
**The East Manchester Academy
Proposed MUGA**

Noise Assessment Report

Project: Proposed MUGA, The East Manchester Academy, Beswick

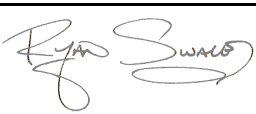
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Authorised by	Ryan Swales, BSc, MIOA Director & Principal Consultant
Signature	

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1. Introduction

- 1.1 RS Acoustic Engineering Ltd have been appointed by Lancaster Maloney Martin on behalf of The East Manchester Academy to undertake a noise impact assessment with regard to a proposed multi-use games area (MUGA) at The East Manchester Academy, Grey Mare Lane, Beswick, Manchester, M11.
- 1.2 The proposals are to create a new MUGA directly adjacent to the large existing MUGA, west of the school buildings. Two small playing courts will be positioned in the north west corner of the site, on the existing sports/playing field. The MUGA will be used for activities such as five-a-side football, basketball, netball and tennis.
- 1.3 The dominant source of noise at the site is a combination of road traffic on the surrounding local road network and intermittent operational noise associated with the school premises.
- 1.4 The nearest noise sensitive receptors are a row of terraced dwellings along Jobling Street to the North.
- 1.5 There will be no fixed building services plant or equipment associated with the new pitches.
- 1.6 Sample noise measurements conducted at similar venues have been used to provide an indication of the resulting sound level at neighbouring dwellings.
- 1.7 This assessment is based on the results of an environmental noise survey undertaken at the site by RS Acoustic Engineering. Continuous sound level monitoring was conducted over a number of days in order to establish the typical acoustic environment during the daytime, evening and night-time period.
- 1.8 The survey and assessment was conducted by Mr Ryan Swales (BSc(Hons), MIOA), Principal Acoustic Consultant and Member of the Institute of Acoustics.
- 1.9 This report presents the results of the noise survey, predicted sound levels at neighbouring dwellings, anticipated impact and recommendations regarding noise mitigation measures.

2. Assessment Guidance & Criteria

National Planning Policy Framework

- 2.1 The latest Planning Policies are included in the National Planning Policy Framework (NPPF) published by the Department for Communities and Local Government (first published March 2012) and updated in July 2021.
- 2.2 The planning policies which relate specifically to noise were updated in July 2021 and are presented in paragraphs 174, 185 and 187 of the document:

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

(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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

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 life;

(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.

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.

Noise Policy Statement for England

- 2.3 The terms ‘significant adverse’ and ‘adverse’ in the NPPF above, are references to the Noise Policy Statement for England (NPSE), published by DEFRA in March 2010.
- 2.4 The first aim of the NPSE is to *Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*
- 2.5 The second aim is to *Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*
- 2.6 The third aim is to *Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.*

- 2.7 Further to the above, the Governments Planning Practice Guidance document updated in July 2019 states:

Noise needs to be considered when development may create additional noise, or would be sensitive to the prevailing acoustic environment (including any anticipated changes to that environment from activities that are permitted but not yet commenced). When preparing plans, or taking decisions about new development, there may also be opportunities to make improvements to the acoustic environment. Good acoustic design needs to be considered early in the planning process to ensure that the most appropriate and cost-effective solutions are identified from the outset.

- 2.8 In addition, the guidance indicates that, whilst noise can override other planning concerns, it is important to look at noise in the context of the wider characteristics of a development proposal, its likely users and its surroundings, as these can have an important effect as to whether or not noise is likely to pose a concern.

World Health Organisation: Guidelines for community noise (1999)

- 2.9 This historical document provides guidelines for community noise in specific environments, suggesting noise levels at which adverse health and annoyance effects are likely. The relevant noise criteria are presented in Table 2.1.

Table 2.1 - Guideline values for community noise in specific environments

Specific environment	Critical health effect(s)	L_{Aeq} (dB)	Time base (hours)	$L_{Amax,fast}$ (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	--
	Moderate annoyance, daytime and evening	50	16	--
Dwelling indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	---

- 2.10 According to the WHO guidance, moderate annoyance is caused by noise levels exceeding 50 dB $L_{Aeq,T}$ dB externally and 35 dB $L_{Aeq,T}$ internally.

British Standard 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

- 2.11 BS 4142 (amended June 2019) describes methods for rating and assessing sound of an industrial and/or commercial nature, such as sound from manufacturing processes and fixed mechanical plant/machinery.

- 2.12 Within Section 1 (Scope), the document states the following:

The standard is not intended to be applied to the rating and assessment of sound from:

a). recreational activities, including all forms of motorsport;

The standard also states: *The standard is not intended to be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels.*

- 2.13 Whilst a comparison with the background sound levels could be undertaken, it is not possible to determine the impact on noise-sensitive properties (dwellings) or the likelihood of complaints from this particular noise source. It is therefore not appropriate to use this standard for the assessment pitch related noise and activity.

3. Environmental Noise Survey

Survey methodology

- 3.1 A baseline noise survey has been conducted over several days in order to establish the prevailing acoustic environment during the daytime, evening and night-time period.
- 3.2 Continuous sound level monitoring was conducted over 54.5 hours near to the school's northern boundary line, directly adjacent to Jobling Street. Measurements were performed from 10:15 hours on Wednesday 29th through to 17:00 hours on Friday 31st March 2023.
- 3.3 The measurement position was considered to be the most secure with regard to leaving the equipment unattended for an extended period and was appropriate for determining the prevailing ambient and background noise climate at the nearest neighbouring dwellings.
- 3.4 A measurement interval of 15-minutes was used during the survey and measurements were considered to be subject to free-field conditions (away from reflective surfaces). Octave-band and A-weighted broadband sound pressure levels were recorded during the survey.
- 3.5 The existing MUGA and external sports facilities are used daily on a relatively frequent basis and therefore make up part of the existing acoustic environment in the local area. The large MUGA is also used for community use in the evening from 18:00 to 22:00 hours. The pitches are used on an hourly basis and during the survey the occupant numbers were approximately 50 to 80 per hour from 18:00 hours onward.
- 3.6 The site location, surrounding area and survey measurement position are shown in Figure 3.1. The existing and proposed site layouts are shown in Appendix A.

Figure 3.1 - Site location and survey measurement position (source: Google Maps)



Survey equipment

- 3.7 The survey was conducted using the following Class 1-specification equipment:
- Brüel & Kjaer 2250-Light data logging sound level meter, microphone type 4189 and pre-amplifier type ZC0032.
 - CEL-120/1 Acoustic calibrator.
- 3.8 Calibration of the sound level meter and microphone used for the measurements are traceable to UKAS accredited laboratories (calibration certificates are presented in Appendix B).
- 3.9 The calibration of both sound level meter and microphone was checked using a 1 kHz tone at 94 dB prior to and following the survey. Calibration drift was less than 0.1 dB.

Weather conditions

- 3.10 The weather conditions during the survey were generally dry and fine with cloud cover ranging from light to thick. Wind speeds measured on site were between 0.6 and 2.8 m/s⁻¹.
- 3.11 The air temperature during the survey ranged between 9°C and 16°C. The weather conditions overall were considered suitable to obtain representative measurements.

Subjective observations of the acoustic environment

- 3.12 A number of site visits were conducted during the daytime and evening period in order to observe the local acoustic environment.
- 3.13 The dominant source of noise at the site is a combination of road traffic on Albert Street, Barmouth Street, Metcombe Way and Grey Mare Lane. Distant road traffic on Alan Turing Way (A6010) to the east also contributes to the prevailing ambient noise at the site.
- 3.14 Noise from the existing sports pitches, playing fields and general school operations also notably contributes to the existing ambient noise climate in the local area.
- 3.15 There was no audible building services (plant) noise at the site boundary or near to neighbouring dwellings.
- 3.16 Other noted noise sources include high altitude aircraft, park related activity to the west, passing pedestrians and intermittent domestic activity at neighbouring dwellings.

Results summary

- 3.17 Table 3.1 overleaf presents a summary of the measured ambient L_{Aeq} sound pressure levels from the continuous monitoring position. Measured values have been rounded to the nearest whole number.
- 3.18 $L_{Aeq,T}$ is the A-weighted equivalent continuous sound pressure level over a period of time, T. Representative of the 'average' sound pressure level over a given period (used to describe the ambient sound level).
- 3.19 Sound pressure level measurements are taken with an A-weighting (denoted by a subscript 'A', e.g. L_{Aeq}) to approximate the frequency response of the human ear.

