

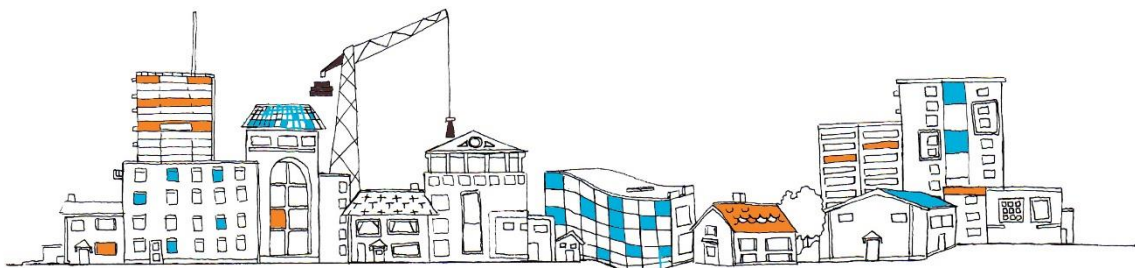
NOISE & VIBRATION REPORT

Green Park Village School

On behalf of Berkeley Homes

Date: 23/04/2018

Energist UK



REVISION HISTORY

Revision	Issue Date	Description	Issued By	Checked by
A	23/04/2018	Noise & Vibration Report	NJ	EW

This report has been produced by Energist UK Ltd for the private use of the client and solely in relation to the named project. It should not be reproduced in part or in whole nor distributed to third parties, without the express permission of both Energist UK Ltd and the Client.

Calculations contained within this report have been produced based on information supplied by the Client and the design team. Any alterations to the technical specification on which this report is based, will invalidate its findings.

College Farm
Tetbury Road
Cirencester
GL7 6PY

Tel: 08458 386 387
Fax: 08456 432 232

info@energistuk.co.uk

www.energistuk.co.uk

energist[®]

CONTENTS

1. INTRODUCTION	3
2. DESCRIPTION OF SITE AND PROPOSALS	3
3. NOISE SURVEY	4
4. INDOOR AMBIENT NOISE LEVELS	6
5. BUILDING SERVICES PLANT NOISE EMISSIONS.....	7
APPENDIX 1: ACOUSTIC TERMINOLOGY.....	9

1. INTRODUCTION

A new school is proposed at Green Park Village off Longwater Avenue on the outskirts of Reading in Berkshire. The new building will include classrooms, a library, science rooms and a hall.

Indoor ambient noise levels within teaching rooms in the new building will be required to meet the standards specified in Building Bulletin 93 “*Acoustic Design of Schools*”, referred to hereafter as BB93.

This report presents the methodology and results of a noise survey to determine external ambient noise levels affecting the site of the new school, as well as an assessment of external noise intrusion and external building services noise emissions in relation to the requirements of Reading Borough Council and BREEAM.

2. DESCRIPTION OF SITE AND PROPOSALS

The site is located on the north-western side of Longwater Avenue on the outskirts of Reading in Berkshire. Residential properties are located to the west, north and east of the site, with commercial office properties located to the south of Longwater Avenue.

Figure 2.1 shows the proposed site layout in **red** and surrounding properties.

Figure 2.1 Proposed Site Layout



3. NOISE SURVEY

3.1 Methodology

An environmental noise survey was undertaken at the site between approximately 09:00 and 15:30 hours on Tuesday 27 February 2018. This survey period was selected to determine ambient and background noise levels during a typical school day.

The measurement position was located at approximately the south-eastern boundary of the site of the proposed school, with the measurement microphone attached to a tripod in free-field at a height of approximately 1.5m above ground level.

The measurement position is indicated in **blue** on Figure 3.1.

Figure 3.1 Site Plan Indicating Approximate Location of Measurement Position



The measurement position was selected as being representative of external ambient noise levels affecting the site of the proposed school, as well as background noise levels in the vicinity of the proposed school site.

The equipment used for the noise survey is summarised in Table 3.1.

Table 3.1. Description of Equipment used for Noise Survey

Item	Make & Model	Serial Number
Type 1 sound level meter	01dB FUSION	11388
Type 1 ½" microphone	GRAS 40CE	259364
Calibrator	01dB CAL21	34375252

L_{A1} , L_{Aeq} and L_{A90} sound pressure levels were measured throughout the noise survey over 125-millisecond intervals, which can then be converted to 30-minute intervals in accordance with BB 93.

Appendix 1 presents an explanation of the acoustic terminology used in this report.

During the morning portion of the survey period, there was noted to be no rainfall, a clear sky and only light wind. During the afternoon, there were periods of snowfall.

The noise monitoring equipment was calibrated before and after the noise survey period. No significant change was found. Equipment calibration certificates can be provided upon request.

3.2 Noise Survey Results

The L_{A1} , L_{Aeq} and L_{A90} sound pressure levels measured at the measurement position throughout the noise survey are shown in Table 3.2.

Table 3.2. Summary of Measured Noise Levels

Period	Measured Noise Level (dB)		
	L_{A1} (30 min)	L_{Aeq} (30 min)	L_{A90} (30 min)
09:00 – 09:30	60	54	48
09:30 – 10:00	60	53	47
10:00 – 10:30	59	52	46
10:30 – 11:00	61	53	46
11:00 – 11:30	60	52	46
11:30 – 12:00	60	53	46
13:30 – 14:00	63	53	47
14:00 – 14:30	61	53	48
14:30 – 15:00	62	53	47

We would consider the levels measured to be reasonable, considering the location of the measurement position and the dominant nearby noise sources.

