



Joseph Norton Academy, Deighton

Noise impact assessment

10046.3

31st August 2023

Revision B



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Prepared for

Frank Shaw Associates

Prepared by

Kaelyn Tan MSc AMIOA

Apex Acoustics Limited Reg. in England no. 05656507
Design Works, William Street, Gateshead, NE10 0JP

Checked by

Nick Conlan BEng MIOA

T 0191 620 0750
E info@apexacoustics.co.uk
W www.apexacoustics.co.uk

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2 Summary

- 2.1 This report has been prepared in support of a Planning Application for a new teaching block and two units of Multi Use Games Area (MUGA) at Joseph Norton Academy, Deighton.
- 2.2 A noise impact assessment has been undertaken to determine the potential impact on the identified noise sensitive receptors due to noise associated with the development.
- 2.3 The noise levels from activities associated with the MUGAs are predicted to be below the noise limits proposed within this report for compliance with the aims of the National Planning Policy Framework (NPPF).
- 2.4 At this stage in the development, exact mechanical plant specifications are unavailable; plant noise limits for the cumulative impact of all proposed plant associated with the new teaching block at the nearest noise sensitive location are proposed to reduce the risk of an adverse impact.

3 Introduction

- 3.1 This report relates to the development of a new teaching block and two MUGAs at Joseph Norton Academy, Deighton.
- 3.2 Apex Acoustics has been appointed to undertake a noise impact assessment associated with the development in support of a Planning Application.
- 3.3 The scope of our instruction includes:
- Desktop review of expected noise climate and plant equipment noise emissions related to the new teaching block to meet typically applied BS 4142 noise impact criteria at nearby residential areas;
 - Model the noise impact from MUGAs;
 - Calculate noise propagation using proprietary noise modelling software to identified noise-sensitive receptors and assess the impact;
 - Advise on a scheme for noise mitigation, if required; and
 - Proposed fixed plant noise limits associated with the new teaching block.
- 3.4 It is understood that the MUGAs would be available for students only within the standard school hours.
- 3.5 The NSR are identified as residential properties as shown in Figure 1.
- 3.6 The report addresses:
- The representative baseline noise climate and background sound levels at the NSR for future plant noise impact assessment; and
 - The noise impact assessment from the proposed MUGAs.



Figure 1: Proposed site outlined in red and identified NSRs outlined in yellow

3.7 A site plan is shown in Figure 2.



Figure 2: Site plan

4 Planning policy and guidance

4.1 National Planning Policy Framework (NPPF)

4.2 The National Planning Policy Framework (NPPF) Reference 1, sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced. In respect of noise, Paragraph 174, 185 and 187 of the NPPF states the following:

4.3 Paragraph 174:

"e) 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..."

4.4 Paragraph 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:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁶⁵ [See Explanatory Note to the Noise Policy Statement for England];*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

4.5 Paragraph 187:

"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed. "

4.6 Noise Policy Statement for England (NPSE)

4.7 The Noise Policy Statement for England, Reference 2, states three policy aims as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;

