic the operation of the human ear. The human ear responds to minute pressure variations in the air. These pressure variations can be likened to the ripples on the surface of water but of course cannot be seen. The pressure variations in the air cause the eardrum to vibrate and this is heard as sound in the brain. The stronger the pressure variations, the louder the sound that is heard. The range of pressure variations associated with everyday living may span over a range of a million to one. On the top range may be the sound of a jet engine and on the bottom of the range may be the sound of a pin dropping. Instead of expressing pressure in units ranging from a million to one, it is found convenient to condense this range to a scale 0 to 120 and give it the units of decibels. The following are examples of the decibel readings of every day sounds: <table> <tr> <td>Four engine jet aircraft at 100m</td><td>120 dB</td></tr> <tr> <td>Riveting of steel plate at 10m</td><td>105 dB</td></tr> <tr> <td>Pneumatic drill at 10m</td><td>90 dB</td></tr> <tr> <td>Circular wood saw at 10m</td><td>80 dB</td></tr> <tr> <td>Heavy road traffic at 10m</td><td>75 dB</td></tr> <tr> <td>Telephone bell at 10m</td><td>65 dB</td></tr> <tr> <td>Male speech, average at 10m</td><td>50 dB</td></tr> <tr> <td>Whisper at 10m</td><td>25 dB</td></tr> <tr> <td>Threshold of hearing, 1000 Hz</td><td>0 dB</td></tr> </table>	Four engine jet aircraft at 100m	120 dB	Riveting of steel plate at 10m	105 dB	Pneumatic drill at 10m	90 dB	Circular wood saw at 10m	80 dB	Heavy road traffic at 10m	75 dB	Telephone bell at 10m	65 dB	Male speech, average at 10m	50 dB	Whisper at 10m	25 dB	Threshold of hearing, 1000 Hz	0 dB
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Male speech, average at 10m	50 dB																		
Whisper at 10m	25 dB																		
Threshold of hearing, 1000 Hz	0 dB																		
dB(A): A-weighted decibels	The ear is not as effective in hearing low frequency sounds as it is hearing high frequency sounds. That is, low frequency sounds of the same dB level are not heard as loud as high frequency sounds. The sound level meter replicates the human response of the ear by using an electronic filter which is called the 'A' filter. A sound level measured with this filter switched on is denoted as dB(A). Practically all noise is measured using the A filter. The sound pressure level in dB(A) gives a close indication of the subjective loudness of the noise.																		
Façade Noise Level	A noise level measured or predicted at the façade of a building, typically at a distance of 1m, containing a contribution made up of reflections from the façade itself (+3 dB).																		
L_{Amax} noise level	This is the maximum noise level recorded over the measurement period.																		
L_{Amin} noise level	This is the lowest level during the measurement period.																		
$L_{Aeq,T}$ noise level	This is the 'equivalent continuous A-weighted sound pressure level, in decibels' and is defined in British Standard 7445 as the 'value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time'. It is a unit commonly used to describe construction noise, noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise.																		

Appendices

L_{A90} noise level	This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.
L_{A10} noise level	This is the noise level which is achieved for 10% of the monitoring period and is often used to describe road traffic noise.
Sound Reduction Index (R)	The sound reduction index is a single-number rating of the sound reduction through a wall or other building element. Since the sound reduction may be different at different frequencies, test measurements are subjected to a standard procedure which yields a single number that is about equal to the average sound reduction in the middle of the human hearing range.
Weighted Sound Reduction Index (R_w)	Single number rating used to describe the laboratory airborne sound insulation properties of a material or building element over a range of frequencies, typically 100-3150Hz.
C_{TR}	An adjustment to the R _w scale to take account of the lower performance against a typical spectrum of road traffic noise dominated by low frequencies.
D_{ne,W}	Weighted element normalised level difference.
VDV	This is the vibration dose value, a measure of vibration exposure; the fourth root of the integral, over the measurement period, of the fourth power of the frequency-weighted and time-varying acceleration.

Appendices



B. Modular Build Acoustic Information

Appendices

Trinity Academy, Barnsley, Temporary Building
Document Reference: WIE17125
WIE1725-106-R-2-1-4

noise.co.uk Ltd
Report No 8554-4

Measurement of Airborne Sound Transmission

Elliott Steelplan Multi (ELM) – Sound Insulation
of Facade

For: Elliott Modular

9/11/2009

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1.0 Object

The object of this report is to present the findings of an airborne sound insulation survey carried out at the development known as Elliott Steelplan Multi modular building system, on the building facade to identify the sound insulation performance.

