24Acoustics
Pepper Mill Barn
Old Salisbury Lane
Romsey
SO51 0GD

T: 01794 515999

PROPOSED MULTI-USE GAMES AREA
POLEGATE PRIMARY SCHOOL, EAST SUSSEX

NOISE IMPACT ASSESSMENT

Technical Report: R6386-1 Rev 1

Date: 21st June 2016

For: ERMC
Broadmarsh Business Centre
Hants Farm Way
Havant
Hampshire
PO9 1HS

24 Acoustics Document Control Sheet

Project Title: Proposed MUGA, Polegate Primary School, East Sussex – Noise Impact Assessment

Report Ref: R6386-1 Rev 1

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	Name	Position	Signature	Date
Prepared by	Kiel Edwards BSc AMIOA Chris McConnell BSc MSc MIOA	Technician Senior Consultant		
Approved by	Stephen Gosling BEng MIOA	Principal Consultant		
For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

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0	Approved For Issue	Kiel Edwards	Stephen Gosling
1	Amendments following comments from ERMC	Chris McConnell	Stephen Gosling

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1.0 INTRODUCTION

1.1 A planning application has been submitted to construct a new Multi-Use Games Area on land at Polegate Primary School, East Sussex.

1.2 The Local Planning Authority, East Sussex County Council, has requested a noise impact assessment to determine the potential impact of the MUGA on existing local residents, with particular regard to community use outside of school hours.

1.3 Accordingly, 24 Acoustics Ltd has been instructed to provide an assessment of the likely noise impact based on the proposed layout and future use.

1.4 An explanation of acoustical terms used in this report is provided in Appendix A. All sound pressure levels in this report are given in dB re: 20µPa.

2.0 SITE DESCRIPTION

2.1 The land of the proposed development currently forms Polegate Primary School's playing field that is used during school hours throughout the year. The proposed Multi-Use Games Area (MUGA) will be located to the north of the existing school building within the school playing field.

2.2 The MUGA will allow public use with the following proposed hours of operation.

Term Time:

- Weekdays: 09:00 - 18:00 for priority curriculum use and after-school clubs;
- Weekdays: 18:00 - 21:00 for public use during term time;
- Saturdays: 09:00 – 18:00 for public use;
- Sundays: 09:00 – 18:00 for public use.

Outside Term Use:

- Weekdays: 09:00 - 18:00 for public use;
- Saturdays: 09:00 – 18:00 for public use;
- Sundays: 09:00 – 18:00 for public use.

2.3 The timing of evening use will depend on seasonal light levels as there will be no flood lighting.

2.4 The nearest properties to the site are those on Oakleaf Drive, which face the playing fields and are approximately 35 metres from the centre of the proposed MUGA.

2.5 The proposed site layout is shown in Figure 1.

3.0 CRITERIA

NPPF Planning and Noise

3.1 The National Planning Policy Framework (NPPF) [Reference 1] was published by the Department for Communities and Local Government in March 2012. For noise the NPPF policy states that planning policies and decisions should aim to:

3.2 Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;

3.3 Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions, while recognising that many developments will create some noise.

3.4 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life;

3.5 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

> *"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."*

3.6 There is no applicable standard for the assessment of noise from sports pitches. Generic guidance on planning matters related to sport and recreational facilities is given in PPG 17, Sport and Recreation [Reference 3], though specific guidance on noise is not given.

3.7 For noise from recreational and sporting activities, the local planning authority must take account of how frequently the noise will be generated, the level of disturbance and balance the enjoyment of the participants against the risk of causing nuisance to other people. It is also considered that, depending upon local circumstances, it may be reasonable to permit higher noise levels than (for example) from industrial developments, if there are limited hours of use and control of noise emission during anti-social hours.

Guidance for Impulsive Sources

3.8 Clay Target Shooting: Guidance on the Control of Noise", published by the Chartered Institute of Environmental Health, [Reference 4], provides a methodology for the measurement and assessment of noise from clay target shooting This methodology is considered an appropriate guide for assessing noise from the proposed development because shooting noise is impulsive in nature and therefore comparable with noise produced by balls rebounding or hitting the boundary fence. It is, however, deemed inappropriate to use this methodology for other types of noise associated with the use of the pitch such as talking or shouting. 24 Acoustics can confirm that in the absence of other published guidance, this standard has been used to assess a wide range of impulsive recreational sources other than shooting noise.

