

Project

St Patrick's Hall, University of Reading

Prepared for

University Partnerships Programme

By

Jago Edwards

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Client Address	40 Gracechurch Street, London EC3V 0BT
Author	Jago Edwards BEng (Hons) AMIOA
Checker	Heulwen Peters BSc (Hons) MIOA
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Revision	Date	Comments
A	02/11/2017	First Issue
B	13/11/2017	Changed Hub building noise break out to give more detail.
C	15/11/2017	Minor corrections of building description

Summary

This Acoustic Report for Planning has been prepared in relation to a revised application for the redevelopment of St Patrick's Hall to provide student accommodation and associated ancillary uses. A previous application (Council Planning Ref: 161182) for the redevelopment of the site was withdrawn following the local listing of Pearson's Court within the site. This revised application retains Pearson's Court and redevelops the remainder of the site.

The changes proposed as part of this revised scheme are summarised as follows:

- There is a net reduction in student bed numbers in comparison with the previous submission. The withdrawn application proposed 1024 new student bedspaces and 6 no. three bedroom flats for families, resulting in a net increase of 726 bedspaces. The revised application provides 884 new bedspaces and would retain 116 existing bedspaces within Pearson's Court. This results in a net increase of 702 bedspaces at the site.
- The demolition of the original Pearson's Court building no longer forms part of the plans for redevelopment.
- The Sets building to the south of the Pearson's courtyard will be removed and replaced with new, high-quality accommodation, this element of the scheme has been redesigned to complement the retained courtyard.
- The proposed new courtyard to the north of the site, has increased in massing to accommodate the need for student accommodation while retaining the locally listed Pearson's Court.
- The two low-rise buildings previously proposed in the southern part of the site have been removed in response to concerns raised regarding the proximity of the buildings to the nearby house.
- New low rise accommodation is proposed set further back from the southern boundary and deeper into the site to mitigate proximity to the neighbours.
- New accommodation is now proposed above the catering Hub building and to the centre of the site.
- The Social facilities including the bar, café and dining facilities will be located in the centre of the site away from the southern boundary.
- The Combined Heat and Power (CHP) energy centre has been relocated to the centre of the site away from the southern boundary.

- Warden accommodation will be provided within the existing accommodation on the southern boundary and an updated Student Management Plan have been introduced as part of the revised application.

SRL Technical Services Limited has been commissioned by UPP (University Partnerships Programme) to complete an acoustic assessment to support the planning application for the proposed redevelopment of the St Patrick's Hall student accommodation at the Northcourt Group site, University of Reading.

The design of the proposed development considers the noise mitigation guidelines set out in Reading Borough Council Core Strategy 2008 as well as specific noise criteria in relevant British Standards including BS 4142:2014, BS 8233:2014.

Noise break in

An environmental noise survey was done in November 2015 to determine the existing ambient and background noise levels at the site. **Standard thermal double glazing when used with trickle vents will be sufficient to meet suitable internal noise levels, as given in BS 8233: 2014.**

Plant noise

Plant noise limits have been set according to the assessment methodologies given in BS4142: 2014. Meeting these plant noise limits will help to see that **noise from fixed plant has a low impact on all nearby receptors**. Meeting these plant noise limits will also satisfy the requirements of BREEAM UK New Construction 2014, credit Pol 5.

Noise from student activities

The 'Hub' building is located in the south of the site close to proposed new and existing student dwellings. The hub will be used as a canteen and casual study/meeting space during the day and may remain open into the night as a bar. **There is no significant noise generation expected from the 'Hub'.**



Jago Edwards

For and on behalf of
SRL Technical Services Limited
Tel: 0161 929 5585
Email: jedwards@srltsl.com

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1.0 Introduction

This report addresses how the existing ambient noise environment will affect the redevelopment at St Patrick's Hall in terms of noise break-in to the dwellings. It also predicts how noise from the redevelopment will affect the nearby residential receptors as well as the proposed new dwellings.