- mitigate and minimise adverse impacts on health and quality of life; and
 - where possible, contribute to the improvement of health and quality of life.”
- 4.8 The NPSE defines adverse noise impact as follows:
- **No Observed Effect Level (NOEL)**
This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
 - **Lowest Observed Adverse Effect Level (LOAEL)**
This is the level above which adverse effects on health and quality of life can be detected.
 - **Significant Observed Adverse Effect Level (SOAEL)**
This is the level above which significant adverse effects on health and quality of life occur
- 4.9 The first two aims of the NPSE require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:
- “... all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur.”
- 4.10 **Planning Practice Guidance – Noise**
- 4.11 Further Government guidance on how planning can manage potential noise impact in new development is outlined in Planning Practice Guidance (PPG-N) notes on the Government website: www.gov.uk/guidance/noise--2
- 4.12 The terminology and noise effect hierarchy are summarised Appendix A.
- 4.13 **BS 4142**
- 4.14 The principal guidance for the assessment of industrial noise impact is BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS 4142), Reference 3.
- 4.15 This method involves the determination of a specific sound level due to the source in question at the NSR, hence a rating level.
- 4.16 According to BS 4142, typically, the greater this difference, the greater the magnitude of the impact.
- “A difference of around +10 dB or more is likely to be an indication of a significant adverse impact”;
- “A difference of around + 5dB is likely to be an indication of an adverse impact”;
- “Where the rating level does not exceed the background sound level, this is an indication of the specific source having a low impact”.
- 4.17 BS 4142 requires a rating level to be calculated based on the character of the specific sound.
- 4.18 The final noise impact is assessed based on the exceedance of the rating level over the background sound and the context.
- 4.19 **WHO: Guidelines for community noise**
- 4.20 For the outdoor living areas, the World Health Organisation Guidelines for Community Noise, 1999 (WHO), Reference 4, includes the following guidance:
- 4.21 To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise. To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq} .
- 4.22 For the daytime indoor noise level, the WHO guidance provides: To enable casual conversation indoors during daytime, the sound level of interfering noise should not exceed 35 dB L_{Aeq} .
- 4.23 For night-time noise levels: The indoor guideline values for bedrooms are 30 dB L_{Aeq} for continuous noise and 45 dB L_{AFmax} for single sound events. At night-time, outside sound levels about 1 metre from façades of living spaces should not exceed 45 dB L_{AFmax}
- 4.24 If “the noise reduction from outside to inside with the window open is 15 dB” as described in the guidance, the indoor and outdoor guideline values are consistent.
- 4.25 **BS 8233**
- 4.26 In BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233), Reference 5, it states that:
- 4.27 For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.

- 4.28 **Sport England guidance on Artificial Grass Pitches (AGP)**
- 4.29 Sport England issued guidance in 2015 including noise impact related considerations Artificial Grass Pitch (AGP) Acoustics - Planning Implications, Reference 6.
- 4.30 The guidance suggests the consideration of the criteria set out by The National Planning Policy Framework and Local Planning Authority planning policies.
- 4.31 This guidance also refers to the WHO guidance to achieve outdoor noise level of 50 dB L_{Aeq} and indoor noise level of 35 dB L_{Aeq} with open windows as the criteria.
- 4.32 For changes to an existing natural turf or AGP pitch or where existing noise levels in the area are high, alternative assessment methodology may be appropriate such as comparison of AGP noise against existing noise climate.
- 4.33 **Summary of the guidance**
- 4.34 Table 1 lists the published guidelines on the limits for outdoor noise.

Guidance (reference)	Parameter	Criteria	Comments
WHO	$L_{Aeq,16hour}$	≤ 50 dB	Protect the majority of people from being moderately annoyed
	$L_{Aeq,16hour}$	≤ 55 dB	Protect the majority of people from being seriously annoyed
	L_{AFmax}	≤ 60 dB	To achieve ≤ 45 dB L_{AFmax} indoor noise level by assuming 15 dB reduction with opening windows
BS 8233	$L_{Aeq,16hour}$	≤ 50 dB	Desirable
	$L_{Aeq,16hour}$	≤ 55 dB	Acceptable
Sport England	$L_{Aeq,T}$	≤ 50 dB	To achieve 50 dB $L_{Aeq,T}$ guideline values as described in WHO To achieve 35 dB indoor level by assuming 15 dB reduction with opening windows

Table 1: Published guidelines for assessment of outdoor noise

5 Existing sound environment

- 5.1 Measurements of the existing noise environment were made over the period 12th to 14th October 2022 using the guidance of BS 7445, Reference 7.
- 5.2 The monitoring locations are identified in Figure 3 and consisted of short-term manned measurements positions 2 – 4 and unattended long term measurements at position 1. At all locations the microphone was located away from reflecting surfaces other than the ground and as such the measurements can be considered free-field.



Figure 3: Measurement locations

- 5.3 Details of the equipment used are shown in Table 2.

Equipment	Model	Serial no.
Sound Level Meter	XL2	A2A-11062-E0
Calibrator	Larson Davis CAL 200	13403
Sound Level Meter	XL2	A2A-20287-E0
Calibrator	Larson Davis CAL 200	19379

Table 2: Equipment

- 5.4 All sound level meters and calibrators used meet the technical specifications of BS 7445 and had current calibration certificates traceable to national standards. The equipment was field-calibrated before and after the measurement with no significant drift in sensitivity noted.
- 5.5 During the attended measurements the temperature was 14°C, wind speed was up to 3.5 m/s and was predominantly from the west and north west, there was 40-60% cloud cover but no precipitation. During the long term measurements conditions were predominantly dry with relatively light winds (< 5 m/s), the wind direction was variable but predominantly from the west.
- 5.6 The measured noise levels at the long-term monitoring locations are shown in Table 3. The representative background sound levels are based on an analysis of the distribution presented in Appendix B.

