

BREEAM POL05 COMMISSION TESTING:

University of Reading Art School

JAH03428-REPT-02-R1
BREEAM POL05
Commission Testing
Ver: R1
10 January 2025

Document status					
Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
R0	Draft	Stephen Hale, BSc (Hons), MIOA Consultant - Acoustic	Lee Whitehall PGDip, MIOA Senior Consultant - Acoustic	Pam Lowery MEng, MSc, MIOA, PIEMA Associate Director - Acoustics	25 April 2024
R1	Issue	Jonty Stewart MSc MIOA, Associate Director - Acoustics	Pam Lowery MEng, MSc, MIOA, PIEMA Associate Director - Acoustics	Pam Lowery MEng, MSc, MIOA, PIEMA Associate Director - Acoustics	10 January 2025
Approval for issue					
Pam Lowery				10 January 2025	

The report has been prepared for the exclusive use and benefit of our client and solely for the purpose for which it is provided. Unless otherwise agreed in writing by RPS Group Plc, any of its subsidiaries, or a related entity (collectively 'RPS') no part of this report should be reproduced, distributed or communicated to any third party. RPS does not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report. The report does not account for any changes relating to the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report.

The report has been prepared using the information provided to RPS by its client, or others on behalf of its client. To the fullest extent permitted by law, RPS shall not be liable for any loss or damage suffered by the client arising from fraud, misrepresentation, withholding of information material relevant to the report or required by RPS, or other default relating to such information, whether on the client's part or that of the other information sources, unless such fraud, misrepresentation, withholding or such other default is evident to RPS without further enquiry. It is expressly stated that no independent verification of any documents or information supplied by the client or others on behalf of the client has been made. The report shall be used for general information only.

Prepared by:	Prepared for:
RPS	Fulkers Bailey Russell
Stephen Hale Consultant - Acoustics	Charlie Joyce Project Manager
6-7 Lovers Walk Brighton, East Sussex BN1 6AH	
T +44 1273 546 800	T 07761 787002
E stephen.hale@rpsgroup.com	E Charlie.Joyce@fulkers.co.uk

EXECUTIVE SUMMARY

The Acoustics team at RPS Environment has been appointed by University of Reading to carry out BS 4142:2014+A1:2019 acoustic impact assessment in relation to the targeted BREEAM Pol 05 credit for the University of Reading Art School building, located on the White Knights Campus off Pepper Lane, Reading RG2 7DB.

A design stage report previously produced by RPS (JAH02871-REPT-01-R2) outlines noise emission limits required to ensure plant noise emission levels achieve a 'low impact' in terms of BS4142:2104+A1:2019.

This report details the first stage of commission testing for the purpose of meeting both BREEAM POL 05 and planning Condition 11 set as part of the planning application for the new School of Art building.

A sound survey was undertaken at the nearest noise sensitive receptors, with unattended sound measurements collected over a 6-hour period commencing at 10:15 hours on Wednesday 22nd November 2023.

Plant associated with the building is not expected to operate during the night-time, therefore this report focuses on daytime noise levels.

The initial BS 4142:2014+A1:2019 commission testing, detailed in this report, identified rating noise levels to be 5 dB above background noise levels.

Therefore, outline mitigation advice has been provided with the aim of reducing the noise impact on the nearby existing sensitive receptors and reduce the rating level of the plant to below background noise levels.

Using the mitigated noise levels as detailed within this assessment, the BS 4142:2014+A1:2019 assessment indicates that operation of the plant at University of Reading School of Art building results in a rating level of 10 dB below background noise levels at noise sensitive receptor A and as such is unlikely to result in adverse noise impacts/effects and that residential amenity is unlikely to be adversely affected.

As such, from a noise perspective, the proposal is likely be compliant with BREEAM POL 05 and National Policy (the 'Noise Policy Statement for England' and the 'National Planning Policy Framework'), Local Policy EN17 and Planning Condition 11.

Contents

EXECUTIVE SUMMARY	I
1 INTRODUCTION	1
2 GUIDANCE, STANDARDS AND POLICY	2
2.1 BREEAM New Construction 2018 (UK).....	2
2.2 British Standard 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'	2
2.3 Local Planning Policy	5
2.4 Consultation with RBC Environmental Health Department.....	6
2.5 RPS Report - JAH02871–REPT–01–R2	6
3 PREVIOUS REPORT FINDINGS	7
3.1 RPS Report - JAH02871–REPT–01–R2	7
4 SITE DESCRIPTION	9
4.1 Site Description	9
4.2 Plant Description	9
4.3 Noise Sensitive Receptors	9
5 BASELINE NOISE DESCRIPTION	11
5.1 Baseline Noise Monitoring Dates and Locations	11
5.2 Instrumentation	12
5.3 Meteorological Conditions	12
5.4 Subjective Description of Sound Climate with Plant Not Operational	13
5.5 Subjective Description of Sound Climate with All Plant Operational	13
5.6 Summary of Measurement Results	13
5.7 Comparison of 2021 and 2023 Background Sound Levels	14
5.8 Representative Background Sound Levels	14
6 BS 4142:2014+A1:2019 NOISE IMPACT ASSESSMENT	16
6.2 Identification of Specific Sound Levels	16
6.3 Application of Weighting for Characteristics of Specific Sound	16
6.4 BS 4142 Initial Assessment.....	17
6.5 Mitigation Advice	18
6.6 BS 4142:2014+A1:2019 Mitigation Assessment	18
6.7 Assessment Summary	19
7 UNCERTAINTY	20
8 CONCLUSION	21

Figures

Figure 3.1: Original Survey Locations.....	8
Figure 4.1: Site Plan	10
Figure 5.1: Measurement Locations	11

Tables

Table 2.1: Definitions of acoustic terms.....	4
Table 3.1: Proposed Noise Emission Limits from Previous RPS Report	7
Table 3.2: Short-Term Noise Measurement Results.....	7

Table 4.1: NSR Location and Distances to Site	9
Table 5.1: Sound Survey Instrumentation	12
Table 5.2: Weather Conditions	12
Table 5.3: Long Term Sound Survey Results	13
Table 5.4: Specific Sound Measurement Results	14
Table 5.5: Representative Background / Residual Sound Levels	15
Table 6.1: Identification of Specific Sound Levels	16
Table 6.2: BS 4142:2014+A1:2019 Initial Estimate of Noise Impact	17
Table 6.3: Mitigation Required to Meet Standards.....	18
Table 6.4: BS 4142:2014+A1:2019 Mitigation Estimate of Noise Impact	19

Appendices

- Appendix A BS4142 Statements
- Appendix B Photos of Plant on Site
- Appendix C Site Survey Forms
- Appendix D Time History Graphs
- Appendix E 1/3 Octave Band Specific Data

1 INTRODUCTION

- 1.1 The Acoustics Team of RPS Environment (RPS) has been appointed by University of Reading (UOR) to carry out a noise assessment to meet conditions set as part of the planning application for the new School of Art building (SOAB), located on the White Knights Campus, off Pepper Lane, Reading, RG2 7DB.
- 1.2 This report details the commission testing for the purpose of meeting both BREEAM POL 05 and the planning condition set as part of the planning application for the new SOAB, which was not in place when the initial design report was undertaken.
- 1.3 Condition 11 states:
- “No mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted and approved by the Local Planning Authority. The assessment shall be carried out for in accordance with BS4142:2014+A1:2019 methodology. The predicted specific sound level ($L_{Aeq,TR}$) (with reference to BS:4142) as measured at a point 1 metre external to the nearest noise-sensitive facade shall be at least 10 dB below the pre-existing background sound level, $L_{A90,T}$ when all plant/equipment (or any part of it) is in operation. The predicted rating level, $L_{Ar,Tr}$ (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to the nearest noise-sensitive façade (habitable window of a dwelling) shall not exceed the pre-existing background sound level, $L_{A90,T}$ when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment and shall thereafter be maintained so that it operates to the same standard”*
- 1.4 RPS acoustic report JAH02871–REPT–01–R2 identifies BS4142 plant noise emission limits for the UOR SOAB development at nearby noise sensitive receptors.
- 1.5 RPS is a member of the Association of Noise Consultants (ANC), the representative body for acoustics consultancies, having demonstrated the necessary professional and technical competence. The assessment has been undertaken with integrity, objectivity, and honesty in accordance with the Code of Conduct of the Institute of Acoustics (IOA) and ethically, professionally, and lawfully in accordance with the Code of Ethics of the ANC.
- 1.6 The technical content of this assessment has been provided by RPS personnel, all of whom are corporate (MIOA) members, or associate members (AMIOA) of the IOA (the UK's professional body for those working in acoustics, noise and vibration) and are therefore ‘suitably qualified acousticians’ as required by BREEAM POL 05.
- 1.7 Personnel and individual qualifications are provided within the Quality Management table at the start of this report and in Appendix A in accordance with the requirement of Section 12 of BS 4142:2014+A1:2019.
- 1.8 This report has been peer reviewed within the RPS team to ensure that it is technically robust and meets the requirements of our Integrated Management System.