Table 3.1 - Summary of continuously measured ambient L_{Aeq} sound pressure levels

Date	Period	Duration, T (hours)	Average $L_{Aeq,T}$ dB	Lowest $L_{Aeq,15min}$ dB	Highest $L_{Aeq,15min}$ dB
Wednesday 29/03/2023	Daytime (10:15-23:00)	12.75	55	50	59
	Night-time (23:00-07:00)	8	48	43	53
Thursday 30/03/2023	Daytime (07:00-23:00)	16	56	47	63
	Night-time (23:00-07:00)	8	47	44	53
Friday 31/03/2023	Daytime (07:00-17:00)	10	54	50	63

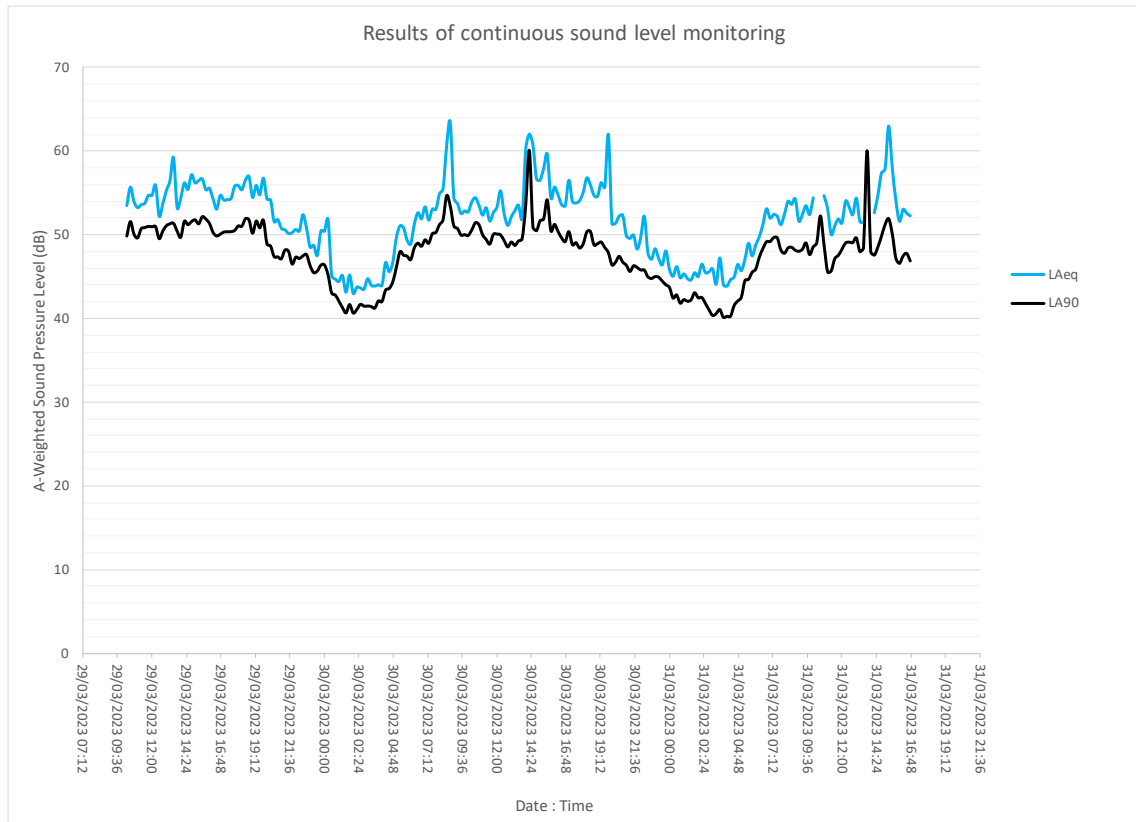
- 3.20 The average ambient sound pressure level ranged between 54 to 56 dB $L_{Aeq,T}$ during the daytime and 47 to 48 dB $L_{Aeq,T}$ during the night-time.
- 3.21 In terms of fifteen-minute sound pressure levels, the measured values ranged between 47 to 63 dB $L_{Aeq,15min}$ during the daytime and 43 to 53 dB $L_{Aeq,15min}$ during the night-time.
- 3.22 In terms of hourly ambient sound pressure levels, the measured values were 49 to 60 dB $L_{Aeq,60min}$ during the daytime and 43 to 51 dB $L_{Aeq,60min}$ during the night-time.
- 3.23 Table 3.2 presents a summary of the measured background L_{A90} sound pressure levels from the continuous monitoring position. Measured values have been rounded to the nearest whole number.

Table 3.2 - Summary of continuously measured background L_{A90} sound pressure levels

Date	Period	Duration, T (hours)	Typical ¹ $L_{A90,15min}$ dB	Lowest $L_{A90,15min}$ dB	Highest $L_{A90,15min}$ dB
Wednesday 29/03/2023	Daytime (10:15-23:00)	12.75	50	46	52
	Night-time (23:00-07:00)	8	41	41	49
Thursday 30/03/2023	Daytime (07:00-23:00)	16	49	45	60
	Night-time (23:00-07:00)	8	42	40	49
Friday 31/03/2023	Daytime (07:00-17:00)	10	48	46	60
¹ The most commonly occurring background sound level (from a statistical analysis)					

- 3.24 With regard to the maximum L_{AFmax} sound pressure levels, during the daytime period the measured maximum sound pressure level ranged between 58 to 84 dB $L_{AFmax,15min}$ and the average sound pressure level was 70 to 71 dB $L_{AFmax,15min}$.
- 3.25 The results of the continuous monitoring are presented graphically in Figure 3.2. Additional tabulated survey data is presented in Appendix C.

Figure 3.2 - Graph showing results of continuous sound level monitoring

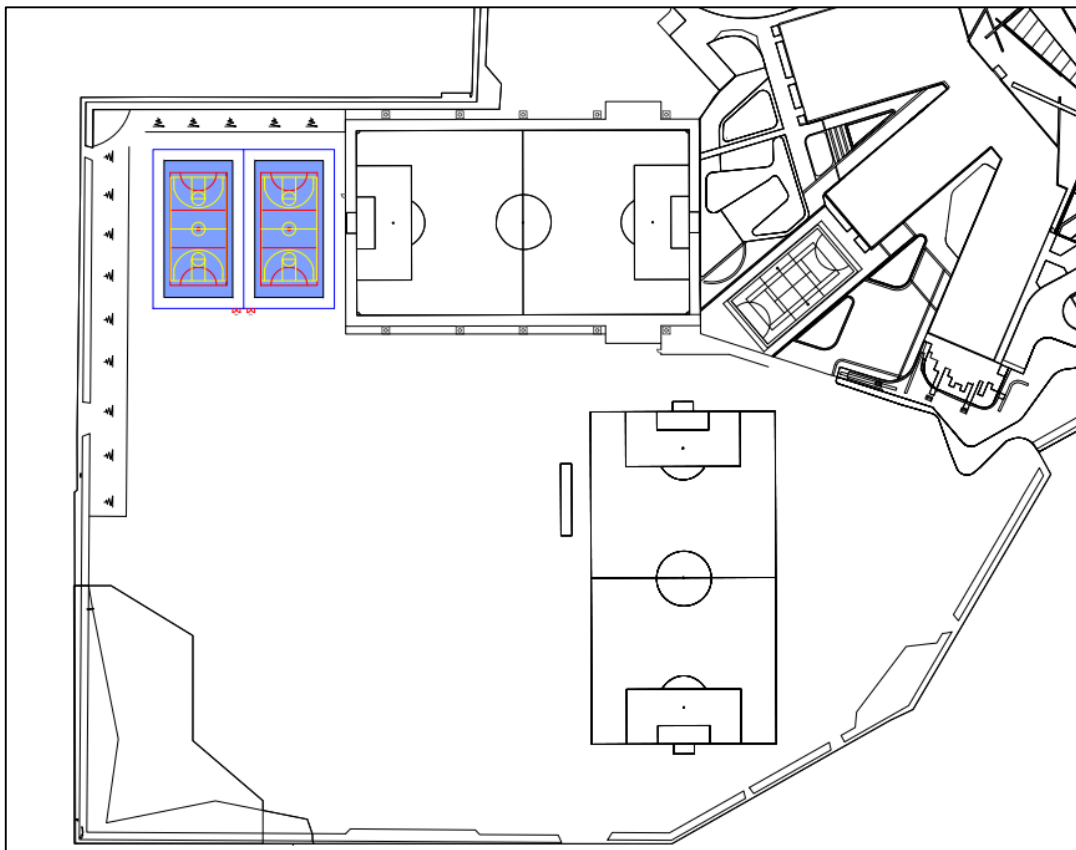


4. Assessment & Discussion

Nearest noise-sensitive receptors and separation distance

- 4.1 The nearest noise-sensitive properties to the proposed courts are a row of terraced dwellings along Jobling Street to the north of the playing fields and existing MUGA.
- 4.2 The shortest distance between the dwellings on Jobling Street (to the property frontages) and the northern edge of the court is approximately 25 metres. The separation distance between the dwellings and the mid-point (centre) of the courts is approximately 50 metres.
- 4.3 There are also a number of dwellings located to the south west of the site along Barmouth Street, however the separation distance is notably greater at approximately 85 to 90 metres to the court mid-point.
- 4.4 Figure 4.1 shows the positioning of the proposed sports courts in relation to the existing MUGA, outdoor sports facilities and existing school buildings.

