



Design & Access Statement

E04759

APPENDIX H

Noise Impact Assessments

including:

R8476-1 Rev 0 Ranikhet Academy, Reading - Ambient Noise Assessment

R8476-2 Rev 0 Ranikhet Academy, Reading - MUGA Noise Impact Assessment



24Acoustics

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Nick Collett – HCC Property Services
C/o Mace
Anglo St James House
39a Southgate Street
Winchester
SO23 9EH

Date: 30th April 2020
Reference: R8476-1 Rev 0

Dear Nick,

Re: Ranikhet Academy, Reading – Ambient Noise Assessment

Further to our recent survey of external noise levels, please see below our assessment of internal ambient noise levels, and potential noise impact, for the proposed new primary school.

1.0 INTRODUCTION AND SITE DESCRIPTION

- 1.1 The proposed scheme is to build a replacement 2FE primary school with relocated external play and games areas. 24 Acoustics has been instructed by Mace, on behalf of Hampshire Property Services (HCC) to assess the external ambient noise levels affecting the proposed scheme and to provide advice on the implications with regards to the requirements of Building Bulletin 93, 'Acoustic Design of Schools' (BB 93).
- 1.2 The site currently comprises existing school buildings, with external play and games areas. The site is located to the west of Reading and is bound by Spey Road & Eddlestone Way to the east and Deveron Drive to the west. To the north, south and east are residential properties. Figure 1 describes the site location.
- 1.3 Ambient noise monitoring has been undertaken to assess the prevailing noise levels at the site. This report addresses the control of noise break-in from external sources with reference to BB 93, and also considers the potential noise impact of the new scheme on nearby sensitive properties.
- 1.4 All measurements in this report are given in dB re: 20 μ Pa. A summary of acoustic terminology is given in Appendix A.

2.0 CRITERIA

Building Bulletin (BB) 93

- 2.1 The document 'Acoustic design of schools: performance standards, Building Bulletin 93' (BB 93) sets out acoustic performance standards for school buildings.
- 2.2 In order to maintain a satisfactory internal teaching environment, Building Bulletin 93 requires that an ambient noise survey be undertaken. The aim is to limit external noise break-in so that it does not interfere with teaching activities once the school is operational. The limits apply to existing or known sources of noise for which the internal levels can be accurately predicted. The limits do not apply to noise sources from within the school.

- 2.3 Ambient noise is defined as the total noise from all external sources intruding into the school together with noise from the school's own ventilation or other plant. This includes noise from road, rail and air traffic and industrial/commercial premises. It does not include noise from school activities such as teaching or sports, nor teaching equipment.
- 2.4 BB 93 guidance requires an upper limit of 35 dB $L_{Aeq, 30 \text{ min}}$ for standard teaching spaces in secondary schools. It has not yet been confirmed whether more stringent requirements would apply to any of the rooms in the new school.
- 2.5 The indoor ambient noise levels must be achieved with adequate ventilation, which may be provided by natural ventilation, mechanical ventilation or a hybrid system.
- 2.6 For rooms that are naturally ventilated, 'normal operation' is defined in BB 93 as providing a minimum ventilation rate of approximately 5 l/s per person. Under this 'normal operation' condition, BB 93 permits internal noise levels that are up to 5 dB above the performance standards for internal noise levels in Table 1 of BB 93.
- 2.7 The upper limits for internal noise levels within typical primary school teaching rooms are specified in Table 1 of BB 93 as follows:

Room	Maximum Internal Noise Level (dB $L_{Aeq, 30 \text{ mins}}$)
Classroom, Hall/Studio, Nursery.	35 (40 if naturally ventilated)
ICT, Science/DT/Art/Food Tech	40 (45 if naturally ventilated)

Table 1: BB 93 Criteria for Internal Ambient Noise Levels

- 2.8 BB93 also provides guidance for regular discrete noise events, stating:

"In order to protect students from regular discrete noise events, eg, aircraft or trains, indoor ambient noise levels should not exceed 60 dB $L_{A1, 30 \text{ mins}}$. This is achieved by default for spaces with IANLs up to 40 dB $L_{Aeq, 30 \text{ min}}$, but requires assessment in spaces with higher IANL limits, eg, 45 and 50 dB."