The survey was carried out on 10th September 2009

2.0 Scope

This report covers the presentation of the sound insulation survey findings with analysis.

3.0 Site

Preamble:

Elliott Steelplan Multi modular buildings are utilised as school buildings with a variety of end uses. Note each room is referred to by its description given on site for ease of identity.

This report is based on tests carried out on a typical BSF decant facility. The building was over two storeys and utilizes Elliott Steelplan Multi modules with no variations on its standard design.

4.0 Measurements

Airborne Sound Transmission (Facades)

A wide band pink noise source was positioned at approximately 45 degrees to the façade under measurement.

Measurements were made on the following facade:

Airborne

1) External – 605 Classroom

In each test, measurements of SPL were made externally 2m from the middle of each façade and at 6 positions internal to the façades at approximately 1.5m to 2m from the internal face of the glazing and 1.5m above the floor. Background measurements were taken in a similar way with the noise source switched off.

The sound level meter was always positioned at least 1m away from the nearest internal wall.

Sound pressure levels were made in one third octave bands from 100Hz - 3150Hz.

Each one third octave measurement took approximately 10 seconds.

The reverberation times of the receiving rooms were measured by recording wide band continuous pink noise.

Measurements were made in accordance with ISO 140 – 5: 1998.

All SPL measurements are in dB re 20 micro pascals.

5.0 Measuring Equipment

Measurements were made using the following equipment:

Measurements were made using the following equipment:

- 1) NOR 118 Sound Level Analyser. UKAS calibration certificate no 01858 instrument Serial no 31477
- 2) NOR 1251 Calibrator. UKAS certificate no 01852 instrument Serial no 31013
- 3) JBL EON 10 Serial No10G2230-15048

The sound level meter was calibrated immediately prior to and immediately after the measurements was carried out.

The calibration was as follows:

Before	114.1dB
After	114.1dB

The equipment has traceable calibration.

6.0 Acoustic Findings

The reverberation times of the receiver room are summarised in the Sound Insulation Certificates in the Appendix.

The correction, which is applied to allow for these reverberation times, is given in the following formula, as given in ISO 140 - 5:

$$\text{Correction} = -10L_g T/T_0 \text{ dB}$$

Where : $T_0 = 0.5$ seconds

T = measured reverberation time.

The required corrections are given in the results tables.

The average SPL in each set of results is calculated in accordance with BS2750 by the following formula:

$$L = 10Lg(P_1^2 + P_2^2 + \dots P_n^2) / nP_0^2 \text{ dB}$$

Where $P_1, P_2, \dots, P_n$ = RMS Sound Pressure Levels at n different positions in the room.

P_0 = 20 micro pascals = Reference Sound Pressure Level.

7.0 Results

Airborne Sound Insulation Results.

The results are detailed in airborne Data Tables for walls and floors in Section 8.0 of this report.

These results are also shown in Graphical format in the Airborne Sound Insulation Certificates, in the Appendix.

8.0 Analysis of Results

Airborne Sound Insulation (Facades)

The procedure for evaluating single number ratings of airborne sound insulation the procedure given in ISO 717 - 1 was followed:

To evaluate the results of a measurement of R, R1, D or DnT in one third octave bands (preferably given to 1 decimal place), the reference curve is shifted in steps of 1dB towards the measured curve until the mean unfavourable deviation, calculated by dividing the sum of the unfavourable deviations by the total number (i.e. 16) of measurement frequencies, is as large as possible but not more than 2.0dB. An unfavourable deviation at a particular frequency occurs when the result of measurement is less than the reference value. Only the unfavourable deviations are taken into account..

The value, in decibels, of the reference curve at 500Hz, after shifting it according to this procedure, is RW, R1W DWor DnTW respectively.

In addition, the maximum unfavourable deviation at any frequency shall be recorded, if it exceeds 8.0dB.

It is noted that the global loudspeaker method of assessing the sound insulation of the façade produces a sound insulation descriptor (the standardized level difference) denoted as:

$D_{is,2m,nT}$

And measured in decibels (dB). These are detailed in the sound insulation certificate for each elevation surveyed as "Average measured" column from 50 – 5000Hz.

NOTE: This descriptor can not be compared with the sound reduction index R_w of the glazing or any other element of the façade.