Position	Period	L _{Aeq,15min} [dB]	Representative L _{A90,15min} [dB]
1	Daytime 07:00 – 23:00	47 – 50	40
	Night-time 23:00 – 07:00	42 – 44	38

Table 3: Measured noise levels (Long term)

- 5.7 The measured noise levels at the short-term monitoring locations are shown in Table 4.

Position	Start	Duration	L _{Aeq,T} [dB]
2	2022-10-14 11:20:00	0:15:00	46.6
	2022-10-14 12:15:00	0:15:00	48.7
	2022-10-14 13:09:00	0:15:00	49.5
3	2022-10-14 11:38:30	0:15:00	50.9
	2022-10-14 12:33:00	0:15:00	50.5
	2022-10-14 13:28:00	0:15:00	47.1
4	2022-10-14 11:57:00	0:15:00	49.0
	2022-10-14 12:51:00	0:15:00	48.5
	2022-10-14 13:46:00	0:15:00	45.3

Table 4: Measured noise levels (Short term)

6 Noise sources

6.1 Noise from proposed MUGAs

- 6.2 It is understood that the MUGAs would be available for the students only and within the standard school hours.
- 6.3 The noise levels from sports pitches vary dependent on the activities on the pitch.
- 6.4 Based on noise measurement of sports pitches including football, hockey and rugby and participation by men, women and children, the majority of the noise levels measured at 10 m are between 56 dB and 58 dB L_{Aeq,T}, Reference 8.
- 6.5 Sport England recommended noise source level from the use of artificial grass pitches is 58 dB L_{Aeq,T} at 10 m, (Reference 8). The study in Reference 7 and Sport England are consistent.
- 6.6 The source noise levels from the proposed pitches are shown in Table 5. The noise levels used in this report are considered to be prudent as in most of the cases, experience has shown that the noise from the AGP is below the levels used in this assessment.

Parameter	Noise level used in the assessment	Sources
L _{Aeq,T}	58 dB L _{Aeq,T} at 10 m	C. Vaughan, Reference 8; and Sport England, Reference 6

Table 5: Source noise levels of the sports pitches

7 Noise transmission and propagation

7.1 Noise transmission and propagation is modelled using proprietary software, CadnaA, Reference 9. This models noise propagation outdoors according to ISO 9613, Reference 10.

7.2 The model parameters and assumptions are shown in Table 6.

Parameter	Details
Model dimensions	British Transverse Mercator coordinates
Site location and layout	Architects' drawings, Reference 11
Topography	Topography included
Building heights – proposed buildings	Architects' drawings
Building heights – outside of site	8 m for residential dwellings
Building and barrier absorption coefficient	0.21 to represent a reflection loss of 1 dB
G, Ground factor	Hard ground, $G = 0$; Porous ground, $G = 1$ (Rugby pitch, grass land around full weather pitches)
Source height	For sports pitches, 1.5 m to represent height of players' mouth
Max. order of reflections	Three

Table 6: Modelling parameters and assumptions – ISO 9613-2

7.3 An area source has been modelled at both the proposed MUGA locations and the noise impact calculated as shown in Figure 4.