- 2.9 For 'summertime ventilation' (i.e. to prevent overheating) and 'intermittent boost' (i.e. for dilution of fumes), when provided by natural ventilation under local control of the teacher, BB 93 requires that internal noise levels are no greater than 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.
- 2.10 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

- 2.11 British Standard 4142:2014 'Methods for Rating Industrial and Commercial Sound, 2014' 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.

3.0 NOISE MEASUREMENTS

- 3.1 Ambient noise measurements were undertaken at the site between 24th and 30th April 2020 to determine the prevailing noise levels affecting the new building and surrounding properties. Measurement Location 1 was located close to the western boundary of the site at a height of approximately 2 m above ground level. Measurement Location 2 was located at the proposed eastern façade of the building approximately 2 m above ground level. Both measurement positions were taken in free-field conditions, as shown in Figure 1.
- 3.2 The instrumentation was set up to monitor ambient noise levels and store data in 5-minute intervals, in terms of the overall A-weighted L_{eq} and L_{90} using fast time weighting. The following instrumentation was used during the survey:
- Rion NL52 Type 1 sound level meter;
 - Rion NL32 Type 1 sound level meter;
 - Brüel & Kjær type 4231 acoustic calibrator.
- 3.3 Calibration of the equipment was checked before and on completion of the measurements and no drift was recorded. Noise measurements were made in accordance with BS 7445: 1991 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use'. The weather during the survey was mixed with periods of adverse weather which have been omitted from analysis.
- 3.1 At the time of the survey, the school was closed and there was a reduction in all transport movements due to the UK Government's lockdown strategy in response to the Covid-19 virus outbreak. This reduction will have affected the overall L_{Aeq} and L_{A90} noise levels at the site and has been taken into account as described in the following assessments.

4.0 RESULTS AND ASSESSMENT

Results

- 4.1 The measured noise levels at locations 1 and 2 are presented graphically in Appendix B.
- 4.2 The average ambient noise levels at both measurement locations were in the order of 43 dB $L_{Aeq, 30min}$ during school hours. The prevailing noise levels were determined by occasional road traffic on local roads.
- 4.3 Due to the reduction in all transport movements across the UK, it is considered acceptable to add 5 dB to the measured L_{Aeq} levels for design purposes, which is in line with survey and traffic data assessed elsewhere during the lockdown conditions. This gives a design ambient noise level of 48 dB $L_{Aeq, 30min}$ during school hours.
- 4.4 The prevailing background noise levels during daytime hours (07:00 and 19:00) were in the order of 36 dB $L_{A90, 1 hour}$ at Location 1 and 38 dB $L_{A90, 1 hour}$ at Location 2.

Assessment – Internal Noise Levels

- 4.5 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.
- 4.6 Applying this reduction to the predicted external noise levels gives predicted internal noise levels in the order of 30 dB $L_{Aeq, 30 min}$ within the new school rooms.

- 4.7 On this basis, a natural or hybrid ventilation strategy that relies on open windows would be acceptable for the new classrooms. The acoustic performance of the ventilation systems, whether passive, hybrid or mechanical, must be appropriately specified.
- 4.8 Spaces that are more sensitive to noise include ensemble rooms, recording studios and rooms intended specifically for students with special hearing and communication needs. Please inform 24 Acoustics if the school is providing acoustically sensitive rooms as attenuation measures may be applicable.

Plant Noise Limits

- 4.9 Policy EN17 from Reading Borough Council's Local Plan 2019 requires the following in relation to noise generating equipment:

"Where noise generating equipment is proposed, the noise source specific level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor."