Figure 4.1 - Proposed pitch layout



Existing ambient sound levels

- 4.5 The average ambient sound pressure level ranged between 54 to 56 dB $L_{Aeq,T}$ during the daytime period (07:00 to 23:00 hours).
- 4.6 In terms of hourly ambient sound pressure levels, the measured values were 49 to 60 dB $L_{Aeq,60min}$ during the daytime period.
- 4.7 Between 07:00 and 18:00 hours (approximate school hours), the hourly ambient sound pressure levels were 52 to 60 dB $L_{Aeq,60min}$ and the fifteen-minute ambient sound pressure levels were 50 to 63 dB $L_{Aeq,15min}$.

- 4.8 Between 18:00 and 23:00 hours, the hourly ambient sound pressure levels were 49 to 58 dB $L_{Aeq,60min}$ and the fifteen-minute ambient sound pressure levels were 47 to 62 dB $L_{Aeq,15min}$.

Resulting sound levels from proposed MUGA

- 4.9 It is anticipated that the courts will typically be used for five-a-side football, basketball, tennis and netball matches/training.
- 4.10 For this assessment, it is considered appropriate to use previously measured sound levels from similar venues, with a number of football matches and basketball training taking place over 60 minute periods.
- 4.11 Previous sample measurements indicate equivalent continuous sound pressure levels ranging between 56 to 58 dB $L_{Aeq,60min}$ at a distance of approximately 25 metres from the pitch centre-point. The microphone was positioned at the pitch edge near to the halfway line.
- 4.12 The main sources of noise associated with a football or basketball game are the participant's voices, intermittent whistles and ball impact. It should be noted that the resulting sound level does not necessarily increase with an increase in the number of participants, since not every participant will make noise simultaneously.
- 4.13 Adopting standard acoustic principles for determining the attenuation of sound over distance for a point source (i.e. 6 dB of attenuation per doubling of distance), it is reasonable to assume that sound attenuation of approximately 6 dB will be achieved over a separation distance of 50 metres.
- $20 \log (25 \text{ metres}/50 \text{ metres}) = -6 \text{ dB}$
- 4.14 Sound attenuation due to ground and atmospheric absorption is considered negligible at this separation distance.
- 4.15 Taking into consideration the potential sound level generated and the separation distance involved, the resulting sound pressure level at the nearest dwelling is approximately 50 to 52 dB $L_{Aeq,60min}$.
- $56 \text{ dB } L_{Aeq,60min} - 6 \text{ dB (distance)} = 50 \text{ dB } L_{Aeq,60min}$
 - $58 \text{ dB } L_{Aeq,60min} - 6 \text{ dB (distance)} = 52 \text{ dB } L_{Aeq,60min}$
- 4.16 The average ambient sound pressure level ranged between 54 to 56 dB $L_{Aeq,T}$ over the full daytime period. However, a more robust approach is to compare the 'hourly' ambient sound pressure levels, which will be lower than those averaged over the full daytime period. Matches and training sessions are also expected to take place over a duration of approximately one hour.
- 4.17 Between 07:00 and 18:00 hours (school hours), the hourly ambient sound pressure levels were 52 to 60 dB $L_{Aeq,60min}$.
- 4.18 The MUGA generated sound pressure level is therefore below, or of a similar magnitude, to the lowest hourly ambient sound pressure level between 07:00 and 18:00 hours. The increase in the current ambient sound level would therefore be marginal.
- 4.19 On this basis, intermittent noise from the MUGA is expected to have a low to negligible impact at the nearest dwellings. Noise related disturbance and annoyance is considered unlikely.
- 4.20 Noise mitigation measures such as installing an acoustic barrier to the boundary line are considered to be unnecessary for MUGA related use during the morning and afternoon period.

Resulting sound levels during the evening period

- 4.21 With regard to the evening period, the hourly ambient sound pressure level reduces slightly by approximately 3 dB between 18:00 to 23:00 hours (to circa 49 dB $L_{Aeq,60min}$).
- 4.22 In this instance, the generated sound pressure level from the MUGA is above the lowest hourly ambient sound pressure level by approximately 1 to 3 dB. The addition of this noise source could also potentially increase the lowest ambient sound level by approximately 4 to 5 dB (i.e. the total ambient sound level would be circa 53 to 54 dB $L_{Aeq,60min}$ as opposed to 49 dB $L_{Aeq,60min}$).
- 4.23 Noise from the MUGA is therefore likely to be audible and distinct in character during the late evening period.
- 4.24 In addition, during the warmer months when windows are likely to be open to provide room cooling and ventilation to front habitable rooms, the resulting ambient sound level could cause low to moderate annoyance for the occupants of the dwellings on Jobling Street.
- 4.25 On this basis, it is therefore recommended that an appropriate noise barrier be installed between the MUGA and the dwellings should the intention be to provide the MUGA for community related use during the evening hours.

Potential noise mitigation measures

- 4.26 One potential mitigation option is to install a timber noise barrier adjacent to the northern boundary line as shown in Figure 4.2.

Figure 4.2 - Potential noise barrier location



- 4.27 There is currently a section of solid timber fencing approximately 2 metres in height along Jobling Street that could be replaced or merged with the new timber barrier as appropriate. The timber fencing currently changes to a metal mesh fence of a similar height as shown below in Figure 4.3.

Figure 4.3 - Photograph showing existing timber and metal mesh fencing



- 4.28 It is estimated that the timber barrier would need to be approximately 4 metres high to be effective.
- 4.29 Indicative calculations have been undertaken in order to determine the potential sound attenuation achievable from an effective barrier along the boundary.
- 4.30 A barrier height of 4 metres and a receptor height of 4 metres above ground (i.e. first floor bedroom window) have been assumed for the calculation. The source height is assumed to be approximately 1.65 metres above ground (to represent a tall person standing).
- 4.31 Table 4.1 presents a results summary for the barrier calculation. Octave-band sound level data has been used in the calculation since barrier attenuation is frequency dependent.

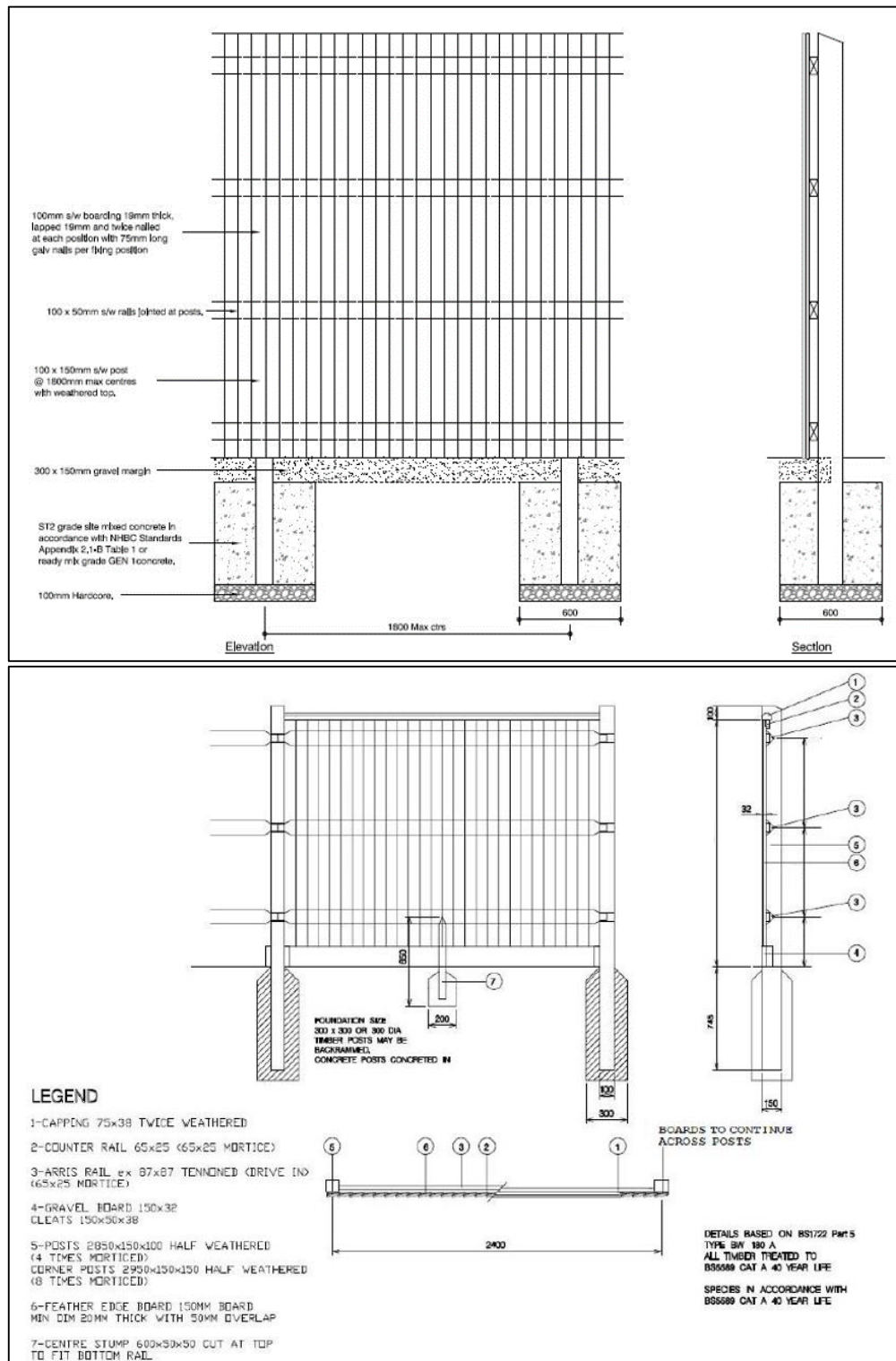
Table 4.1 - Predicted sound attenuation with a 4 metre high noise barrier