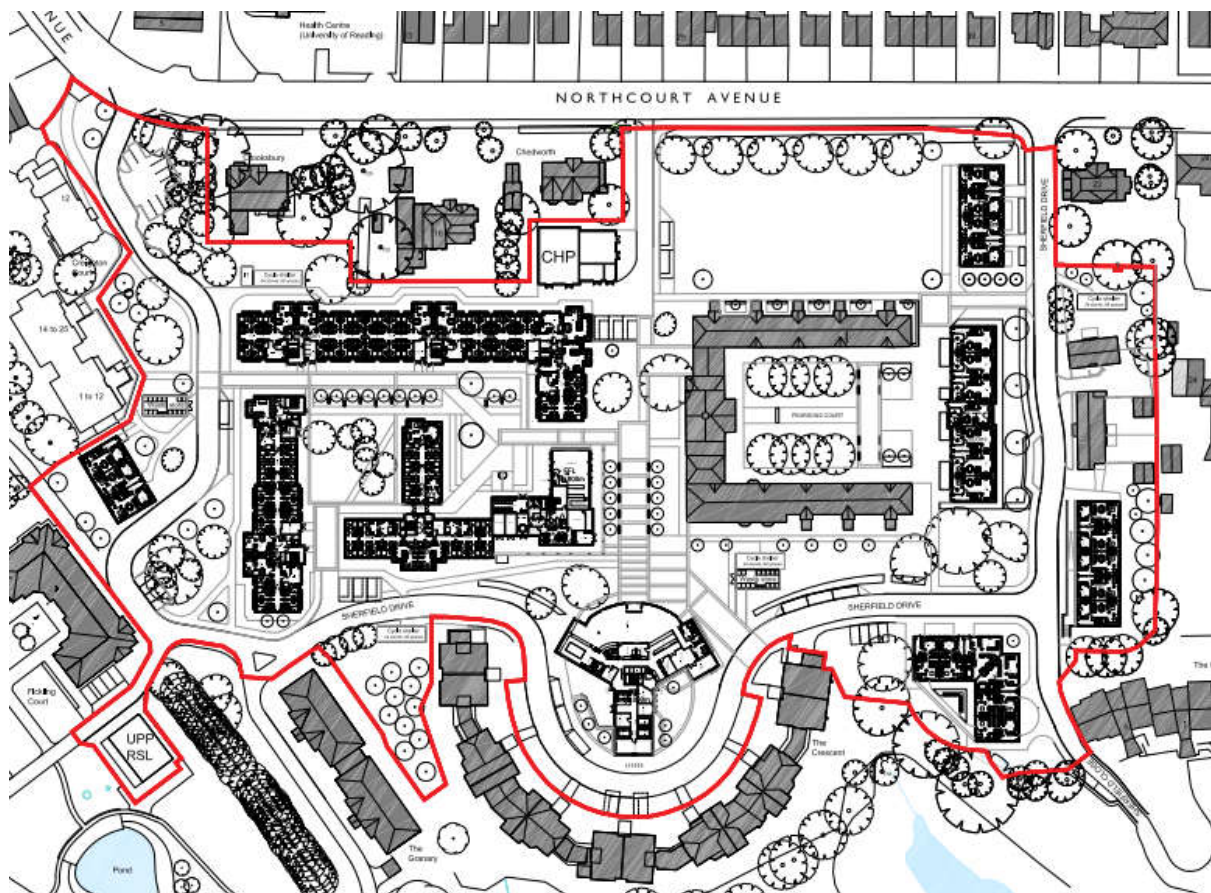
The application site is the current site of St Patrick's Hall located on the Northcourt Group site, University of Reading (shown in red in Figure I.1 below).

The main entrance to the site is on Northcourt Avenue, a residential road. The remainder of the site is bordered by further student accommodation areas, residential areas and parkland (see Figure I.1 below).

The proposals consist of 12 buildings (Blocks A-L & Block 'SETS'). The scheme also has an energy centre with a CHP plant. Pearsons Court is to be retained and will not be materially changed in use or layout.

Block A and K will consist of a concrete frame transfer slab at level 1 and a steel superstructure from level 1. All other blocks will have a steel superstructure throughout.

Figure I.1: Site boundary and local area



2.0 Criteria

The design of the redevelopment considers the following criteria. These criteria are taken from the Local Authority published guidelines and relevant British Standards identified below.

2.1 Local Policy

Reading Borough Council Core Strategy 2008 does not provide any specific noise criteria for new developments, by way of environmental noise impacting upon the development, or noise generated by the redevelopment impacting upon the local environment. Policy CS34: “Pollution and Water Resources” in the Core Strategy does however state the following:

“Development will only be permitted where it would not be damaging to the environment through [noise pollution].”

“Proposals for development that are sensitive to the effects of [noise pollution] will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.”

We are satisfied that demonstrating compliance with the noise criteria set by the following British Standards will be sufficient to meet these guidelines.

2.2 National guidance – Professional Practice Guidance on Planning and Noise (ProPG)

Professional Practice Guidance on Planning and Noise” (ProPG) was published in June 2017, it provides guidance on a recommended approach to the management of noise within the planning system in England for new housing. It is not an official government code of practice, nor does it replace or provide an authoritative interpretation of the law or government policy, but it does help to draw together existing policies, such as the National Planning Policy Framework (NPPF) and BS 8233: 2014 “Sound Insulation and noise reduction for buildings – Code of practice”. It also provides additional guidance which helps fill in some of the current gaps within existing codes of practice. It encourages the process of good acoustic design in and around every new residential development and gives in outline what should be taken into account in deciding planning applications for new noise-sensitive developments

2.3 Noise Break-in criteria

The design is based on noise levels inside dwellings meeting ‘Reasonable’ internal noise standards defined in BS 8233: 2014 “Sound Insulation and noise reduction for buildings – Code of practice”. BS 8233 considers the

guidance given in the World Health Organisation 'Guidelines for Community Noise' when setting internal noise criteria.

**Table 2.2: Indoor ambient noise levels in spaces when they are unoccupied
(Extract from Table 4 of BS 8233: 2014)**

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom *	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

* We consider that for a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{Amax} .

2.4 Noise from fixed plant – BS 4142

The Local Authority are expected to set a planning condition relating to noise from fixed plant.

Plant noise limits are based on the assessment methodology set out in BS 4142: 2014 “*Method for rating and assessing industrial and commercial sound*”.

BS 4142 describes a method for assessing the likelihood of complaint due to noise from industrial sources (including fixed plant).