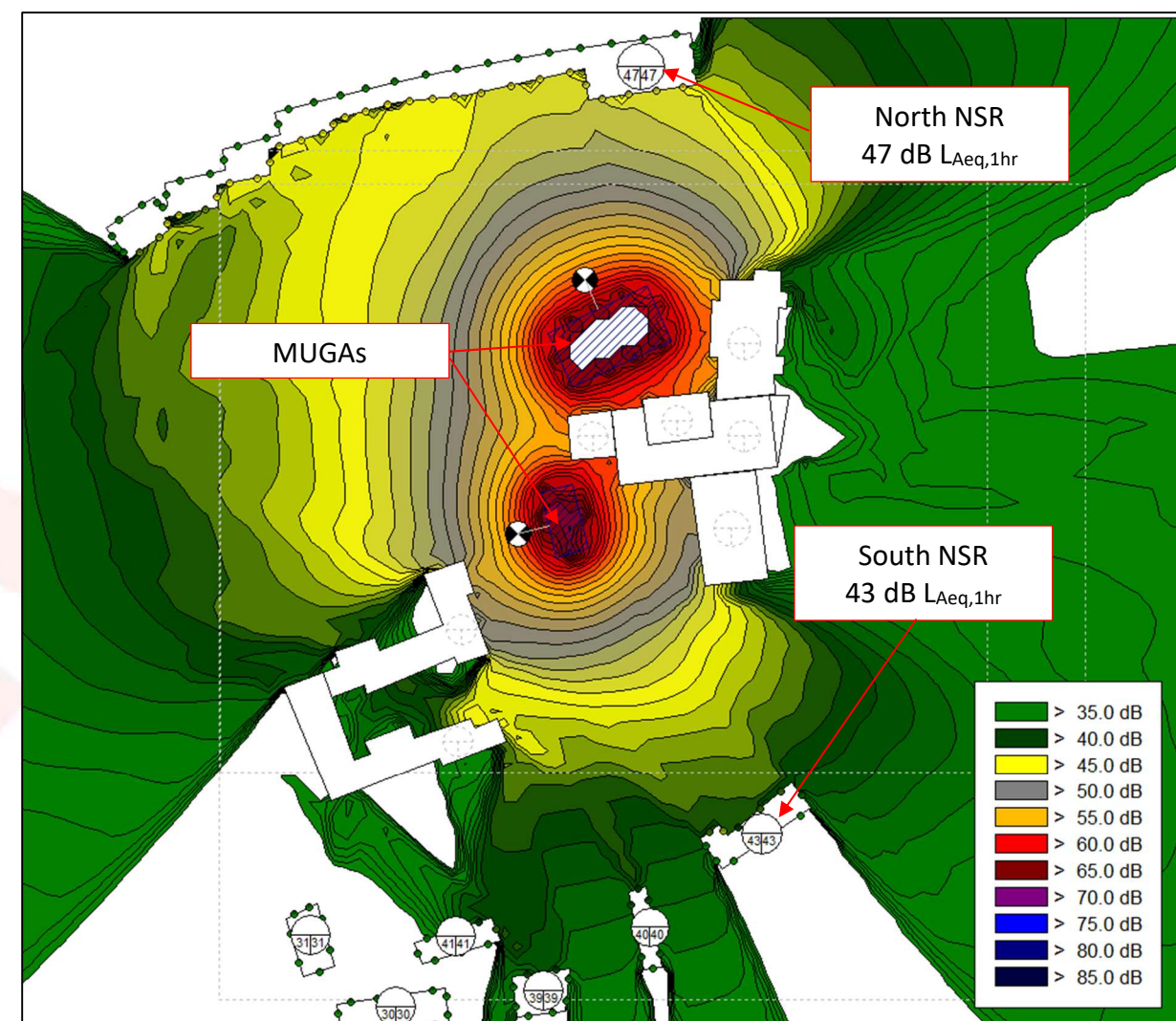


Figure 4: $L_{Aeq,1hr}$ Noise level contour due to proposed MUGAs at 1.5 m above ground

8 Calculated noise levels and assessments

8.1 The calculated noise levels at the noise sensitive receptors (NSR) are shown in Table 7.

Noise source	Calculated noise level at NSR	Assessment criteria	Criteria achieved?
MUGAs	North 47 dB LAeq,1hr	Desirable ≤ 50 dB LAeq,1hr	Yes
	South 43 dB LAeq,1hr		

Table 7: Calculated noise levels

- 8.2 The highest calculated noise levels at the noise sensitive receptors are within the noise limits proposed.
- 8.3 The calculated noise levels indicate that the noise impact is likely to be around Lowest Observed Adverse Effect Level (LOAEL) according to the Noise Policy Statement for England.
- 8.4 On this basis, it is anticipated that Local Authority requirements shall be satisfied.
- 8.5 It is recommended that the measures outlined in the Sports England Design Guidance Note, Reference 6, to control sound from ball impacts are implemented.
- 8.6 Where the MUGAs are intended to be used by community groups during the evenings and weekends, it is recommended that a noise management plan is implemented, including the following:
- a facility for neighbours to report excessive noise or anti-social behaviour directly to the operator of the site and that all such complaints be logged and investigated upon receipt, and appropriate action taken promptly, and the complainant kept informed of progress.
 - a system for training all staff to follow an action plan for dealing with complaints. This would include the ability to warn or ban user groups from the pitches.
 - a method of informing users that swearing and anti-social behaviour is unacceptable, and that the operator of the site reserves the right to dismiss users from the pitch and ban their future use
 - a log of complaints which should be retained for at least a period of two years.

