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**NEW BUILDING
HSDC HAVANT CAMPUS**

NOISE IMPACT ASSESSMENT

Technical Report: R10194-1 Rev 1

Date: 20th September 2023

For: Havant and South Downs Corporation
College Road
Waterlooville
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24 Acoustics Document Control Sheet

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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been appointed by Peter Marsh Consulting Ltd, on behalf of Havant and South Downs Corporation (HSDC), to provide a noise impact assessment for the proposed new teaching building at HSDC's Havant Campus.
- 1.2 The primary source of noise in the area is road traffic noise from New Road and Petersfield Road. Accordingly, this ambient noise assessment has included:
- Environmental noise monitoring;
 - Consideration of the ambient noise affecting the site;
 - Assessment of internal noise levels within the proposed new teaching building;
 - External noise criteria for new building services plant.
- 1.3 This report presents the results of the assessment, following site visits and an ambient noise survey undertaken between 31st July and 4th August 2023.
- 1.4 All sound pressure levels quoted in this report are in dB relative to 20 µPa. A glossary of the acoustic terminology used in this report is provided in Appendix A.

2.0 SITE DESCRIPTION

- 2.1 The proposed building is to be located to the east of the existing campus, to the south of the existing Sports Block building. New Road is located to the south of the proposed building and Petersfield Road to the east.
- 2.2 The new three-storey building will comprise ten new classrooms , including general purpose classrooms and IT classrooms.
- 2.3 The proposed site layout is shown in Figure 1.

3.0 CRITERIA

Building Bulletin 93 – Internal Ambient Noise Levels

- 3.1 The document 'Acoustic design of schools: performance standards, Building Bulletin 93' [Reference 1], sets out acoustic performance standards for school buildings. The college provides teaching and learning facilities for further and higher education; therefore BB 93 is the most appropriate standard to use.

- 3.2 Table 1 in BB 93 gives the upper limit for the indoor ambient noise level (dB $L_{Aeq, 30 \text{ min}}$) criteria based on the type of room. The relevant criteria for the proposed room types within the new buildings are shown in Table 1.

Room Type	BB 93 Upper Indoor Ambient Noise Level (dB $L_{Aeq, 30 \text{ min}}$)
General Purpose Classroom	35
IT Classroom	40

Table 1: BB 93 Upper Limits for Ambient Noise Levels – New Building

- 3.3 If natural ventilation is to be used under normal operational conditions (i.e. a minimum ventilation rate of approximately 5 l/s per person), under BB 93 the values in Table 1 can be relaxed (i.e. increased) by 5 dB.
- 3.4 For summer overheating and intermittent boost conditions, if achieved with mechanical ventilation the indoor noise level can be up to 5 dBA higher, or if achieved via natural ventilation up to 55 dB $L_{Aeq, 30 \text{ min}}$. BB 93 also states that this relaxation does not apply to classrooms intended specifically for students with special hearing and communication needs.
- 3.5 In relation to summer overheating, BB 93 notes that *'the peak summertime condition is defined as the 200 hottest hours that occur using the design summer year (DSY) weather file during normal daily school operating hours including the summer holiday period.'*

British Standard (BS) 4142: 2014

- 3.6 British Standard 4142:2014 'Methods for Rating Industrial and Commercial Sound, 2014' [Reference 2] provides a method for rating the effects of industrial and commercial sound on residential areas. The standard advocates a comparison between the representative measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes, if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction should be applied.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS

Ambient Noise Levels

4.1 An ambient noise survey was undertaken from 31st July to 4th August 2023 to determine the existing noise levels at the site. Ambient noise levels were measured using the following equipment:

- Rion precision sound level meter Type NL-52;
- Brüel & Kjær acoustic calibrator Type 4231.

4.2 A noise monitor was set-up to the east of the site, at a location considered representative of the proposed façade of the new building overlooking Petersfield Road. The monitor was set-up at a height of approximately 2 m.

4.3 Noise measurements were undertaken in samples of 5 minutes in terms of the overall free-field A weighted L_{eq} and L_{90} noise levels. Measurements were made in accordance with BS 7445:1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference 3].

4.4 The instrumentation's calibration was checked before and after the survey in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. Calibration of 24 Acoustics' equipment is traceable to National Standards. All instruments were fitted with environmental weather shields during the surveys.

4.5 Weather conditions during the survey were generally fine and dry.

Results

4.6 The results of the ambient noise survey are shown graphically in Appendix B.

4.7 Table 2 and Table 3 summarise the typical ambient and background noise levels, respectively, measured during the survey.