Frequency (Hz)	63	125	250	500	1000	2000	4000	L _{Aeq} dB
Male raised voice at 1 metre dB	56	56	68	81	74	65	61	80
Barrier attenuation dB	5	5	6	6	8	9	12	---
Resulting sound level L _{eq} dB	51	51	62	75	66	56	49	73

- 4.32 The barrier calculation indicates sound attenuation of approximately 7 dB L_{Aeq,T}.
- 4.33 The calculation above assumes that the noise source is positioned at the approximate mid-point of the court.
- 4.34 When the calculations are repeated for the noise source positioned near to the northern edge of the court (and therefore close to the barrier), the level of sound attenuation provided by the barrier increases to approximately 12 dB.
- 4.35 Similarly, if the receptor position is considered to be the ground floor window, as opposed to the first floor window, the level of sound attenuation increases from 7 to 12 dB to approximately 12 to 15 dB.
- 4.36 Where the barrier is expected to provide sound attenuation of approximately 7 to 12 dB (i.e. at first floor windows), the resulting source sound level would reduce to approximately 38 to 45 dB L_{Aeq,60min}.

- 4.37 In this instance, the resulting sound level would be approximately 4 to 11 dB below the lowest hourly ambient sound pressure level during the late evening period (49 dB $L_{Aeq,60min}$).
- 4.38 On this basis, intermittent noise from the new MUGA would have a negligible impact at the nearest dwellings. Noise related disturbance and annoyance is considered unlikely.
- 4.39 The barrier should be imperforate, sealed at the base, sealed between panels (no gaps) and have a mass per unit area of at least 12.5 kg/m². Hit and miss fencing, slatted fencing, waney lap fencing and foliage do not make effective noise barriers.
- 4.40 The timber barrier will also provide a degree of visual privacy between the MUGA and the windows to the front elevations along Jobling Street.
- 4.41 Further guidance regarding the barrier height and construction can be provided once the finished site level is known and the court location finalised. For guidance, example acoustic timber fence construction details are provided overleaf in Figure 4.4.
- 4.42 Alternative constructions may be acceptable, subject to the approval of the local authority and/or project acoustician.

Figure 4.4 - Example acoustic fence construction details



5. Conclusion

- 5.1 Continuous sound level monitoring has been conducted over a number of days in order to establish the existing acoustic environment during the daytime and late evening period at the nearest dwellings.
- 5.2 During the daytime, the average ambient sound pressure level ranged between 54 to 56 dB $L_{Aeq,T}$ and in terms of hourly ambient sound pressure levels, the measured values were 49 to 60 dB $L_{Aeq,60min}$.
- 5.3 An assessment of hourly ambient sound pressure levels has been undertaken, since this is considered to be a more robust approach than comparing the source sound levels with the average ambient sound levels over the full daytime period.
- 5.4 The predicted sound pressure level generated by the MUGA is below, or of a similar magnitude, to the lowest hourly ambient sound pressure level between 07:00 and 18:00 hours. The increase in the current ambient sound level would therefore be marginal.
- 5.5 During typical school hours, intermittent noise from the MUGA is expected to have a low to negligible impact at the nearest dwellings. Noise related disturbance and annoyance is considered unlikely.
- 5.6 Noise mitigation measures such as installing an acoustic barrier to the boundary line are considered to be unnecessary for MUGA related use during the morning and afternoon period.
- 5.7 With regard to the evening period, the hourly ambient sound pressure level reduces slightly by approximately 3 dB between 18:00 to 23:00 hours (to circa 49 dB $L_{Aeq,60min}$).
- 5.8 In this instance, the generated sound pressure level from the MUGA is above the lowest hourly ambient sound pressure level by approximately 1 to 3 dB. Noise from the MUGA is therefore likely to be audible and distinct in character during the late evening period.
- 5.9 It is therefore recommended that an appropriate noise barrier be installed between the MUGA and the dwellings on Jobling Street, should the intention be to provide the MUGA for community related use during the evening hours.

