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Noise Impact Report

Project Details

Client	Witherslack Group Limited
Client Address	Lupton Tower Lupton Carnforth LA6 2PR
Site Address	Proposed Educational Development The Old Rectory Rectory Lane Market Bosworth Nuneaton Leicestershire CV13 0LS
Survey Date	15/03/2023
Reference	20736

Quality Assurance

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Revision History

Version	Date	Editor	Notes
V1	24/03/2023	Matt Hine	First issue
V2	12/05/2023	Matt Hine	Revised site layout including relocated MUGA and additional play area, updated car park usage data & BB93 assessment
V3	30/06/2023	Martin Hamer	Report updates to include operational hours, staff & children's numbers and other minor changes as requested by Witherslack Group.



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1 Summary

- A noise assessment has been conducted for a proposed educational facility providing special needs schooling at The Old Rectory, Market Bosworth.
- The assessment is to be submitted as part of a planning application for the development site to Hinckley and Bosworth Borough Council.
- The assessment considers the impact on potentially noise sensitive neighbouring residential premises in comparison World Health Organisation (WHO) and Sport England guideline noise criteria and guidance.
- Assessment of noise levels at the development due to car park vehicle movements and external play areas activity at the proposed development are within WHO guideline values indicating no adverse impact on the amenity of the local community.
- Projected internal noise levels within the majority of rooms at the school are within BB93 criteria.
- Context in terms of design considerations, operational periods and other factors are considered.



2 Introduction

Witherslack Group Limited has instructed Spratt and Hamer Limited to undertake an environmental noise survey in order to assess the impact of a proposed educational development on nearby existing residential receptors together with internal noise levels within the development itself.

The proposal is change of use of 'The Old Rectory' from a single dwelling house (Class C3) to a Specialist Education Needs (SEN) School (Class F1); alongside the erection of two single storey external classrooms; a Multi-Use Gaming Area (MUGA); a revised parking layout; replacement boundary fencing; and external landscaping with associated works to trees.

This report is prepared solely for Witherslack Group Ltd. Spratt and Hamer Limited accepts no responsibility for its use by any third party.

This document has been prepared using the various documents listed within the appendices of this report, together with drawings, technical information and additional verbal representations made by third parties. We have not audited nor independently verified the content or accuracy of any of the documents and information provided to us in the preparation of this report.

If additional information comes to light subsequent to the production of this report, we reserve the right to revise our opinions and the conclusions reached within this report.

2.1 An Environmental Noise Assessment

Spratt and Hamer Limited has undertaken an environmental noise assessment at the above site with noise levels measured externally during the daytime operational hours of the proposed development. Monitoring equipment was set up in the early morning and measurements taken until the early afternoon to capture critical periods during the daytime including the morning peak hour.

This report will state the measured noise levels and will refer to guidance relevant to the nature of this survey whilst considering Local Planning Authority guidance.



3 Assumptions, Limitations & Uncertainty

- a. All suggested specifications require a good level of workmanship and for materials to be installed as the manufacture intends. Any poor workmanship may lead to weaknesses in the sound attenuation provided by the building elements.
- b. It is assumed that the sound pressure levels measured on site during the environmental noise survey are typical of the site.
- c. It is assumed that drawings and information supplied by Witherslack Group Ltd. are up to date and correct.



4 Planning Policies, Guidance and Criteria

The planning policies and criteria listed below are taken from associated relevant guidance documents, all of which should be considered for the internal and external noise and vibration levels.

4.1 National Planning Policy

The National Planning Policy Framework (NPPF) July 2021 set out the Government's planning policies for England and how they are expected to be applied. It provides a framework within which the Local Authorities are to prepare local plans and use their planning powers to minimise the adverse impact of noise. It should contain the following in relation to noise impacts.

174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

'preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.'

185. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

'mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life'.

The NPPF noise exposure hierarchy table is reproduced overleaf in Table 1.



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Perception	Examples of outcomes	Increasing effect level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Table 1: Noise exposure hierarchy based on likely average response

4.2 World Health Organisation

The World Health Organisation (WHO) Guidelines For Community Noise includes guideline criteria for noise in outdoor living areas, which may be considered relevant to considering the amenity of neighbouring external areas such as gardens and patios at this development site. The relevant section taken from Table 1 of the WHO guidelines is reproduced below in Table 2:

Specific Environment	Critical Health Effect(s)	L_{Aeq} (dB)	Time Base (hours)
Outdoor living area	Serious annoyance, daytime and evening	55	16
	Moderate annoyance, daytime and evening	50	16

Table 2: WHO Guideline values for community noise in specific environments



4.3 Sport England

Artificial Grass Pitch Acoustics - Planning Implications published in 2015 by Sport England provides guidance on the design, specification and construction of MUGAs.

The document references WHO guidance in terms of an internal noise limit of 35dB L_{Aeq} within noise sensitive premises during the day period based on external limits of 50dB L_{Aeq} at 1m from the façade of living spaces (assuming 15 dB sound reduction of a partially open window) from noise associated with artificial grass pitches.

It also states: "It is normally advisable to locate a MUGA (especially floodlit ones) at least 12m, and ideally at least 30m from other residences" and advises "landscaping and mounding can be used to reduce noise breakout".

4.4 Building Bulletin 93 Acoustic design of schools: Performance Criteria 2015

Building Bulletin 93 is intended to provide advice to all those involved in the specification, design and construction of school buildings.

Table 1 of the document (Shown below as Table 3 of this report) specifies upper limits for indoor ambient noise levels in terms of $L_{Aeq,30mins}$ during normal teaching hours.

Room Type	Room Classifications for the purpose of airborne sound insulation...		Upper Limit for the indoor ambient noise level $L_{Aeq,30minutes}$ dB	
	Activity noise (Source Room)	Noise Tolerance (Receiving Room)	New Build	Refurbishment
Nursery school rooms	Average	Medium	35	40
Primary school: classroom, class base, general teaching area, small group room				
Secondary school: classroom, general teaching area, seminar room, tutorial room, language laboratory				
Teaching space intended specifically for students with special hearing and communication needs	Average	Low	30	35
SEN calming room	High	Low	35	35
Administration and ancillary spaces:	High Low Average High Average	High Medium High High High	50 40 45 50 50	55 45 55 55 55
Kitchen				
Office, medical room, staff room				
Corridor, stairwell, coats and locker area				
Changing area				
Toilet				
Dining Room	High	High	45	50

Table 3: BB93 Upper Limits for internal ambient noise levels



4.5 Criteria Summary

World Health Organisation, Sport England and BB93 guideline criteria and advice are considered appropriate in assessing noise from and at the proposed development at the Old Rectory.