	Environmental Noise Measurements Daytime hours (08:00 – 18:00)
	Typical Ambient Noise, dB $L_{Aeq, 30 \text{ mins}}$
Representative Level	65 to 67

Table 2 – Ambient Noise Measurements, Daytime Hours 08:00 to 18:00

	Typical Background Noise Level, dB L_{A90}		
	Daytime 07:00 – 19:00	Evening 19:00 – 23:00	Night-time 23:00 – 07:00
	Typical $L_{A90, 1hr}$	Typical $L_{A90, 1hr}$	Typical $L_{A90, 15min}$
Representative Level	54	49	35

Table 3 – Background Noise Measurements.

- 4.8 The principal noise source at the measurement location was road noise from traffic using New Road and Petersfield Road and the adjoining roundabout.

5.0 INTERNAL AMBIENT NOISE LEVELS – NEW BUILDING

- 5.1 Based the measured noise levels, an upper external noise level of 67 dB $L_{Aeq, 30 \text{ mins}}$ has been used to represent typical conditions – for design purposes.
- 5.2 Under BB 93, where natural ventilation is to be used under normal operational conditions (i.e. a minimum ventilation rate of approximately 5 l/s per person) the upper internal ambient noise level targets are shown in Table 4 below.

Room	BB 93 Upper Limit for Indoor Ambient Noise Level (dB $L_{Aeq, 30 \text{ min}}$)	BB 93 Upper Limit for Indoor Ambient Noise Level – Natural Ventilation (dB $L_{Aeq, 30 \text{ min}}$)
General Purpose Classroom	35	40
IT Classroom	40	45

Table 4: BB 93 Upper Limits for Ambient Noise Levels - With Natural Ventilation.

- 5.3 In 24 Acoustics' experience, the attenuation provided by an open window, in terms of the difference between an external and internal noise level, is approximately 18 dBA for classrooms that meet the reverberation requirements of BB 93.
- 5.4 Applying this reduction to the design external noise level of 67 dB $L_{Aeq, 30 \text{ min}}$ gives predicted internal noise levels in the order of 49 dB $L_{Aeq, 30 \text{ min}}$, which would exceed BB 93 upper internal noise levels for the proposed teaching rooms.
- 5.5 On this basis, acoustically attenuated ventilation, e.g. mechanical ventilation will be necessary to the teaching rooms facing New Road and Petersfield Road, in order to achieve the internal noise level requirements.
- 5.6 A natural or hybrid ventilation strategy that relies on open windows would be acoustically acceptable for rooms on facades not facing New Road and Petersfield Road, as shown in Figure 2.
- 5.7 The acoustic performance of the ventilation systems, whether passive and/or mechanical, and external façade elements (glazing and external walls) shall be appropriately specified during detailed design, to ensure that BB 93 internal noise criteria are achieved.

Plant Noise Limits

- 5.8 The proposed building may include building services plant associated with the development. Plant operating hours are not yet known.
- 5.9 The nearest residential properties to the building are located south of New Road at an approximate distance of 80 m from the proposed building.
- 5.10 In the absence of any specific local authority requirements, an external plant noise limit of 5 dB below the prevailing background noise level at the nearest noise sensitive windows is proposed, during the plant operating hours. Plant noise levels should be assessed using the guidance of BS 4142: 2014.
- 5.11 In accordance with the above, the following maximum cumulative plant noise levels are applicable for new plant associated with the scheme, during the relevant operating hours, shown in Table 5 below.

Plant Noise Limit		
Daytime 07:00 – 19:00	Evening 19:00 – 23:00	Night-time 23:00 – 07:00
49 dB L _{Ar} , 1hr	44 dB L _{Ar} , 15 min	30 dB L _{Ar} , 15 min

Table 5 – Proposed Noise Limits for Fixed Plant - Properties to the South of New Road..

- 5.12 If the noise emissions are tonal, or contain other noticeable characteristics, then a suitable correction is applicable, in accordance with BS 4142:2014.
- 5.13 Noise from proposed plant should also not exceed 30 dB L_{Aeq,T} within existing or new teaching rooms.