Appendix A

Existing and proposed site plans

Figure A.1 - Location plan

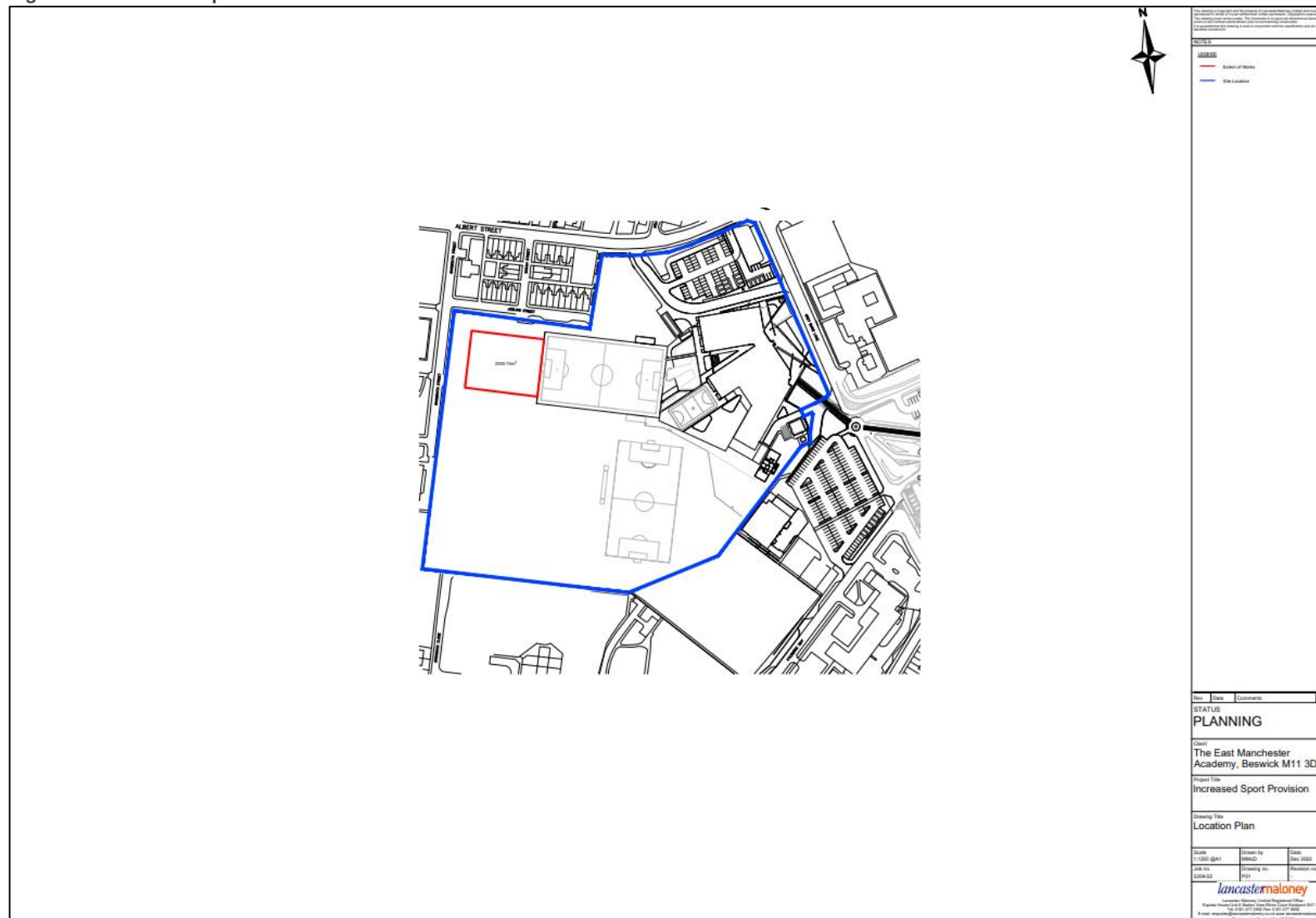


Figure A.2 - Existing site plan

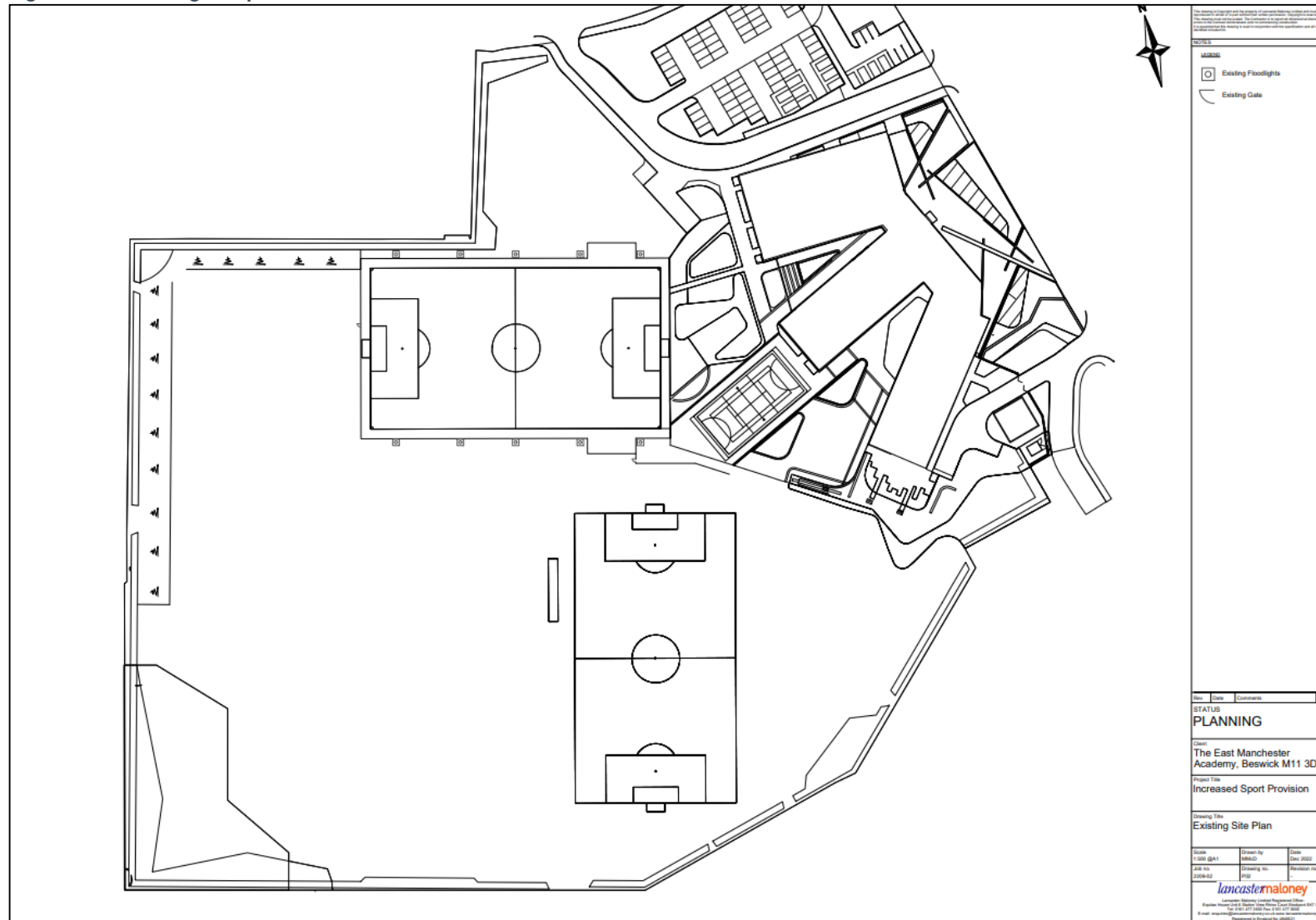


Figure A.3 - Proposed site plan

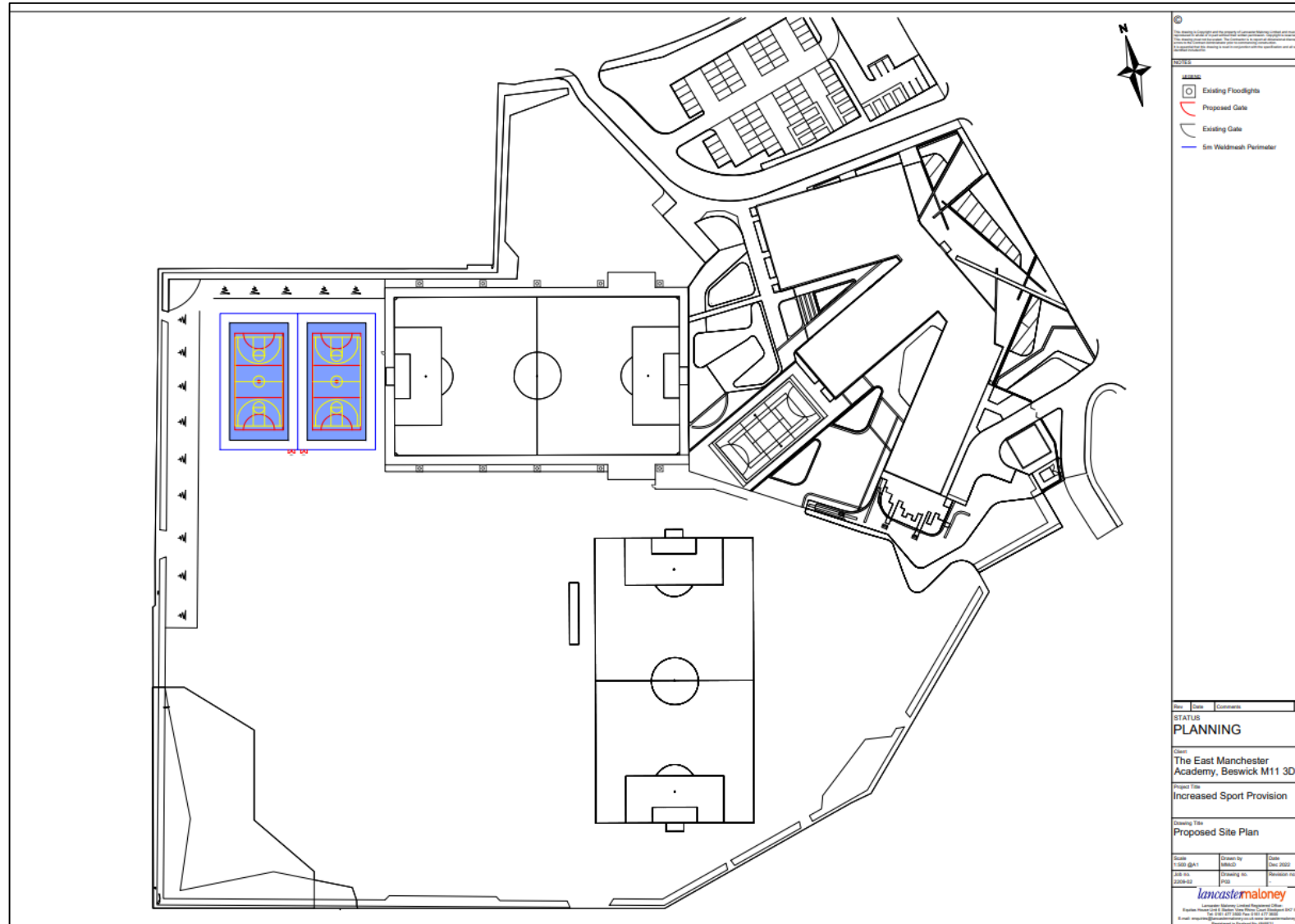


Figure A.4 - Line marking layout

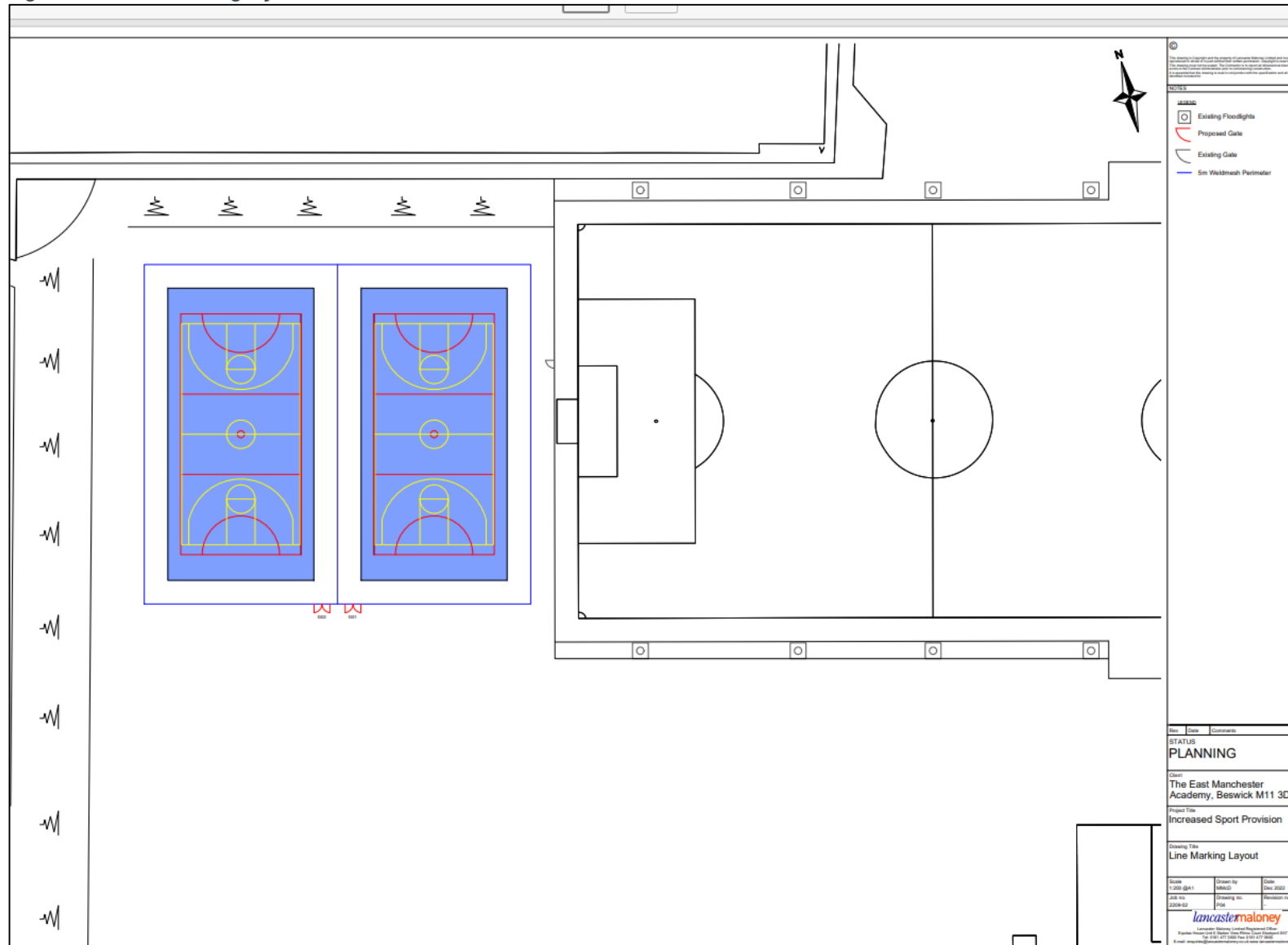
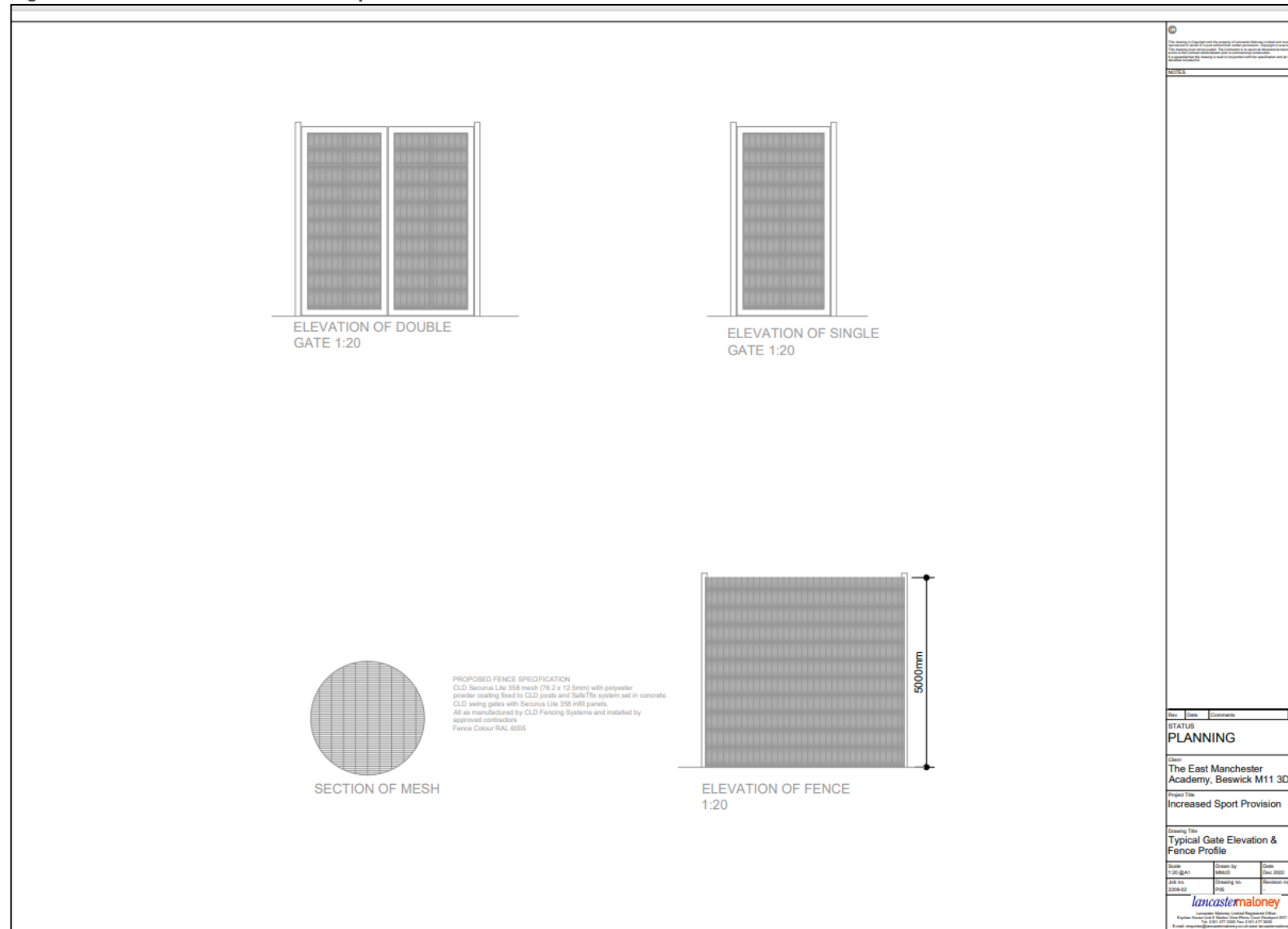


Figure A.5 - Gate elevation and fence profile



Appendix B

Equipment calibration certificates



Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

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APPROVED SIGNATORIES

Claire Lomax [] Harry Bulger [x]
Gary Phillips [] Daniel Wong-McSweeney []

acoustic calibration laboratory

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t 0161 295 3030/0161 295 3319 f 0161 295 4456 e c.lomax1@salford.ac.uk



0801

University of
Salford
MANCHESTER

Certificate Number: 06067/1

Date of Issue: 25 January 2023

PERIODIC TEST OF A SOUND LEVEL METER to IEC 61672-3:2006

FOR:	RS Acoustic Engineering Ltd 76 Marple Road Stockport Cheshire SK2 5QH
FOR THE ATTENTION OF:	Ryan Swales
DATE RECEIVED:	10 January 2023
PERIODIC TEST DATE:	25 January 2023
LOCATION OF CALIBRATION:	Acoustic Calibration Laboratory, Newton G31, University of Salford
TEST PROCEDURE:	CTP12 (Laboratory Manual)

Sound Level Meter Details-

Manufacturer	B&K
Model	2250L
Serial number	2638934
Class	1
Hardware version: 2.0	Sound Level Meter Software: BZ7130 Version 3.1

Associated Items:-

Type	Manufacturer	Model	Serial Number
Microphone	B&K	4189	2643196
Preamplifier	B&K	ZC 0032	8938

Test Engineer (initial):	GP	Name:	Gary Phillips
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Results in this certificate relate only to instruments tested.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

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UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

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Certificate Number: 06067/1

Date of Issue: 25 January 2023

Procedures from IEC 61672-3: 2006 and TPS 49 Edition 2 June 2009 were used to perform the periodic tests.