5 Site Description

The proposed development at The Old Rectory is an existing 1849 built Grade II listed residential dwelling set within extensive grounds located in Market Bosworth, south of Rectory Lane and approximately 1.6km east of the A447.

The development proposes to make use of a large dwelling-house and ancillary buildings to form a school for children with special needs, with the inclusion of additional classroom and therapy buildings.

A Multi-Use Games Area (MUGA) and playground are proposed within external grounds at locations designed to be largely shielded and at distance from neighbouring residential properties. It is also proposed to use the area at the front of the development as a car park and drop off area.

Operational Hours are proposed to be 08:00 and 17:00, Monday to Friday (38 weeks – primary school). Children teaching time will be between 08.30 and 15.00.

Staff Numbers are proposed to be approximately 40 full time equivalent staff (30 full time, 20 part time).

Children – Approx. 40 (5–11 years old).

The school will follow a typical schedule, open solely during weekdays and following typical term and holiday dates including closure during summer months.

5.1 Subjective Observations

During site attendance, subjectively the main source of noise was road traffic on Rectory Road and with occasional air traffic and distant farmwork noise audible throughout the day.

5.2 Weather

Description	Daytime Average
Temperature	3°C
Wind Speed	2.5m/s
Wind Direction	S
Precipitation	Dry
Any damp road/ wet ground	None
Any fog/snow/ice	Morning ground frost

Table 4: Weather Conditions (www.windy.com)



6 Noise Measurement Procedure

6.1 Personnel Present

Jack Holmes BSc (Hons) MIOA

6.2 Survey Equipment Used

Manufacturer	Model	Serial No.	Description
Rion	NL52	01032413	Integrating Sound Level Meter and Real Time Analyser
Rion	NL52	00976149	Integrating Sound Level Meter and Real Time Analyser
Pulsar	Model 105	86702	Acoustic Calibrator

Table 5: Survey Equipment Used

6.3 Calibration

The sound level meters were calibrated with the field calibrator to a level of 94.0 dB @ 1 kHz prior to and on completion of the survey. No significant drift in calibration was observed. The meters used during the survey are precision grade class 1.

Calibration certificates are available on request.

6.4 External Ambient Sound Measurements

The measurement locations chosen during the survey were deemed suitable for the determination of noise levels at nearby residential receptors.

The sound level meters were set to measure primarily L_{Aeq} values in 5-minute periods.

6.4.1 Monitoring Position 1

A microphone was placed 1.5m above the ground floor surface at the front of the site facing Rectory Road, level with neighbouring residential properties.

6.4.2 Monitoring Position 2

A microphone was placed 1.5m above the ground floor surface at the rear façade level with neighbouring residential properties.



6.4.3 Monitoring Positions



7 Results and Analysis

7.1 External Ambient Noise Measurement Results Analysis

Table 6 below presents summary highest recorded 30-minute average L_{Aeq} results Monitoring Positions 1 and 2:

Time Period	Monitoring Position 1 $L_{Aeq, 30\text{ min}}$ (dB)	Monitoring Position 2 $L_{Aeq, 30\text{ min}}$ (dB)
08:00 – 09:00	53.4	49.5
09:00 – 10:00	51.5	48.0
10:00 – 11:00	48.4	46.2
11:00 – 12:00	48.2	42.2
12:00 – 13:00	48.1	43.2
13:00 – 14:00	47.3	43.7
14:00 – 15:00	48.7	44.9
15:00 – 16:00	48.9	43.5
16:00 – 17:00	49.4	43.6
Complete Day: 08:00 – 17:00	48.8	49.5
Teaching Hours: 08:30 – 15:00	51.5	48.0

Table 6: Summary 1 hour Noise Survey Results

Table 6 demonstrates highest $L_{Aeq, 30\text{ min}}$ levels are c.2-4dB lower at Monitoring Position 2 compared with Monitoring Position 1, primarily due to further distance from Rectory Road traffic noise and natural acoustic shielding afforded by The Old Rectory building.



8 Noise Impact Assessment in accordance with World Health Organisation

As a part of the development, it is proposed to use land at the front of the development as a car park and drop off/ pick up area. It is also proposed to make use of a section of land at the rear of the development as a Multi-Use Games Area (MUGA).

Both vehicle movements within the proposed car park, and the proposed MUGA are assessed in order to determine the noise impact at the nearest receptors.

8.1 Noise Levels

8.1.1 Sound Pressure Level of Vehicle Movements Within Car Park

Spratt and Hamer Ltd. has measurement data of car park vehicle movements at an unrelated site. This historical data is used in the assessment of car park noise at the Old Rectory development site.

An average sound pressure level of 55.6dB $L_{Aeq, 2.5 min}$ based on this data measured at 3m for one vehicle is used to provide sound power level data for use in noise model calculations and assessment.

8.1.2 Sound Pressure Level of Proposed Multi-Use Games Area

As the development is currently in planning stage, it was not possible to measure the MUGA on site; however, Spratt and Hamer Ltd. has previously measured sound pressure levels at football training sessions which are considered representative of MUGA noise. The historical session being used for this assessment is the worst case of multiple measured sessions and includes the use of shouts and whistles. The football training session used in the assessment of this area is also considered representative of children playing, for example during break times. Figure 1 below shows measurement results for the football training session data:

