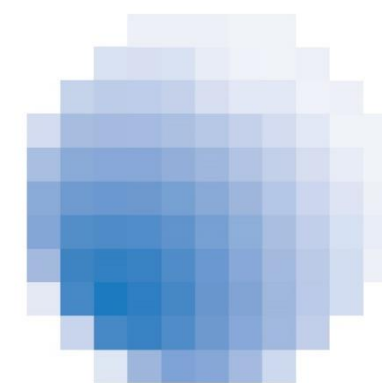




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Star Radcliffe Academy – Temporary Accommodation
Radcliffe, Manchester

Environmental & Intrusive Noise Study (Planning)

FS1013-SOL-ZZ-ZZ-D-J-0003 REV A

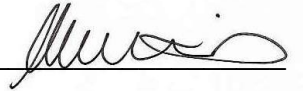
9 August 2023

PROJECT: Star Radcliffe Academy – Temporary
Accommodation
Radcliffe, Manchester
Environmental & Intrusive Noise Study
(Planning)

CLIENT: Morgan Sindall Construction
2 Anchorage Quay
Salford Quays
M50 3YW

DOCUMENT
REFERENCE: FS1013-SOL-ZZ-ZZ-D-J-0003 REV A

SIGNED: 
BRIAN HORNER

CHECKED: 
SIMON FERENCZI

DATE: 9 August 2023

EXECUTIVE SUMMARY

Sol Acoustics Ltd (“Sol”) has been appointed by Morgan Sindall PLC to undertake an environmental and intrusive noise study to support the Planning Application for the existing modular accommodation building that is to be temporarily relocated to the site of the new Star Radcliffe Academy, which is to be located on Spring Lane in Radcliffe Manchester M26 2SZ whilst the proposed new Star Radcliffe Academy is under construction.

This environmental and intrusive noise study considers the potential noise impact as associated with the temporary building only (a separate Planning Application is to be submitted for the proposed new Academy). It is understood by the Building Control Officer that the existing modular school building has been constructed to a good standard and further acoustic upgrade is not deemed to be necessary. The acoustic design of the existing modular school building is outside of the scope of this environmental and intrusive noise study.

The purpose of this report is therefore to provide outline acoustic design recommendations with regards to the ventilation strategy and key elements of the external façade and to specify appropriate M&E plant daytime and night time environmental noise limits for any proposed building services equipment serving the temporary building.

Please refer to the main report and appendices for further information.



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1 INTRODUCTION

Sol Acoustics Ltd (“Sol”) has been appointed by Morgan Sindall PLC to undertake an environmental and intrusive noise study to support the Planning Application for the existing modular accommodation building that is to be temporarily relocated to the site of the new Star Radcliffe Academy, which is to be located on Spring Lane in Radcliffe Manchester M26 2SZ whilst the proposed new Star Radcliffe Academy is under construction.

This environmental and intrusive noise study considers the potential noise impact as associated with the temporary building only (a separate Planning Application is to be submitted for the proposed new Academy).

The purpose of this report is as follows:

- To identify the location of the nearest pre-existing noise sensitive receptors to the site, which are most likely to be affected by environmental noise arising from plant and/or processes associated with the development.
- To determine the prevailing background noise climate at the nearest noise sensitive receptors.
- To determine maximum permissible noise level limits which are required to be achieved by all proposed externally mounted building services equipment associated with the development.
- To determine the typical ambient noise levels expected at the location of the temporary building.
- To provide outline acoustic design recommendations for the proposed new development with regards to the ventilation strategy and key elements of the external façade.

This acoustic report is structured as follows:

- Section 2 provides a basic description of the proposed temporary building and the surrounding noise sensitive receptors.
- Section 3 provides a summary of the relevant acoustic design standards and guidance documents which have been used to inform this assessment.
- Section 4 provides information regarding the benchmark environmental noise survey which shall be undertaken in order to determine the pre-existing environmental noise climate at the identified NSRs and also at the location of the proposed temporary building.
- Section 5 provides a basic summary of the proprietary 3D acoustic models constructed and acoustic calculations undertaken.