3.9 The guidance suggests that there is no fixed shooting noise level (SNL) at which annoyance starts to occur, however, annoyance is less likely to occur at a mean SNL below 55 dBA, and highly likely to occur at a mean SNL above 65 dBA. It is recognised that the likelihood of annoyance at levels within this range will depend upon local circumstances.

British Standard 8233: 2014

3.10 It is important to consider internal noise conditions and therefore appropriate to refer to British Standard 8233: Guidance on sound insulation and noise reduction for buildings, 2014 [Reference 5].

3.11 BS 8233 provides internal design sound levels for desirable conditions inside habitable rooms due to external noise sources. Table 1 shows a summary of the maximum levels recommended in BS 8233 for habitable rooms.

Criterion	Typical Situation	Design Noise Levels	
		07:00 to 23:00 Hours (dB $L_{Aeq, 16\ hour}$)	23:00 to 07:00 Hours (dB $L_{Aeq, 8\ hour}$)
Resting	Living room	35	-
Dining	Dining room	40	-
Sleeping (daytime resting)	Bedroom	35	30

Table 1 - Indoor Ambient Noise Levels BS 8233: 2014

3.12 It should be noted that the noise levels specified are for anonymous sources, such as road traffic or continuously running plant for which occupants may tolerate higher noise levels. Noise levels and appropriate time assessment periods are not given for other types of noise. Indeed, BS 8233 is not directly applicable for the assessment of noise from recreational activities but will be used to provide an outline indication of possible complaints.

3.13 Given the nature of recreational noise, an upper value of 30 dB $L_{Aeq,1hr}$ within habitable rooms during the daytime is considered appropriate, i.e. 5 dB better than the BS 8233: 2014 standard.

BS 4142

3.14 British Standard 4142 'Methods for Rating Industrial and Commercial Sound', 2014 [Reference 6] provides a method for rating the effects of industrial and commercial sound on residential areas.

3.15 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.

3.16 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact, also depending on the context. Where the rating level does not exceed the background noise (sound) level, this is an indication of the specific sound source having a low impact (depending upon the context).

3.17 It is relevant to note that BS 4142 is not directly applicable for the assessment of noise from recreational activities but will be used to provide an outline indication of possible complaints.

Local Authority Guidance

3.18 The Sussex Planning Noise Advice Document [Reference 7] states the following in relation to noise from outdoor sports and recreation, such as MUGAs:

> *" In some circumstances, the noise levels generated from these types of activities are likely to be higher than would normally be accepted for other development consents, such as industrial processes, because of the characteristics of the noise generated, the controls that are possible, and the pattern of use."*
>
> *"Currently, there are no Codes of Practice for controlling noise from MUGAs. Planning applications for such facilities can give rise to a range of amenity concerns, especially noise, particularly where they are proposed in residential neighbourhoods. Noise impacts from MUGAs can vary depending on a number of factors including the location, design, and size of the facility and the level of use. Consequently, early guidance should be sought from the LPA."*

Summary

3.19 Based upon the review of standards described above, noise from the proposed MUGA has been assessed in accordance with the following methodologies:

- Guidance for impulsive noise sources using the clay target shooting SNL;
- BS 8233: 2014 for internal noise levels, on the basis of an upper level of 30 dB L_{Aeq} for internal noise levels in habitable rooms;
- BS 4142: 2014 for external levels relative to the background noise level at the most critical time.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS

Ambient Noise Levels

4.1 Ambient noise monitoring has been undertaken to assess prevailing noise levels in the vicinity of residential properties on Oakleaf Drive and the surrounding area. Measurements were obtained between the 9th and 14th June 2016. The instrumentation was located in the free-field location shown in Figure 1, at a height of 2m.