Summary of Façade Single Airborne Sound Insulation Test Results

Source Façade	Elevation	$D_{is,2m,nT}$ dB	Ctr	$D_{is,2m,nT} + Ctr$ dB
External	605 Classroom	35	-3	32

9.0 Conclusions

Sound Insulation:

The facades tested show single figure sound insulation performance levels to indicate the likely performance of the façade measured. Internal criteria will be dependent upon the positioning of the units and would be site specific.

W.A.Whitfield BA. MSc, MIOA

Noise & Vibration Consultant

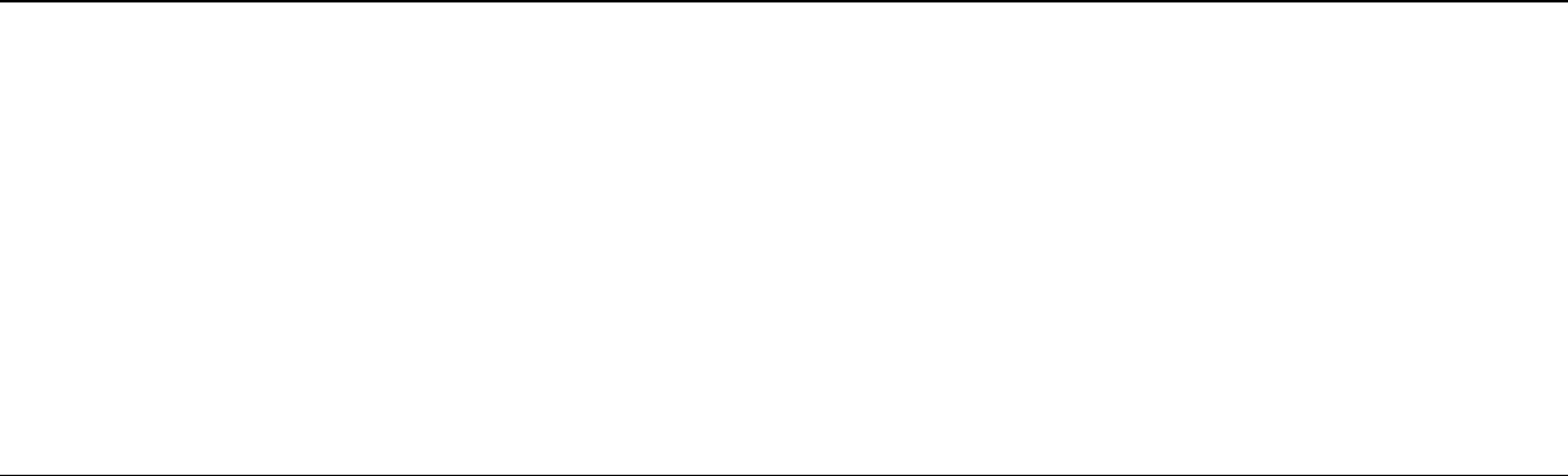
Appendix

Facade Insulation Certificate - New Build

Airborne Sound Insulation Test Calculator

Elliott Steelplan Multi (ELM)

Source Room: External
Receiver Room: 605 Classroom
Acoustic Treatment 0



Frequency Hz	Average Measured #NUM!	Amended Standard Curve	Added Difference	Standard Curve	Deviation	Noted Deviation	Average	Receiver Room Correction
50	24.4						1.95	5.91
63	21.9						1.32	4.22
80	25.2						0.86	2.33
100	22.2	16	-17	33	0.0	None	0.72	1.60
125	23.6	19	-17	36	0.0	None	0.86	2.36
160	27.3	22	-17	39	0.0	None	0.85	2.28
200	29.7	25	-17	42	0.0	None	1.09	3.39
250	31.9	28	-17	45	0.0	None	1.31	4.17
315	34.8	31	-17	48	0.0	None	1.56	4.95
400	36.5	34	-17	51	0.0	None	1.66	5.20
500	36.3	35	-17	52	0.0	None	1.60	5.06
630	36.8	36	-17	53	0.0	None	1.65	5.18
800	37.0	37	-17	54	0.2	None	1.62	5.11
1000	34.7	38	-17	55	1.0	None	1.74	5.41
1250	34.9	39	-17	56	4.3	None	1.75	5.44
1600	31.2	39	-17	56	4.1	None	1.64	5.16
2000	29.7	39	-17	56	7.8	None	1.50	4.77
2500	42.3	39	-17	56	9.3	***	1.46	4.66
3150	46.0	39	-17	56	0.0	None	1.60	5.05
4000	47.4						1.58	5.00
5000							1.49	4.74