- 4.10 BS 4142: 2014 requires the noise impact to be assessed depending on the context. In relation to situations where background noise levels are low, the standard states *"Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background."*
- 4.11 Given that the measured background noise levels during lockdown conditions were lower than would normally be expected, a relaxation of Reading Borough Council's criterion is considered appropriate in this case. A plant noise limit of 5 dB below the prevailing background noise level at the nearest noise sensitive windows is therefore proposed, as this would still provide a high level of protection to the neighbouring properties.
- 4.12 In accordance with the above, the following maximum plant noise levels are applicable for new plant associated with the scheme, assuming typical daytime operation (07:00 to 19:00 hours):

Properties to the north and east on Deveron Drive 31 dB $L_{Aeq, 1 \text{ hour}}$

Properties to the south and east on Spey Road / Eddleson Way 33 dB $L_{Aeq, 1 \text{ hour}}$

- 4.13 If the noise emissions are tonal, or contain other noticeable characteristics, then a suitable correction is applicable, in accordance with BS 4142:2014.

Proposed MUGA

- 4.14 As shown on the proposed site plan in Figure 2, a relocated MUGA is proposed in the northern corner of the site. Given the proximity to nearby residential properties on Deveron Drive, there is the potential for the MUGA to cause an adverse noise impact upon the existing residential properties. A further assessment of the noise impact from the relocated MUGA may therefore be required during the planning process, once more details are known regarding the proposed design of the MUGA and times of operation.

5.0 SUMMARY

- 5.1 A survey of external noise levels has been undertaken at the site of the proposed new school building at Ranikhet Academy, Reading..
- 5.2 The assessment concludes that, based on measured ambient noise levels, a natural or hybrid ventilation strategy that relies on open windows would be appropriate for the school to achieve the BB93 requirement for ambient noise levels in classrooms.
- 5.3 Noise limits for new building services plant have been established, applicable at the nearest residential properties.
- 5.4 The potential noise impact of the relocated MUGA may require a further assessment, once more details are available regarding the proposed design and operating times.

I trust the above is in order. Please call if you have any queries.

Yours sincerely
For 24 Acoustics Ltd

Miles Hodge BSc (Hons)
Technician

Noise Measurement Location 1**Noise Measurement Location 2**

Project: Ranikhet Academy, Reading	Title: Aerial View & Measurement Locations		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: 0	
Date: April 2020	Drawn By: MH	Job No: 8476	



Project: Ranikhet Academy	Title: Proposed Site Plan		 24Acoustics
DWG No: Figure 2	Scale: N.T.S.	Rev: 0	
Date: April 2020	Drawn By: MH	Job No: 8476	

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 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 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".