9 External plant noise emissions

- 9.1 Noise emissions from building services plant and equipment to nearby noise sensitive receptors will need to be controlled to meet the Local Authority requirements.
- 9.2 Information available on the Kirklees Council website indicates that the Local Authority would likely require a plant noise rating level outside nearby noise sensitive properties of 5 dB below the existing background sound level, assessed in accordance with BS 4142.
- 9.3 Table 8 summarises the representative background sound levels and rating level limits at the nearest noise sensitive receptors.

Noise sensitive receptor location	Assessment period	Representative background sound level LA90,15min (dB)	Rating level upper limit LA,r,Tr (dB)
Existing residential properties & Christ Church CE Academy	Daytime (07:00 – 23:00 hrs)	40	35
	Night time (23:00 – 07:00 hrs)	38	33

Table 8: Representative background sound levels and plant noise limits

- 9.4 Once the Local Authority requirements are confirmed, building services plant and equipment should be designed accordingly to satisfy the specified limits, including any corrections for tonality, impulsivity or other distinguishing characteristics.

10 Conclusion

- 10.1 Based on the current development proposals, the noise levels from activities associated with the MUGAs are predicted to be below the noise limits proposed within this report for compliance with the aims of the National Planning Policy Framework (NPPF).
- 10.2 At this stage in the development, exact mechanical plant specifications are unavailable; plant noise limits for the cumulative impact of all proposed plant associated with the new teaching block at the nearest noise sensitive location are proposed to reduce the risk of an adverse impact.

11 References

- 1 National Planning Policy Framework, Ministry of Housing, Communities & Local Government, February 2021.
- 2 Noise Policy Statement for England, Department for Environment, Food and Rural Affairs, March 2010.
- 3 BS 4142:2014:A1+2019, Method for rating and assessing industrial and commercial sound.
- 4 World Health Organisation Guidelines for Community Noise, 1999
- 5 BS 8233:2014 Guidance on sound insulation and noise reduction in buildings.
- 6 Sport England: Artificial Grass Pitch (AGP) Acoustics – Planning Implications, New Guidance for 2015.
- 7 BS 7445:2003, Description and measurement of environmental noise. Guide to quantities and procedures.
- 8 The assessment of noise from all-weather sports pitches, Charley Vaughan, IOA Acoustics Bulletin Vol 43 No 1 January/February 2018.
- 9 CadnaA environmental noise modelling software, version 2017, Datakustik GmbH.
- 10 ISO 9613: Acoustics - Attenuation of sound during propagation outdoors.
- 11 Architects drawings: General Arrangement Plan Landscape Layout, Joseph Norton Academy, Deighton, Drawing no. L-2352-GAP-1000, Rev 25, dated 30th August 2023.

Appendix A Noise exposure hierarchy

Planning Practice Guidance - Noise				Significant adverse effect + 10 dB Adverse effect + 5 dB Low Impact 0 dB An initial estimate of the impact of the specific sound may be obtained by subtracting the measured background sound level from the rating level. Typically, the greater this difference, the greater the magnitude of impact
Noise	Example of outcomes	Increasing effect level	Action	
Present and very distributive	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	
Present and distributive	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	
Significant Observed Adverse Effect Level (SOAEL)				
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	
Lowest Observed Adverse Effect Level (LOAEL)				
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	
No Observed Adverse Effect Level (NOAEL)				
Not present	No effect	No Observed Effect	No specific measures required	
No Observed Effect Level (NOEL)				

Table 9: PPG-N Noise Exposure Hierarchy and BS 4142 initial estimate of impact

Appendix B Background sound levels

B.1 The distribution of the background sound levels is shown below.

