

Noise Impact Assessment Report

Proposed University of Reading School of Art Development

For University of Reading

PROPOSED UNIVERSITY OF READING SCHOOL OF ART DEVELOPMENT

Quality Management

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1 Introduction

- 1.1 The Acoustics Team of RPS Environment (RPS) has been appointed by University of Reading (UoR) to carry out a noise survey and assessment to form part of a planning application for the new School of Art building.
- 1.2 The main issue with respect to noise for this development is likely to be the impact of noise from any mechanical plant associated with the development at nearby noise sensitive receptors. This report outlines the methodology and results of the baseline noise survey and also identifies plant noise emission limits for the new development at nearby noise sensitive receptors. In addition, the impact of noise from existing sources on the proposed development has been considered. However, this is only to inform the design and is unlikely to be a planning issue.
- 1.3 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.
- 1.4 The technical content of this assessment has been provided by RPS personnel, the majority of whom are corporate (MIOA) or non-corporate, associate members (AMIOA) of the IOA (the UK's professional body for those working in acoustics, noise and vibration). This report has been peer reviewed within the RPS team to ensure that it is technically robust and meets the requirements of our Quality Management System (QMS).

2 Description of site and proposals

- 2.1 This section of the report briefly describes the existing site conditions and the proposed development.

Site Description

- 2.2 This proposed development 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.
- 2.3 The nearest noise sensitive receptors to the development are judged to be the existing UoR buildings (including the Knowledge Transfer Centre, Computer Sciences and Biomedical Engineering departments) approximately 45 metres north of the proposed development and Leighton Park School buildings (a number of which appear to be residential in nature) approximately 75 metres to the south of the proposed development.
- 2.4 The location of the proposed development and the nearest noise sensitive receptors are shown in Figure 1 below.

Figure 1 – Site location plan



3 Policy and Guidance

- 3.1 This section of the report summarises the key policy, standards and guidance relevant to the assessment.

National Planning Policy

- 3.2 The Noise Policy Statement for England (NPSE), the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG-N) do not contain guidance in terms of numerical noise levels. Guidance is provided descriptively, which may be transposed to numerical noise levels for site-specific situations, using the methods contained within relevant standards and guidance.
- 3.3 Relevant experience and professional judgment are fundamental to all stages of the assessment that leads to the determination of the significance of a noise effect. The non-numerical guidance contained within the PPG-N, which is based upon the initial advice in the NPSE, is summarised in Table 3.1 below.
- 3.4 The PPG-N states that there are many factors which should be considered when determining if noise is of concern; one factor is the number of noise events and the frequency and pattern of occurrence of the noise.
- 3.5 The PPG-N provides further information in relation to the adverse effects of noise and how it can be mitigated. For noise sensitive development, mitigation measures can include: avoiding noisy locations; designing the development to reduce the impact of noise from the local environment, including noise barriers; and optimising the sound insulation provided by the building envelope.

Table 3.1: Summary of Guidance from NPSE and PPG-N

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g., turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the	Observed Adverse Effect	Mitigate and reduce to a minimum

Perception	Examples of Outcomes	Increasing Effect Level	Action
	acoustic character of the area such that there is a perceived change in the quality of life.		
Significant Observed Adverse Effect Level (SOAEL)			
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g., avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g., regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g., auditory and non-auditory	Unacceptable Adverse Effect	Prevent

3.6 The information in the table above aligns with the NPPF which states that planning policies and decisions should:

“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 quality of life.”

Local Policy

3.7 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.*

3.8 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 10dBA below the existing background level as measured at the nearest noise sensitive receptor.

Consultation

3.9 RPS have liaised with Reading Borough Council Environmental Health Department in relation to local noise policy relevant to this type of development.

3.10 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 (LAeq,TR) (with reference to BS:4142) as measured at a point 1 metre external to the nearest noise-sensitive facade shall be at least 10dB below the pre-existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The predicted rating level, LAr,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, LA90,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 Email from Ross Jarvis, Senior Environmental Health Officer of RBC dated 29th November 2021.

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.