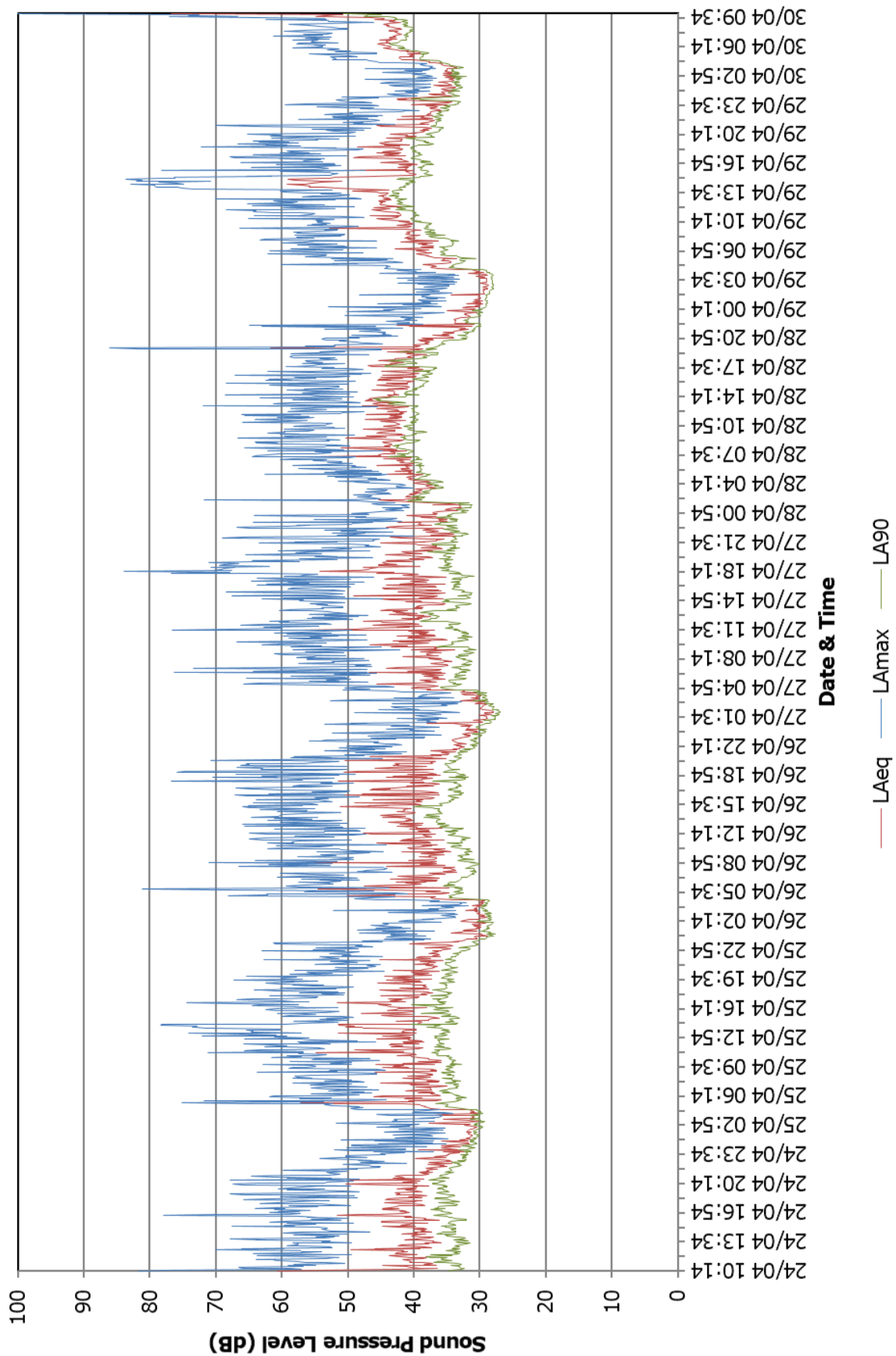
It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