2 GUIDANCE, STANDARDS AND POLICY

2.1 BREEAM New Construction 2018 (UK)

- 2.1.1 The Building Research Establishment Environmental Assessment Method 2018 (BREEAM 2018) is an environmental assessment credit system for non-domestic buildings within the UK.
- 2.1.2 The credit relevant to this assessment in terms of acoustics is Pollution 05 (POL 05).

POL 05: Reduction of Noise Pollution

- 2.1.3 The BREEAM New Construction 2018 guidance provides the following assessment criteria for the POL 05 credit where there are noise-sensitive receptors within an 800 m radius of the assessed site:

"2. Where there are noise-sensitive areas within the assessed building or noise-sensitive areas within 800 m radius of the assessed site, a noise impact assessment compliant with BS 4142:2014 is commissioned. Noise levels must be measured or determined for:

2.a: Existing background noise levels:

2.a.i at the nearest or most exposed noise-sensitive development to the proposed assessed site

2.a.ii including existing plant on a building, where the assessed development is an extension to the building

2.b: Noise rating level from the assessed building.

3 The noise impact assessment must be carried out by a suitably qualified acoustic consultant.

4 The noise level from the assessed building, as measured in the locality of the nearest or most exposed noise-sensitive development, must be at least 5 dB lower than the background noise throughout the day and night.

5 If the noise sources from the assessed building are greater than the levels described in criterion 4, measures have been installed to attenuate the noise at its source to a level where it will comply with the criterion."

- 2.1.4 Based on the above, this report gives an assessment of noise rating levels against background noise levels at UOR SOAB at the nearest NSR to comply with the requirements of the BREEAM POL 05 guidance.

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

- 2.2.1 BS 4142:2014+A1:2019 primarily provides a numerical method by which to determine the significance of sound of an industrial nature (i.e. the 'specific sound' from the proposed development) at residential Noise Sensitive Receptors (NSR). The specific sound level may then be corrected for the character of the sound (e.g. perceptibility of tones and/or impulses), if appropriate, and it is then termed the 'rating level', whether or not a rating penalty is applied. The 'residual sound' is defined as the ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.

- 2.2.2 The specific sound levels should be determined separately in terms of the $L_{Aeq,T}$ index over a period of $T = 1$ -hour during the daytime and $T = 15$ -minutes during the night-time. For the purpose of the Standard, daytime is typically between 07:00 and 23:00 hours and night-time is typically between 23:00 and 07:00 hours.
- 2.2.3 BS 4142:2014+A1:2019 requires that the background sound levels adopted for the assessment be representative for the period being assessed. The Standard recommends that the background sound level should be derived from continuous measurements of normally not less than 15-minute intervals, which can be contiguous or disaggregated. However, the Standard states that there is no 'single' background sound level that can be derived from such measurements.
- 2.2.4 BS 4142:2014+A1:2019 states that measurement locations should be outdoors, where the microphone is at least 3.5 m from any reflecting surfaces other than the ground and, unless there is a specific reason to use an alternative height, at a height of between 1.2 m and 1.5 m above ground level. However, where it is necessary to make measurements above ground floor level, the measurement position, height and distance from reflecting surfaces should be reported, and ideally measurements should be made at a position 1 m from the façade of the relevant floor if it is not practical to make the measurements at least 3.5 m from the facade.
- 2.2.5 With regards to the rating correction, paragraph 9.2 of BS 4142:2014+A1:2019 states:
- "Consider the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention."*
- 2.2.6 The commentary to paragraph 9.2 of BS 4142:2014+A1:2019 suggests the following subjective methods for the determination of the rating penalty for tonal, impulsive and/or intermittent specific sounds:

"Tonality"

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a rating penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

"Impulsivity"

A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.

NOTE 2 If characteristics likely to affect perception and response are present in the specific sound, within the same reference period, then the applicable corrections ought normally to be added arithmetically. However, if any single feature is dominant to the exclusion of the others then it might be appropriate to apply a reduced or even zero correction for the minor characteristics.

"Intermittency"

When the specific sound has identifiable on/off conditions, the specific sound level should be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. ... If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

Other sound characteristics

Where the specific sound features characteristics that are neither tonal nor impulsive, nor intermittent, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

- 2.2.7 An initial estimate of the impact of the specific sound is obtained by subtracting the measured background sound level from the rating level of the specific sound. In the context of the Standard, adverse impacts include, but are not limited to, annoyance and sleep disturbance. Typically, the greater this difference, the greater is the magnitude of the impact:
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context,
 - A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context,
 - 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.
- 2.2.8 Whilst there is a relationship between the significance of impacts determined by the method contained within BS 4142:2014+A1:2014 and the significance of effects described in the PPGN, there is not a direct link.
- 2.2.9 The significance of the effect of the noise in question (i.e. whether above or below SOAEL and LOAEL) should be determined on the basis of the initial estimate of impact significance from the BS 4142:2014+A1:2014 assessment with reference to the examples of outcomes described within the PPGN and after having considered the context of the sound. It is necessary to consider all pertinent factors, including:
- the absolute level of sound,
 - the character and level of the residual sound compared to the character and level of the specific sound, and
 - the sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
 - facade insulation treatment; and
 - ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation.
- 2.2.10 Definitions of some of the key terms from this standard, and used in this report, are provided in Table 2.1 below.

Table 2.1: Definitions of acoustic terms.

Terminology	Definition
Rating Level, $L_{Ar,T}$	The specific sound level plus any adjustment for the characteristic features of the sound.
Background Sound Level, $L_{A90,T}$	The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T , measured using fast time-weighting, F , and quoted to the nearest whole number of decibels.

Terminology	Definition
Ambient Sound Level, $L_{Aeq,T}$	The steady sound level which, over a period of time T, contains the same amount of A-weighted sound energy as the time varying sound over the same period. Also known as the equivalent continuous sound pressure level. <i>NOTE The ambient sound level is a measure of the residual sound and the specific sound when present.</i>
Specific Sound Level, L_{Aeq,T_r}	The equivalent continuous A-weighted sound pressure level produced by the specific noise source at the assessment location over a given reference time interval, T_r .

2.3 Local Planning Policy

2.3.1 Within Reading Borough Local Plan 2019, there are several policies relating to noise. The relevant section of Policy CC8 is reproduced below:

“CC8: SAFEGUARDING AMENITY

Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of:

- *Privacy and overlooking;*
- *Access to sunlight and daylight;*
- *Visual dominance and overbearing effects of a development;*
- *Harm to outlook;*
- *Noise and disturbance;*
- *Artificial lighting;*
- *Vibration;*
- *Dust and fumes;*
- *Smell;*
- *Crime and safety; or*
- *Wind, where the proposals involve new development of more than 8 storeys.*

Policy EN17 is specifically relevant to this assessment (i.e. the setting of plant noise emission limits) and is reproduced below:

EN17: NOISE GENERATING EQUIPMENT

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

2.3.2 The requirements of Policy EN17 are duplicated within Planning Condition 11.

2.4 Consultation with RBC Environmental Health Department

- 2.4.1 RPS have liaised with Reading Borough Council Environmental Health Department in relation to local noise policy relevant to this type of development.
- 2.4.2 In an email received from RBC¹, it was stated that the following condition is likely to be attached to any permission:

"N2 MECHANICAL PLANT (NOISE ASSESSMENT REQUIRED)"

No mechanical plant shall be installed until a noise assessment of the proposed mechanical plant has been submitted and approved by the Local Planning Authority. The assessment shall be carried out for in accordance with BS4142:2014 methodology. The predicted specific sound level ($L_{Aeq,Tr}$) (with reference to BS:4142) as measured at a point 1 metre external to the nearest noise-sensitive facade shall be at least 10 dB below the pre-existing background sound level, $L_{A90,T}$ when all plant/equipment (or any part of it) is in operation. The predicted rating level, $L_{Ar,Tr}$ (specific sound level plus any adjustment for the characteristic features of the sound) as measured at a point 1 metre external to the nearest noise-sensitive façade (habitable window of a dwelling) shall not exceed the pre-existing background sound level, $L_{A90,T}$ when all plant/equipment (or any part of it) is in operation. The plant shall thereafter only be installed in accordance with the assessment and shall thereafter be maintained so that it operates to the same standard.