Relevant Guidance

- 3.11 BS 4142:2014+A1:2019 '2019 'Methods for rating and assessing industrial and commercial sound' provides guidance on the measurement and assessment of noise from industrial and commercial noise sources, such as mechanical plant and equipment associated with new buildings
- 3.12 Although this report does not constitute a full assessment in accordance with BS 4142, the guidance provided in the standard is relevant to the background sound survey methodology and identification of plant noise emission limits.

4 Baseline Survey

- 4.1 This section of the report describes the noise survey undertaken to identify baseline noise conditions across the site.
- 4.2 The baseline survey has been carried out based on the guidance presented within BS 4142:2014+A1:2019 wherever possible.

Establishing Baseline Conditions

Survey Locations

- 4.3 Baseline sound measurements were made with the aim of identifying the exiting background sound levels at the site at nearest noise sensitive receptors.
- 4.4 A long-term unattended noise monitor was setup up on site and attended noise monitoring was undertaken at a further three locations.
- 4.5 The measurement locations are shown in Figure 2 below:

Figure 2 – Measurement locations



- 4.6 Survey location LT1 was located near the central kitchen building on the University of Reading campus, in the carpark adjacent to it, 15m south east of its north eastern corner of the building (perpendicular distance), 4.5 m north east of north eastern corner (perpendicular distance), and 0.5m south west of fence surrounding carpark. The microphone was set up 1.5 m above ground level (AGL), with an environmental windshield.
- 4.7 Survey location ST1 was located next to the life science building, across the road from the central kitchen building. The meter was located 1.5m north east of the kerb of Carter Drive, 9.5 m south east of south eastern corner of Polly Vancher building, and 11 m south west of life sciences building. The microphone was set up 1.5 m AGL with an environmental windshield.
- 4.8 Survey location ST2 was located on Pepper Lane, opposite Pepper Lane (University) bus stop (around 7.5 m away) 1 m away from the kerb of Pepper Lane. The microphone was set up at 1.5 m AGL with an environmental windshield.
- 4.9 Survey location ST3 was located near White Knights energy centre, 13.5 m north east of easter corner, and 23 m south east of Carter Drive. The microphone was set up 1.5 m AGL with an environmental wind shield.

Instrumentation

- 4.10 Details of the instrumentation used during the survey are provided in Table 4.1 below. Calibration certificates of the equipment are available upon request. Calibration of the equipment was carried out before and after the measurements and no significant drift ($< \pm 0.5$ dB) was observed.

Table 4.1 Baseline Sound Survey Instrumentation

Measurement Location	Make/Model	Serial Number	Calibration Ref/ Calibration Start /Calibration End	Last Calibration Date
LT1	Rion NL52	#147 / 386736	94.0 / 94.1 / 93.9 dB	25/11/2019
ST1	Rion NL52	#167 / 998567	94.0 / 93.9 / 93.9 dB	16/03/2020
ST2	Rion NL52	#167 / 998567	94.0 / 93.9 / 93.9 dB	16/03/2020
ST3	Rion NL52	#167 / 998567	94.0 / 93.9 / 93.9 dB	16/03/2020
Calibrator	Rion NC72	#033 / 34472822	n/a	19/11/2021

Survey Periods

- 4.11 Table 4.2 summarises the measurements start dates / times and durations.

Table 4.2 Baseline Sound Survey Durations

Measurement Location	Start Date	Start Time	Duration
LT1	19/11/2021	13:30	≈ 7 days
ST1	19/11/2021	14:43	30 mins
ST2	19/11/2021	15:18	15 mins
ST3	19/11/2021	15:40	15 mins

Weather Conditions

- 4.12 A wind monitor and rain gauge were set up alongside the noise monitor at location LT1, so as to properly quantify the weather conditions throughout the survey. Overall, there were no periods of wind fast enough to interfere with the validity of the data. There were some periods of rain recorded and noise data collected during these periods have been discounted from the analysis later in this report (these are shown in the time history in Appendix 1).
- 4.13 In addition to the long term monitoring the following attended weather observations were made:
- At LT1 on deployment it was 13°C, 80% relative humidity, 0.3 ms⁻¹ wind from the west, 8 oktas of cloud.
 - At LT1 on collection it was 10°C, 80% relative humidity, 0.4 ms⁻¹ wind from the east, 2 oktas of cloud.
 - At ST1 on the 19th of November 2021 it was 12°C, 82% relative humidity, 0.8 ms⁻¹ wind from the west, 8 oktas of cloud.
 - At ST2 on the 19th of November 2021 it was 12°C, 82% relative humidity, 1.1 ms⁻¹ wind from the west, 8 oktas of cloud.
 - At ST3 on the 19th of November 2021 it was 11°C, 83% relative humidity, 0.5 ms⁻¹ wind from the west, 8 oktas of cloud.