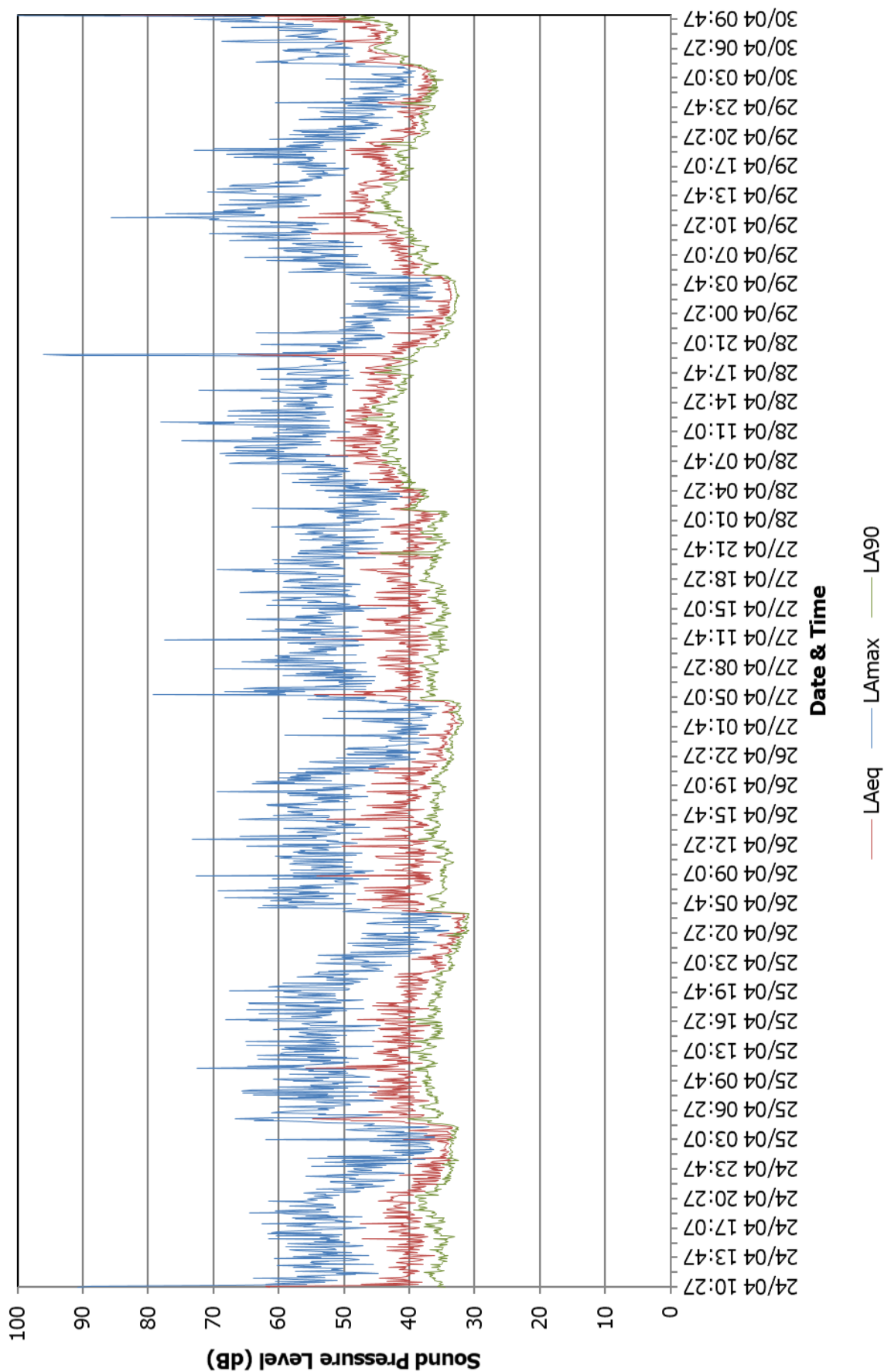
This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

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**Location 1 - Environmental Noise Measurements
Ranikhet Academy, Reading - 24th to 30th April 2020**

**Location 2 - Environmental Noise Measurements
Ranikhet Academy, Reading - 24th to 30th April 2020**



Nick Collett – HCC Property Services
C/o Mace
Anglo St James House
39a Southgate Street
Winchester
SO23 9EH

Date: 14th January 2021
Reference: R8476-2 Rev 0

Dear Nick,

Re: Ranikhet Academy, Reading – MUGA Noise Impact Assessment

Please see below our assessment of the potential noise impact of the proposed multi-use games area (MUGA) at Ranikhet Academy, Reading.

1.0 INTRODUCTION AND SITE DESCRIPTION

- 1.1 The proposed scheme is to build a replacement 2FE primary school with relocated external play and games areas. 24 Acoustics has been instructed by Mace, on behalf of Hampshire Property Services (HCC) to assess impact of the proposed MUGA on internal noise levels at the nearest residential properties.
- 1.2 The site is located to the west of Reading and is bound by Spey Road & Eddlestone Way to the east and Deveron Drive to the west. To the north, south and east are residential properties. Figure 1 describes the site location and proposed site layout.
- 1.3 Ambient noise monitoring was undertaken at the site between 24th and 30th April 2020 and the results are presented in full in 24 Acoustics' ambient noise assessment report (reference R8476-1 Rev 0). Further to a request from the local planning authority, this report addresses the noise impact of the proposed MUGA on nearby sensitive properties.
- 1.4 The proposed MUGA will be located at the north of the site on land currently occupied by the existing school buildings, as shown in Figure 1. The existing STP, located in the south of the site, will be retained.
- 1.5 The new MUGA will be floodlit and will allow public use with the following aspirational hours of operation, as confirmed by Hampshire County Council Property Services:
 - Weekdays: 09:00 - 16:30 for school use during term time;
 - Weekdays: 16:30 - 22:00 for public use during term time;
 - Weekdays: 09:00 - 22:00 for public use during school holidays;
 - Saturdays: 09:00 - 22:00 for public use;
 - Sundays: 09:00 - 22:00 for public use.
- 1.6 The nearest properties to the site are those on Deveron Drive to the west, at approximately 65 metres from the centre of the proposed MUGA, and the proposed residential development on Thurso Close to the north, at approximately 44 metres from the centre of the proposed MUGA.