REASON: To safeguard the amenities of the adjoining premises and the area generally, in accordance with Policy CC8 and EN17 of the Reading Borough Local Plan 2019."

- 2.4.3 The above communication has been formalised into Planning Condition 11.

2.5 RPS Report - JAH02871-REPT-01-R2

- 2.5.1 RPS acoustic report JAH02871-REPT-01-R2 identifies BS 4142 plant noise emission limits for the UOR SOAB development at nearby noise sensitive receptors.
- 2.5.2 This report and findings are detailed further in the next section.

¹ Email from Ross Jarvis, Senior Environmental Health Officer of RBC dated 29th November 2021.

3 PREVIOUS REPORT FINDINGS

3.1 RPS Report - JAH02871-REPT-01-R2

- 3.1.1 RPS were commissioned by UOR to undertake a noise survey and assessment to form part of a planning application for the new School of Art building, the full details of this assessment are detailed in RPS report JAH02871-REPT-01-R2.
- 3.1.2 A baseline noise survey was conducted on site, commencing 19th November 2021 for a duration of 7 days, to identify baseline noise conditions across the site.
- 3.1.3 Background (L_{A90}) noise levels were captured at LT1, approximately 75 m from the centre of Pepper Lane.
- 3.1.4 Based on the results of the noise survey of that report, the following noise emission limits were proposed for the development, outlined in Table 3.1 below.

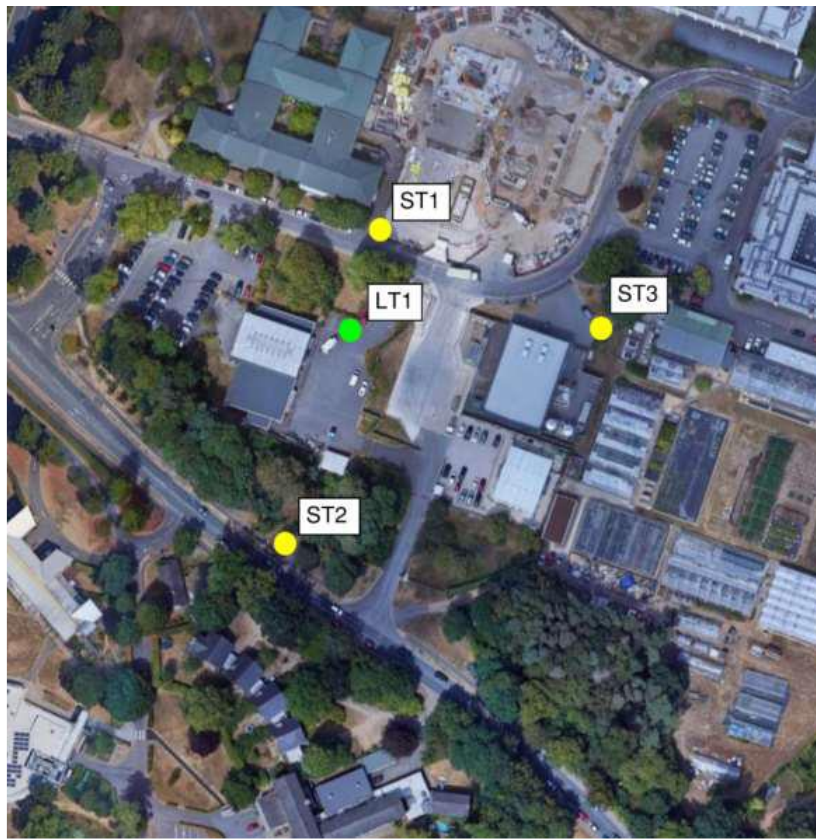
Table 3.1: Proposed Noise Emission Limits from Previous RPS Report

Noise Sensitive Receptor	Assessment Period	Background Sound Level, dB $L_{A90,T}$	'Specific Sound Level' limit, dB $L_{Aeq,Tr}$	'Rating Level' limit, dB $L_{Ar,Tr}$
Leighton Park School buildings to the south	Daytime	49	39	49
	Night-time	45	35	45
UOR buildings to the north	Daytime	49	39	49
	Night-time	45	N/A	N/A

- 3.1.5 However, it is noted that these results may not be representative of background noise levels at NSRs to the south of the development due to the difference in distance from the primary noise source, road traffic on Pepper Lane.
- 3.1.6 Below is an evaluation of the distances between the measurement locations and the dominant noise source (road traffic on Pepper Lane):
- Distance from LT1 to centre of Pepper Lane 75 m
 - Distance from ST2 to centre of Pepper Lane 11 m
 - Distance from NSR to centre of Pepper Lane 15 m
- 3.1.7 Figure 3.1 below illustrates each measurement location used in RPS report JAH02871-REPT-01-R2.
- 3.1.8 Table 3.2 below replicates the short-term measurement results from Table 4.4 of RPS report JAH02871-REPT-01-R2.

Table 3.2: Short-Term Noise Measurement Results

Measurement Location	Measurement Duration (hh:mm:ss)	Measurement Date / Time (dd/mm/yyyy hh:mm)	$L_{Aeq,8hr}$ (dB)	$L_{A90,15min}$ (dB)
ST1	00:30:00	19/11/2021 13:43:00	56	51
ST2	00:15:00	19/11/2021 14:18:00	73	57
ST3	00:15:00	19/11/2021 14:40:00	51	49

Figure 3.1: Original Survey Locations

- 3.1.9 It is noted that measurement location LT1 was approximately 75 m from Pepper Lane. The closest NSR (NSR A) is only around 15 m from Pepper Lane, so the ambient sound level is likely higher as it is dominated by road traffic. ST2 was installed approximately 11 m from Pepper Lane, on the opposite side of the road to NSR A. Therefore, levels measured at ST2 (57 dB $L_{A90,15min}$) are likely to be more representative of background sound levels at receptors to the south, with levels at ST1 (51 dB $L_{A90,15min}$) more representative of NSs to the north.

4 SITE DESCRIPTION

4.1 Site Description

- 4.1.1 The UOR SOAB consists of an extension to the existing Central Kitchen building (located close to Pepper Lane on the UOR White Knights Campus) to form a new School of Art.
- 4.1.2 The SOAB is only expected to operate during the daytime only.

4.2 Plant Description

- 4.2.1 On the site of UOR SORB there is a mixture of plant, housed both internally and externally.
- 4.2.2 Plant is housed internally on the 1st floor of the UOR SORB. This area is ventilated with louvres surrounding the building. The 1st floor plant area contains a mixture of general services plant (air condition filtration and water facilities).
- 4.2.3 Plant is also located externally on the ground floor on the most southern façade of the UOR SOAB. The ground floor plant area contains two woodworking extract fans.
- 4.2.4 Photos of all plant on site have been included within Appendix B.