- Section 6 provides an outline intrusive noise assessment of the temporary accommodation and specifies appropriate acoustic measures as required to achieve appropriate indoor ambient noise levels.
- Section 7 sets appropriate noise level limits for all proposed building services equipment.
- *Appendix A provides a glossary of acoustic terminology.*
- *Appendix B provides details of the noise surveys undertaken and a summary of the data obtained from them.*
- *Appendix C gives details and qualifications of contributing Sol staff.*

2 DESCRIPTION OF SITE

2.1 General Overview of the Site and Surroundings

The proposed Academy is to be located on Spring Lane, in a predominantly residential area. The existing Radcliffe Leisure Centre and Spring Lane school are currently located on the site.

The Radcliffe to Bury Metrolink line is located just east of the Academy site.

The nearest residential housing to the site are as follows:

- Housing located on Shirebrook Drive, which is located c.40 metres distance to the south west;
- Housing located on Bury Road, which is located c.40 metres distance to the east.

An aerial photograph of the development site and its immediate surroundings is provided in Figure 1.

2.2 Development Proposals

An existing modular school building is to be relocated onto site to provide temporary teaching accommodation whilst the proposed Academy is under construction. A separate planning application is to be submitted for the proposed Academy.

Details of the construction of the existing modular school building are currently unknown to Sol but the Building Control Officer has stated the following with regards to the acoustic performance:

'... The "temporary" relocation of the modular unit buildings to the new site would not attract any requirements for acoustic upgrades and the drawings indicate that it has a very good acoustic design within the build ...'

The acoustic design of the existing modular school building is outside of the scope of this environmental noise and intrusion study.

Figure 2 provides the site plan for the temporary building.

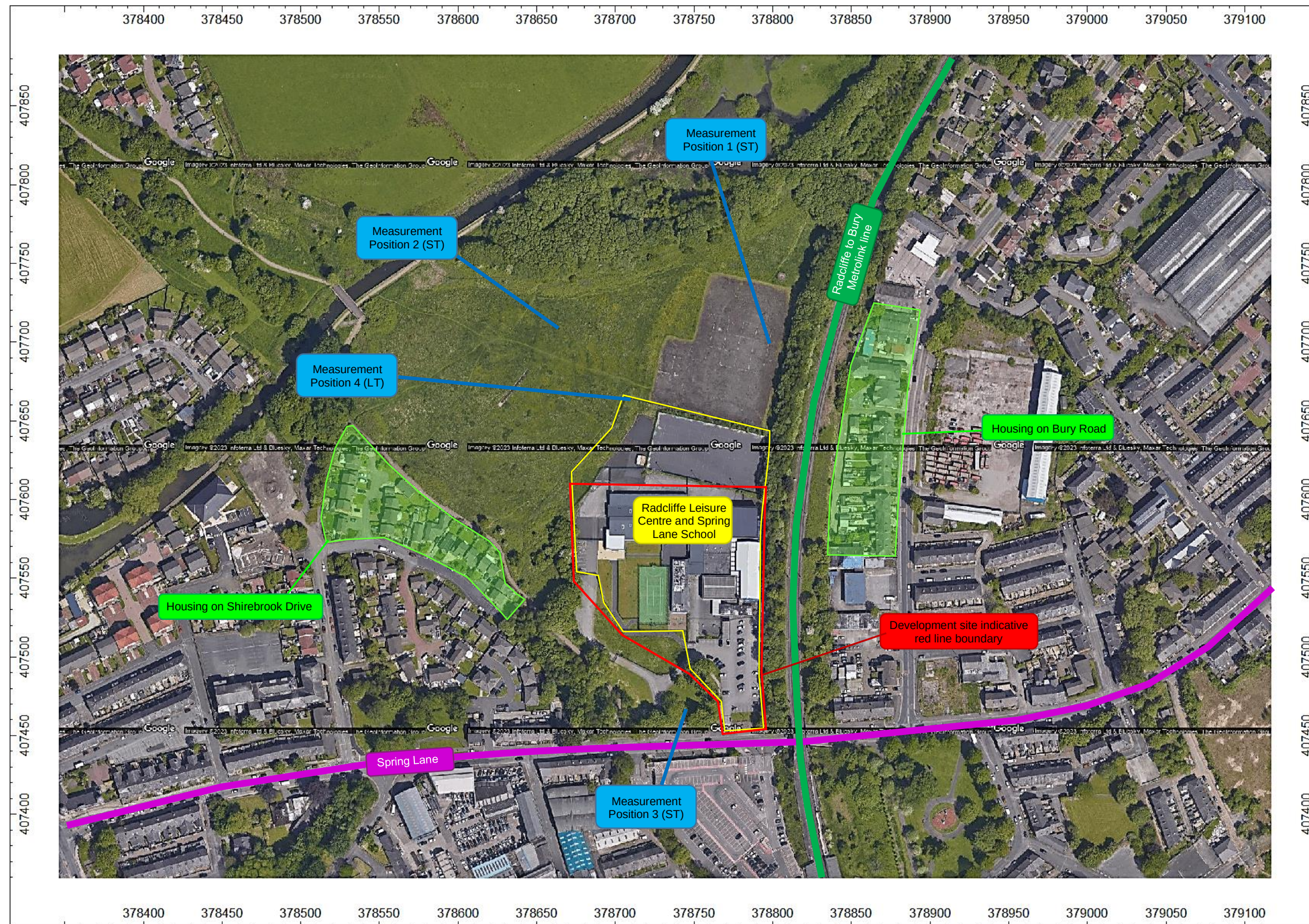
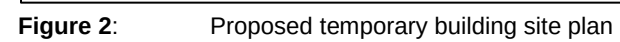