The standard states that *"the significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound exceeds the background sound level and the context in which the sound occurs"*.

The specific level in this case is likely to be the manufacturer's tested noise emission level for each item of plant. The rating level is calculated by applying corrections to the measured specific level of plant. The corrections can be applied as follows:

Tonality – a correction of between 0 and +6 dB can be applied depending on how tonal the specific noise is.

- +0 dB for a non tonal source
- +2 dB for a tone which is just perceptible at the receptor
- +4 dB for a tone which is clearly perceptible at the receptor, and
- +6 dB for a tone which is highly perceptible at the receptor

When assessing tonality using manufacturers data, a 6 dB correction is applied if a “tone” is present (by assessing third octave noise data). Else, if appropriate manufactures’ data is not available, the reference method is used which assesses likely tonality based on archive data held for similar items of equipment.

Impulsivity – a correction of up to 9 dB can be applied to specific noise which is impulsive.

- +0 dB for no impulsivity
- +3 dB for impulsivity which is just perceptible at the receptor
- +6 dB for impulsivity which is clearly perceptible at the receptor, and
- +9 dB for impulsivity which is highly perceptible at the receptor

Other sound characteristics – where the noise source has other characteristics that are readily distinguishable against the residual acoustic environment, a penalty of up to +3 dB can be applied.

Intermittency – when the noise source has identifiable on/off conditions, and these on/off conditions are readily distinguishable against the residual acoustic environment, a penalty of up to +3 dB can be applied.

These corrections can add up to a potential 21 dB correction, however it is considered very unlikely that noise at any development would be so significantly tonal and impulsive that the total 15 dB of correction could be applied. Normally we consider that the worst-case situation would be that no more than 15 dB of correction would be applied.

Once the rating noise level has been determined by applying these corrections to the specific noise level, this rating level is compared with the measured background level. BS 4142: 2014 states that *“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”*.

On this basis, the rating level will be set such that it does not exceed the measured background noise level. When final plant is selected, we will be able to determine the rating corrections required and therefore the ability for that plant to meet the proposed limits.

Note:

BS4142:2014 superseded BS4142:1997 *“Method for rating industrial noise affecting mixed residential and industrial areas”*. The methodology set out in BS4142:2014 is different to that given in BS4142:1997 in a number of key ways.

Both standards still compare the rating noise level against the background noise level to assess the potential impact of noise from industrial sources. However, the rating level in BS4142:2014 is calculated differently to the rating level in BS4142:1997. In BS4142:2014 the rating level is the specific noise level with corrections applied as described above.

In BS4142:1997, the rating level is the specific noise level plus a 5 dB correction if the noise is tonal, intermittent, impulsive or contains other acoustic effects likely to be noticeable.

Because the rating levels are calculated differently, BS4142: 2014 states that *“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”*. BS4142:1997 advised that if the rating level was 10 dB below the background noise level, it was a positive indication that complaints were unlikely.

The removal of the BS4142:1997 “background minus 10 dB” criterion is offset by significant changes to the corrections that should be applied to predicted or measured commercial/industrial noise containing intrusive characteristics. These characteristics include tonality, impulsivity, and intermittency. The corrections in BS4142:2014 are now potentially much higher, meaning that noise containing these characteristics will be severely penalised.

For these reasons, and because BS4142:2014 is the current relevant standard, we recommended a plant rating noise limit no higher than 0 dB below the background noise level.

Setting a rating noise limit of 10 dB below the background noise level in accordance with BS4142:2014 does not reflect the intent of the standard and mixes the old BS4142:1997 and new BS4142:2014 methodologies.

It is our opinion that any proposed condition needs wording to reflect the intent of the new standard - i.e. setting a noise limit 0 dB below the background noise level (considering that the rating level is calculated with the potential for more correction), or, the condition needs to refer to BS4142:1997 (which has now been superseded).

2.5 Noise from fixed plant – BREEAM 2014 Pol 05

To gain the BREEAM 2014 Pol 05 credit, the following criteria must be met

“The noise level from the proposed site/building, as measured in the locality of the nearest or most exposed noise sensitive development, is a difference no greater than +5dB during the day (07:00 to 23:00) and +3dB at night (23:00 to 07:00) compared to the background noise level.”

The plant at this point in time is not known. However, the plant noise limits set in accordance to BS 4142:2014 are more onerous and therefore would automatically achieve the criteria for the Pol 05 credit.