4.3 Noise Sensitive Receptors

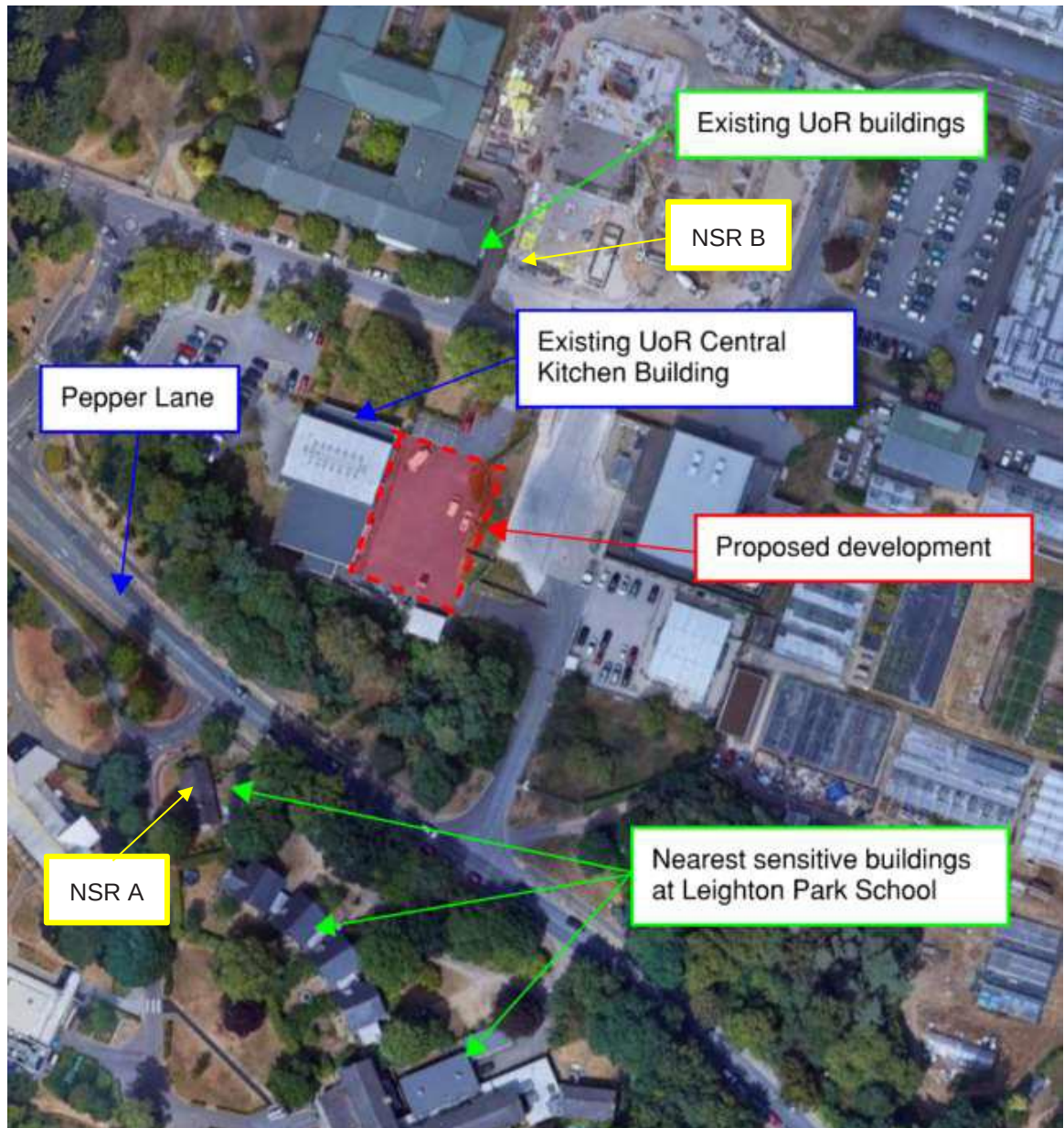
- 4.3.1 The nearest Noise Sensitive Receptors (NSRs) to the development are the existing UOR buildings (such as the Knowledge Transfer Centre, Computer Sciences and Biomedical Engineering departments) north of the proposed development and the Leighton Park School buildings (a number of which appear to be residential in nature) to the south of the proposed development.
- 4.3.2 The nearest noise sensitive receptors (NSRs) to the site are described below in Table 4.1.

Table 4.1: NSR Location and Distances to Site

NSR	NSR Name	Direction from Site	Name & Location of Nearest Noise Source	Approximate Distance from Noise Source (m)
A	Leighton Park School	South	External Ground Floor Extracts Units	55
B	Existing UOR Buildings	North	Internal First Floor Plant	45

- 4.3.3 The location of the proposed development and the nearest noise sensitive receptors are highlighted in Figure 4.1 below.

Figure 4.1: Site Plan



5 BASELINE NOISE DESCRIPTION

5.1 Baseline Noise Monitoring Dates and Locations

- 5.1.1 A predominantly unattended survey was conducted by Stephen Hale (MIOA), commencing at 10:15 hours and concluding at 16:15 hours on Wednesday 22nd November 2023.
- 5.1.2 Although the noise measurements undertaken are classed as unattended measurements, the operator was on site for the duration and regularly observed the noise climate at each measurement location.
- 5.1.3 The primary objective of the survey was to determine the existing baseline sound levels and to quantify the plant noise levels associated with the development site on the surrounding area.
- 5.1.4 All plant was fully operational for one hour between 13:15 and 14:15 on Wednesday 22nd November 2023.
- 5.1.5 Figure 5.1 below illustrates the measurement locations used for this assessment.

Figure 5.1: Measurement Locations



- 5.1.6 Long-term (LT) monitoring locations LT1 and LT2 are considered to be representative of background noise levels at each NSR.
- 5.1.7 Monitoring location LT1 was chosen to capture noise levels incident on, and background sound levels at NSR A, Leighton Park School.

- 5.1.8 Monitoring location LT2 was chosen to capture noise levels incident on, and background sound levels at NSR B, UOR White Knights Campus.
- 5.1.9 Additional short-term (ST) spot measurements were undertaken adjacent to external plant. The locations of the ST measurements were selected for the purpose of gathering specific sound levels of the plant associated with UOR SOAB for the purpose of investigations.
- 5.1.10 Details of the site survey sheets can be found in Appendix C.

5.2 Instrumentation

- 5.2.1 Details of the instrumentation used during the survey are provided in Table 5.1 below.
- 5.2.2 Calibration certificates of the equipment are available upon request. Field calibration of the equipment was carried out before and checked after the measurements with no significant drift (± 0.5 dB) observed.

Table 5.1: Sound Survey Instrumentation

Measurement Location	Make / Model	Internal Reference / Serial Number	Calibration Ref / Start / End	Last Calibration Date
LT1	Rion-NL-52	998566	94.0 / 94.0 / 94.0	02/03/2022
LT2	Rion-NL-52	998569	94.0 / 94.0 / 94.0	02/03/2022
ST	Rion-NL-52	998567	94.0 / 94.0 / 94.0	02/03/2022
Calibrator	Rion NC-74	#33 / 34472822	N/A	12/10/2023

5.3 Meteorological Conditions

- 5.3.1 Meteorological conditions have been assessed using a Davis Vantage Vue Weather Station (Model Number: 6250). The weather was installed at LT2 an operational for the full duration of the survey period.
- 5.3.2 Table 5.2 below details the weather conditions at the start and end of each survey period at each measurement location.

Table 5.2: Weather Conditions

Measurement Location	Time	Wind Speed, m/s	Wind Direction	Temperature, °C	Relative Humidity, %	Cloud Cover, Oktas
LT1	Deployment	0.1	---	7.1	91	3
LT1	Collection	1.8	N	10.4	85	4
LT2	Deployment	0.1	---	7.1	91	3
LT2	Collection	1.8	N	10.4	85	4

- 5.3.3 During the survey period there were no instances of precipitation, with maximum wind speeds noted to remain below 3 m/s.
- 5.3.4 As such no data has been removed from the dataset as a result of adverse metrological conditions.
- 5.3.5 Full meteorological conditions for the survey period can be found within the time history graphs presented in Appendix D.

5.4 Subjective Description of Sound Climate with Plant Not Operational

- 5.4.1 When deploying and collecting the SLM at measurement location LT1, subjectively, the existing sound climate at this location was considered to be relatively 'quiet'. The primary noise source at this measurement location was local road traffic noise traveling at up to 30 mph on Pepper Lane which lies 11 m from the measurement position; pedestrians using the footpath and light maintenance work within Leighton Park School were also audible at this location.
- 5.4.2 When deploying and collecting the SLM at measurement location LT2, subjectively, the existing sound climate at this location was considered to be relatively 'quiet'. The primary noise source at this measurement location was road traffic noise traveling at up to 20 mph within the UOR local road network. Students using the footpath within UOR were also audible.

5.5 Subjective Description of Sound Climate with All Plant Operational

- 5.5.1 Between 13:15 and 14:15 when all plant from UOR SOAB was operational, noise from UOR SOAB was clearly audible at measurement location LT1. Through further investigation on-site it was determined that the noise originated from UOR SOAB external plant (woodwork extract fans). During this period noise from UOR SOAB was not audible at measurement location LT2. This is supported by the measurement data shown in Table 5.3 below, wherein the measured background level did not change when the plant was running.
- 5.5.2 Additionally, when conducting site observations around the perimeter of the SOAB, noise from the 1st floor plant room louvres was not audible when all plant from UOR SOAB was operational (13:15 to 14:15).

5.6 Summary of Measurement Results

- 5.6.1 Table 5.3 below provides a summary of the measured sound levels measured over the 6-hour survey period. It is noted that the levels at LT1 increased from around 15:15 due to activity related to children being collected from school. The $L_{Aeq,1hr}$ and $L_{A90,1hr}$ values have been calculated from 100 ms measurement data over each 60-minute measurement period.