Figure 1: Aerial photography of the proposed Academy, measurement locations and surrounding areas/receptors (Google Earth 2023)



3 ACOUSTIC ASSESSMENT CRITERIA

3.1 Building Bulletin 93

Issued by the Department for Education (DfE) in February 2015, Building Bulletin 93 *'The Acoustic Design of Schools'* ("BB93") sets out acoustic performance standards to be achieved in a learning and teaching environment. It applies to both new-build and refurbished developments. For learning and teaching spaces as located within a secondary school educational establishment, compliance with this Standard is mandated under Requirement E4 of Part E the Building Regulations 2010 ("ADE"), which states:

'... Each room or other space in a school building shall be designed and constructed in such a way that it has the acoustic conditions and the insulation against disturbance by noise appropriate to its intended use ...'

ADE in support of the Building Regulations gives the following guidance:

'... In the Secretary of State's view the normal way of satisfying Requirement E4 will be to meet the values for sound insulation, reverberation time and internal ambient noise which are given in section 1 of Building Bulletin 93 'The Acoustic Design of Schools', produced by DfES ...'

(Note: Department for Education and Skills (DfES) is now DfE).

Specifically, BB93 provides design targets for the following acoustic considerations:

- Indoor ambient noise levels
- Sound insulation between internal spaces (airborne and impact sound transmission)
- Reverberation times in key spaces and sound absorption in corridors and stairwells
- Speech intelligibility within open plan spaces; and
- Indoor ambient noise levels generated during rainfall

3.2 BS4142: 2014+A1: 2019

BS 4142: 2014+A1: 2019: *'Method for rating and assessing industrial and commercial sound'* is intended to be used to assess noise of an industrial nature, which includes sound from fixed installations comprising of mechanical and/or electrical plant and equipment. The methods prescribed in this British Standard use outdoor sound levels in order to assess the likely effects of sound on people who might be inside or outside a dwelling or premises that is used for residential purposes upon which sound is incident.

The procedure contained in BS 4142: 2014+A1: 2019 for assessing environmental noise impact is to compare the measured or predicted noise level from the source in question - the "Specific Sound Level" immediately outside the noise sensitive premises - with the corresponding "Background Sound Level". Where the noise contains attention attracting characteristics such as tonal, impulsive and/or intermittent elements, it may be appropriate to apply a correction to the Specific Sound Level in order to obtain the "Rating Level."

BS 4142: 2014+A1: 2019 states that the significance of sound arising from an industrial and/or commercial nature depends upon both the margin by which the Rating Level of the "Specific Sound Source" exceeds the Background Sound Level, and also the context in which the sound occurs:

- a) Typically, the greater this difference, the greater the magnitude of the impact;
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context;
- d) The lower the Rating Level is relative to the measured Background Sound Level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the Rating Level does not exceed the Background Sound Level, this is an indication of the specific sound source having a low impact, depending on the context.

For the daytime, the assessment is conducted over a one-hour period, and over a 15-minute period at night. The daytime and night time periods are defined as occurring between 07:00 hours to 23:00 hours, and 23:00 hours to 07:00 hours, respectively.

4 ENVIRONMENTAL NOISE SURVEY

4.1 Sol Environmental Noise Survey

An environmental noise survey was conducted by Sol between 7 June and 8 June 2023.