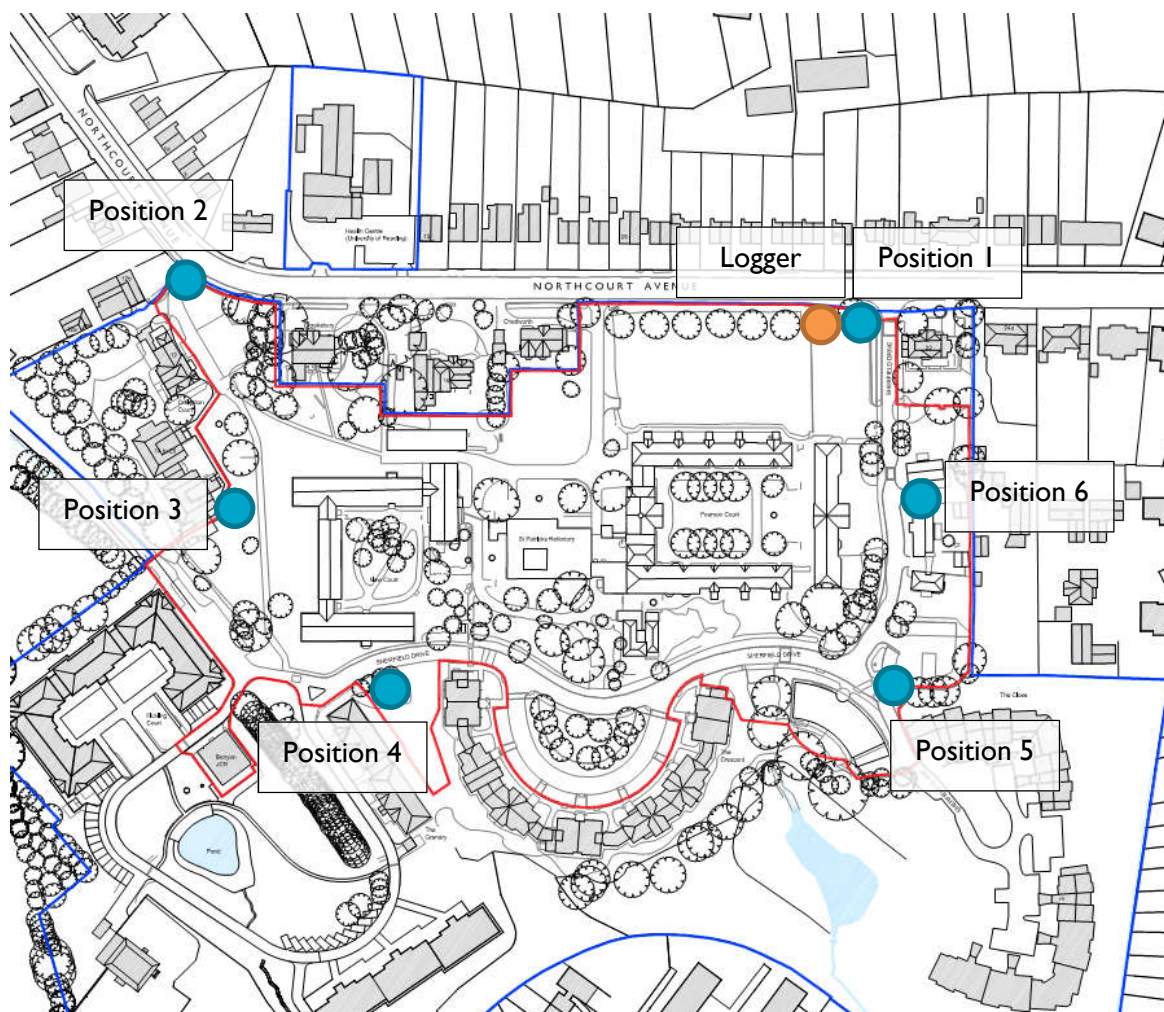
3.0 Survey Results

3.1 Baseline Noise Survey

We measured noise continuously at the site with an unattended logger from 23 to 27 November 2015, and took attended measurements on Monday 23 November and Tuesday 24 November 2015. Due to poor weather conditions towards the end of the week, we have omitted the unattended measurements that were taken after 18:00 on Thursday 26 November.

Figure 3.1 below shows the measurement locations in relation to the existing site layout. Weather during the attended survey period was cool, with a light breeze and occasional light rain.

Figure 3.1: Measurement positions on the existing site.



All measurements (both attended and unattended) were taken at a height of 1.5 m above local ground. All measurements were taken in free-field conditions (nearest reflective surfaces >3.5m away). All measurements were 10 minutes in duration apart from night-time attended measurements, which were 5 minutes in duration.

The noise levels from the attended measurements are summarised in Tables 3.1 and 3.2 below.

Table 3.1: Attended Measurements – Ambient Noise Levels (dBA)

Measurement Position	Day $L_{Aeq,16hr}^*$	Night $L_{Aeq,8hr}^*$
1	50	50
2	54	55
3	49	45
4	47	45
5	51	44
6	49	46

* Average day and night-time noise levels have been calculated using a shortened measurement procedure based on sample measurements over a 24-hour period with a minimum of three measurements per location.

Table 3.2: Attended Measurements - Background Noise Levels (dBA)

Measurement Position	Lowest measured background noise level (L_{A90})	
	Day	Night
1	41	40
2	40	40
3	42	41
4	43	41
5	42	40
6	41	40

The dominant noise source at all positions on site is distant road traffic. On Northcourt Avenue, early morning waste and recycling vehicles were the cause of measured night time maximum noise levels.

Survey details are given in Appendix A.

Appendix B gives L_{Aeq} and L_{A90} octave band data for each attended measurement.

Appendix C shows a chart of the unattended noise measurements. Full unattended noise data can be made available upon request.

Appendix D gives explanations of the used terminology.

4.0 Noise break-in assessment

The internal noise levels in student living areas have been calculated for daytime and night-time periods using the external noise levels measured on site (Table 3.1).