6.0 CONCLUSIONS

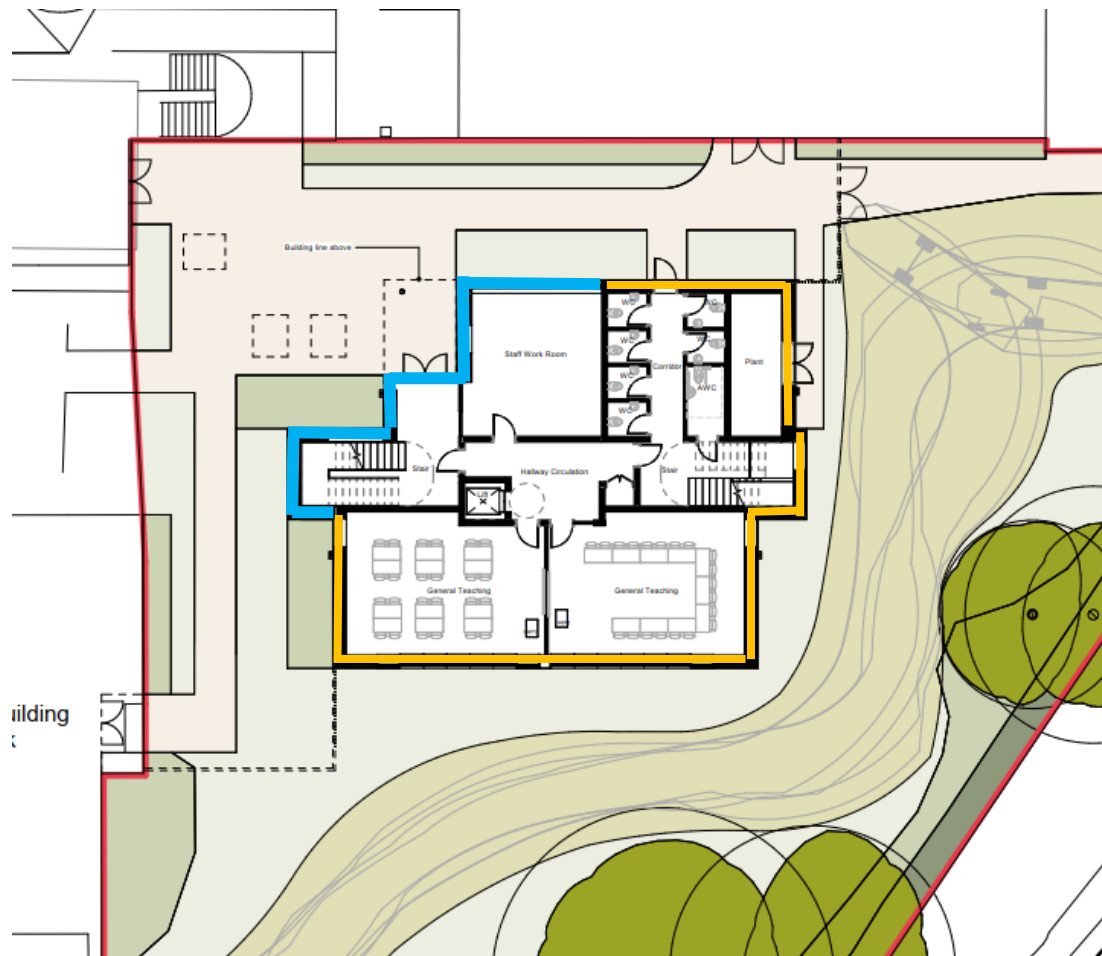
- 6.1 24 Acoustics Ltd has been appointed by Peter Marsh Consulting Ltd, on behalf of Havant and South Downs Corporation (HSDC), to provide a noise impact assessment for the proposed new teaching building at HSDC's Havant Campus.
- 6.2 An environmental noise survey has been undertaken to determine prevailing ambient and background noise levels at the proposed site and the nearest affected properties.
- 6.3 The assessment concludes that, based on the measured ambient noise levels, acoustically attenuated ventilation e.g. mechanical ventilation will be necessary to rooms facing New Road and Petersfield Road. The ventilation systems and external façade shall be appropriately specified at the design stage, to ensure that BB 93 internal noise criteria are achieved.
- 6.4 Limiting external noise criteria have been determined, applicable to new building services plant associated with the scheme.

REFERENCES

1. Department for Education, Building Bulletin 93, 'Acoustic design of schools: performance standards', Version 17, February 2015.
2. British Standards Institution. British Standard 4142. Methods for Rating Industrial and Commercial Sound, 2014
3. British Standards Institution. British Standard 7445:1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use, 1991.



Project: HSDC Havant Campus	Title: Aerial view and survey location		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: 1	
Date: September 2023	Drawn By: AP	Job No: 10194	



Natural or Hybrid Ventilation - —

Acoustically Attenuated Ventilation - —

Project: HSDC Havant Campus	Title: Proposed site plan and Recommendations for teaching rooms on all floors		
DWG No: Figure 2	Scale: N.T.S.	Rev: 1	
Date: September 2023	Drawn By: AP	Job No: 10194	

APPENDIX A: ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 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 and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The 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 the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B: ENVIRONMENTAL NOISE MEASUREMENTS