The noise climate at the measurement position was affected by road traffic using Longwater Avenue (mainly cars, buses and taxis) as well as distant road traffic noise on the raised M4 motorway approximately 700m south-west of the site.

Noise due to vehicle activities in the adjacent Marketing Suite car park and occasional construction activities were also noted at the measurement position, however these have been excluded from subsequent analysis.

4. INDOOR AMBIENT NOISE LEVELS

4.1 Existing Noise Levels

BB 93 specifies internal noise level limits for the various types of room likely to be found within a school.

The limits are based on the $L_{Aeq (30 \text{ min})}$ parameter – the A-weighted equivalent continuous noise level, logarithmically averaged over a 30-minute period. The noise limits should not be exceeded during any 30-minute period during a typical school day and it therefore follows that the noise limits should not be exceeded during the noisiest 30-minute period during a typical school day and any external façade/ventilation design should consider this noisiest period.

Table 4.1 presents internal noise level limits for the various types of school room proposed, based on BB 93.

Table 4.1. BB 93 Internal Noise Level Limits

Room Type	BB 93 Internal Noise Limit (dB $L_{Aeq (30 \text{ min})}$)
Classroom	35
Nursery Room	35
Group Room	35
Studio	35
Food Science/DT	40
Library Resource Centre	40
Main Hall	40

In addition, where normal ventilation is to be provided by natural means (e.g. open windows), BB 93 permits the limits shown in Table 4.1 to be increased by 5 dB (up to a maximum of 45 dB L_{Aeq} (30 min)).

It is generally accepted that an open window can provide attenuation of external noise levels of 10-15 dB.

Therefore, external noise levels would need to be less than 50-55 dB L_{Aeq} (30 min) to achieve the BB 93 standards in normal new teaching rooms.

It can be seen from Table 3.2 that the measured external noise levels do not generally exceed 55 dB L_{Aeq} (30 min) in the area of the site represented by the measurement position, therefore open windows should be an acoustically acceptable means of providing ventilation in the new school.

4.2 Future Noise Levels

We are in receipt of existing and predicted future road traffic flows, based on the known wider Green Park Village development masterplan, which show an increase in road traffic flows along Longwater Avenue (to the south-east of the site) to the years 2022 and 2037. The traffic flows, along with predicted road traffic noise level changes, are shown in Table 4.2.

Table 4.2. Future Changes to Road Traffic Flows and Noise Levels

Scenario	2017	2022 (without development)	2022 (with development)	2037 (without development)	2037 (with development)
Road Traffic Flow	1101	3876	4498	7275	4320
Road Traffic Noise Level Change Compared to 2017(dB)	-	+5	+6	+8	+6
Predicted L_{Aeq} (30 min) (dB)	52-54	57-59	58-60	60-62	58-60

It can be seen from Table 4.2 that road traffic noise levels are predicted to increase, pending further development, and forecasted by at least 5 dB in the future. As such, future noise levels affecting the site may need further consideration, but the scheme is currently acoustically acceptable for natural ventilation via openable windows, as has been designed and considered.

5. BUILDING SERVICES PLANT NOISE EMISSIONS

5.1 Noise Limits

The lowest background noise level measured during school hours was 46 dB L_{A90} .

From previous liaison with the Environmental Protection departments, we understand Reading Borough Council typically requires building services plant noise emissions to be limited to a level 10 dB less than the lowest background noise levels, therefore plant noise emissions should not exceed a level of **36 dB $L_{Aeq, T}$** when measured 1m external to the nearest noise sensitive property.

One credit is available under Pol05 of BREEAM 2014 where it can be demonstrated that the noise level due to new plant does not exceed the existing background noise level by more than +5 dB during daytime periods (07:00 – 23:00 hours) or by more than +3 dB during night-time periods (23:00 – 07:00 hours), when measured in the locality of the nearest or most exposed noise sensitive development.

This criterion is significantly less onerous than the Reading Borough Council requirement, therefore compliance with the Reading Borough Council noise limit determined above should ensure compliance with BREEAM Pol05.

5.2 Control of Noise Emissions

At this stage in the design process it is considered that the plant design is sufficiently flexible to ensure that suitably quiet, non-tonal plant can be procured and where necessary mitigation options can be included (e.g. plant location, enclosures, screening) to ensure the noise limits are not exceeded.

The building services design is at an early stage, but noise mitigation measures that will be considered for the plant are as follows:

- Housing plant within the building, wherever possible
- Suitable location of plant to provide maximum distance and screening from nearby noise sensitive properties
- Use of acoustic louvres, screens and enclosures to attenuate noise emissions, where necessary
- Acoustically absorptive linings in plant areas, to attenuate reflections
- Suitable selection of plant, with night set-back modes
- Use of plant-specific anti-vibration mounts on plant and associated pipework

APPENDIX 1: ACOUSTIC TERMINOLOGY

Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing (20×10^{-6} Pascals).
Sound Pressure Level (L_p)	The sound pressure level is the sound pressure fluctuation caused by vibrating objects relative to the threshold of hearing.
A-weighting (L_A or dBA)	The sound level in dB with a filter applied to increase certain frequencies and decrease others to correspond with the average human response to sound.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T, which for schools is taken as 30 minutes. This is the sound level that is equivalent to the average energy of noise recorded over a 30 minute period.
L_{A1}	The noise level exceeded for 1% of the time.
L_{A90}	The noise level exceeded for 90% of the time, commonly referred to as the 'background noise level'.