The survey consisted of three short term and one long term measurement positions as shown in Figure 1, and as described in Table 1:

Measurement Position		Description
Short term	MP1	Tripod-mounted microphone sited in free field conditions, at a height of c.1.5 metres above ground level near the eastern site boundary. The microphone was approximately 30 metres distance from the railway line.
	MP2	Tripod-mounted microphone sited in free field conditions, at a height of c.1.5 metres above ground level near the northwest site boundary.
	MP3	Tripod-mounted microphone sited in free field conditions, at a height of c.1.5 metres above ground level near Spring Lane to the south of the site.
Long term	MP4	Mast-mounted microphone sited in free field conditions, at a height of c.3 metres above ground level near the centre of the site.

Table 1: Noise monitoring measurement positions summary

Type 1 Precision Grade sound measuring instrumentation was exclusively used and a microphone windshield was used in all cases. Full details of all the instrumentation used, and corresponding traceable calibration records, are retained on file by Sol and available for inspection if required.

Meteorological data was recorded for the duration of the noise survey, as using a Professional Grade Vaisala “WXT530” weather station. Weather conditions remained favourable for the duration of the survey.

Notwithstanding the weather conditions recorded, the microphone systems were entirely weatherproofed and fitted with all-weather environmental windshields, each with a bird spike.

Appendix B provides further details of the survey methodology and recorded weather conditions.

4.2 Environmental Noise Survey Results

Table 2 provides a basic summary of the average, free field environmental noise levels measured at the short term positions MP1, MP2 and MP3:

Measurement Location	Start Time (hh:mm)	Measured Noise Level		
		dB L _{A1,30min}	dB L _{Aeq,30min}	dB L _{A90,15min}
MP1	07/06/2023 11:32	63	50	41
MP2	07/06/2023 12:07	57	48	44
MP3	07/06/2023 12:50	67	62	52

Table 2: Summary of typical, measured broadband environmental noise levels at short term positions

Table 3 provides a basic summary of the average, free field environmental noise levels measured at the long term position MP4:

Measurement Position	Date	Daytime (07:00 – 23:00 Hours)		Night Time (23:00 – 07:00 Hours)	
		dB L _{Aeq,T}	dB L _{A90,15min} (Typical)	dB L _{Aeq,T}	dB L _{A90,15min} (Typical)
MP4	Wednesday 7 June 2023	49*	45	44	37
	Thursday 8 June 2023	49*	46	-	-
* Measurement not conducted for the full assessment period					

Table 3: Summary of typical, measured broadband environmental noise levels at long term position

5 ENVIRONMENTAL NOISE MODEL

In order to predict the likely noise levels impinging on the surrounding noise sensitive receptors from the Academy, proprietary 3D computer noise models were created using the DataKustik “CadnaA” Noise Mapping software. The following assumptions have been made when building all the noise models:

- (a) The noise model was set up to apply the noise prediction methodology set out in ISO 9613-2: ‘Acoustics – Attenuation of Sound propagation outdoors – Part 2: General Method of Calculation’.
- (b) The model was set to include second order reflected noise from solid structures.
- (c) The base ground absorption for the model has been set to $G=1.0$ (predominantly soft ground).
- (d) Noise from nearby road traffic and the Metrolink line have been determined based upon the results of the on-site environmental noise level measurements.

Figure 3 provides a three-dimensional visualisation of the noise model used to inform the noise impact assessment:



Figure 3: 3D view of the noise model for the proposed Academy and temporary building

6 INTRUSIVE NOISE ASSESSMENT

6.1 Acoustic Design Targets

The required degree of sound insulation to be provided by the external building fabric is determined as based upon the predicted environmental noise levels expected to be incident on the façades of the Academy, and the indoor ambient noise level requirements of the occupied spaces adjoining the external building envelope. Table 3 provides the indoor ambient noise level (IANL) requirements to be achieved in each type of space within the temporary building:

Space	Indoor Ambient Noise Level Requirement, dB $L_{Aeq,30min}$
Ground Floor	
General Science / Laboratory	40
Reception, offices, meeting rooms	40**
Dining room, corridors, and stairwell	45
Kitchen, changing rooms, toilets	50**
Storerooms	n/a
First Floor	
General Classrooms	35
Art DT	40
Offices	40**
Corridors and stairwell	45
Toilets	50
Storerooms	n/a
<i>** Exempt From ADE requirements, recommended performance only.</i>	