4.2 Environmental noise levels were measured using the following instrumentation:

Rion sound level meter	Type NL 31;
Brüel and Kjær acoustic calibrator	Type 4231.

4.3 The meter was equipped with an environmental microphone and an extension cable. The instrument was powered by external batteries and stored in a weatherproof case. The calibration of the instrumentation was checked before and after the tests and no signal variation occurred. Calibration of 24 Acoustics' equipment is traceable to National Standards.

4.4 The instrumentation was configured to continuously measure and store overall A-weighted statistical parameters such as L_{Aeq} and L_{A90} (all measured on fast response) in 5 minute intervals. Measurements were made with reference to BS 7445: 1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use [Reference 8].

4.5 The weather during the site visits was dry and the wind speed typically below 5 m/s.

Results

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

4.7 Tables 2 and 3 summarise the typical ambient and background noise levels measured during the proposed operational hours of the MUGA.

Date	Typical Ambient Noise, dB $L_{Aeq, 1\ hr}$	
	Daytime hours (09:00 – 18:00)	**Evening Hours (18:00 – 21:00)**
Thursday 9th	-	50
Friday 10th	51	51
Saturday 11th	48	N/A
Sunday 12th	48	N/A
Monday 13th	51	47
Tuesday 14th	-	-

Table 2 - Summary of Ambient Noise Measurements - Results

Date	Typical Background Noise, dB $L_{A90, 1\ hr}$	
	Daytime Hours (09:00 – 18:00)	**Evening Hours (18:00 – 21:00)**
Thursday 9th	-	43
Friday 10th	43	41
Saturday 11th	40	N/A
Sunday 12th	40	N/A
Monday 13th	41	39
Tuesday 14th	-	-

Table 3 - Summary of Background Noise Measurements – Results

4.8 The principal noise source at the measurement locations was distant road traffic. Daytime measurements on weekdays were also affected by noise from school activity, which forms part of the existing ambient and background noise levels.

4.9 A background noise level of 41 dB $L_{A90,\ 1\ hour}$ has been selected as representative of the proposed public hours of use (i.e. Evenings and weekends).

5.0 NOISE IMPACT ASSESSMENT

5.1 The proposed MUGA will comprise an all-weather surface, 37m in length and 18.5m in width enclosed by a three metre high wire fence.

5.2 Due to the existing use of the playing fields by the school, it is considered that noise levels associated with the proposed MUGA are unlikely to cause unreasonable disturbance to residents at the nearest residential properties during school hours. Hence the following sections focus on the potential noise impact from public use during evenings and weekends.

5.3 The proposed operational times of the proposed MUGA indicate that the night time levels at the nearest residential properties will not be affected. Due to this only the sensitive daytime and evening periods when the proposed MUGA will be in operation have been assessed.

Impulsive Noise Levels

5.4 The data used to determine the peak noise levels used for the calculations is football activity taken from 24 Acoustics' in-house database. The source noise measurements were made at a synthetic turf pitch in Winchester and while source noise levels were influenced by adults shouting, it includes ball impact events.

5.5 The mean Shooting Noise Level (SNL) would normally be determined from the logarithmic average of the 25 highest noise levels measured over a 30 minute period from the instantaneous A-weighted, and fast time weighted sound pressure level. In the absence of this specific data, it is considered that the following typical maximum fast-weighted values measured, from library data, will be approximately equal to the SNL.

Winchester Football Pitch: 75 dB $L_{Amax,f}$ at 25m (from the centre of the pitch and without acoustic screening).

5.6 The noise level from impulsive ball events has been calculated to the nearest residential location (free-field location at a height of 1.5m) and is shown in Table 4.

Receptor	Predicted SNL
Nearest property on Oakleaf Drive (approximately 35 metres from the centre of the MUGA)	72 dBA

Table 4 - Predicted Impulsive Noise Levels

5.7 The calculated SNL outside the nearest properties exceeds the level at which annoyance is highly likely to occur (65 dBA).

5.8 Mitigation therefore would be required to reduce the impulsive noise levels predicted at the houses to a satisfactory level (see paragraph 5.16 below).