Noise levels around the site are low, and our calculations show that standard thermal double glazing units will be acoustically acceptable in all areas on site to achieve the internal noise criteria given in Table 2.2 when used with standard, non-acoustic trickle vents.

5.0 Noise break-out assessment

5.1 Noise from Fixed Plant

In order to meet the plant noise limits (section 2.4), noise from fixed plant will not exceed the levels shown in the table below at the closest receptor properties.

Table 5.1: Plant Noise Limits

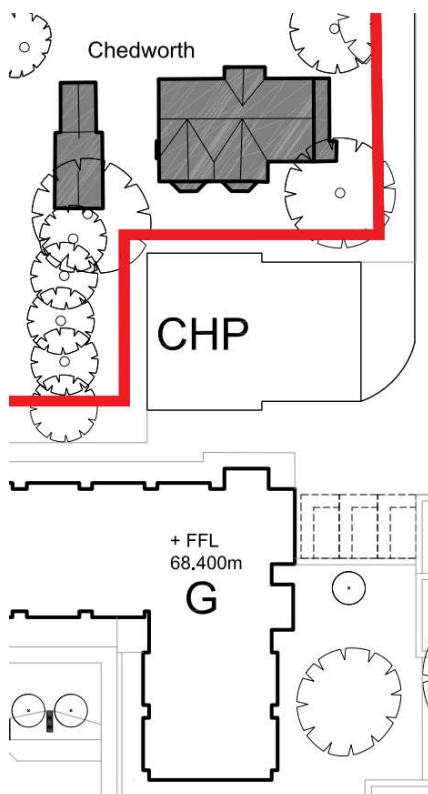
Location	Plant Noise Rating Limit	
	L _{Ar}	
	Day	Night
1	41	40
2	40	40
3	42	41
4	43	41
5	42	40
6	41	40

Figure 3.1 shows the location of the assessment positions.

5.2 Noise break out from CHP

A CHP unit will be installed on the site. the nearest noise sensitive receptors are block G, which is part of St. Patrick's Hall and "Chedworth" on Northcourt Avenue; a residential receptor outside the site boundary. These receptors are both approximately 6m away from the CHP. This is shown in the figure below.

Figure 5.2 – location of CHP



The table below presents the rating level limits for noise from the CHP at Block G and Chedworth. These are based on plant noise limits presented in Table 5.1 for measurement positions 1 and 2 which are considered representative of Chedworth and Block G. The CHP will be gas fired and therefore will be no noise from fuel deliveries.

Table 5.2 Noise limits from CHP

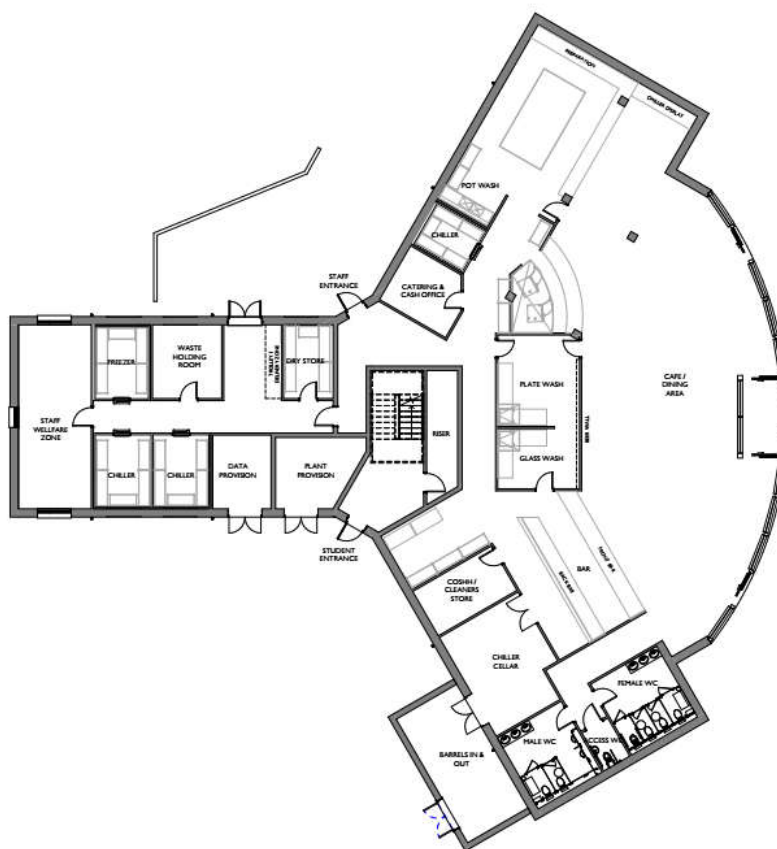
Time period	Plant Noise Rating Limit, L_{Ar}
Day	41
Night	40

It is unfortunately not possible to do an accurate and detailed assessment of plant noise at this stage as final plant selections, building façade acoustic performances, louvre sizes and louvre locations are not known.

The building envelope and louvre configurations will be such that they aid in the control of plant noise to the receptors – i.e. locating louvres to face away from the closest noise sensitive receptors and control of CHP noise at source will be implemented if necessary to meet the expected planning condition.

