clement acoustics

202 Uxbridge Road
London
W12 7JP

Tel: +44(0)203 475 2280
Fax: +44(0)203 475 2281

info@clementacoustics.co.uk

www.clementacoustics.co.uk

TEACHING BLOCK,

PARLIAMENT HILL SCHOOL, HIGHGATE ROAD, CAMDEN

NOISE IMPACT ASSESSMENT

Report **10883-NIA-01B**

Prepared on 26 March 2018

Issued For:

Farrans Construction
New Cambridge House
Bassingbourn Road
Litlington nr Royston
SG8 0SS

Institute of Acoustics sponsoring organisation
committed to CSCS Platinum award
CQMS Safety Scheme
ISO 17025 Quality Assurance
CHAS Accredited Contractor
Constructionline
UKAS Testing 7688

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1.0 INTRODUCTION

Clement Acoustics Ltd has been commissioned by Farrans Construction to investigate and assess the possibility of noise emissions from proposed internal activities within the teaching block at Parliament Hill School, Highgate Road, Camden.

This report presents the results of a background noise survey and break out assessment followed by an assessment of the anticipated noise emission levels and outlines any necessary mitigation measures.

2.0 SITE DESCRIPTION

As part of the proposed Teaching Block, a sports hall and design technology room will be created, which have the potential to generate noise emissions in internal spaces.

The Teaching Block is located towards the south of the school site, close to residential receivers.

The closest window to the noise generating rooms is at a minimum distance of 20 m from plant located terminating on the closes facade.

An assessment has been carried out in order to investigate the anticipated level of noise breakout from the spaces and assess whether any particular mitigation measures are necessary.

3.0 BACKGROUND NOISE LEVELS

Environmental noise surveys were undertaken by Hoare Lea in September to October, 2013. These surveys were used to determine existing ambient and background noise levels on the site, as detailed in report REP-1005073-TH-20140217-4.

Close to the Teaching Block, the minimum background noise level was determined to be 43 dB(A) during daytime hours.

As the rooms will only be in use during school hours, assessing to the daytime criterion is considered suitably robust.

4.0 NOISE EMISSIONS CRITERIA

4.1 External Noise Emissions

In order to assess the likely impact of the music and multi-purpose rooms on nearby residential windows, we would suggest the comparison of anticipated noise emission levels to the minimum measured background noise levels (L_{A90}) and provide a rating of impact according to BS4142:2014:*'Methods for rating and assessing industrial and commercial sounds'*.

British Standard 4142:2014 can be seen as a good guide for assessing the suitability of varying (i.e. non-fixed) noise emissions to residential receivers. In a BS4142 assessment, corrections are applied to measured noise levels in order to calculate a noise rating level for the effects of the source on nearby noise sensitive receivers.

As rooms are for school use, this assessment will compare noise emissions to the daytime hours measured background noise level of 43 dB(A).

In a BS4142 assessment, corrections are applied to measured noise levels in order to calculate a noise rating level for the effects of the source on nearby noise sensitive receivers. BS4142 states that a noise rating 5dB above the background noise level is likely to be an indication of an adverse impact. If the difference is of 10dB or more, then this is stated as likely to be an indication of a significant adverse impact. Where the rating level does not exceed the background noise level, this is stated as an indication of the sound source having a low impact.

5.0 NOISE IMPACT ASSESSMENT - INTERNAL ACTIVITIES

5.1 Proposed Activities

In order to predict worst case levels of noise anticipated from the use of the rooms, measurements have been taken from previous projects covering similar activities. The noise sources used are described as follows:

- Sports Hall: Measurements taken in a spinning class at a gymnasium. Particularly in terms of a constant level of noise over a daytime reference period, this is considered particularly robust.
- Design & Technology Classroom: Measurements taken in a commercial wood workshop. Machinery in use included nail guns, sanders, chop saws and hand tools.

The measured spectral noise levels for the above scenarios are shown in Table 5.1.

	Sound Pressure Level (dB) in each Frequency Band, at source								
Source	**63Hz**	**125Hz**	**250Hz**	**500Hz**	**1kHz**	**2kHz**	**4kHz**	**8kHz**	**dB(A)**
Spinning Class at Gymnasium	81	89	82	81	80	84	79	67	88
Commercial Wood Workshop	64	71	71	71	69	67	66	60	74

Table 5.1: Loudest Typical Measured Activity Noise Levels

These levels will be used to calculate the current noise breakout to nearby noise sensitive receivers.

For all calculated levels shown below, full formulae used and spectral calculations are shown in Appendix B.

5.2 Noise Breakout Assessment – Through External Facade

Residential windows have been identified at the location shown in attached site plan 10883-TH1. The closest windows are located approximately 20 m from the closest point of the proposed school building facade.