BS 8233

5.9 A resultant noise level of 50 dB L_{Aeq} outside the nearest residential properties has been calculated using an expected worst-case source sound power level of 89 dB L_{Aeq} (Ref. library noise data obtained at Winchester football pitch).

5.10 The resultant noise levels within the properties would be subject to a reduction from inside to outside of approximately 15 dBA (depending of the extent to which the window is open, room volume and glazing configuration).

5.11 The resultant internal noise levels are shown in Table 5.

Receptor	Resultant Noise Level dB L_{Aeq}
Properties on Oakleaf Drive	35

Table 5 - Predicted Internal Noise Levels – Assessment

5.12 The above values exceed the target upper level of 30 dB L_{Aeq}. It is notable that noise levels would be lower with a partially open or closed window.

5.13 Mitigation would therefore be required to reduce the predicted ambient noise levels within houses on Oakleaf Drive to a satisfactory level (see paragraph 5.16 below).

BS 4142: 2014

5.14 The predicted external levels (as derived above) and rating levels calculated in accordance BS 4142 are compared to the typical background noise levels in Table 6.

Description	Noise Level, dB
Specific Level from MUGA at nearest residential property	50
Typical evening and weekend background Noise Level, dB L_{A90}	41
Excess over background	+9

Table 6 - BS 4142 comparison against the background noise level - Assessment

5.15 The results of the BS 4142 would also indicate that mitigation would be required to reduce the predicted noise levels outside houses on Oakleaf Drive to a satisfactory level (see paragraph 5.16 below).

Discussion and Mitigation Measures

5.16 The above assessments indicate that noise mitigation measures will be required in order to reduce the noise impact of the MUGA to within acceptable levels at the nearest residential dwellings.

5.17 The inclusion of acoustic screening will reduce noise levels from the MUGA at the nearest properties. From observations on site it is noted that some (but not all) of the houses adjoining the western site boundary have existing solid fencing to their gardens which will assist to provide acoustic screening from the MUGA.

5.18 Subject to a review of the existing fencing, it is recommended to provide an additional barrier along the western boundary where the existing fencing is deemed insufficient (i.e. not present or in a poor condition). The following specification is recommended for the barrier:

- The barrier should be installed in the location as indicated in Figure 2, subject to the condition of the existing fencing;
- The barrier should have a minimum height of 1.8m above local ground level;
- The barrier material should have a minimum mass per unit area of 10 kg/m^2;
- There must be no holes or openings in the barrier and all joints and gaps must be well-sealed.

5.19 In order to reduce noise from impulsive ball events, it is also recommend to provide a heavy gauge mesh fence within the MUGA, as per the photograph in Appendix C. Source noise measurements were undertaken with such fencing installed at a MUGA at South Downs College and noise levels from ball impact events were in the order of 65 dB $L_{Amax,f}$ at approximately 24m from the centre of the pitch.

5.20 With acoustic screening provided by the barrier, and noise from ball impacts reduced from the use of robust fencing, the results of the assessment are summarised below at the closest proposed houses.

5.21 From impulsive ball events, the predicted SNL is 53 dBA at the nearest proposed houses, which is below the threshold of acceptability and is therefore considered acceptable.

5.22 External noise levels of 42 dB L_{Aeq} have been calculated outside the nearest proposed houses, which would give rise to internal noise levels in the order of 27 dB L_{Aeq} within habitable rooms (assuming a 15 dBA loss between outside and inside for an open window). Levels with windows closed would be lower. The predicted internal noise levels are therefore lower than the target value of 30 dB L_{Aeq} for internal noise levels in habitable rooms.

5.23 The difference between the external source level of 42 dB L_{Aeq} and background noise level of 41 dB $L_{A90,\ 1\ hour}$ is + 1 dB at the nearest property. Due to the assessment method of BS 4142 being usually used for continuous noise levels from industrial sources, and the noise from the proposed MUGA being intermittent in nature, it is considered that these noise levels should not cause a significant impact on nearby residents.

5.24 It is therefore concluded that, with noise mitigation as specified, noise levels from the proposed MUGA would be acceptable at the nearest dwellings.