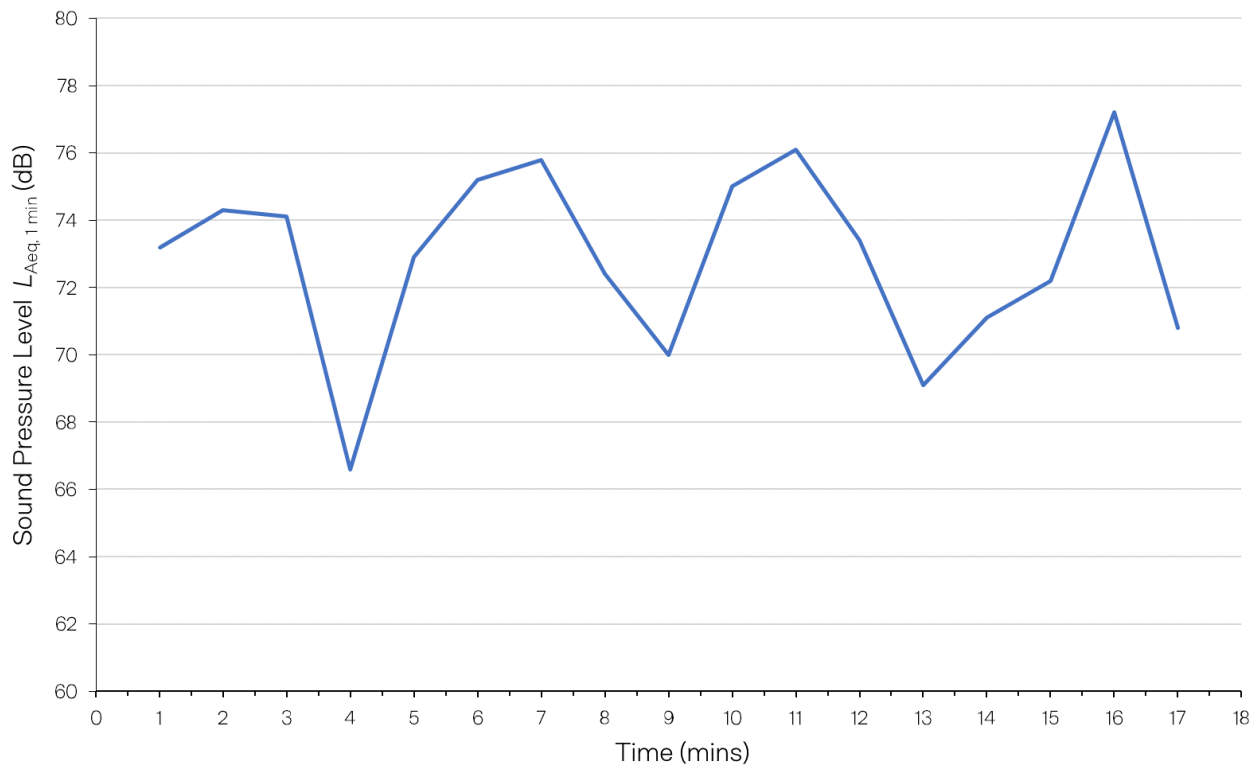


Figure 1: Measured football training session $L_{Aeq, t}$ sound pressure level time history



An average sound pressure level of 73.6dB $L_{Aeq,T}$ based on the football training data measured at 4m is used to provide sound power level data for use in noise model calculations and assessment.

In addition to the noise of students playing, the noise of a ball hitting the MUGA chain link fence will also generate noise impact. Spratt and Hamer Ltd. has undertaken measurements of such a situation. Figure 2 below shows measurement results for a ball hitting a MUGA chain link fence cage for use in this assessment:

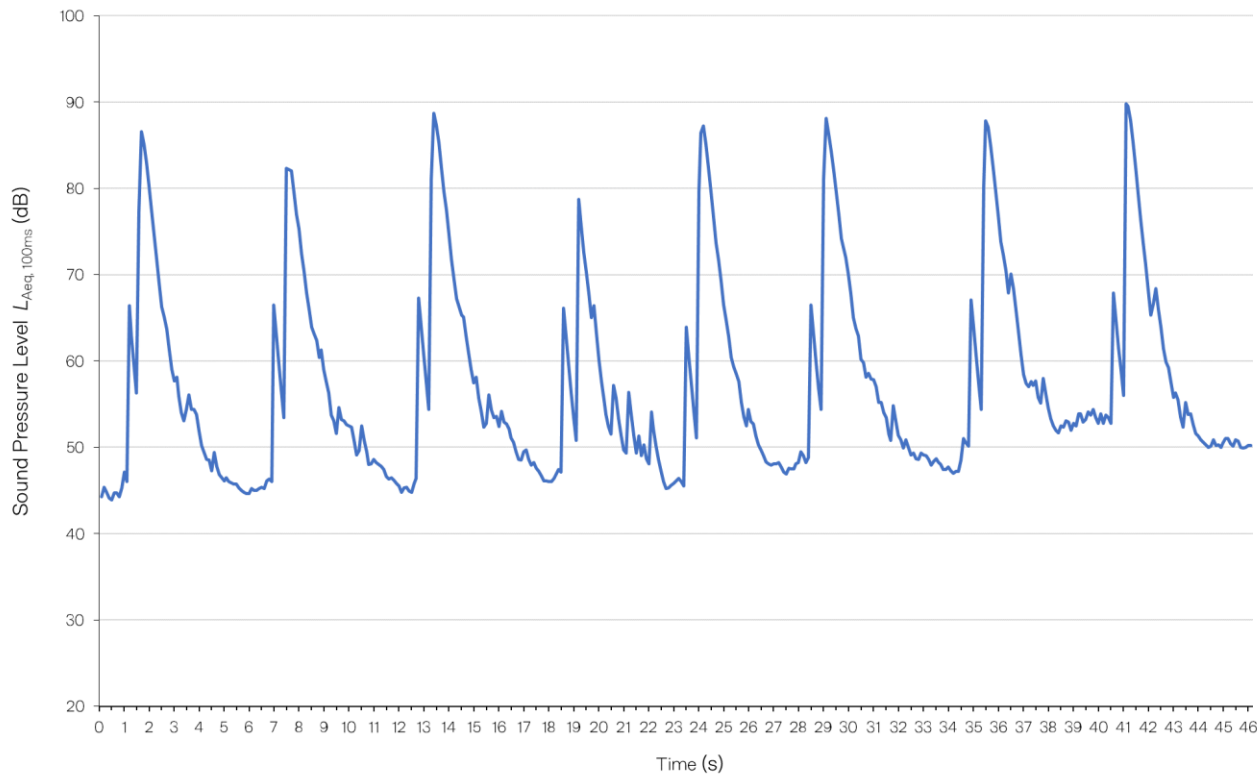


Figure 2: Measured ball hitting MUGA cage $L_{Aeq,t}$ sound pressure level time history

An average sound pressure level of 71.4dB $L_{Aeq,T}$ based on data measured at 3m is used to provide sound power level data for use in noise model calculations and assessment.