Table 3: Indoor ambient noise level requirements

BB93 allows for various relaxations which can be applied to the IANL design target depending upon the ventilation solution adopted and the required ventilation rate. The various ventilation conditions are defined as follows:

- **Normal:** The normal condition for a ventilation system with purely mechanical air supply is defined as when the system is operating to limit the daily average carbon dioxide concentration to no more than 1,000ppm, with the maximum concentration not exceeding 1,500ppm for more than 20 consecutive minutes on any day during normal school operating hours. This would normally equate to a minimum ventilation rate of approximately 8l/s per person;
- **Summertime:** Ventilation under local control of teacher to prevent overheating – allowable during the hottest 200 hours of the year;

- **Intermittent boost:** Ventilation under local control of teacher for dilution of fumes during practical activities as in practical spaces for science, art, food technology and design and technology.

Under “normal” ventilation conditions, BB93 allows for a +5dB relaxation to be applied to the IANL design standard, as presented in Table 3 for the spaces proposed within this Academy for all rooms which are:

- Naturally ventilated; or
- Ventilated using a hybrid (mechanically assisted natural ventilation) solution. In this case, the noise level from the mechanical system alone should not exceed the specified IANL target (i.e. the +5dB relaxation only applies to the natural ventilation component and not the mechanical ventilation component).

The above cannot be applied to teaching and learning spaces with an IANL target (excluding the +5dB relaxation) greater or equal to 45dB $L_{Aeq,30min}$.

In addition to the above, the following relaxations can be applied to the Indoor Ambient Noise Level during “Summertime” or “Intermittent boost” ventilation conditions:

- IANL target of 55dB $L_{Aeq,30min}$ or lower for rooms where the required ventilation rate is provided by natural means;
- BB93 IANL target + 5dB $L_{Aeq,30min}$ or lower for rooms where the required ventilation rate is provided by a mechanical system. This relaxation cannot be applied to teaching and learning spaces with an IANL target greater or equal to 45dB $L_{Aeq,30min}$.

It should be noted that the above relaxations do not apply to any spaces intended specifically for students with special hearing and communication needs.

In addition, relaxations can be applied to the Indoor Ambient Noise Level for rooms with local process extract systems, i.e. such as odour extracts, fume cupboards etc. The relaxation will depend upon the specific requirements of the process extract system.

The above noise limits include the noise contributions from all external environmental noise sources, in addition to noise from building services plant associated with the Academy itself.

6.2 Predicted Environmental Noise Levels

The results of the environmental noise survey and 3D noise model have been used to predict the environmental noise levels on each façade of the Development.

Figure 4 shows the predicted daytime environmental noise levels on each façade of the temporary building.

Details of the existing glazing, façade and roof construction to the modular building are unknown to Sol at this stage. However, based upon the results of the 3D noise model, standard thermal insulating glazing (e.g. 4mm / 10mm / 4mm double glazing) would provide suitable protection from environmental noise intrusion for all spaces of the temporary building.

The use of open windows could be used to provide “summertime” and “intermittent boost” ventilation to all spaces of temporary accommodation.