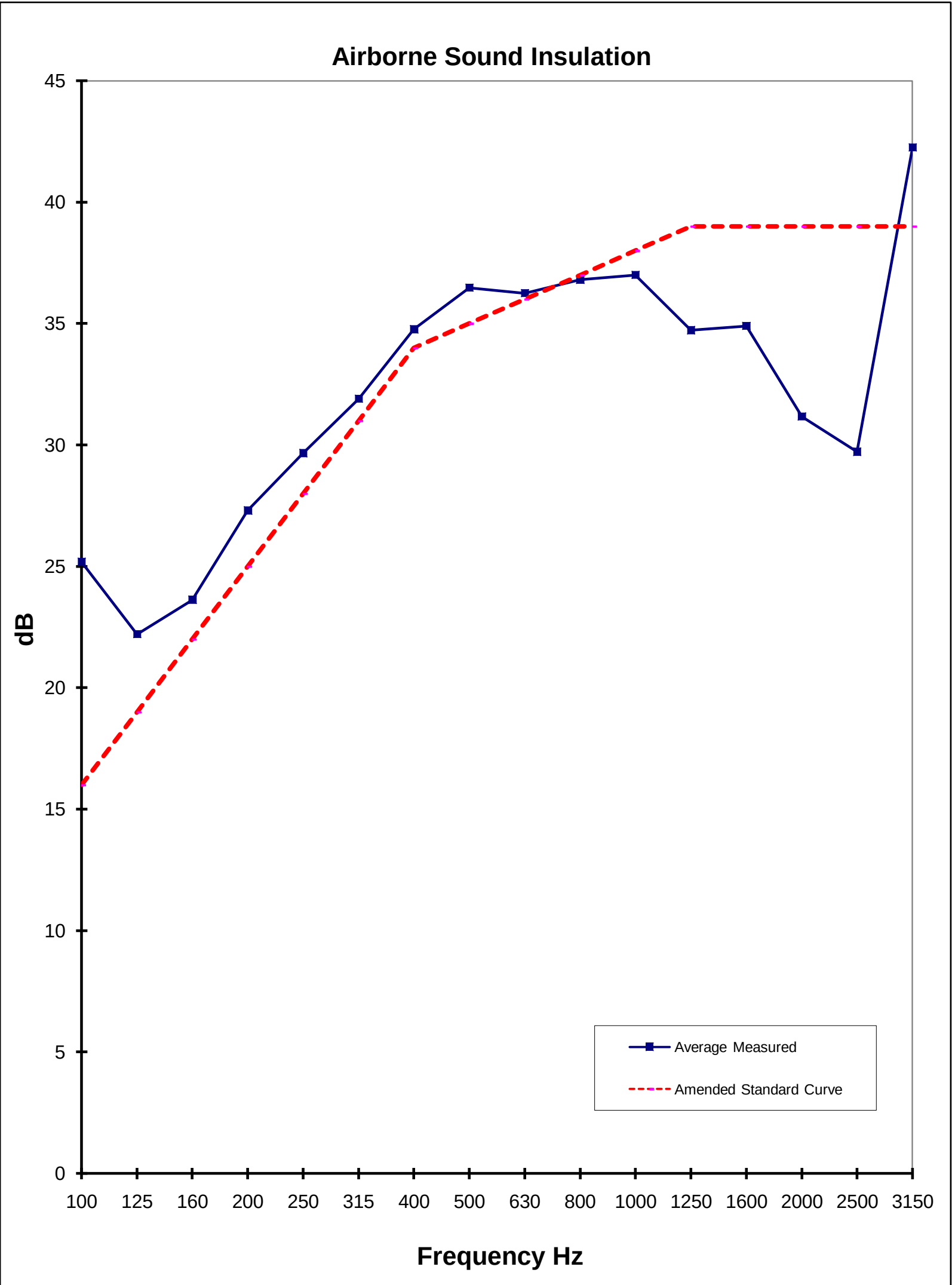
-17

26.6

*** Means Deviation is greater than 8dB

D is,2m.nT + C _{tr} = 32 dB	Test D is,2m.nT = 35 dB

Sound Insulation Results: EN ISO 140-5: 1998	D _{is,2m.nT} (C;C _{tr}) = 35 (-2 -3)
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Client: Elliott Modular
Survey Date: 10th September 2009

UK and Ireland Office Locations