8.1.3 Summary of Proposed Noise Sources

The noise source data are calibrated into sound power levels (SWL) for use in CadnaA noise models of the proposed development site to assess the noise impact at the nearest noise sensitive receptors.

It is assumed the proposed car park will be in use for a full hour, MUGA sound power data is based on 30 minutes of a football game including 15 minutes of a ball hitting the chain link fence. Table 7 below summarises the noise sources sound power levels used in the CadnaA model and assessment:

Noise Source	Sound Power Level $L_{Aeq,1\text{ hour}}$ (dB)
Car Park Vehicle Movement	77.0
MUGA 30 min football game, incl. 15 min ball hitting fence	93.4

Table 7: Summary Noise Source Data used in model calculations and assessment



8.2 CadnaA 3D Noise Model of Proposed Development

8.2.1 Site Layout

Based on site layout details provided by Witherslack Group Ltd., the proposed development site has been created in CadnaA noise on top of an exported Open Street Map of the area and architect's site plan as shown below in Figure 3:

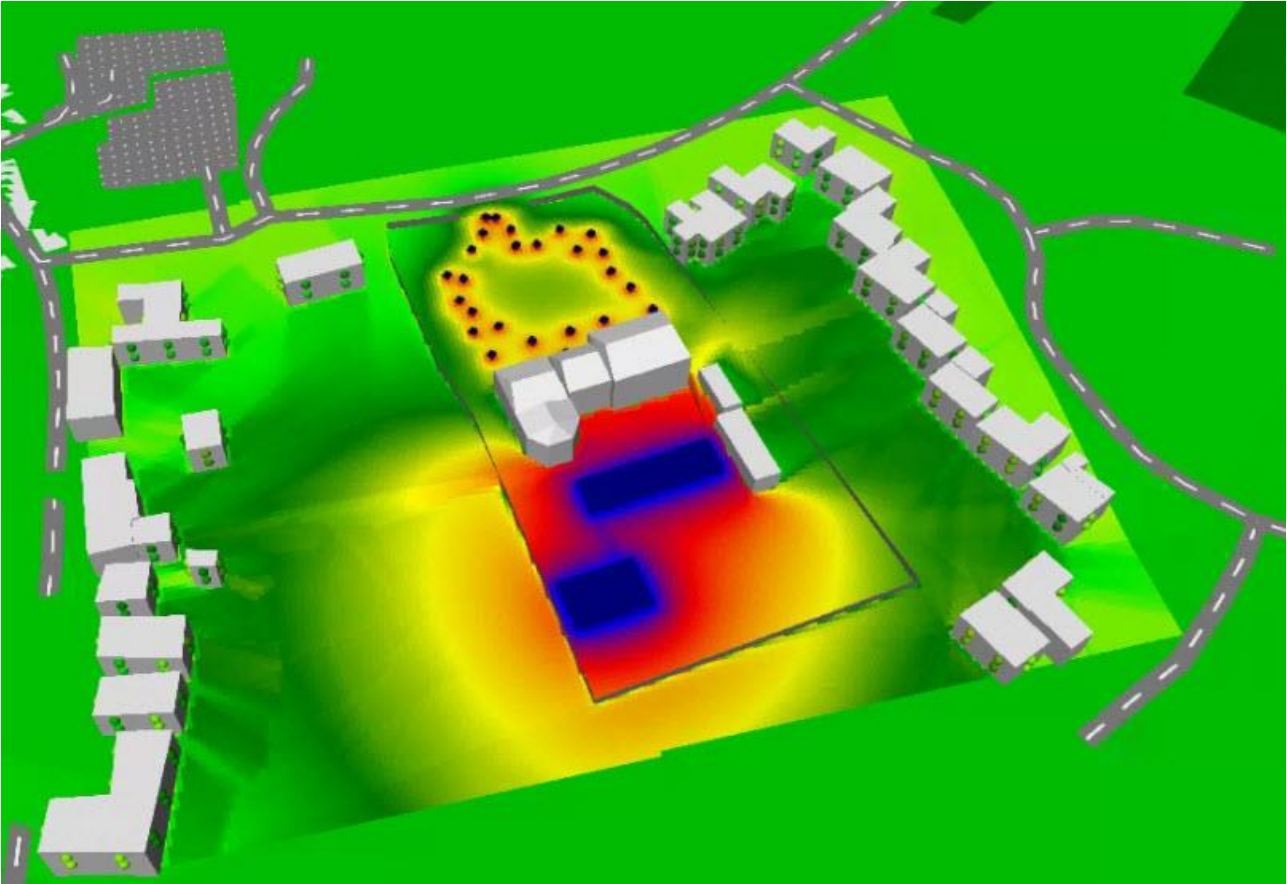


Figure 3: CadnaA Proposed Site Layout

8.2.2 Estimated Sound Levels at Nearest Receptors from Proposed Development

Noise impact from the proposed development has been modelled in CadnaA noise modelling software. Noise from the proposed MUGA / playground is modelled separately to noise from vehicle movements in the car park as it is likely that the play areas will be in use during daytime school hours whilst vehicle movements will mostly occur at the start and close of the school day.



8.2.3 Noise Impact Resulting from Proposed Vehicle Movements

Figure 4 below provides a noise impact map of vehicle movements in the proposed car park, modelled in CadnaA as 40 point sources at the location outlined on the architect's drawings.