The proposed external wall constructions for each space are summarised as follows (the option shown for the Sports Hall is the weaker of the two wall types used):

Sports Hall (Wall Type EW1)

- External aluminium cladding panels,
- 200mm insulation in c300mm void,
- 12mm cement particle board,
- 150mm c-stud with 100mm mineral wool,
- 15mm SoundShield inner lining

Design & Technology Room (EW2)

- Insulated render system (250mm insulation),
- 12mm cement particle board,
- 150mm c-stud with 100mm mineral wool,
- 15mm SoundShield inner lining

The wall systems shown above would be expected to provide sound reduction level of at least R_w 55 dB.

For the Design & Technology room, the weakest element of the external facade will be glazed elements. For the purposed of this assessment, it will be assumed that glazing could be formed of nominal double glazing, with a sound reduction level of R_w 30 dB.

With internal activities at the above levels and proposed building performances adopted, noise emissions levels at nearest residential windows due to internal music play back would be as shown in Table 5.2.

In a BS4142 Assessment, corrections are applied to noise sources considered distinctive against the residual acoustic environment. In this instance, a 3dB penalty has been applied in the calculations to account for the potentially distinctive nature of noise, the maximum penalty applicable.

Levels have been calculated using the measured activity noise levels, the minimum specified sound reduction of the facades and the formula shown in Appendix B.

Receiver	Minimum Daytime Background Noise Level L90	Noise Level at Receiver (due to amplified music)
Closest Residential Receiver	43 dB(A)	25 dB(A)

Table 6.2: Noise levels and criteria at Receiver

As shown in Table 5.2 and Appendix B1, transmission of noise to the nearest sensitive windows due to the effects of the activities would provide a noise rating level of -18 dB. This would be classed as an indication of the sound source having a low impact as defined in the standard.

6.0 CONCLUSION

An assessment of noise breakout from internal activities has been undertaken for the proposed Teaching Block at Parliament Hill School, Highgate Road, Camden. The results of a previously undertaken survey have enabled the assessment of noise propagation of proposed internal activities to surrounding receivers.

Calculations have been based on a worst case scenario of the Sports Hall and Design & Technology room to receivers, with a minimum proposed external building fabric performance.

Calculations have shown that the noise from activities within the facility would meet the set noise criteria.

Report by

Duncan Martin MIOA

Checked by

Florian Clement MIOA

10883-SP1 Indicative site plan indicating noise monitoring position and nearest noise sensitive receivers

Date: 26 March 2018

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.

APPENDIX B

10883

Parliament Hill School, Highgate Road, Camden

Acoustic Calculation used for Indoor to Outdoor Transmission:

$$SPL_{outdoor} = SPL_{indoor} - SRI_{composite} + 10log_{10}S - 20log_{10}r - 14$$

APPENDIX B: Noise Breakout Assessment
Source: Sports Hall and Design & Technology Activities

	Frequency, Hz								
	63	125	250	500	1k	2k	4k	8k	dB(A)
Internal Measured Sound Pressure Level Measured source noise level at gymnasium spinning class	81	89	82	81	80	84	79	67	88
Sound Reduction of weakest facade (EW1), dB (SRI)	-25	-32	-46	-53	-55	-55	-55	-55	
Correction for total area of building facade (S = 60m^2)	17	17	17	17	17	17	17	17	
Correction for distance (r) (r = 20m)	-26	-26	-26	-26	-26	-26	-26	-26	
Non reverberant correction	-14	-14	-14	-14	-14	-14	-14	-14	
Correction for distinctive noise emissions	3	3	3	3	3	3	3	3	
Sound pressure level at receiver due to Sports Hall	**36**	**37**	**16**	**8**	**5**	**9**	**4**	**-8**	**22**
Internal Measured Sound Pressure Level Measured source noise level in wood workshop	64	71	71	71	69	67	66	60	74
Sound Reduction of weakest facade (nominal glazing), dB (SRI)	-18	-20	-22	-28	-33	-34	-28	-30	
Correction for total area of building facade (S = 20m^2)	13	13	13	13	13	13	13	13	
Correction for distance (r) (r = 20m)	-26	-26	-26	-26	-26	-26	-26	-26	
Non reverberant correction	-14	-14	-14	-14	-14	-14	-14	-14	
Correction for distinctive noise emissions	3	3	3	3	3	3	3	3	
Sound pressure level at receiver due to Design & Technology	**22**	**27**	**25**	**19**	**12**	**9**	**14**	**6**	**22**
Cumulative sound pressure level at receiver	**36**	**37**	**26**	**19**	**13**	**12**	**14**	**6**	**25**