- 1.7 All measurements in this report are given in dB re: 20 μ Pa. A summary of acoustic terminology is given in Appendix A.

2.0 CRITERIA

- 2.1 There is no directly applicable standard for the assessment of noise from sports pitches, therefore several different standards and assessments have been used as described below.
- 2.2 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

- 2.3 Clay Target Shooting: Guidance on the Control of Noise, published by the Chartered Institute of Environmental Health, 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.
- 2.4 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

- 2.5 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.
- 2.6 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

- 2.7 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.

British Standard (BS) 4142: 2014

- 2.8 British Standard 4142 'Methods for Rating Industrial and Commercial Sound', 2014 provides a method for rating the effects of industrial and commercial sound on residential areas.
- 2.9 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.
- 2.10 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).
- 2.11 It is relevant to note that BS 4142 also states that "*The standard is not intended to be applied to the rating and assessment of sound from: a) recreational activities*".
- 2.12 Although the methodology in BS 4142 is not directly applicable for the assessment of noise from recreational activities, the standard will be used to provide an outline indication of possible complaints.

Summary

- 2.13 Based upon the review of standards described above, the noise impact 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 35 dB L_{Aeq} for internal noise levels in habitable rooms during the daytime);
 - BS 4142: 2014 for external levels relative to the background noise level, with the caveat that the standard does not formally apply to recreational noise;

3.0 RESULTS AND ASSESSMENT

- 3.1 The proposed MUGA will comprise an all-weather surface enclosed by a 3m high wire fence.
- 3.2 Due to the existing use of the site 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.
- 3.3 From the results of the environmental noise survey, as presented in 24 Acoustics' technical report R8476-1 Rev 0, the following typical evening background noise levels have been determined:
- 34 dB L_{A90} at the residential properties at Deveron Drive to the west.
 - 36 dB L_{A90} at the proposed residential properties on Thurso Close to the north.

- 3.4 It is noted that, at the time of the noise survey in April 2020 the school was closed and there was a reduction in all transport movements due to the UK Government's lockdown strategy in response to the Covid-19 virus outbreak. This reduction will have affected the overall L_{Aeq} and L_{A90} noise levels at the site. The measured background noise levels were lower than would normally be expected and are, therefore, conservative.
- 3.5 Due to the height of the existing apartments on Deveron Drive (four storeys), and as the orientation and building heights of the proposed properties on Thurso Close are currently unknown, acoustic screening has not been included in the calculations.

Impulsive Noise Levels

- 3.6 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.
- 3.7 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).

- 3.8 The noise level from impulsive ball events has been calculated to the nearest residential locations (free-field location at a height of 1.5m) and is shown in Table 2. The calculations have included losses due to distance between the residential properties and the centre of the proposed MUGA..

Receptor	Predicted SNL, dBA
Nearest proposed properties on Thurso Close to the north (approximately 44 metres from the centre of the MUGA)	70
Nearest property on Deveron Drive to the west (approximately 65 metres from the centre of the MUGA)	67

Table 2 - Predicted Impulsive Noise Levels

- 3.9 The calculated SNL outside the nearest properties exceeds the level at which annoyance is highly likely to occur (65 dBA).
- 3.10 Mitigation would therefore be required to reduce the impulsive noise levels predicted at the properties on Thurso Close and Deveron Drive to a satisfactory level (see paragraphs 3.19 and 3.20 below).