6.0 CONCLUSIONS

6.1 24 Acoustics Ltd has reviewed the potential impact of noise associated with a Multi-Use Games Area at Polegate School, East Sussex.

6.2 An environmental noise survey has been undertaken to determine prevailing ambient and background noise levels at the nearest affected properties. As there is no directly applicable standard for the assessment of noise from such facilities, a number of different assessments have been undertaken. The assessment has assessed the impact of community use outside of school hours.

6.3 To reduce noise levels at the nearest properties it has been recommended that a barrier is put in place along the western site boundary, subject to the condition of the existing fencing. A recommendation has also been made to erect a heavy gauge fence around the proposed MUGA in order to reduce noise from impulsive ball events.

6.4 With the proposed mitigation measures in place it is concluded that noise levels associated with the MUGA are unlikely to cause unreasonable disturbance to occupiers of the nearest residential properties.

REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, March 2012.

2. DEFRA, Noise Policy Statement for England, March 2010.

3. Planning Policy Guidance 17: Planning for Open space, Sport and Recreation (2002).

4. Clay Target Shooting: Guidance on the Control of Noise (2003).

5. British Standards Institution. British Standard 8233: Guidance on sound insulation and noise reduction for buildings, 2014.

6. British Standards Institution. British Standard 4142. Methods for Rating Industrial and Commercial Sound, 2014

7. Planning Noise Advice Document: Sussex, March 2013.

8. British Standard 7445: 1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use (1991).

Project: Proposed MUGA, Polegate School	**Title:** Proposed site plan and survey location	
DWG No: Figure 1	**Scale:** N.T.S.	**Rev:** A
Date: June 2016	**Drawn By:** KE	**Job No:** 6386

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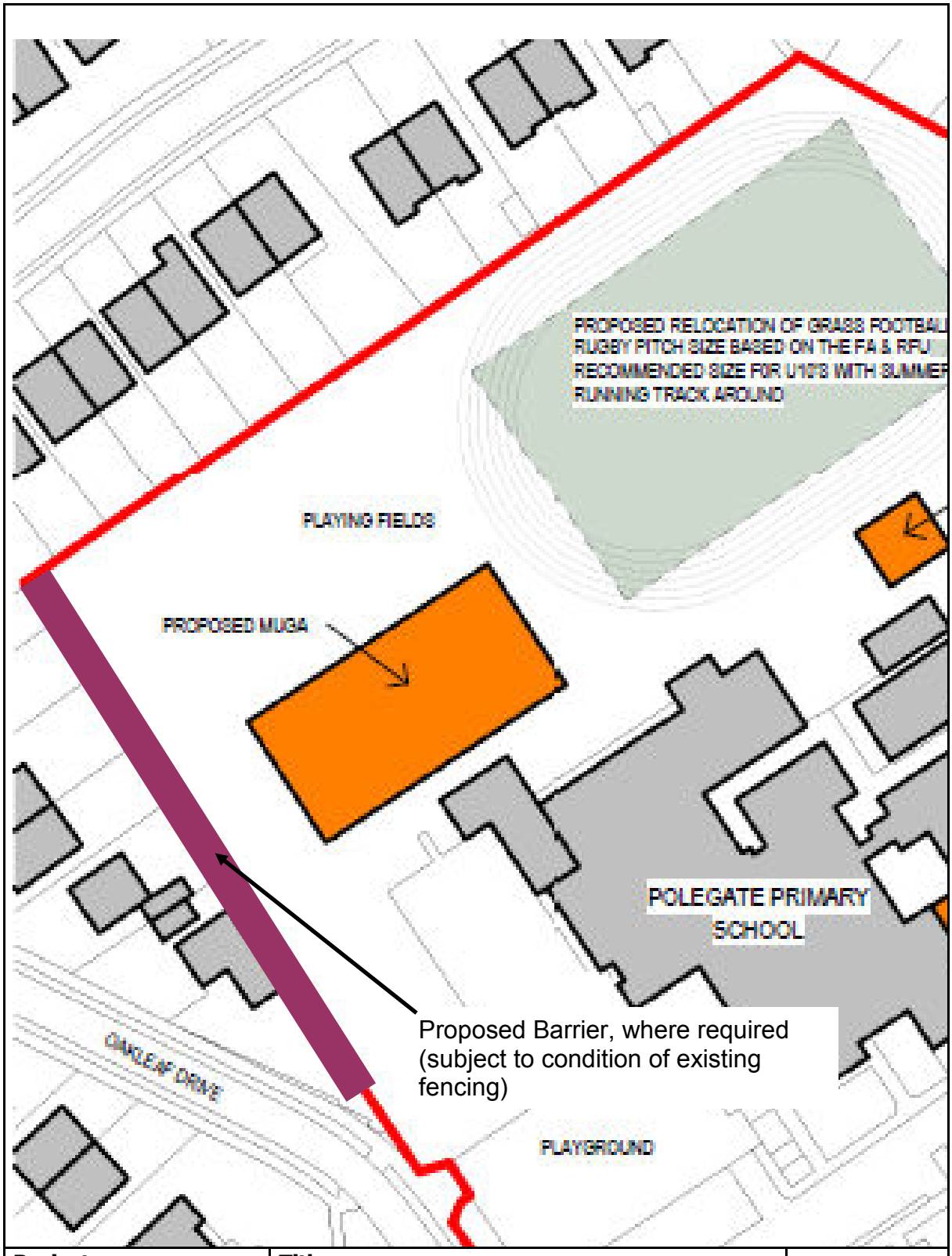