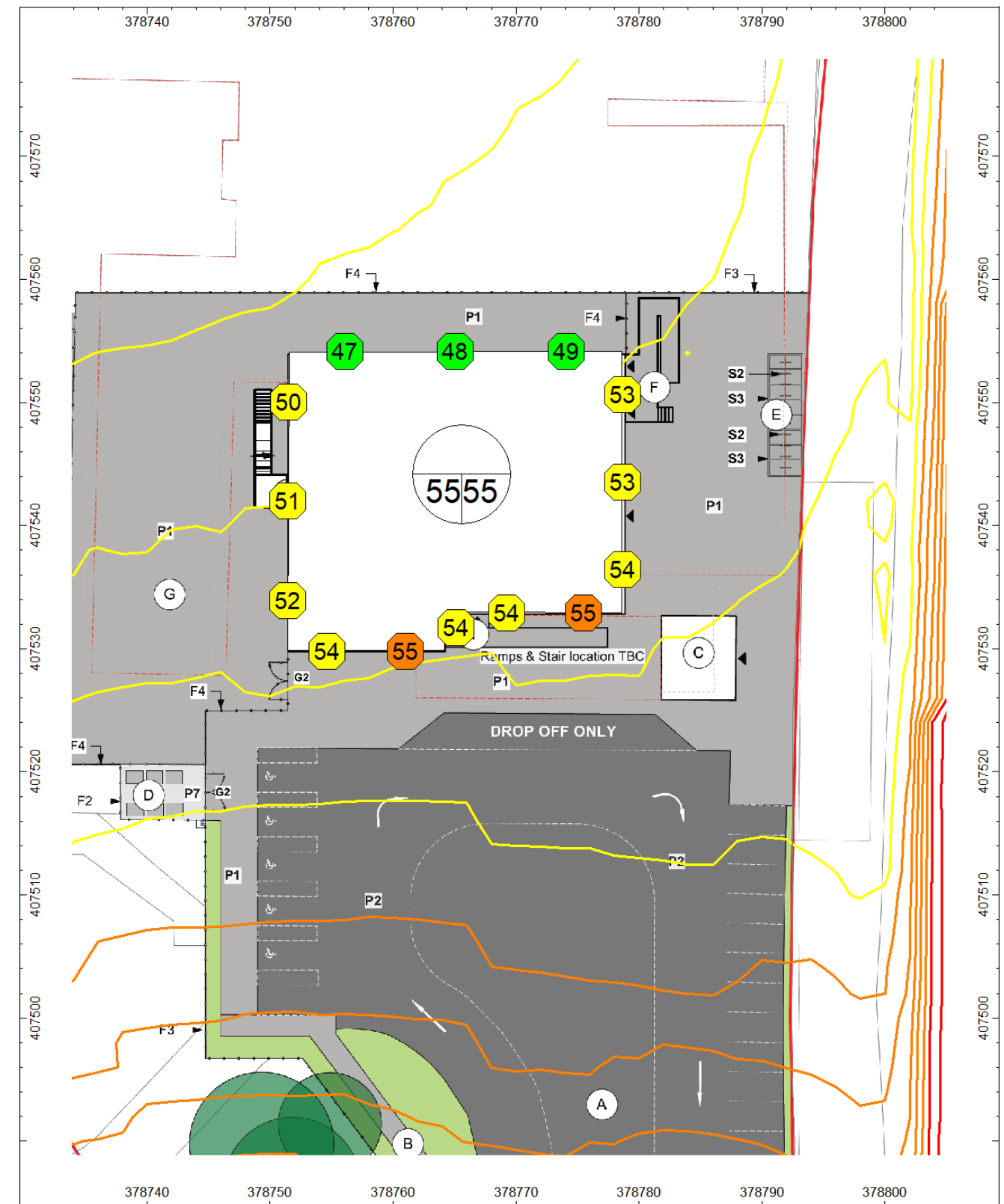


Figure 4: Predicted daytime free-field ambient noise levels on the façades of the Temporary block, dB $L_{Aeq,30min}$



7 BUILDING SERVICES PLANT

7.1 Acoustic Performance Specification Requirements

7.1.1 Environmental (Atmospheric Side) Plant Environmental Noise Limits

Based upon the results of the environmental noise survey, Table 4 shows appropriate maximum permissible *cumulative* noise Rating Level limits which are applicable at the identified noise sensitive receptors.

These noise Rating Level limits are applicable to any required operating condition (including all plant operating simultaneously at the highest required duty etc.) are equivalent to 5dB below the as measured typical daytime and night time Background Sound Levels):

Noise Sensitive Receptor	Maximum Permissible Noise Rating Level Limit, dB $L_{A,T1}$	
	Daytime (07:00 – 23:00hrs)	Night Time (07:00 – 23:00hrs)
Shirebrook Drive (c.40 metres to the south west)	40	32
Bury Road, (c.40 metres to the east)	40	32

Table 4: Maximum permissible cumulative environmental noise level limits at receptors