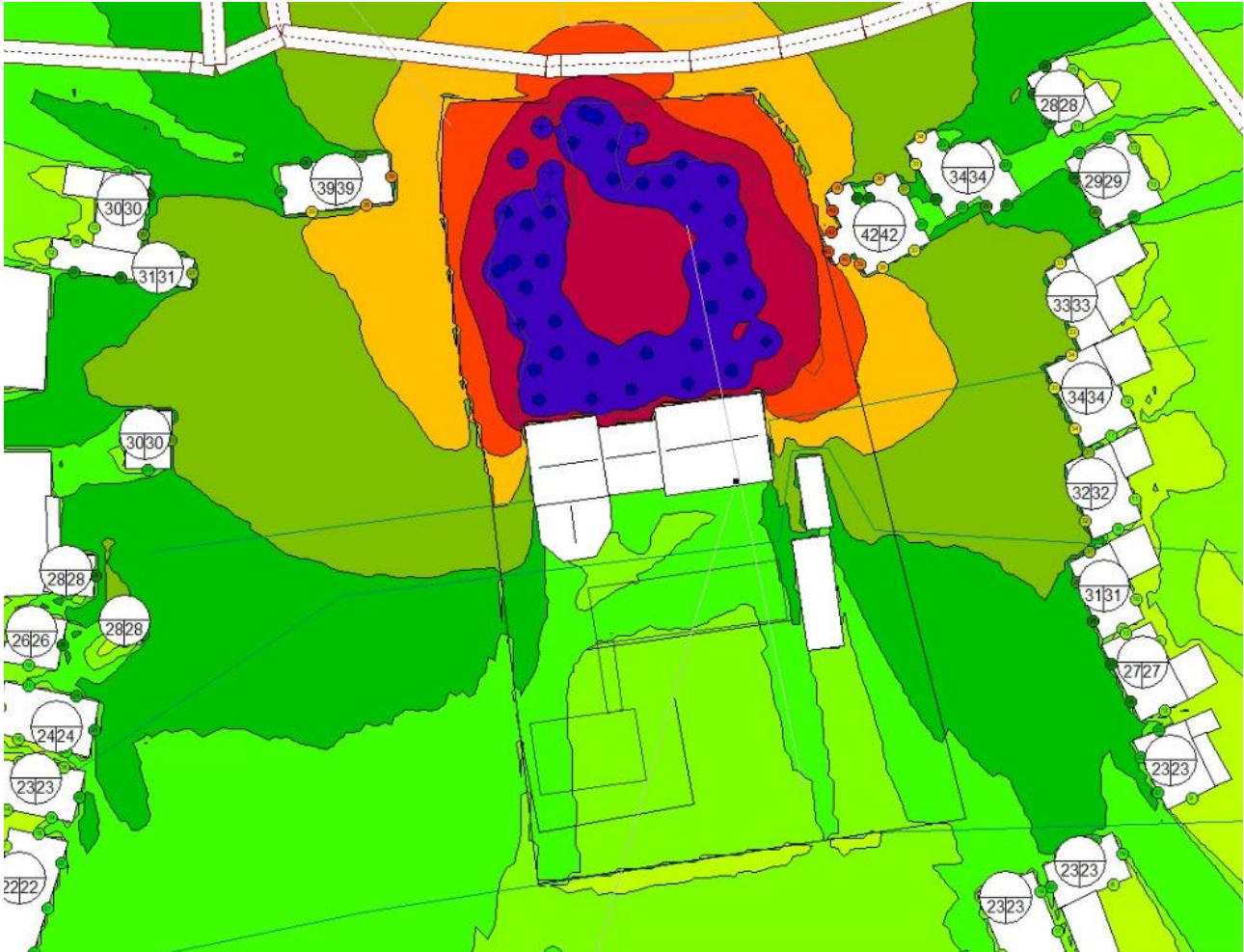


Figure 4: Car Park Noise Impact Map

Figure 4 shows the resultant noise impact from vehicle movements in the proposed car park to be between 39dBA and 42dBA at nearest noise sensitive locations.



8.2.4 Noise Impact Resulting from Proposed Play Areas

Figure 5 below provides a noise impact map of the proposed play areas, input into the CadnaA noise model as hard surface area sources at the location outlined on the architect's drawings.