Table 5.3: Long Term Sound Survey Results

Measurement Location	Start Time	Residual Sound Level (dB $L_{Aeq,1hr}$)	Background Sound Level (dB $L_{A90,1hr}$)
*All plant operational			
LT1	10:15	67	55
	11:15	67	55
	12:15	67	55
	13:15*	69*	61*
	14:15	68	56
	15:15	68	59
LT2	10:15	56	50
	11:15	55	49
	12:15	57	49
	13:15*	55*	50*
	14:15	56	50
	15:15	55	51

- 5.6.2 Analysis of results in Table 5.3 indicates that at position LT2, the background sound level shows no noticeable change during the hour when all plant is operational, but there is a noticeable increase at LT1. This indicates that the plant noise level at LT2 is at least 10 dB below the background level, but the level at LT1 exceeds the background level.
- 5.6.3 Table 5.4 below details the results of the specific sound measurement, taken 1 m from one of the woodwork extract units located externally to the UOR SOAB.

Table 5.4: Specific Sound Measurement Results

Measurement Location	Specific Sound Level (dB L _{Aeq})
Woodwork Extract Unit	89

Note: Measurements taken at 1 m from noise source

- 5.6.4 1/3 octave band sound level data for specific measurements can be found in Appendix E.

5.7 Comparison of 2021 and 2023 Background Sound Levels

- 5.7.1 RPS were commissioned in 2021 by UOR to undertake a noise impact assessment to form part of a planning application for the new SOAB, the full details of which are detailed in RPS report JAH02871–REPT–01–R2. Within that report, representative background levels were presented as replicated in Table 3.1 and Table 3.2 of this report.
- 5.7.2 As previously noted, the long-term background sound levels were measured at a position where the dominant noise sources (road traffic on Pepper Lane and the UOR internal road network) were more distant than from the NSRs, and are therefore not considered to be suitably representative of the NSRs.
- 5.7.3 Measurement location ST2 of the original RPS report is located at approximately 11 m from the centre of Pepper Lane, so levels at ST2 are considered more representative of background noise levels at NSR A.
- 5.7.4 Likewise, measurement location ST1 of the original RPS report is located further from Pepper Lane than LT1 but closer to the internal road network of UOR. Therefore, noise levels at ST1 are more representative of background noise levels to the north of site (NSR B).
- 5.7.5 Additionally, regarding the longer-term data collected in November 2023, typical noise levels at NSR A are around 55 dB L_{A90,1hr} and around 50 dB L_{A90,1hr} at NSR B, as shown in Table 5.3, which shows good agreement with the previous short-duration measurements at ST2 and ST1.
- 5.7.6 In summary, the measurements undertaken during the 2021 survey are not considered suitably representative of the NSR locations and therefore the 2023 measurements results have been adopted for this assessment.

5.8 Representative Background Sound Levels

- 5.8.1 BS 4142:2014+A1:2019 requires that the background sound levels adopted for the assessment are representative of the period being assessed. The Standard recommends that the background sound level should be derived from continuous measurements of normally not less than 15-minute intervals, which can be contiguous or disaggregated (paragraph 8.13 of BS 4142:2014+A1:2019).
- 5.8.2 However, the Standard states that there is no 'single' background sound level that can be derived from such measurements. The accompanying note states that *"a representative level should account for the range of background sounds levels and should not automatically be assumed to be either the minimum or modal value"*.

- 5.8.3 In this instance, based on review of the data, the duration of the measurements and to take a cautious approach, the lowest measured $L_{A90,1hr}$ value has been chosen as the representative background sound level due to the short-term measurements undertaken as part of the assessment.
- 5.8.4 Likewise, the lowest measured $L_{Aeq,1hr}$ value has been chosen as the representative residual sound level.
- 5.8.5 As previously noted, the UOR SOAB is expected to operate during the daytime only, therefore only this period has been assessed.
- 5.8.6 Table 5.5 below provides a summary of representative sound levels used within the assessment for NSR A and NSR B.

Table 5.5: Representative Background / Residual Sound Levels

NSR Location	Period	Background Sound Level (dB $L_{A90,1hr}$)	Residual Sound Level (dB $L_{Aeq,1hr}$)
A	Daytime (07:00 to 23:00)	55	67
B		49	55

6 BS 4142:2014+A1:2019 NOISE IMPACT ASSESSMENT

- 6.1.1 This section of the report details an assessment of the potential noise impact from plant associated with UOR SOAB on noise sensitive receptors (NSRs) using the methodology contained within BS 4142.

6.2 Identification of Specific Sound Levels

- 6.2.1 BS4142 details the specific noise level as *'the sound source being assessed'*.
- 6.2.2 All plant at UOR SOAB was fully operational for 1 hour between the hours of 13:15 to 14:15 on Wednesday 22nd November 2023. The plant at UOR SOAB was not operational at all other times.
- 6.2.3 On-site observations detailed in sections 5.4 and 5.5, and the time history graphs found in Appendix D, show that the dominant noise source from UOR SOAB on NSR A are the two woodwork extract units found to the rear of the UOR SOAB.
- 6.2.4 It was found that noise associated with the plant within the 1st floor plant room of the SOAB was not audible at either measurement position during the operational hour. Analysis of the LT2 time history graph indicates no change in noise level between periods when the plant was operational and adjacent periods when it was not, and during operation no tonal, impulsive or intermittent characteristics were noted. This is an indication that the plant sound level was at least 10 dB below the background sound level at LT2.
- 6.2.5 Therefore, this assessment will focus only on the audible plant noise from UOR SOAB, produced by the ground floor woodwork extract units.
- 6.2.6 Table 5.4 details noise levels associated with the external woodwork extract units, with the individual unit recorded as being 89 dB $L_{Aeq,1hr}$ at 1 m. It is assumed that the extract units will run continuously for the 1-hour reference time period.
- 6.2.7 Using distance attenuation calculation, the specific sound level of the pair of units at NSR A has been calculated, detailed below in Table 6.1.

Table 6.1: Identification of Specific Sound Levels

Specific Sound Level Calculations	
Measured 1 m	89
Sound Power Level of 1 Unit L_w	97
Number of Units	2
Sum L_w	100
Distance to NSR A	53
Specific Sound Pressure Level @ NSR A	58

- 6.2.8 Table 6.1 shows the specific sound level of the pair of units has been calculated as 58 dB $L_{Aeq,1hr}$ at NSR A.

6.3 Application of Weighting for Characteristics of Specific Sound

- 6.3.1 BS 4142:2014+A1:2019 includes guidance on the application of additional weightings which include tonality, impulsivity and intermittency. Where such features are present at the assessment location, character corrections should be added to the specific sound to obtain a rating level.

- 6.3.2 As previously mentioned, onsite observations noted that at measurement location LT1 it was possible to hear a distant extract fan noise from UOR SOAB, but it was not thought to be tonal.
- 6.3.3 Further spectral analysis of the specific sound was undertaken in accordance with Annex C of BS4142:2014+A1:2019 which confirmed there was no significant tonal component.
- 6.3.4 On-site observations noted that the extract fan noise from UOR SOAB was constant: once the extract fan is running it runs continuously without interruption.
- 6.3.5 No correction has therefore been applied for tonality, intermittency, or impulsivity in the following assessment.
- 6.3.6 The sound of the extract units was readily distinguishable against the residual sound climate, however, so a +3 dB character correction penalty has been applied.

6.4 BS 4142 Initial Assessment

- 6.4.1 In accordance with BS 4142:2014+A1:2019, the rating level from plant associated with the UOR SOAB has been compared with the measured background sound level at NSR A, and the result is presented below in Table 6.2.

Table 6.2: BS 4142:2014+A1:2019 Initial Estimate of Noise Impact

NSR Name	Background Level, dB(A) $L_{A90,T}$	Specific Sound Level L_S dB(A)	Character Correction, dB(A)	Rating Level, dB(A) $L_{A,Tr}$	Rating / Background Level Difference, dB(A)
NSR A	55	58	3	61	+6

- 6.4.2 With regard to the rating/background level difference, BS 4142:2014+A1:2019 states:
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
 - A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and
 - 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.
- 6.4.3 On the basis of the above and with reference to Table 6.2, it is considered that for NSR A the rating level be 6 dB above measured background noise levels. This indicates that operation of the proposed facility may result in an adverse impact at NSR A for the daytime period, depending on the context.
- 6.4.4 BREEAM POL 05 states *'The noise level from the assessed building, as measured in the locality of the nearest or most exposed noise sensitive development, must be at least 5 dB lower than the background noise throughout the day and night'*. The rating level at NSR A does not comply with this.
- 6.4.5 Planning Condition 11 states that the predicted specific sound level should be at least 10 dB below background, and the rating level must not exceed the background sound level. The predicted specific and rating levels at NSR A do not comply with this.
- 6.4.6 As a consequence, mitigation of plant noise levels should be considered to reduce this adverse impact.