A planning condition that requires a detailed plant noise assessment to be done to show plant noise limits can be met is reasonable.

The 'Hub' building is located in the south of the site close to proposed new student dwellings and existing student dwellings. The hub will be used primarily as a café/canteen and informal study space, but may have a more 'bar-like' function during evening and early night-time hours.



Appendix A Survey Details

A1. Location of Survey

St. Patrick's Hall Student Village, Northcourt Avenue, Reading, RG2 7HB

A2. Date & Time of Survey

Manned measurements - 23/11/2015 13:00 - 24/11/2015 07:00

Unmanned measurements - 23/11/2015 13:00 - 27/11/2015 11:30

A3. Personnel Present During Survey

Alice Rushton - SRL Technical Services Ltd

A4. Weather Conditions during Survey

Cool and cloudy, ground slightly damp.

A5. Instrumentation

Nor-140 Sound Level Analyser - Handheld meter

Nor-140 Sound Level Analyser - Unmanned logger with weather kit

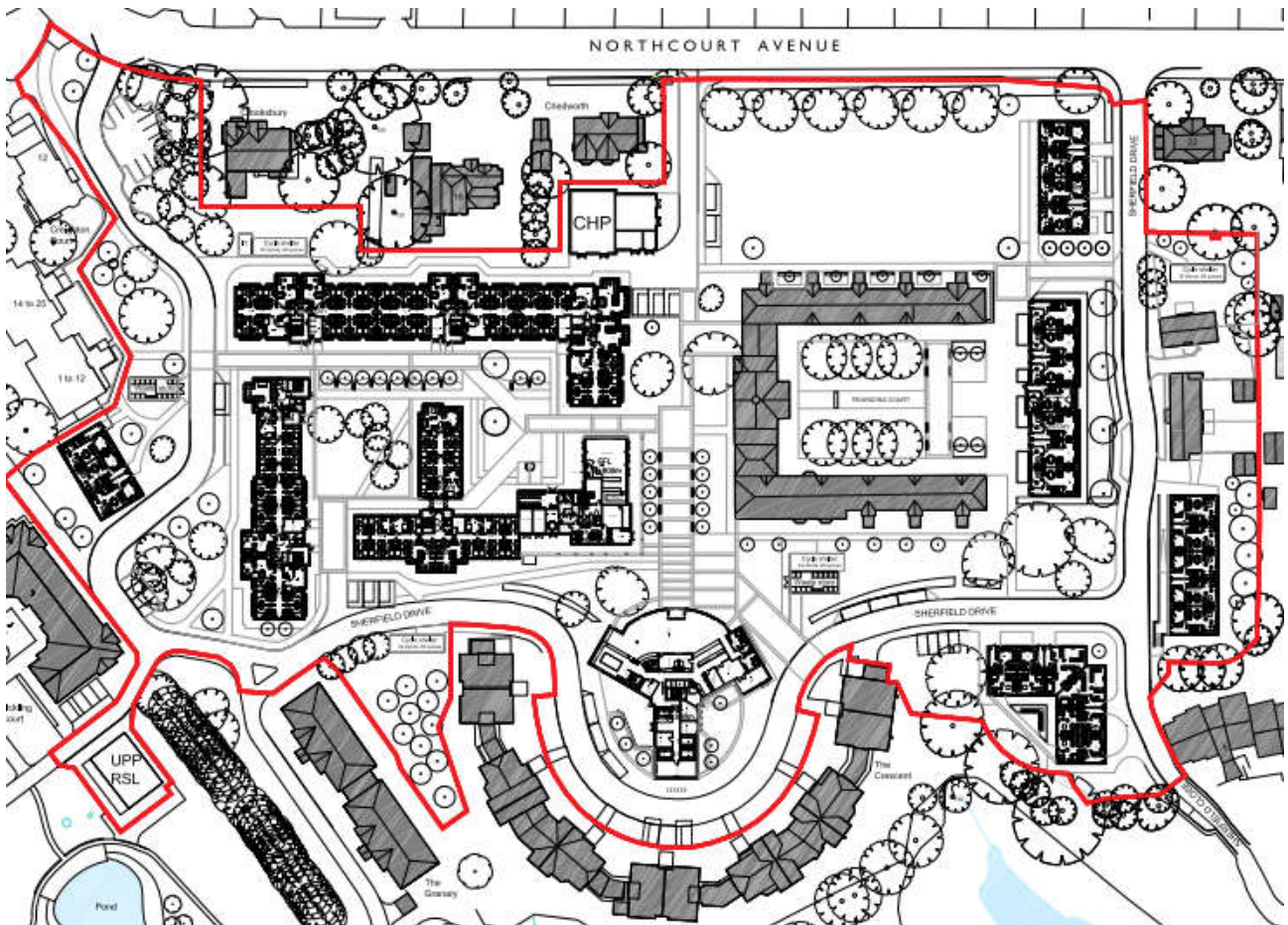
A6. Calibration Procedure

Before and after the survey the measurement apparatus was checked calibrated to an accuracy of ± 0.3 dB using the type 4231 Sound Level Calibrator. The Calibrator produces a sound pressure level of 93.8 dB re 2×10^{-5} Pa at a frequency of 1 kHz.