Project: Proposed MUGA, Polegate School	**Title:** Proposed site plan and barrier location	
DWG No: Figure 2	**Scale:** N.T.S.	**Rev:** A
Date: June 2016	**Drawn By:** KE	**Job No:** 6386

APPENDIX A: ACOUSTIC TERMINOLOGY

Noise Levels

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 important 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 dBA is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dBA. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dBA 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 [2] as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, 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.

Airborne Sound Insulation

Voices, hi-fi systems, television and radio sound and musical instruments are all sources of airborne sound. They excite the air around them and the vibration in the air is transmitted to surrounding surfaces, such as walls, ceilings and floors. This sets these constructions into vibration and this vibration is re-radiated in neighbouring rooms as sound. Energy is lost in the transmission path and this is referred to as transmission loss or more generally, airborne sound insulation. The most simple measure of sound insulation between two rooms is the sound level difference, D, which is the arithmetic difference between the sound level, in dB, in the source room and the sound level in the receiving room.

Other measures of sound insulation include the sound reduction index (R, obtained by laboratory test), the apparent sound reduction index (R', obtained in field tests) and the standardised level difference (DnT, used mainly in the sound insulation of rooms in dwellings and other cellular rooms). The relevant test procedures are laid down in BS EN ISO 140. The results are obtained over a range of frequencies. A single-figure "weighted" result can be obtained from one-third octave band results measured over the frequency range 100 - 3150Hz by using a curve-fitting procedure laid down in BS EN ISO 717. The subscript "w" is added to the descriptors above, for example; $D_{nT,w}$.