6.5 Mitigation Advice

6.5.1 Section 6.4 of this document determined that background noise levels are exceeded at NSR A, and therefore mitigation needs to be considered with the aim of reducing the plant noise levels.

6.5.2 The level of attenuation required to achieve guideline noise levels are detailed below in Table 6.3.

Table 6.3: Mitigation Required to Meet Standards

Standard	Required Guideline Noise Level	Attenuation Required to Achieve Guideline Noise Level
BS4142:2014+A1:2019	Up to 4 dB above background noise level - Low adverse impact	1 dB
BREEAM 2018 POL 05	Rating level 5 dB below background sound level	11 dB
Planning Condition 11	Specific level 10 dB below background sound level And Rating level not exceeding background sound level	13 dB

6.5.3 Acoustic theory suggests adding a single barrier blocking complete line of sight between the noise source and the NSR will give a reduction of approximately 10 dB.

6.5.4 For a noise barrier to be an effective mitigation measure it requires:

- A minimum surface mass density of 15 kg/m².
- To be completely imperforate, any gaps or openings in the barrier will allow sound to travel through.
- Complete block line of sight between the woodwork extract units and NSR A, including line of sight from bedroom window height.

6.5.5 The introduction of a solid barrier, therefore, located on the perimeter of the UOR SOAB at a height greater than the woodwork extract units, may reduce noise levels at NSR A in line with the requirements of BS4142:2014+A1:2019 and BREEAM 2018 POL 05.

6.5.6 However, adding a noise barrier would not provide sufficient mitigation to meet Planning Condition 11 and therefore further mitigation is required.

6.5.7 It is therefore proposed that an acoustic enclosure be installed around each of the woodwork extract units, with the aim of achieving 13 dB reduction to each unit.

6.5.8 Adding acoustic enclosures with an assumed 13 dB reduction to each unit will reduce noise levels in line with Planning Condition 11.

6.6 BS 4142:2014+A1:2019 Mitigation Assessment

6.6.1 Assuming a minimum attenuation of 13 dB provided by the acoustic enclosures, an estimate of noise impact using mitigated noise levels has been provided in Table 6.4. The predicted specific sound level is significantly below the background level, so no acoustic feature correction is considered necessary.

Table 6.4: BS 4142:2014+A1:2019 Mitigation Estimate of Noise Impact

NSR Name	Background Level, dB(A) $L_{A90,1hr}$	Specific Sound Level L_s dB(A)	Character Correction, dB(A)	Rating Level, dB(A) $L_{A,Tr}$	Rating / Background Level Difference, dB(A)
NSR A	55	45	0	45	-10

- 6.6.2 With reference to Table 6.4, under mitigated conditions, it is considered that for NSR A the rating level will be 10 dB below measured background levels. This indicates that operation of the proposed facility is likely to result in a low impact during the daytime period, depending on the context. The context here is that the predicted rating level is more than 20 dB below the background sound level and is therefore likely to be inaudible during typical acoustic conditions.
- 6.6.3 Since the mitigated rating level is more than 5 dB below the background level, the requirements of Pol 05 are met.
- 6.6.4 Since the mitigated specific level is more than 10 dB below the background level and the mitigated rating level is below the background level, the requirements of Planning Condition 11 are also met.

6.7 Assessment Summary

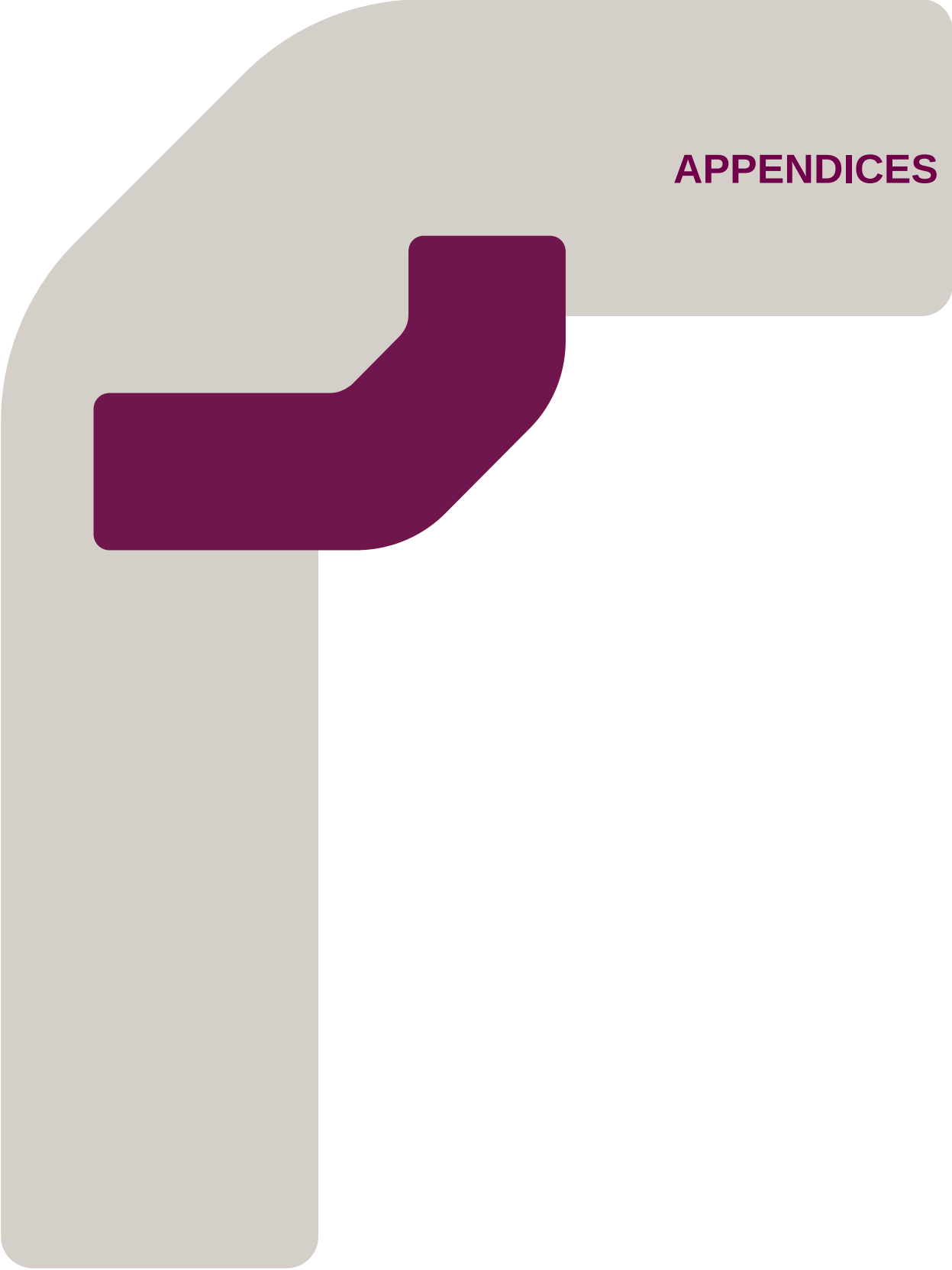
- 6.7.1 The initial BS 4142:2014+A1:2019 assessment, detailed in Section 6.3.6, found that rating levels were 6 dB above background noise levels and did not comply with the levels set out either in BREEAM Pol 05 or Planning Condition 11.
- 6.7.2 Outline mitigation advice has therefore been provided, as detailed in Section 6.5. The use of acoustic enclosures is estimated to result in a reduction in noise levels of approximately 13 dB.
- 6.7.3 Using assumed mitigated levels, a revised BS 4142:2014+A1:2019 assessment, detailed in Section 6.6, found that the predicted rating level was 10 dB lower than background sound level and complied with the requirements set out in both BREEAM Pol 05 and Planning Condition 11.