The manufacturer's instruction manual was marked as follows: B&K 2250-L with mic 4950 BE 1774-11 June 2007 From hardware version 2.0.

Adjustment data used to adjust the sound levels indicated in response to the application of an electrostatic actuator to sound levels equivalent to those that would be indicated in response to plane, progressive sound waves were obtained from the manufacturer's instruction manual referred to in this certificate.

The sound level meter calibration check frequency is 1000 Hz, the reference sound pressure level is 94 dB. As this instrument only has a single range, this range is the reference level range.

The environmental conditions in the laboratory at the start of the test were:

Static pressure 102.702 kPa $\pm$ 0.013 kPa; air temperature 22.0 °C $\pm$ 0.3 °C; relative humidity 40.1 % $\pm$ 2.6 %.

The initial response of the instrument to application of the suitable laboratory sound calibrator was 93.8 dB (C). The instrument was then adjusted to indicate 94.0 dB (C).

This indication was obtained from the calibration certificate of the calibrator and information in the manufacturer's instruction manual specified in this certificate, when the instrument is configured as follows; Transd. Used 4189 (2643196), Sound Field Correction: Free-field, Windscreen Correction: None. The instrument was calibrated without a windscreen. Consult manufacturer's instructions if using a windscreen.

With the microphone installed the level of self-generated noise was:

A: 16.5 dB

With the microphone replaced by an electrical input device with a similar capacitance to the supplied microphone, the levels of self-generated noise were:

A: 13.1 dB

B: 12.3 dB

C: 13.9 dB

Z: 19.1 dB

The environmental conditions in the laboratory at the end of the test were:

Static pressure 102.458 kPa $\pm$ 0.013 kPa; air temperature 22.7 °C $\pm$ 0.3 °C; relative humidity 39.9 % $\pm$ 2.6 %.

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

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Certificate Number: 06067/1

Date of Issue: 25 January 2023

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

The microphone corrections applied as specified in 12.6 of IEC 61672-3:2006 were obtained from a frequency response measured by this Laboratory using the electrostatic actuator method. This response in isolation is not covered by our UKAS accreditation.

Instruments used in the verification procedure were traceable to *National Standards*. The electrostatic actuator method was employed in the acoustical tests of a frequency weighting.

The uncertainty evaluation has been carried out in accordance with UKAS requirements. All measurement results are retained at the acoustic calibration laboratory for at least four years.

-----END OF CERTIFICATE-----

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to the units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full except with the prior written approval of the issuing laboratory.

Appendix C

Tabulated survey results

Start Date & Time	LAFmax,15min dB	LAeq,15min dB	LA90,15min dB
29/03/2023 10:15	64.11	53.51	49.82
29/03/2023 10:30	73.98	55.71	51.56
29/03/2023 10:45	67.33	53.97	50.03
29/03/2023 11:00	73.87	53.26	49.6
29/03/2023 11:15	68.29	53.61	50.7
29/03/2023 11:30	69.61	53.78	50.83
29/03/2023 11:45	70.25	54.72	50.98
29/03/2023 12:00	71.88	54.73	50.93
29/03/2023 12:15	82.94	55.94	50.95
29/03/2023 12:30	65.77	52.24	49.5
29/03/2023 12:45	68.77	53.68	50.41
29/03/2023 13:00	73.82	55.3	51.05
29/03/2023 13:15	72.19	56.48	51.28
29/03/2023 13:30	78.65	59.24	51.35
29/03/2023 13:45	66.38	53.26	50.4
29/03/2023 14:00	69.48	54.39	49.67
29/03/2023 14:15	71.99	56.22	51.58
29/03/2023 14:30	75.95	55.42	51.18
29/03/2023 14:45	75.62	57.2	51.55
29/03/2023 15:00	74.29	56.22	51.76
29/03/2023 15:15	74.98	56.5	51.28
29/03/2023 15:30	73.2	56.69	52.14
29/03/2023 15:45	70.25	55.4	51.85
29/03/2023 16:00	74.94	55.56	51.33
29/03/2023 16:15	70.3	54.3	50.25
29/03/2023 16:30	67.2	53.07	49.83
29/03/2023 16:45	76.49	54.73	50.04
29/03/2023 17:00	71.56	54.17	50.3
29/03/2023 17:15	72.82	54.22	50.33
29/03/2023 17:30	70.04	54.34	50.35
29/03/2023 17:45	76.83	55.82	50.49
29/03/2023 18:00	70.09	55.91	51.03
29/03/2023 18:15	70.72	55.39	51
29/03/2023 18:30	68.41	56.56	51.89
29/03/2023 18:45	71.9	56.98	51.75
29/03/2023 19:00	72.47	54.48	50.15
29/03/2023 19:15	71.21	55.93	51.61
29/03/2023 19:30	72.69	54.79	50.8
29/03/2023 19:45	75.72	56.79	51.71
29/03/2023 20:00	70.08	54.31	48.88
29/03/2023 20:15	73.18	54.15	48.63
29/03/2023 20:30	66.28	51.57	47.35
29/03/2023 20:45	67.76	51.83	47.33
29/03/2023 21:00	67.93	50.78	47.1

Start Date & Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A90,15min} dB
29/03/2023 21:15	64.23	50.6	48.14
29/03/2023 21:30	70.26	50.15	48
29/03/2023 21:45	65.1	50.25	46.46
29/03/2023 22:00	67.65	50.65	47.29
29/03/2023 22:15	67.2	50.46	47.13
29/03/2023 22:30	71.37	52.41	47.44
29/03/2023 22:45	69.63	50.8	47.6
29/03/2023 23:00	63.19	48.52	46.27
29/03/2023 23:15	69.55	48.75	45.44
29/03/2023 23:30	62.54	47.53	45.63
29/03/2023 23:45	77.1	50.47	46.33
30/03/2023 00:00	70.09	50.43	46.36
30/03/2023 00:15	66.79	51.82	45.16
30/03/2023 00:30	68.39	45.09	42.99
30/03/2023 00:45	61.2	44.7	42.76
30/03/2023 01:00	59.33	44.41	42.03
30/03/2023 01:15	63.33	45.13	41.25
30/03/2023 01:30	57.05	43.12	40.61
30/03/2023 01:45	63.35	45.19	41.62
30/03/2023 02:00	56.57	42.98	40.59
30/03/2023 02:15	58.78	43.73	41.02
30/03/2023 02:30	56.87	43.63	41.64
30/03/2023 02:45	56.51	43.49	41.42
30/03/2023 03:00	58.35	44.74	41.44
30/03/2023 03:15	53.71	43.96	41.38
30/03/2023 03:30	58.85	43.87	41.19
30/03/2023 03:45	57.55	44.02	42.05
30/03/2023 04:00	54.36	43.94	41.97
30/03/2023 04:15	68.33	46.67	43.34
30/03/2023 04:30	57.37	45.58	43.54
30/03/2023 04:45	66.92	46.68	44.31
30/03/2023 05:00	65.51	49.66	46.06
30/03/2023 05:15	61.36	51.06	47.93
30/03/2023 05:30	68.18	50.86	47.53
30/03/2023 05:45	66.58	49.35	47.41
30/03/2023 06:00	59.45	48.92	46.99
30/03/2023 06:15	65.83	51.26	48.41
30/03/2023 06:30	68.11	52.64	48.97
30/03/2023 06:45	67.18	51.91	48.6
30/03/2023 07:00	71.65	53.35	49.37
30/03/2023 07:15	64.74	51.76	48.95
30/03/2023 07:30	67.72	53.09	50.09
30/03/2023 07:45	67.53	53.06	50.25
30/03/2023 08:00	67.18	54.91	51.19
30/03/2023 08:15	69.17	55.56	51.77