APPENDIX A GLOSSARY OF ACOUSTIC TERMS

Term	Abbreviation	Description
Sound Pressure Level	L_{pA}	A measure of the sound pressure at a particular location. Typically expressed in dB(A) referenced to 2×10^{-5} Pascals.
Equivalent Continuous Sound Level	$L_{Aeq,T}$	The steady level of sound over a prescribed period of time which would contain the same total sound energy as the actual fluctuating noise under consideration in the same period of time.
Statistical Sound Levels	L_{A10} and L_{A90}	The level of noise exceeded for a percentage of the time period being sampled typically either 10% or 90%.
Background Sound Level	$L_{A90,T}$	The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90% of a given time interval.
Maximum Sound Level	L_{Amax}	The maximum sound or noise level determined with instrumentation set to either a fast time weighting, L_{AFmax} , or a slow time weighting, L_{ASmax} .
Sound Power Level	L_{WA}	A measure of the total sound energy radiated from a source. Like sound pressure levels this is also expressed in dB(A), but instead it is referenced to 10^{-12} W.
Broadband		Over a wide range of frequencies.
Narrow-band		Acoustic Energy over a restricted range of frequencies. Used to ascertain the strength of audible tones, and to assist in identifying particular sources of noise in a complex sound environment.
Ambient Sound		Totally encompassing sound in a given situation at a given time usually composed of sound from many sources, near and far.
Specific Sound Level	$L_{eq,Tr}$	The Equivalent Continuous A-Weighted Sound Level at an assessment position produced by a specific sound over a given referred time interval, Tr
Rating Level	$L_{Ar,Tr}$	The Specific Sound Level plus any adjustment for the acoustic characteristic features of the noise (e.g. intermittency, tones etc.)
Residual Noise	$L_{Aeq,T}$	The ambient sound remaining at given position in a given situation when the specific sound source is suppressed to a degree such that it no longer contributes to the ambient sound.
Sound Reduction Index	SRI	The reduction in sound energy when transmitted through a panel or similar planar element, used typically in relation to single octave or one-third octave frequency band values.
Weighted Sound Reduction Index	R_w	The Sound Reduction Index expressed as a single figure.
Dynamic Insertion Loss	DIL	Reduction in acoustic energy resulting from the insertion of a noise control element (e.g. a silencer).
Occupied spaces		A room or space within the assessed building that is likely to be occupied for 30 minutes or more by a building user.



APPENDIX B NOISE SURVEY DETAILS & SUMMARY RESULTS

LOCATION

Spring Lane School, Radcliffe, Manchester

DATES & TIMES

7th June to 8th June 2023

WEATHER CONDITIONS

Date	Daytime (07:00 - 23:00)				Night Time (23:00 – 07:00)			
	Temp, °C	Rain, mm	Wind Direction	Average Wind Speed, m/s	Temp, °C	Rain, mm	Wind Direction	Average Wind Speed, m/s
07/06/2023	15	0.0	E	2.5	9	0.0	NE	1.3
08/06/2023	12	0.0	E	2.4	-	-	-	-

PERSONNEL PRESENT DURING MEASUREMENTS

Chris Downing MMath - Sol Acoustics Ltd

INSTRUMENTATION

Measurement Positions 1,2,3

01dB Cube Sound level meter (serial no. 12070)
01dB Pre22 Microphone preamplifier (serial no. 1915040)
GRAS 40CD Microphone capsule (serial no. 288057)
01dB Cal21 Acoustic calibrator (serial no. 34675320)