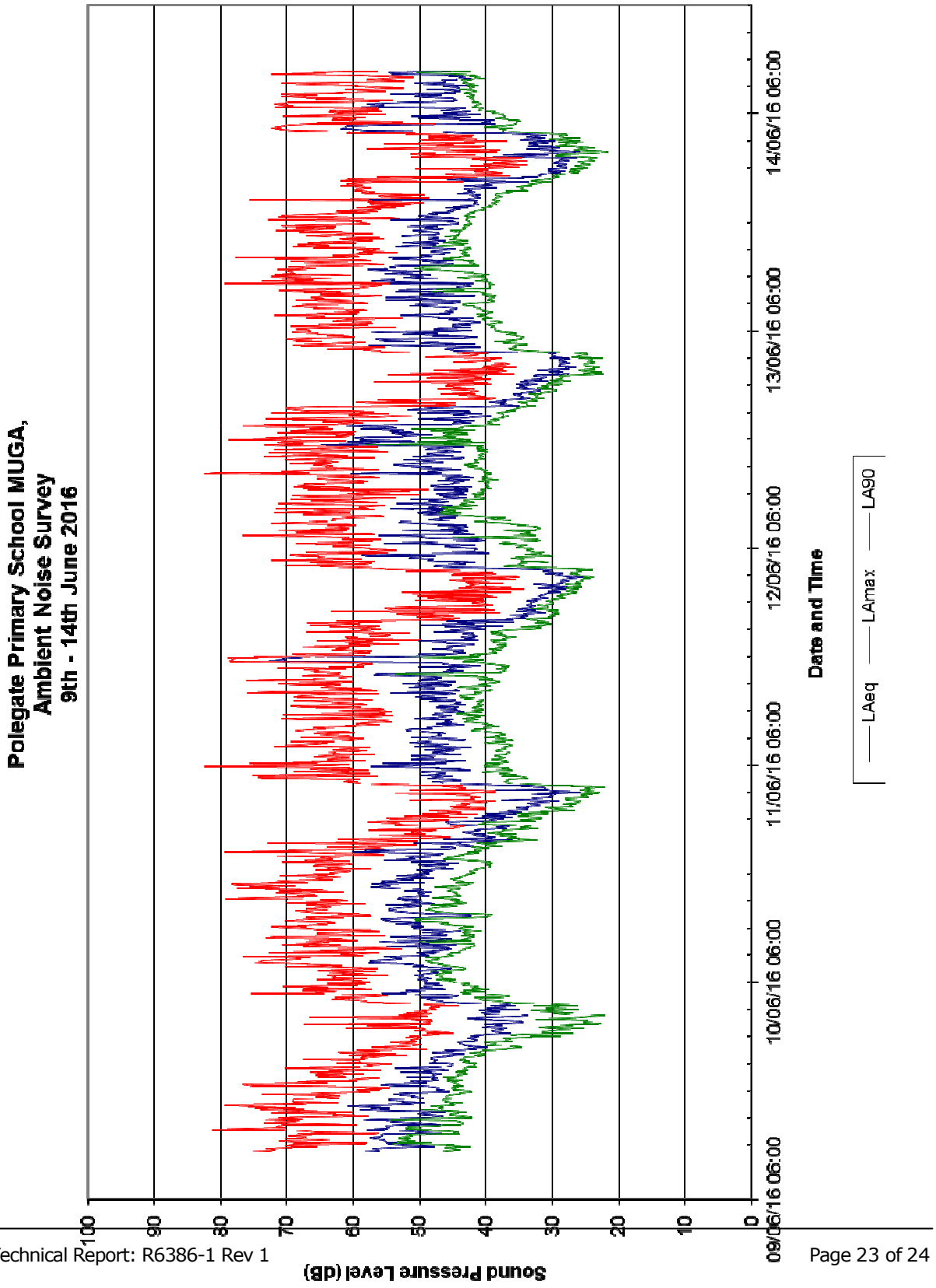
Impact Sound Isolation

In the case of impact sound, the building construction is caused to vibrate as a result of a physical impact. Footsteps on floors are the most obvious example. The vibration is radiated as sound in neighbouring rooms. Impact insulation is measured using a standard tapping machine, which drops weights cyclically onto a floor. The sound pressure level is measured in the receiving room below and the result is known as the impact level, L_i. This test is used in the evaluation of domestic separating floors. As with airborne sound, the test procedures are set out in BS EN ISO 140 and the single-figure weighting of the results is described in BS EN ISO 717. The descriptor for the final result of a field test is $L'_{nT,w}$.

Reverberation time

The reverberation time is a measure of the rate of decay of sound in a room and this influences the sound pressure level of noise in that room. It is defined as the time taken, in seconds, for the level of sound in a room to decrease by 60 dB (a millionth of its original energy value) after the discontinuation of a sound. Reverberation time is measured in accordance with the requirements of BS EN ISO 140.

APPENDIX B: ENVIRONMENTAL NOISE MEASUREMENTS



APPENDIX C: PHOTOGRAPH OF HEAVY GAUGE MESH FENCE (As Installed at South Downs College)