A7. Survey Procedure

Ambient noise levels were monitored at various positions around the site as shown on Figure 3.1. The attended measurements are tabulated in Appendix B, the unattended measurements are graphed in Appendix C and explanations of the parameters used are listed in Appendix D.

Figure A1: Proposed development plan with site boundary.



Appendix B - Attended Measurement Noise Data

Measured $L_{Aeq, 10min}$ - Daytime

Measurement Position	Time	$L_{Aeq, 10min}$ dB	Octave band centre frequency (Hz) - L_{Aeq} dB						
			63	125	250	500	1000	2000	4000
1	13:10	51.6	66.7	59.7	55.1	46.6	45.4	41.7	32.4
	14:36	50.0	64.3	57.3	52.5	44.1	43.1	42.3	35.2
	16:00	49.7	61.5	57.0	51.2	44.7	44.0	42.2	32.7
2	13:32	54.7	62.7	56.8	54.6	50.2	50.2	47.6	40.3
	14:51	52.5	62.5	55.2	52.6	50.7	47.9	42.4	34.9
	16:14	53.5	67.3	58.9	53.2	48.7	49.8	44.8	33.1
3	13:43	48.5	55.5	50.4	46.7	42.3	41.9	43.7	36.2
	15:04	47.1	59.2	53.6	49.5	42.5	41.7	38.2	31.7
	16:49	50.4	59.2	54.3	49.5	48.6	46.9	36.2	30.2
4	13:54	57.9*	66.7	58.8	55.3	54.0	51.9	51.7	47.3
	15:18	46.7	58.1	53.1	48.7	44.7	41.0	34.7	28.7
	17:02	48.0	57.4	52.3	46.5	45.3	44.8	36.2	29.4
5	14:06	59.3*	66.8	63.3	60.9	60.0	51.3	43.6	34.8
	15:29	50.0	59.6	55.8	50.1	46.6	44.3	40.9	38.8
	16:34	52.0	59.0	60.0	56.2	46.4	47.0	39.8	32.7

Measurement Position	Time	L _{Aeq, 10min} dB	Octave band centre frequency (Hz) - L _{Aeq} dB						
			63	125	250	500	1000	2000	4000
6	14:24	50.0	61.8	60.0	54.0	44.4	42.3	39.6	34.0
	15:46	47.0	57.8	54.4	47.2	41.4	41.9	39.5	34.1
	17:15	49.5	60.3	53.3	47.7	46.8	45.7	39.8	32.3

* Omitted from calculation of L_{Aeq, 16h} due to extraneous noise events contributing to the L_{Aeq, 10min}.