Subjective Description of the Noise Climate

- 4.14 At location LT1, at the time of deploying the survey, the main noise source on site was road traffic, mainly from Pepper Lane to the south. Other noise sources included continuous but subjectively quiet noise from plant and equipment from UoR buildings and occasional vehicles passing on Carter Drive. Occasional noise from overflying aircraft was also just audible.
- 4.15 At location ST1 the main noise was the plant / equipment associated with the life sciences building. When compared to LT1, traffic on Pepper Lane was quieter but was still clearly audible.

Other noise sources included slow moving and infrequent traffic on Carter lane, plant / equipment noise from other buildings. Overflying aircraft were also occasionally just audible.

- 4.16 At location ST2 the noise climate was dominated by constant traffic on Pepper Lane.
- 4.17 At location ST3 the main noise sources were plant and equipment from surrounding buildings, including the 'Airedale Deltachill' chiller units to the east and plant associated with the Whiteknights Energy Centre to the south. Noise from occasional vehicles passing on Carter Drive was also noted.

Noise Measurement Results

- 4.18 A summary of the long-term noise monitoring results are summarised in Table 4.3.

Table 4.3 Long-Term Noise Measurement Results

Measurement Location	Daytime (07:00-23:00)		Night-time (23:00-07:00)	
	'Average' $L_{Aeq,16hr}$ (dB)*	'Typical' $L_{A90,15min}$ (dB)**	'Average' $L_{Aeq,8hr}$ (dB)*	'Typical' $L_{A90,15min}$ (dB)**
LT1	55	49	48	45

Notes:
All values have been rounded to the nearest whole number, where 0.5 is rounded up.
* logarithmic average.
** 25th percentile $L_{A90,15min}$ (dB): A-weighted L_{90} sound pressure level which is exceeded for 25 % of the measurement time. This was chosen to reflect reasonable worst case $L_{A90,15min}$. The time history graph has also been reviewed to verify that this presents a reasonable worst L_{A90} value.

- 4.19 The results from the short-term attended noise monitoring are summarised in Table 4.4.

Table 4.4 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

5 Plant Noise Emission Limits

5.1 This section of the report identifies plant noise emission limits for any new plant and equipment to be included as part of the new UoR School of Art building.

5.2 As previously noted, following consultation with the RBC, the following requirements relating to noise from mechanical plant were provided:

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 (LAeq,TR) (with reference to BS:4142) as measured at a point 1 metre external to the nearest noise-sensitive facade shall be at least 10dB below the pre-existing background sound level, LA90,T when all plant/equipment (or any part of it) is in operation. The predicted rating level, LAr,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, LA90,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.

5.3 This condition requires an assessment of noise from mechanical plant and equipment in accordance with BS 4142: 2014 (amended in 2019) and has two main requirements, applicable at the nearest noise sensitive receptors:

- *The 'specific sound level' shall be 10 dB below the pre-existing background sound level*
- *The 'rating Level' shall not exceed the pre-existing background sound level*

Noise Sensitive Receptors and Representative Background Sound Levels

5.4 Long term unattended noise measurements were made at the location of the proposed development and additional attended measurements were made in a number of locations representative of the nearest noise sensitive receptors.

5.5 The closest non UoR noise sensitive receptors to the development are the Leighton Park School Buildings (that may be residential in nature) situated across Pepper Lane to the south of the site. Due to the similar distance from Pepper Lane the unattended long term noise monitoring location can also be considered representative of the background sound levels at these buildings.

5.6 The attended measurements at ST2 (close to the Leighton Park School Buildings) show much higher ambient and background sound levels. However, this is due to the close proximity of the

sound level meter to the road. Therefore, the lower noise levels measured during the long-term survey are considered more representative.