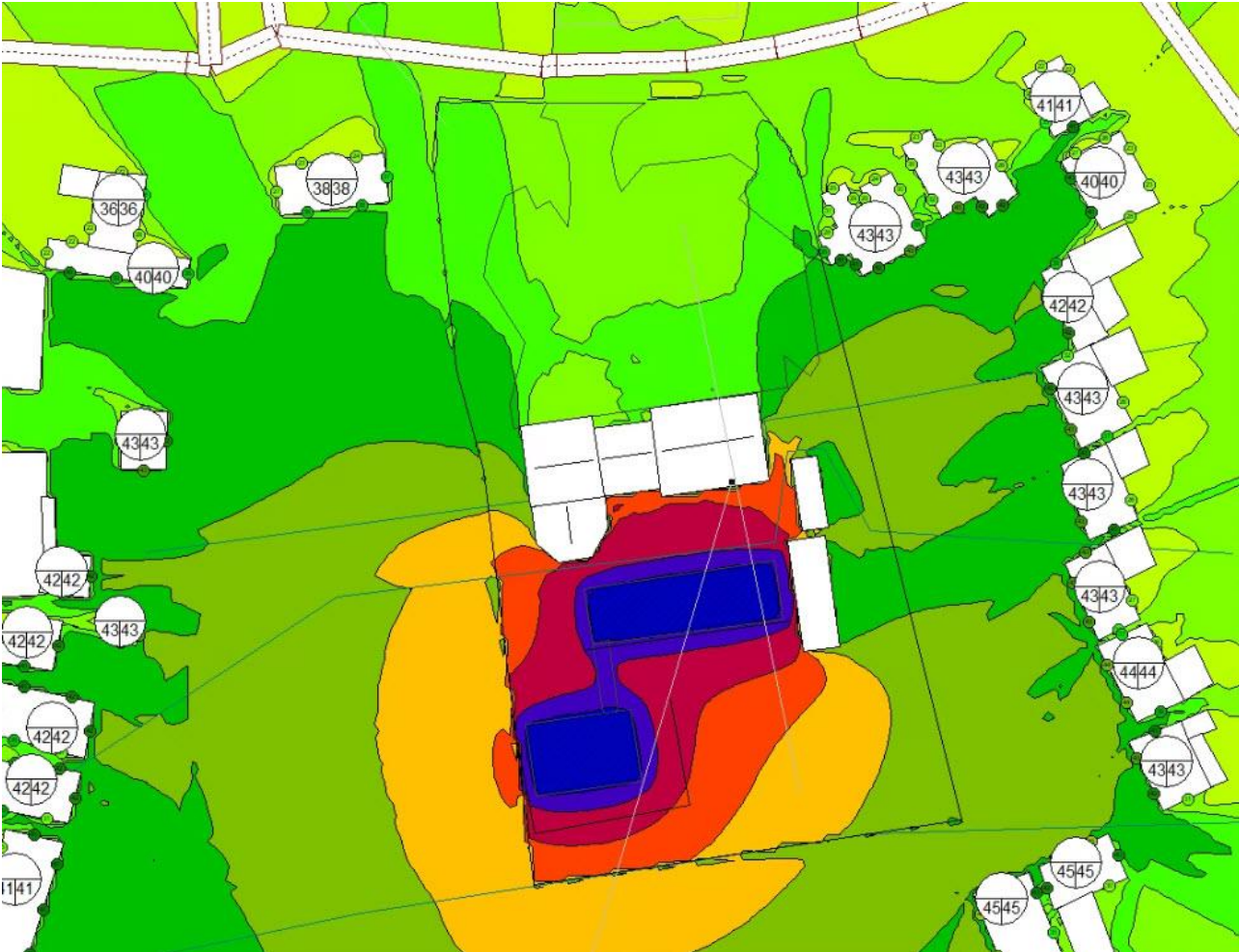


Figure 5: Play Areas Noise Impact Map

Figure 5 shows that the resultant noise impact from the MUGA/playground to be between 43dBA and 45dBA at the nearest noise sensitive locations. Distance from the MUGA/playground to the nearest noise sensitive location is c.42m.



8.3 Numerical Assessment

8.3.1 Assessment of Proposed Vehicle Movements

Table 8 below presents the cumulative noise level attributable to both the modelled vehicle movements within the proposed car park and the existing measured noise level compared with WHO guideline noise criterion for moderate annoyance in outdoor living areas at the nearest and potentially most affected noise sensitive receptor.

Description	Sound Pressure Level (dB)
Car Park Noise Level $L_{Aeq,T}$ at nearest noise sensitive location	42.0
Existing Noise Level $L_{Aeq,T}$ at nearest noise sensitive location	49.0
Cumulative Noise Level $L_{Aeq,T}$ at nearest noise sensitive location	49.8
WHO Guideline Noise Level $L_{Aeq,T}$ at nearest noise sensitive location	50.0
Difference: WHO Guideline Noise Level – Cumulative Noise Level	-0.2

Table 8: Car Park Noise Impact Assessment

Table 8 indicates the noise impact of vehicle movements in the proposed car park at the development to be within the World Health Organisation guideline noise criterion for moderate annoyance in outdoor living areas at the nearest noise sensitive receptor.

8.3.2 Assessment of Proposed MUGA/Playground

Table 9 below presents the cumulative noise level attributable to both the modelled MUGA/playground and the existing measured noise level compared with WHO guideline noise criterion for moderate annoyance in outdoor living areas at the nearest and potentially most affected noise sensitive receptor.

Description	Sound Pressure Level (dB)
MUGA/Playground Noise Level $L_{Aeq,T}$ at nearest noise sensitive location	45.0
Existing Noise Level $L_{Aeq,T}$ at nearest noise sensitive location	44.8
Cumulative Noise Level $L_{Aeq,T}$ at nearest noise sensitive location	47.9
WHO Guideline Noise Level $L_{Aeq,T}$ at nearest noise sensitive location	50.0
Difference: WHO Guideline Noise Level – Cumulative Noise Level	-2.1

Table 9: MUGA Noise Rating Level Impact

Table 9 indicates the noise impact of the proposed play areas to be within the World Health Organisation guideline noise criterion for moderate annoyance in outdoor living areas at the nearest noise sensitive receptor.



9 Internal Ambient Noise Level Assessment in Accordance with BB93

Internal ambient noise levels at the proposed development have been calculated using the Building Research Establishment (BRE) Building Element Evaluation tool based on external noise levels measured during site attendance. Calculations assume each room achieves the upper limit for the target reverberation time detailed in BB93. Table 10 below compares estimated internal ambient noise levels with BB93 criteria based on a natural ventilation strategy with scenarios where windows are closed and when open:

Room	Measured External $L_{Aeq, 30minute}$ (dB)	BB93 Criteria $L_{Aeq, 30minute}$ (dB)	Estimated Internal Natural Ventilation $L_{Aeq, 30minute}$ (dB)	Natural Ventilation Within BB93 Criteria (Yes/No) ?	Estimated Internal Open Window $L_{Aeq, 30minute}$ (dB)	Open Window Within BB93 Criteria (Yes/No) ?
Existing Building						
GF Classroom 1	48.0	35.0	21.6	Yes	33.0	Yes
GF Classroom 2	48.0	35.0	19.6	Yes	33.0	Yes
GF Staff Room	48.0	45.0	21.2	Yes	33.0	Yes
GF Office	48.0	45.0	22.8	Yes	33.0	Yes
GF Toilet	48.0	50.0	21.1	Yes	33.0	Yes
GF Kitchen	51.5	55.0	39.7	Yes	36.5	Yes
GF Dining Hall	51.5	55.0	22.3	Yes	36.5	Yes
GF Office	51.5	45.0	27.6	Yes	36.5	Yes
GF Meeting Room	51.5	45.0	25.0	Yes	36.5	Yes
1F Classroom 3	48.0	35.0	25.9	Yes	33.0	Yes
1F Classroom 5	48.0	35.0	24.6	Yes	33.0	Yes
1F Pastoral Office	48.0	45.0	25.5	Yes	33.0	Yes
1F Therapy Room	48.0	35.0	22.1	Yes	33.0	Yes
1F Office/Immersive Room	51.5	40.0	28.8	Yes	36.5	Yes
1F Classroom 6	51.5	35.0	28.4	Yes	36.5	No
1F Office	51.5	45.0	31.1	Yes	36.5	Yes
1F Classroom 4	51.5	35.0	28.4	Yes	36.5	No
New Therapy/Office Building						
GF Office	51.5	45.0	31.7	Yes	36.5	Yes
GF Therapy Room	48.0	35.0	26.6	Yes	33.0	Yes
New Classrooms/Therapy Building						
GF Classroom	48.0	35.0	25.9	Yes	33.0	Yes
GF Therapy Room	48.0	35.0	26.7	Yes	33.0	Yes

Table 10: Estimated Internal Ambient Noise Levels

It may be seen from Table 10 above that estimated internal noise levels are comfortably within BB93 criteria for all naturally ventilated rooms with closed windows and all except two rooms with windows partially open.



10 Recommendations

Predicted noise levels attributable to the development are comfortably below World Health Organisation (WHO) Guidance values for both serious and moderate annoyance within outdoor living areas during the day/evening period as reproduced in Table 3, Section 4.3; therefore no further recommendations are required.