BS 8233:2014

- 3.11 A resultant noise level of 48 dB L_{Aeq} outside the nearest proposed residential properties on Thurso Close and 45 dB L_{Aeq} at Deveron Drive has been estimated using an expected worst-case source sound power level of 89 dB L_{Aeq} (Ref. library noise data obtained at Winchester football pitch). Calculations have included losses due to distance.
- 3.12 The resultant noise levels within the properties would be subject to a reduction from inside to outside of around 15 dBA (depending on the extent to which the window is open, room volume and glazing configuration).

- 3.13 The resultant internal noise levels are shown in Table 3.

Receptor	Resultant Noise Level dB L _{Aeq}
Proposed Properties at Thurso Close	33
Properties on Deveron Drive	30

Table 3 - Predicted Internal Noise Levels – Assessment

- 3.14 The above values are considered borderline acceptable with reference to BS 8233: 2014 criteria for internal noise levels in habitable rooms during the daytime. It is notable that noise levels would be lower with a closed window.

BS 4142: 2014

- 3.15 The predicted external levels (as derived above) and rating levels calculated in accordance with BS 4142 (with a correction of +3 dB for the impulsive and distinctive character of the noise) are compared to the typical background noise levels in Tables 4 and 5 below.

Description	Noise Level, dB
Specific Level from MUGA at nearest residential properties	48
correction for character of noise	+3
Rating Noise Level, dB L _{Aeq}	51
Typical evening background Noise Level, dB L _{A90}	36
Excess over background	+15

Table 4 - BS 4142 comparison against the background noise level – Thurso Close

Description	Noise Level, dB
Specific Level from MUGA at nearest residential properties	45
correction for character of noise	+3
Rating Noise Level, dB L _{Aeq}	48
Typical evening background Noise Level, dB L _{A90}	34
Excess over background	+14

Table 5 - BS 4142 comparison against the background noise level – Deveron Drive

- 3.16 The results of the BS 4142 assessment provide an indication of a risk of adverse impact, however, given the existing use of the school site, the outcome cannot be assessed as if the noise source were completely new.
- 3.17 BS 4142 also states that “*The standard is not intended to be applied to the rating and assessment of sound from a) recreational activities*”.
- 3.18 Based on the above, mitigation would be required in order to reduce the level of noise impact at the nearest residential properties (see paragraphs 3.21 and 3.22 below).

Discussion and Mitigation Measures

- 3.19 In order to reduce noise from impulsive ball events, it is recommended to provide a heavy gauge mesh fence around the MUGA, as per the photograph in Appendix B. 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.
- 3.20 The heavy gauge fence as described would be expected to reduce impulsive noise levels associated with the proposed MUGA at the nearest properties on Deveron Drive and Thurso Close by approximately 10 dBA. Calculations confirm a predicted SNL of 56 dBA at properties on Deveron Drive and 60 dBA at the Thurso Close properties, which is below the threshold of acceptability (65 dBA) for impulsive events and is therefore acceptable.
- 3.21 In order to reduce the potential for noise disturbance during evenings and weekends, it is recommended that the hours of use of the proposed MUGA are restricted to no later than 20:00 hours on any day. In addition, it is also recommended that a booking system be implemented for the public use of MUGA, such that the use of the facility during evenings and weekends will be well-managed.
- 3.22 With the above mitigation measures in place as described, it is considered that noise levels associated with the proposed MUGA are unlikely to cause unreasonable disturbance to occupiers of the nearest residential properties and are therefore acceptable.