5.7 The existing UoR buildings to the north of the site are also considered sensitive to noise. Whether the RBC requirements also apply to these buildings will need to be confirmed with RBC and these buildings may be considered less sensitive for the following reasons:

- The buildings are operated by UoR (which will also operate the proposed new buildings);
- The buildings are likely to be mechanically ventilated and cooled (and therefore are unlikely to require open windows);
- The buildings are only likely to be sensitive during the daytime when in use; and
- Some education uses laboratories, break out spaces may be less sensitive to noise than residential buildings or traditional teaching type spaces.

5.8 If these spaces are judged to be less sensitive then it is likely that less onerous noise criteria will apply to these buildings.

5.9 Notwithstanding the above and to assess a worst-case scenario, it has been assumed that the RBC requirements will apply to the UoR buildings although they will only be sensitive during the daytime period.

5.10 The two receptors considered above are the closest to the proposed development and by meeting the RBC requirements in these locations it is likely the requirements will be met at all other noise sensitive receptors.

Noise Emission Limits

5.11 Based on the results of the noise survey and the RBC requirements, the following noise emission limits are proposed for the development.

5.12 Free field noise from new plant and equipment associated with the proposed new School of Art building, when assessed in accordance with BS 4142:2014+A1:2019, should not exceed the following levels at 1 metre from the façade of the nearest noise sensitive receptors:

Table 5.1 Proposed noise emission limits

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

- 5.13 By achieving the RBC requirements and the noise emission limits in the preceding table, a BS 4142:2104+A1:2019 assessment conclusion of 'low impact' would be achieved. It is therefore considered that by meeting the RBC requirements, this will align with the requirements of the NPPF and adverse noise effects are unlikely to occur at nearby noise sensitive receptors.
- 5.14 At this stage of the development details of plant and equipment associated with the scheme are not available. However, all new plant and equipment associated with the scheme should be designed and, if necessary, mitigated so that the above noise emission limits are complied with.

6 Noise Impact on the Proposed Development

- 6.1 This section of the report briefly discusses the impact of the existing noise climate at the site on the proposed development. As this is a university building this is unlikely to be a requirement of the planning process but is provided to inform the future design of the project.
- 6.2 Based on relevant guidance (e.g. Building Bulletin 93) it is likely the most sensitive areas of the proposed building will require internal noise levels (from intrusive noise) to be no more than 35 dB $L_{Aeq,T}$ in the various teaching, learning and ancillary spaces.
- 6.3 Typical daytime external ambient noise levels have been measured at 55 dB $L_{Aeq,16hr}$ at the site of the proposed development. At this level of noise, most standard façade constructions (e.g. standard double glazing) should comfortably reduce noise levels within the proposed School of Art building to below 35 dB $L_{Aeq,T}$.
- 6.4 A simple calculation of internal ambient noise levels, based on the following assumptions, would predict internal ambient noise levels inside the building to be approximately 31 dB $L_{Aeq,T}$:

Calculation assumptions

- Calculation based on a simplified version of the guidance provided in BS 8233:2014:

$$L_i = L_{ex} - R + 3$$

Where:

L_i = Internal ambient noise level in dB $L_{Aeq,T}$

L_{ex} = Free field external noise level at the building façade

R = Sound insulation of the weakest façade element (in $R_w + C_{tr}$).

- It is assumed that standard thermal double glazing (i.e. 6/16/6 mm double glazing) or better will be used providing 27 dB $R_w + C_{tr}$ sound insulation.
- External noise levels at the façade of 55 dB $L_{Aeq,16hr}$ as measured during the survey.