Measurement Position 4

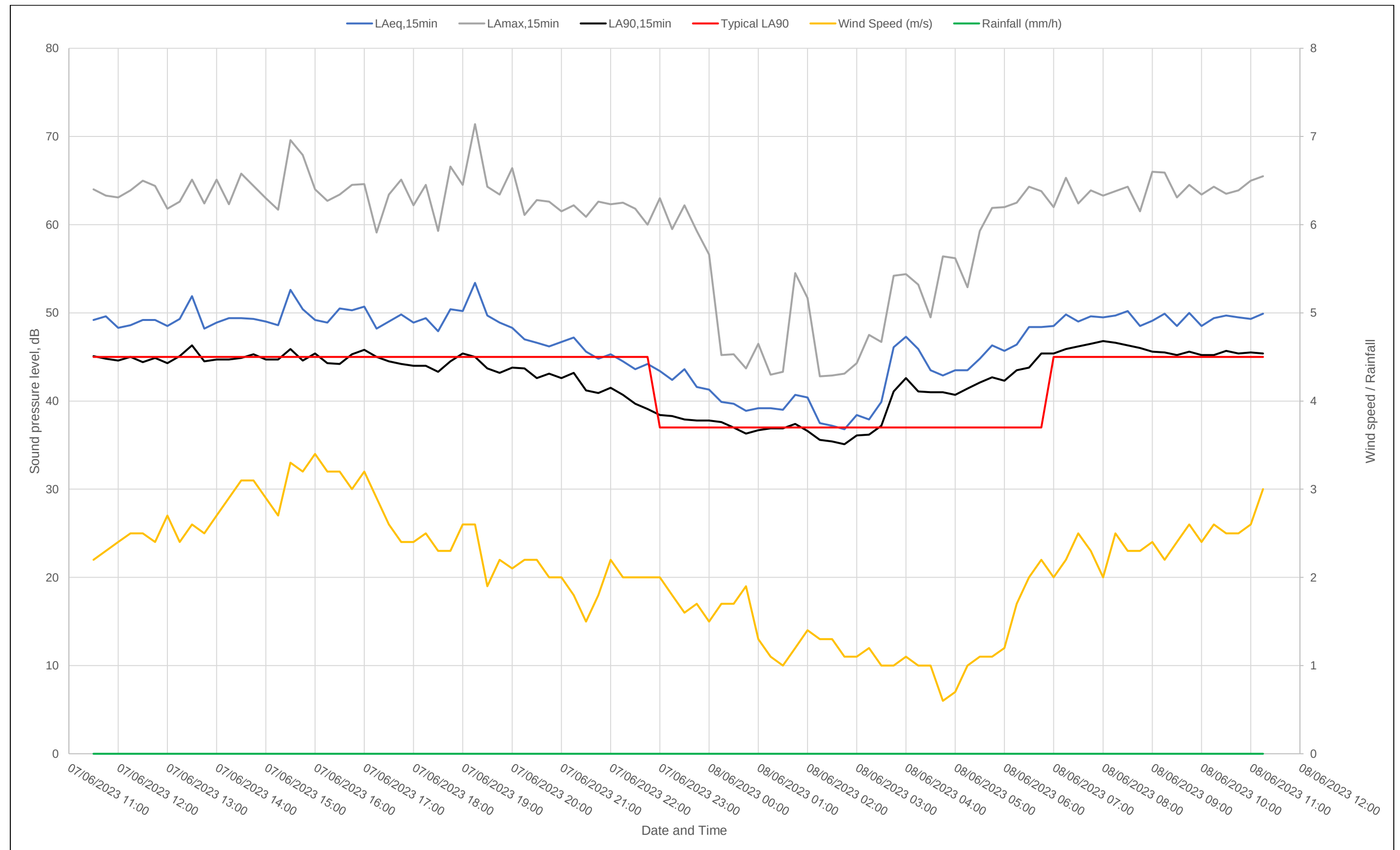
01dB Cube Sound level meter (serial no. 11348)
01dB Pre22 Microphone preamplifier (serial no. 1805362)
GRAS 40CD Microphone capsule (serial no. 260642)
01dB Cal21 Acoustic calibrator (serial no. 34675320)
Vaisala WXT520 Weather Station

METHODOLOGY

Before and after the measurements the sound level meters were checked and calibrated to an accuracy of $\pm 0.3\text{dB}$ using the 01dB CAL 21 Calibrator. The calibrator produces a sound pressure level of 94 dB re 2×10^{-5} Pa @ 1kHz.

MEASUREMENT RESULTS

Graph A1 summarises the results obtained from the noise survey at Measurement Position MP4.



Graph A1: Graph showing measured environmental noise levels as measured at Measurement Position MP4



APPENDIX C DETAILS AND PROFESSIONAL QUALIFICATIONS OF CONTRIBUTING SOL STAFF

Company Details

Name of Organisation: Sol Acoustics Limited

Status: Private Limited Company

Address: Unit 11, Brunel Court,
Gadbrook Park
CW9 7LP

Telephone Number: 01565 632535

E-Mail: info@solacoustics.co.uk

Nature of Business: Acoustic Consultancy

Directors: Simon Ferenczi

Company Registration Number: 4218702

Key Technical Personnel & Qualifications

Simon Ferenczi	Institute of Acoustics Diploma (with additional modules), MIOA
Brian Horner	BSc (Hons), MIOA
Chris Downing	MMaths

Company Accreditations

Sol Acoustics is a member of The Association of Noise Consultants (ANC) and is qualified to perform sound insulation testing under the ANC's accredited testing scheme to demonstrate compliance with the requirements of Approved Document E of the Building Regulations.