The noise break-in assessment has demonstrated that all rooms of the development are expected to meet the BB93 requirements for internal ambient noise levels with the exception of two classrooms during periods when windows are required to be opened.

Due to the building's Grade II listed status, it is currently unclear as to the scope of alterations permissible to the building fabric, of which the glazing and ventilation strategy are important considerations from an acoustic perspective, representing the dominant paths for external noise to enter rooms.

It is recommended that further discussion may be required as to whether the current glazing and/or ventilation strategy needs further assessment.

It should also be noted that if mechanical ventilation is considered to be installed, upper limits set out in BB93 must be adhered to by cumulative noise resulting from external ambient break-in and mechanical plant operation.

10.1 Calculation Methodology

The BRE Building Envelope Insulation calculator has been used for the noise break in calculations for the BB93 assessment which is based on the rigorous calculation method of BS 8233:2014 and BS EN 12354-3.

The calculations are based on the existing glazing observed during site attendance, assumed to be 4mm single glazed windows, predominantly in timber sash windows.

All room dimensions used in calculations are based on drawings provided by the architect.

Calculations are based on the solid brick external wall observed during site attendance.

The calculations assume each room meets target reverberation times outlined in BB93.

Rooms used as classrooms have been assessed using the $L_{Aeq,30minutes}$ 35dB criterion applicable to teaching spaces intended specifically for students with hearing and communication needs in refurbishments (Section 4.4, Table 3)

Predictions have been calculated assuming all windows are naturally ventilated with either closed windows including one standard non-acoustic performance trickle vent (or equivalent system) per room or partially open windows with a typical sound reduction of 15dBA R_w in accordance with BS 8233, Table 10.



11 Context

In keeping with good practice, design of the development has included repositioning of external play areas away from their original location closer to residential properties on Cedar Drive in order that they are largely shielded and at a further distance from nearest sensitive receptors with resultant lower noise impact.

The distance between the closest section of both the MUGA and the playground and nearest noise sensitive locations is c.42m which is above both the minimum and ideal design advice distances of 12m and 30m respectively provided in Sport England *Artificial Grass Pitch Acoustics*.

In assessing noise impact from the development, consideration may also be given to the limited periods of time that external noise generating activities within play areas are likely to occur. Physical Education classes in the MUGA and playground break times will take place over short durations solely between 09:00 and 15:30 on weekdays and during terms times only.

Internal noise predictions to rooms within the proposed development are assessed to be within BB93 criteria with the exception of two classrooms during periods when windows are required to be opened.

The classrooms (Classrooms 6 and 4) are both located at first floor level of the main building on the north and north-east façades, potentially exposed to higher noise levels due to closer proximity to the dominant noise source of road traffic on Rectory Lane and as recorded during the noise survey.

Noise survey results indicate that at times when windows are required to be open, levels in these rooms may exceed BB93 criteria by $L_{Aeq, 30minutes}$ 1.5 dBA.

It is noted that the BB93 criteria is only exceeded in the highest recorded $L_{Aeq, 30minutes}$ period from Monitoring Position 1 which occurred during 09:00 and 10:00. The external level at this time is 51.5 dBA, compared with levels of between 47.3 – 48.9 $L_{Aeq, 30minutes}$ at all other times during teaching hours which projects internal levels to be within BB93 criteria.

Classroom calculations have been assessed on a worst case scenario basis by using the more onerous $L_{Aeq, 30minutes}$ 35dB criterion applicable to teaching spaces intended specifically for students with hearing and communication needs in refurbishments as opposed to the less demanding $L_{Aeq, 30minutes}$ 40dB criterion applicable to nursery/primary/secondary classrooms in refurbishments (Section 4.4, Table 3).

Potentially also of note is that the more typical relaxation of BB93 internal noise criteria that permits an additional +5dBA for natural ventilation has not been applied in the assessment at this development of classrooms intended specifically for students with special hearing and communication needs in accordance with footnote 5 of BB93 Table 2.



12 References

National Planning Policy Framework (NPPF)

World Health Organisation Guidelines for Community Noise

Building Bulletin 93 Acoustic Design Of Schools: Performance Standards February 2015 (BB93)

Sports England Design Guidance Note: Artificial Grass Pitch (AGP) Acoustics – Planning Implications 2015