7 UNCERTAINTY

- 7.1 In all assessments it is good practice to consider uncertainty, which can arise from a number of different aspects. There are degrees of uncertainty associated with: instrumentation used for surveying; measurement technique and the variables influencing the measurement results such as transmission path and weather conditions; source assumptions used for modelling; calculation uncertainty; assessment uncertainty; and the subjective response of residents to noise sources.
- 7.2 Uncertainty due to instrumentation has been significantly reduced with the introduction of more modern instrumentation and is reduced further by undertaking field calibration checks on sound level meters before and after each measurement period, and ensuring that all instrumentation is within accepted laboratory calibration intervals.
- 7.3 Every effort has been made to reduce the uncertainty of the baseline sound level measurements. The duration of the baseline survey is considered to significantly reduce the uncertainty associated with the baseline sound levels. Based on professional judgement including substantial experience of acquiring and analysing baseline data for numerous sites in various locations, and a desk-based review of the site and surrounding area, it is considered that the baseline data acquired during the survey is typical of the area.
- 7.4 Calculation uncertainty and assessment uncertainty have been reduced by peer review of all baseline data, model input data, model results and assessment calculations, and by using the appropriate level of precision at each stage of the assessment calculations.
- 7.5 A quantitative assessment has been undertaken based on source levels measured by RPS personnel, provided by the project team for the proposed equipment or based on recognised and accepted empirical calculation methodologies. Where assumptions have been made, they have favoured a worst-case scenario.
- 7.6 Areas and potential consequences of uncertainty have been minimised where possible at each stage of the assessment process. On the basis of the above, it is considered that uncertainty associated with the assessment process is unlikely to significantly change the conclusions of this noise impact assessment.

8 CONCLUSION

- 8.1 The Acoustics Team of RPS Environment (RPS) has been appointed by University of Reading (UOR) to carry out a noise assessment to meet conditions set as part of the planning application for the new School of Art building (SOAB), located on the White Knights Campus off Pepper Lane, Reading RG2 7DB.
- 8.2 BREEAM Pol 05 requires a BS 4142:2014+A1:2019 noise assessment be conducted with a rating level at least 5 dB below background levels.
- 8.3 Planning Condition 11 requires the specific sound level to be at least 10 dB below background, and the rating level to not exceed the background level.
- 8.4 The initial BS 4142 assessment indicates that operation of the plant at UOR SOAB results in a rating level of 6 dB above background noise levels at NSR A so mitigation is required to meet the requirements of Pol 05 and Planning Condition 11.
- 8.5 An estimate of the impact of mitigation has been undertaken, in the form of an acoustic enclosure with an assumed 13 dB reduction to the BS 4142 rating level.
- 8.6 Using the assumed mitigated noise levels, the BS 4142 assessment indicates that operation of the plant at UOR SOAB is predicted to result in a rating level of 10 dB below the background sound level at NSR A and as such is unlikely to result in any adverse noise impacts/effects, and residential amenity is unlikely to be adversely affected.
- 8.7 As such, from a noise perspective, the proposal with the mitigation implemented is predicted to be compliant with BREEAM Pol 05, National Policy (the 'Noise Policy Statement for England' and the 'National Planning Policy Framework') and Local Policy (Planning Condition 11).



APPENDICES

Appendix A

BS4142 Statements

Stephen Hale – Consultant – Acoustics

BSc (Hons) Sound Engineering, Member of the Institute of Acoustics

- A.1 Stephen is an Acoustic Consultant and Sound Insulation specialist with over seven years' experience. He has a First-Class Bachelor of Science Degree in Sound Engineering and also has an Institute of Acoustics Certificate of Confidence in Environmental Noise Measurement. He has been a member of the IOA since 2016.
- A.2 Stephen joined RPS in 2021, he has project managed and undertaken noise assessments for a variety of developments, including: large scale mixed-use developments, incorporating commercial, retail, leisure and residential elements; energy sites; manufacturing facilities; distribution centres; retail units; minerals extraction and exploration; solar farms; and petrol service filling stations. He has provided input into Environmental Impact Assessments (EIAs) and undertaken noise assessments to support planning applications and discharge planning conditions. He has a Continuous Professional Development (CPD) Record to support this competency and experience.
- A.3 Stephen has been involved BS 4142 noise assessments for both the previous and current 2014 version of BS 4142. He is familiar with the Standard and has attended RPS CPD training seminars regarding the revised 2014 version of the Standard. On the basis of Stephen's overall experience in acoustics, combined with particular focus on BS 4142 and with the assistance of more experienced colleagues, he is deemed competent for BS 4142 assessments.
- A.4 For this project Stephen has taken on the role of consultant responsible for carrying out the acoustic surveying and the acoustic modelling.
- A.5 Stephen was also responsible for undertaking the site visit, carrying out sound monitoring, downloading and processing the survey data, undertaking the assessment, undertaking the modelling and preparing the report, figures and appendices.

Appendix B

Photos of Plant on Site

Internal Plant Photos



External Plant Photos





Appendix C

Site Survey Forms

LT1

Page 1 of 4

Location			3428 UOR School of Art Building - LT1 - NSR A							
Purpose of Monitoring			Plant Noise Assessment							
Relevant Guidance / Standard			BS4142 & POL 05							
Sound Measurement System										
RPS ID	Manufacturer / Model		Serial Number	Last Lab Verification	Filename	Memory Card ID				
166	Rion-NL-52		998566	02/03/2022	2201	Yes				
Mic Height	Measurement Interval	Dynamic Range (dB)	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?				
1.5	100 ms	25 - 138	Fast	A weighted	freefield	✓				
			START		END					
Personnel			SDH		SDH					
Date / time			10:15 Wednesday 22nd November 2023		16:15 Wednesday 22nd November 2023					
Calibrator	RPS ID		33		33					
	Manufacturer / Model		RION-NC-74		RION-NC-74					
	Serial Number		34472822		34472822					
	Date last verification		12/10/2023		12/10/2023					
	Reference level (dB)		94.0		94.0					
	Meter reading (dB)		94.0		94.0					
Wind speed (m/s) & dir'n Av.			0.1	---	1.8	N				
Cloud cover (100% = 8 oktas)			3		4					
Temperature (degrees Celsius)			7.1		10.4					
Relative Humidity (%)			91		85					
Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)			TI	P	F	S	TI	P	F	S
			x	x	x	x	x	x	x	x
Subjective description / additional details			Dry day not really much wind				Dry day not really much wind			
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))										
SLM located on boundary of the NSR, on soft ground immediately outside the school, attached next to the schools sign, approximately 50 m from the external noise source and 9.5 m from the central of Pepper Lane										
Description of sound environment at start of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)										
Cars passing on Pepper Lane, Pedesrians using the foot path, natural sounds, local construction works										
Description of sound environment at end of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)										
Cars passing on Pepper Lane, Pedestrians using the foot path, natural sounds, local construction works										

Location	3428 UOR School of Art Building - LT1 - NSR A
Photographs of measurement location	
	