Start Date & Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A90,15min} dB
30/03/2023 08:30	71.69	60.67	54.66
30/03/2023 08:45	77.56	63.44	53.41
30/03/2023 09:00	73.35	54.41	51.03
30/03/2023 09:15	67.75	53.76	50.73
30/03/2023 09:30	68.39	52.56	49.94
30/03/2023 09:45	65.17	52.86	49.99
30/03/2023 10:00	65.77	52.75	49.89
30/03/2023 10:15	71	53.95	50.56
30/03/2023 10:30	68.67	54.44	51.42
30/03/2023 10:45	66.3	53.52	51.17
30/03/2023 11:00	66.65	52.36	49.97
30/03/2023 11:15	73.74	53.24	49.4
30/03/2023 11:30	65.66	51.65	48.86
30/03/2023 11:45	65.96	52.68	50.03
30/03/2023 12:00	69.11	53.31	50.06
30/03/2023 12:15	79.21	55.27	49.95
30/03/2023 12:30	66.95	52.52	49.27
30/03/2023 12:45	64.75	51.13	48.52
30/03/2023 13:00	66.4	52.16	49.1
30/03/2023 13:15	70.12	52.9	48.7
30/03/2023 13:30	73.61	53.56	49.24
30/03/2023 13:45	73.79	51.97	49.49
30/03/2023 14:00	71.57	60.26	53.53
30/03/2023 14:15	69.65	62.06	60.07
30/03/2023 14:30	77.12	60.78	50.9
30/03/2023 14:45	83.37	56.7	50.46
30/03/2023 15:00	71.39	56.54	51.66
30/03/2023 15:15	73.97	57.96	51.88
30/03/2023 15:30	93.2	59.66	54.15
30/03/2023 15:45	71.69	54.44	50.45
30/03/2023 16:00	71.63	55.72	51.22
30/03/2023 16:15	70.92	54.77	50.36
30/03/2023 16:30	66.89	53.6	49.58
30/03/2023 16:45	71.45	53.49	49.16
30/03/2023 17:00	79.46	56.53	50.35
30/03/2023 17:15	69.43	53.98	48.78
30/03/2023 17:30	71.95	53.81	49.03
30/03/2023 17:45	73.72	54.1	48.38
30/03/2023 18:00	73.62	55.1	48.89
30/03/2023 18:15	74.78	56.83	50.31
30/03/2023 18:30	72.71	55.95	50.37
30/03/2023 18:45	73.13	54.71	48.76
30/03/2023 19:00	72.66	54.63	48.9
30/03/2023 19:15	75.52	56.26	49.1
30/03/2023 19:30	71.98	55.71	48.45

Start Date & Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A90,15min} dB
30/03/2023 19:45	83.02	62	47.83
30/03/2023 20:00	71.54	51.33	46.37
30/03/2023 20:15	67.59	51.38	46.7
30/03/2023 20:30	68.18	52.24	47.39
30/03/2023 20:45	72.21	52.33	46.7
30/03/2023 21:00	69.04	49.9	46.32
30/03/2023 21:15	63.84	49.57	45.58
30/03/2023 21:30	65.23	49.96	46.25
30/03/2023 21:45	60.51	48.29	46.06
30/03/2023 22:00	67.61	49.7	45.75
30/03/2023 22:15	67.52	52.23	45.74
30/03/2023 22:30	58.18	47.82	44.94
30/03/2023 22:45	60.74	47.06	44.74
30/03/2023 23:00	69.72	48.33	44.96
30/03/2023 23:15	60.27	47.15	44.89
30/03/2023 23:30	58.36	46.4	44.42
30/03/2023 23:45	70.72	48.07	43.98
31/03/2023 00:00	58.86	45.85	43.66
31/03/2023 00:15	58.27	45.03	42.39
31/03/2023 00:30	61.03	46.2	42.77
31/03/2023 00:45	64.28	44.85	41.78
31/03/2023 01:00	57.75	45.32	42.21
31/03/2023 01:15	57.1	44.76	42.01
31/03/2023 01:30	55.86	44.6	42.17
31/03/2023 01:45	60.83	45.46	43.03
31/03/2023 02:00	60	45.01	42.42
31/03/2023 02:15	64.2	46.48	42.46
31/03/2023 02:30	55.21	45.47	41.75
31/03/2023 02:45	59.26	45.56	40.98
31/03/2023 03:00	64.65	45.92	40.31
31/03/2023 03:15	56.82	44.08	40.53
31/03/2023 03:30	64.87	47.23	41.02
31/03/2023 03:45	59.76	44.03	40.09
31/03/2023 04:00	72.81	43.85	40.21
31/03/2023 04:15	60.64	44.63	40.22
31/03/2023 04:30	59.52	44.95	41.5
31/03/2023 04:45	63.68	46.45	42.04
31/03/2023 05:00	54.72	45.72	42.49
31/03/2023 05:15	59.12	47.07	44.48
31/03/2023 05:30	68.14	48.97	44.63
31/03/2023 05:45	59.23	47.47	45.48
31/03/2023 06:00	65.09	48.79	45.86
31/03/2023 06:15	65.41	49.78	47.29
31/03/2023 06:30	65.27	51.25	48.32
31/03/2023 06:45	76.35	53.12	49.13

Start Date & Time	L _{AFmax,15min} dB	L _{Aeq,15min} dB	L _{A90,15min} dB
31/03/2023 07:00	63.67	52	49.16
31/03/2023 07:15	67.84	52.43	49.63
31/03/2023 07:30	64.63	52.23	49.6
31/03/2023 07:45	65.58	51.22	48.15
31/03/2023 08:00	66.72	52.48	47.76
31/03/2023 08:15	74.7	54.01	48.4
31/03/2023 08:30	67.35	53.64	48.47
31/03/2023 08:45	67.75	54.3	48.12
31/03/2023 09:00	69.05	51.65	48
31/03/2023 09:15	69.24	52.44	48.24
31/03/2023 09:30	66.6	53.49	49
31/03/2023 09:45	69.62	52.43	47.6
31/03/2023 10:00	71.33	54.43	48.53
31/03/2023 10:15	Helicopter landing on school fields		
31/03/2023 10:30	Helicopter landing on school fields		
31/03/2023 10:45	72	54.69	48.78
31/03/2023 11:00	77.47	53.12	45.53
31/03/2023 11:15	66.6	50.04	45.64
31/03/2023 11:30	64.68	51.09	47.11
31/03/2023 11:45	72.79	51.9	47.51
31/03/2023 12:00	64.7	51.42	48.24
31/03/2023 12:15	71.84	54.02	48.99
31/03/2023 12:30	67.79	53.33	49.09
31/03/2023 12:45	67.25	52.41	49.04
31/03/2023 13:00	70.92	54.38	49.6
31/03/2023 13:15	65.83	51.58	47.94
31/03/2023 13:30	68.69	51.54	48.44
31/03/2023 13:45	Helicopter take-off from school fields		
31/03/2023 14:00	Helicopter take-off from school fields		
31/03/2023 14:15	68.82	52.64	47.53
31/03/2023 14:30	72.27	54.75	48.52
31/03/2023 14:45	84.11	57.42	49.81
31/03/2023 15:00	72.84	57.9	51.2
31/03/2023 15:15	80.15	63.02	51.9
31/03/2023 15:30	74.61	58	50.07
31/03/2023 15:45	71.3	54.12	47.16
31/03/2023 16:00	71.64	51.62	46.55
31/03/2023 16:15	73.25	53.05	47.42
31/03/2023 16:30	69.03	52.58	47.74
31/03/2023 16:45	69.72	52.28	46.84

Appendix D

Assessment terminology

Assessment terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$).
dB(A)	The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq} , L_{A90} etc, according to the parameter being measured.
Acoustic environment	Sound from all sources as modified by the environment.
Ambient sound level	The totally encompassing sound in a given situation at a given time; it is usually composed of sound from many sources, near and far.
Equivalent continuous sound level - $L_{Aeq,T}$	The A-weighted equivalent continuous sound pressure level over a period of time, T. Representative of the 'average' sound pressure level over a given period (commonly used to describe the 'ambient' sound level).
Maximum sound level - $L_{AFmax,T}$	The A-weighted 'maximum' sound pressure level that occurred during a given period, T (commonly used for the assessment of intermittent loud noises).
Background sound level - $L_{A90,T}$	The sound pressure level that is exceeded for 90% of the measurement time interval, T. $L_{A90,T}$ is often used to describe the 'background' sound level.
Rating level $L_{Ar,T}$	Specific sound level plus any adjustment for the characteristic features of the sound.
Habitable room	Any room used or intended to be used for sleeping, cooking, living or eating purposes (enclosed spaces such as bath or toilet facilities, service rooms, corridors, laundries, hallways, utility rooms or similar spaces are excluded from this definition).
R_w	The weighted sound reduction index expressed in dB. A single number quantity for airborne sound insulation rating.
Free-field level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other significant reflective surfaces. Generally as measured outside and away from buildings (>3.5metres).