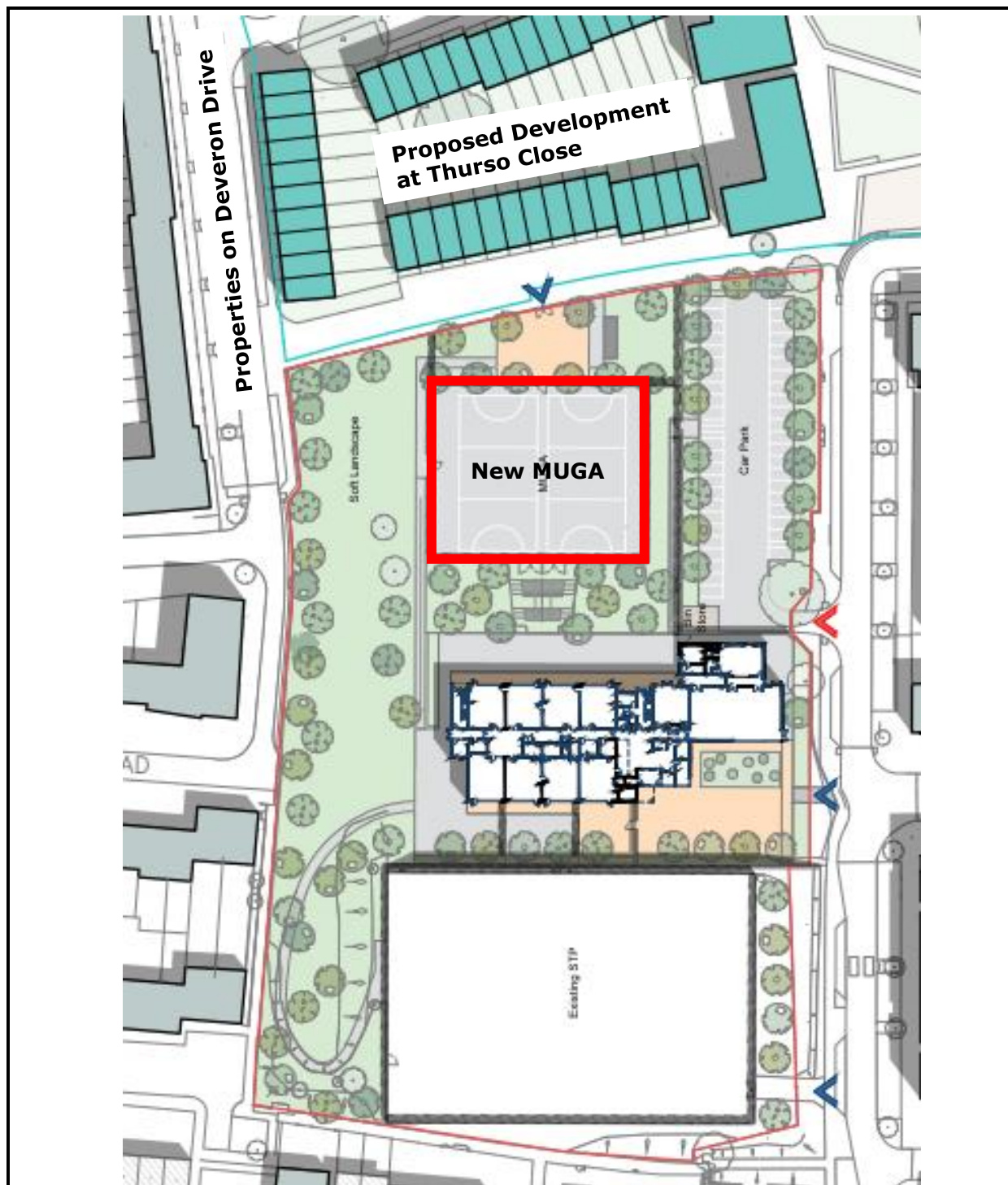
4.0 SUMMARY

- 4.1 The potential noise impact of the new MUGA at Ranikhet Academy, Reading has been assessed with regards to the proposed opening hours, to include public use during evening and weekends.
- 4.2 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.
- 4.3 Noise mitigation measures have been recommended, in terms of heavy gauge mesh fencing to reduce noise from impulsive ball events, restrictions to the hours of use during evening periods and the implementation of a booking system for public use.
- 4.4 With the recommended mitigation measures in place it is concluded that noise levels associated with the proposed MUGA are unlikely to cause unreasonable disturbance to occupiers of the nearest residential properties and are therefore acceptable.

I trust the above is in order. Please call if you have any queries.

Yours sincerely
For 24 Acoustics Ltd

Miles Hodge BSc (Hons)
Technician



Project: Ranikhet Academy, Reading	Title: Proposed Site Layout		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: 0	
Date: January 2020	Drawn By: MH	Job No: 8476	

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