BS 7445-1:2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures

CadnaA noise mapping software by DataKustik

www.openstreetmap.org

www.windy.com

12.1 Drawing References

23.009(2-) 006.B

23.009(2-) 008.B

23.009(2-) 009

23.009(9-) 001.C



Appendix



Monitoring Position 1

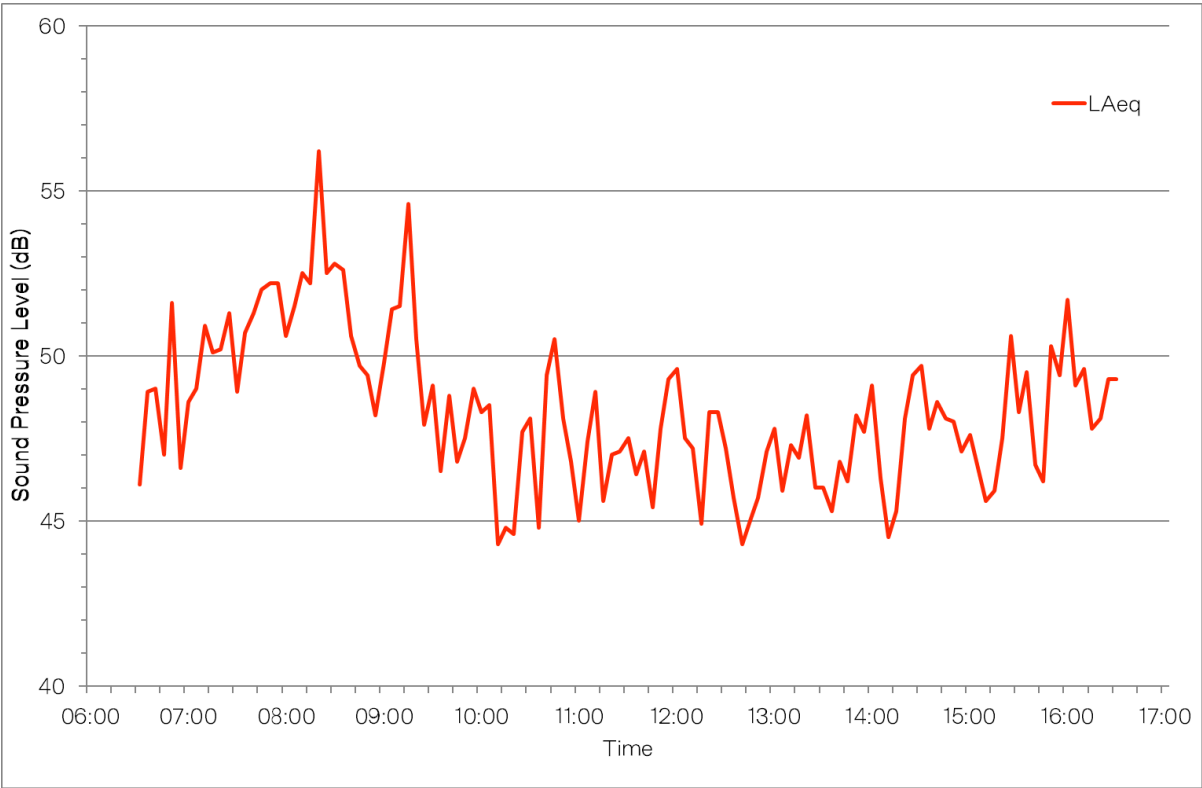


Monitoring Position 2

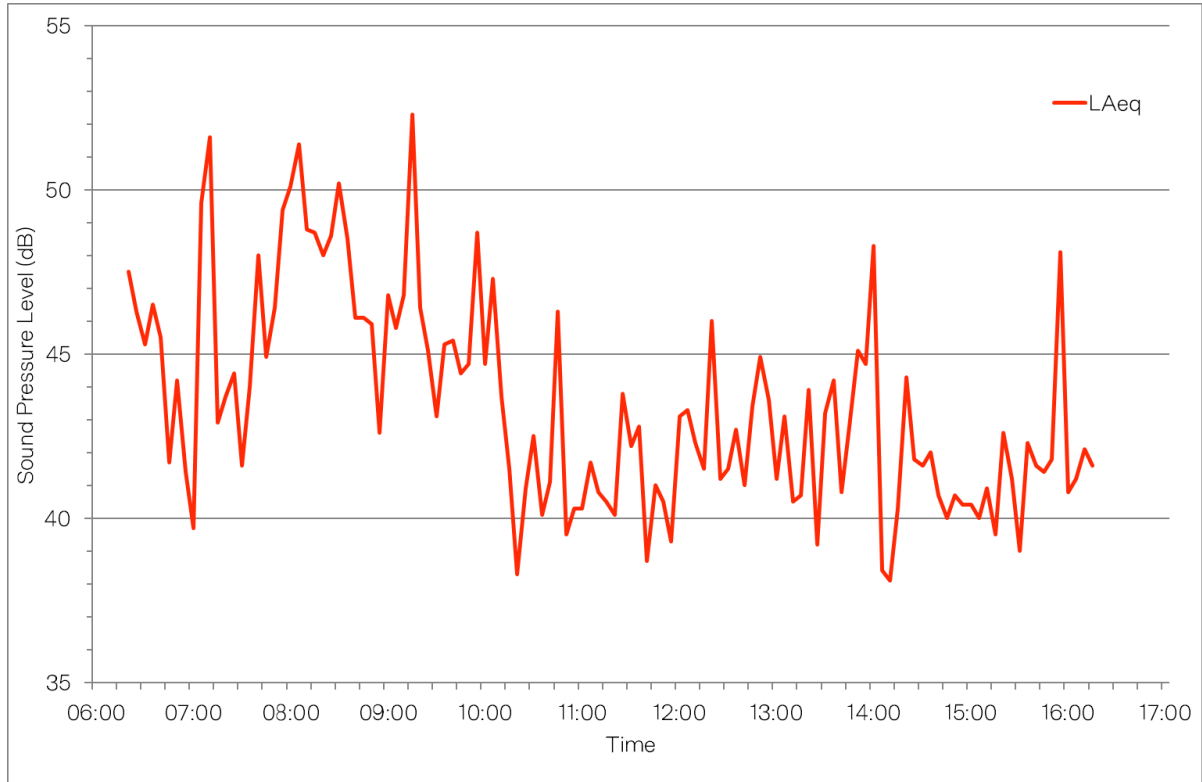


Measurement Results

Monitoring Position 1



Monitoring Position 2



Glossary Of Acoustic Terminology

A-weighting

Noise levels are corrected to represent human response to sound.

L_{Aeq}

This is a continuous equivalent of time varying noise, or effectively the average measured (A weighted) noise level over a defined period of time.

$L_{Aeq,16hour}$

A 16 hour long measurement of the L_{Aeq} over the period between 07:00 and 23:00, also known as a daytime measurement.

$L_{Aeq,8hour}$

An 8 hour long measurement of the L_{Aeq} over the period between 23:00 and 07:00, also known as a night time measurement.

L_{AFmax}

The highest, or maximum A-weighted sound pressure level measured over a specified time period. The 'F' defines a time weighting in Fast.

L_{A90}

The A-weighted noise level or average level which is exceeded for 90 percent of the measured time period. Also known as a background level.

L_{A10}

The A-weighted noise level or average level which is exceeded for 10 percent of the measured time period.

1:1 & 1:3 octave spectrum analysis

A single measurement that is separated into frequency bands to allow for a more detailed analysis of the noise source in question.

R_w

The weighted sound reduction index of a partition or facade. A single number value based on the performance of a partition between two rooms across the frequency range 100Hz to 3150Hz. The level is adjusted for the effects of reverberation and background noise.



$D_{n,e,w}$

The weighted level difference of a partition or façade which takes into account a small element such as a grill or vent.

SEL (sound exposure level)

A measure of A-weighted sound energy used to describe a particular event, such as a train pass. It is the sound energy, which, if occurring over one second would contain the same energy as the event.

Free field sound pressure

Is where the radiation or spread of sound is completely unaffected by the presence of any reflecting surfaces or boundaries.

Low Frequency Noise

A term generally used for sound below a frequency of 100 to 150Hz.





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