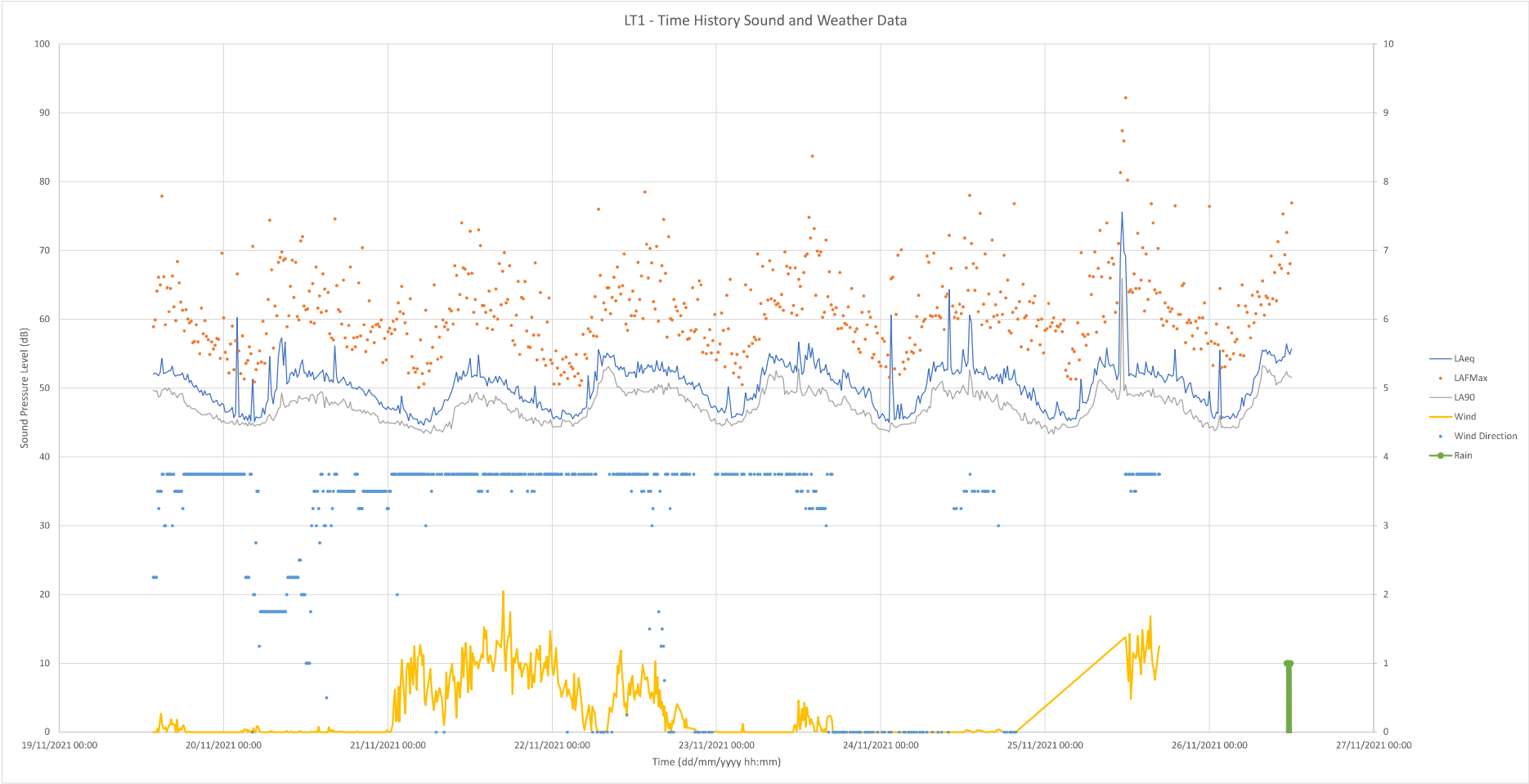
- 6.5 Internal ambient noise levels and facade design will need to be examined in more detail later in the design of the building. However, this simple assessment has found that appropriate internal ambient noise levels should be achievable inside the proposed development using standard façade materials.

7 Summary and Conclusions

- 7.1 The Acoustics Team of RPS Environment (RPS) has been appointed by University of Reading to carry out baseline noise survey and assessment as part of a planning application for the proposed new School of Art building on the White Knights Campus.
- 7.2 At this stage of the project details of the likely noise generating plant and equipment associated with the development are not available. Therefore, noise emission limits have been set for the proposed development based on Reading Borough Council requirements and the results of the noise survey.
- 7.3 A simple assessment of the impact of the existing noise climate on the proposed development has also been undertaken. It has been found that appropriate internal ambient noise levels are likely to be achieved using standard façade materials.
- 7.4 Assuming the noise emission limits identified in this report (that are based Reading Borough Council requirements) are complied with, it is unlikely that that the proposed development will result in adverse effects at nearby noise sensitive receptors. It is therefore considered that, with respect to noise, there is no reason why planning permission should not be granted for the development.

Appendices

Appendix A: Baseline Survey Time History Data



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