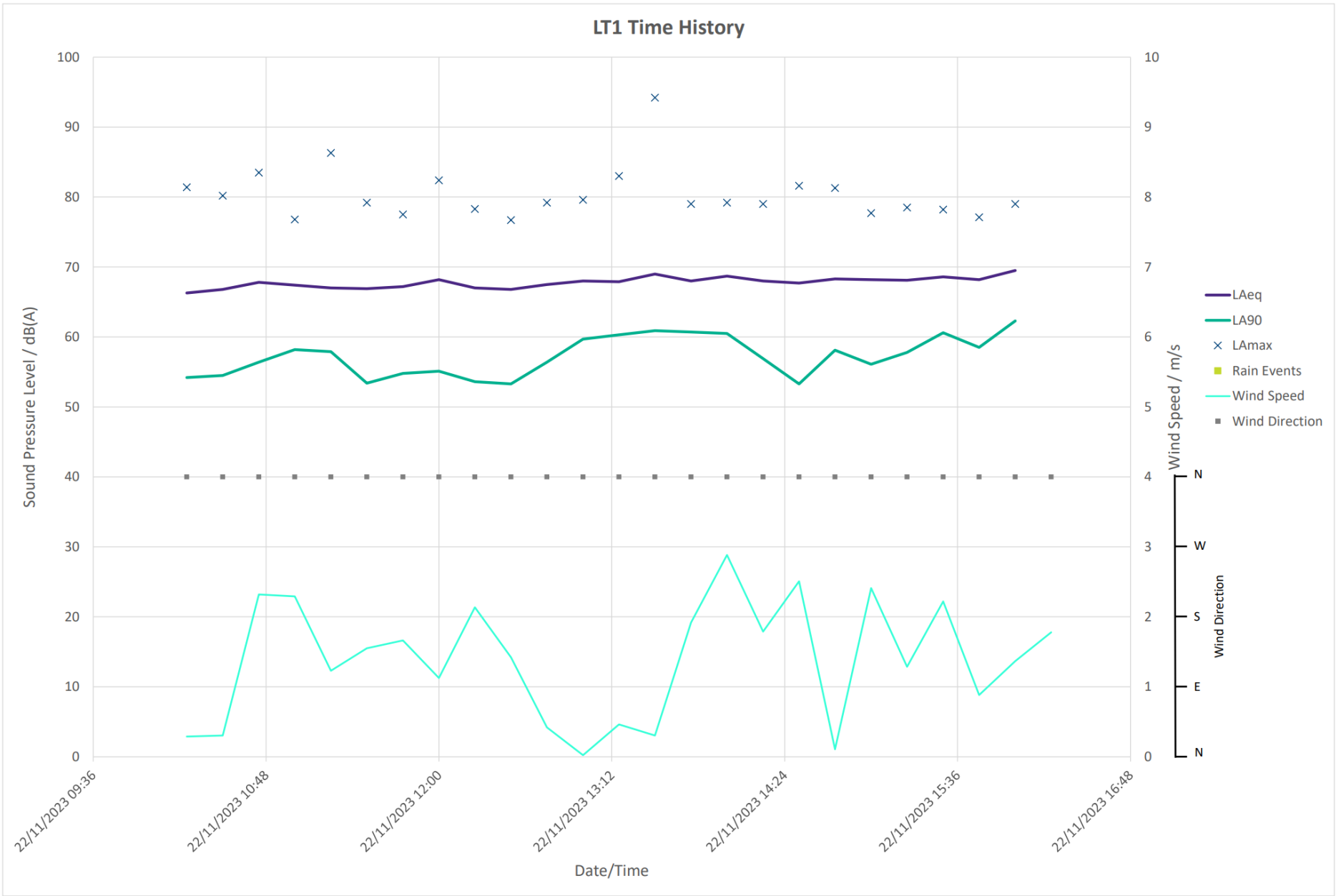
Location			3428 UOR School of Art Building - LT2 - NSR B						
Purpose of Monitoring			Plant Noise Assessment						
Relevant Guidance / Standard			BS4142 & POL 05						
Sound Measurement System									
RPS ID	Manufacturer / Model		Serial Number	Last Lab Verification	Filename	Memory Card ID			
168	Rion-NL-52		998569	02/03/2022	2202	Yes			
Mic Height	Measurement Interval	Dynamic Range (dB)	Time Weighting	Frequency Weighting	Façade / Freefield	Photo?			
1.5	100 ms	25 - 138	Fast	A weighted	freefeild	✓			
			START		END				
Personnel			SDH		SDH				
Date / time			10:15 Wednesday 22nd November 2023		16:15 Wednesday 22nd November 2023				
Calibrator	RPS ID		33		33				
	Manufacturer / Model		RION-NC-74		RION-NC-74				
	Serial Number		34472822		34472822				
	Date last verification		12/10/2023		12/10/2023				
	Reference level (dB)		94.0		94.0				
	Meter reading (dB)		94.0		94.0				
	Wind speed (m/s) & dir'n Av.		0.1	---	1.8	N			
Cloud cover (100%= 8 oktas)		3		4					
Temperature (degrees Celsius)		7.1		10.4					
Relative Humidity (%)		91		85					
Likely temp. inversion / Precipitation / Fog / Wet ground / Frozen ground / Snow cover? (tick boxes)		TI	P	F	S	TI	P	F	S
		x	x	x	x	x	x	x	x
Subjective description / additional details		Dry day not really much wind			Dry day not really much wind				
Description of site (location of equipment, general surroundings, nature of ground between NSR and sound source(s) (hard/ soft ground, topography, intervening features, reflecting surfaces))									
SLM located on boundary of the NSR, on soft ground immediately outside the nearest builing to UOR SORB, attached to tree, approximately 47 m from the internal noise source and 12 m from the center of Carter Drive									
Description of sound environment at start of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)									
Cars passing on Carter Drive, Pedesrians using the foot path, natual sounds, local construction works									
Description of sound environment at end of survey (principal environmental and natural sound sources, which sources are dominant, character of the sound environment cf. to the character of the new source)									
Cars passing on Carter Drive, Pedesrians using the foot path, natual sounds, local construction works									

Location	3428 UOR School of Art Building - LT2 - NSR B
Photographs of measurement location	
	

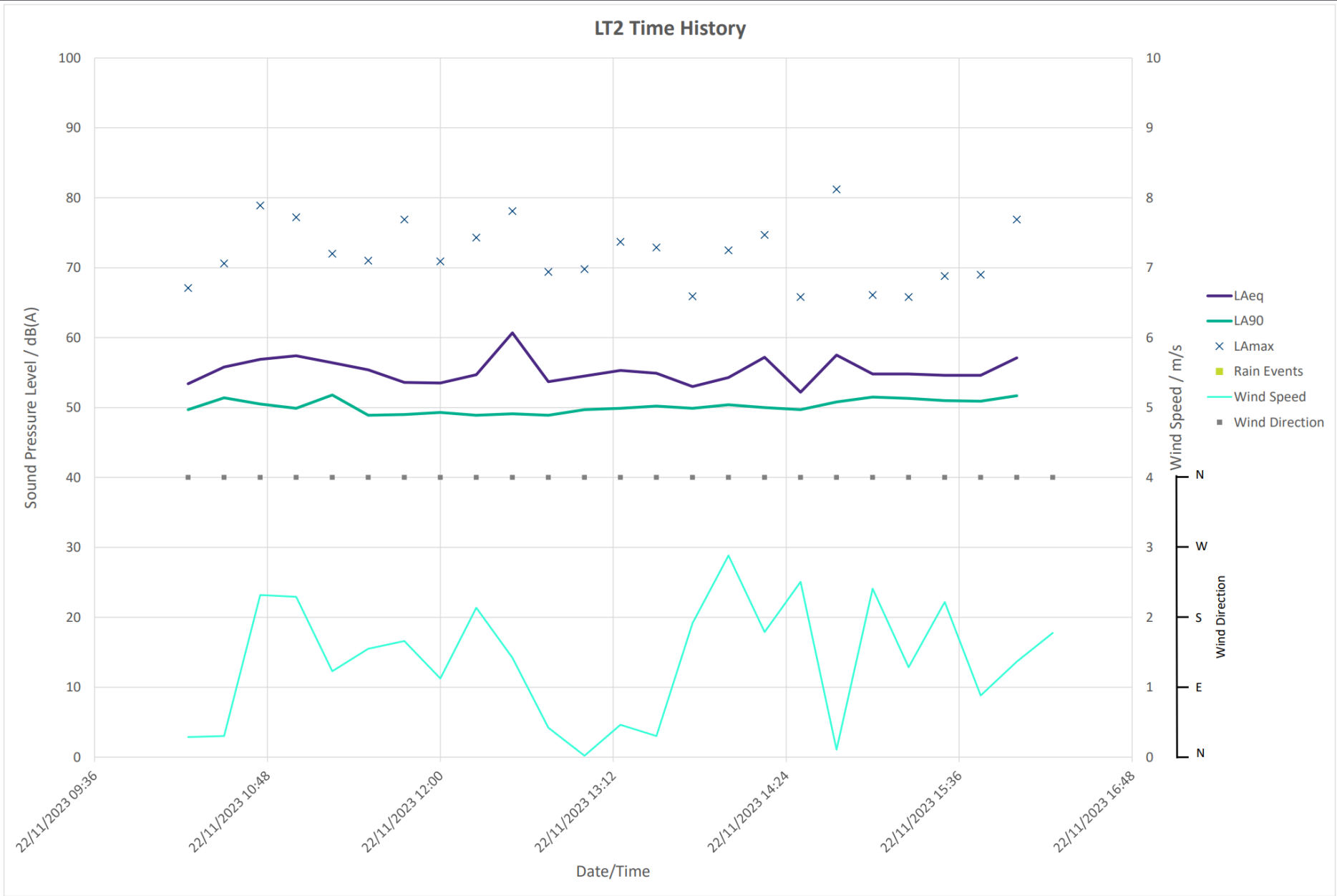
Appendix D

Time History Graphs

BREEAM POL 05 COMMISSION TESTING: UNIVERSITY OF READING ART SCHOOL



BREEAM POL 05 COMMISSION TESTING: UNIVERSITY OF READING ART SCHOOL



Appendix E

1/3 Octave Band Specific Data

Woodwork Extract Unit 1/3 Octave Band L_{Aeq} Sound Level Data

12.5 Hz	16 Hz	20 Hz	25 Hz	31.5 Hz	40 Hz	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	12.5 kHz	16 kHz	20 kHz
65	69	68	70	71	73	76	76	77	77	78	79	81	81	79	87	84	79	81	79	77	75	74	72	70	68	65	62	61	58	55	53	49

Note:

This measurement taken 1 m for the facade of the woodwork extract unit