Measured $L_{Aeq, 10min}$ - 23:00 to 00:00

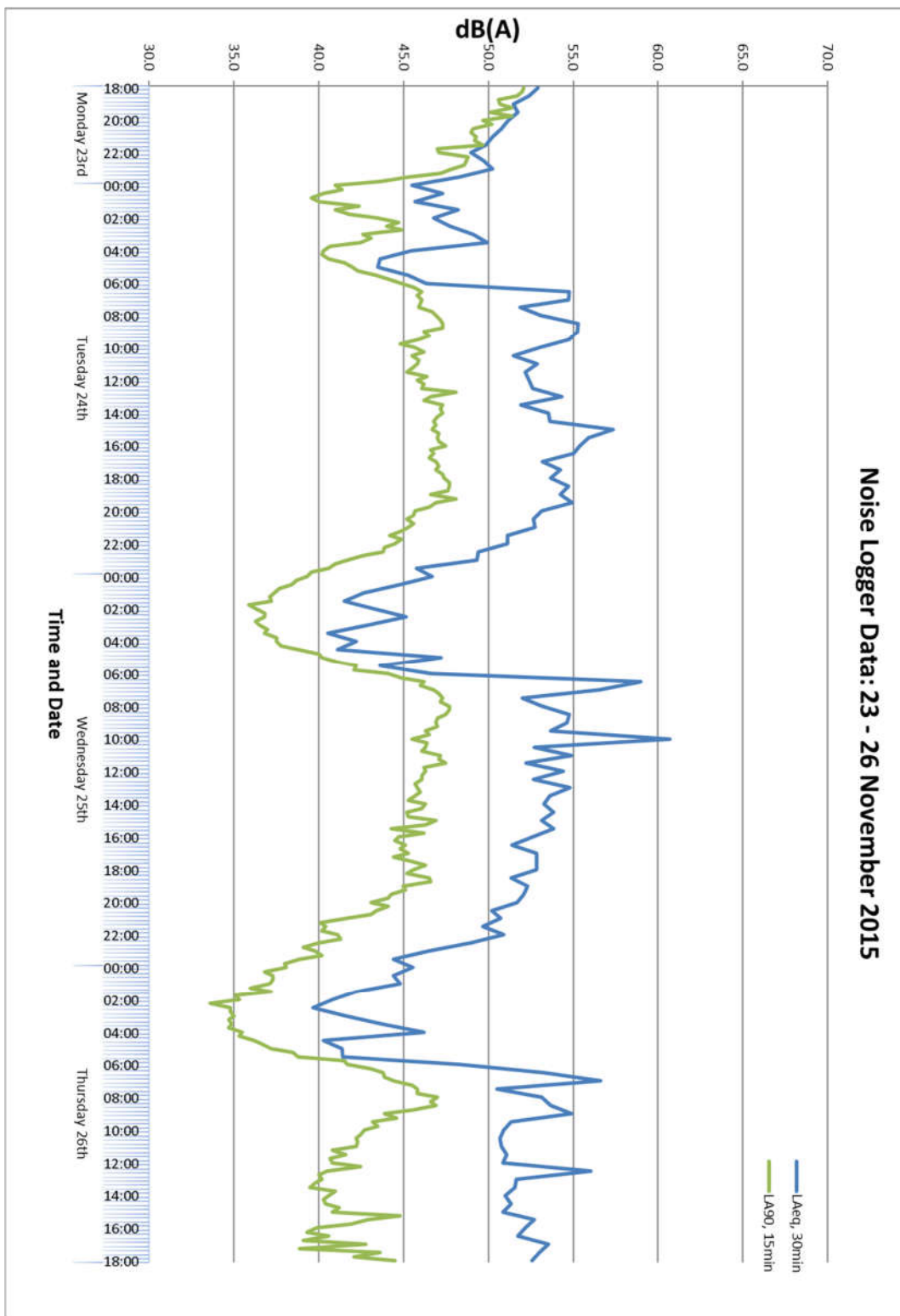
Measurement Position	Time	$L_{Aeq, 10min}$ dB	Octave band centre frequency (Hz) - L_{Aeq} dB						
			63	125	250	500	1000	2000	4000
1	23:00	47.9	57.2	53.8	45.5	42.3	44.5	40.2	29.7
	23:37	47.2	60.3	48.1	43.0	41.2	44.1	39.5	30.1
2	23:08	49.1*	57.1	49.5	45.9	44.0	45.6	41.7	34.7
	23:43	43.7	50.4	44.6	39.4	39.7	39.2	36.6	32.5
3	23:13	46.3	56.6	48.5	43.1	42.0	42.4	38.6	32.3
	23:48	43.3	54.3	47.2	40.7	40.4	38.4	34.0	32.3
4	23:19	42.6	51.4	46.4	40.2	40.0	38.5	32.5	30.5
	23:53	43.5	51.6	46.0	40.7	40.2	38.6	34.5	33.9
5	23:25	42.2	49.2	43.8	38.6	39.8	38.5	32.0	29.6
	23:58	40.9	48.4	42.9	37.1	37.1	36.0	32.9	31.4
6	23:31	44.4	52.8	46.6	46.3	40.6	39.4	35.1	31.4
	00:03	51.7*	54.3	49.5	45.8	45.0	48.5	45.0	39.3

Measured $L_{Aeq, 10min}$ - 06:00 to 07:00

Measurement Position	Time	$L_{Aeq, 10min}$ dB	Octave band centre frequency (Hz) - L_{Aeq} dB						
			63	125	250	500	1000	2000	4000
1	06:00	51.3	55.8	50.3	44.3	43.6	46.6	45.0	42.9
	06:32	52.1	56.5	50.2	45.1	43.2	45.6	46.9	44.7
2	06:05	63.8*	60.1	57.5	55.3	56.4	60.8	57.4	50.6
	06:37	57.7	57.6	51.5	49.4	50.3	54.7	51.1	45.6
3	06:10	44.9	53.4	48.3	41.6	41.6	41.7	33.7	32.0
	06:42	46.9	55.5	51.4	44.6	43.0	43.8	36.3	33.3
4	06:15	45.5	53.5	48.7	42.6	41.4	41.2	34.1	37.4
	06:48	45.9	55.0	50.6	44.8	41.9	42.7	34.8	32.1
5	06:21	45.8	53.4	48.4	41.4	41.8	41.6	35.0	37.5
	06:53	45.1	53.8	48.5	42.9	40.8	41.6	35.0	33.0
6	06:27	48.1	54.3	48.9	42.7	42.9	43.2	38.1	41.6
	06:59	45.3	53.8	48.5	42.1	41.4	42.6	34.3	28.7

* Omitted from calculation of $L_{Aeq, 8h}$ due to extraneous noise events contributing to the $L_{Aeq, 10min}$.

Appendix C - Unattended Measurement Noise Data



Appendix D - Acoustic Terminology

Noise Measurement Parameter Definitions

L_{Aeq} - The "A" weighted equivalent continuous sound pressure level. A representation of a continuous sound level containing the same amount of sound energy as the measured varying noise, over the measurement period. It can be considered as the "average" noise level.

L_{A90} - The "A" weighted sound pressure level that is exceeded for 90% of the measurement period. It is commonly used as the "Background Noise Level".

L_{Amax} - The "A" weighted maximum sound pressure level that occurs during the measurement period.

Sudbury Consultancy

Holbrook House
Little Waldingfield
Sudbury
Suffolk
CO10 0TF
Tel: +44 (0)1787 247595

Manchester Consultancy

Lynnfield House
Church Street
Altrincham
Cheshire
WA14 4DZ
Tel: +44 (0)161 929 5585

London Consultancy

70 Cowcross Street
London
EC1M 6EJ
Tel: +44 (0)207 251 3585

Birmingham Consultancy

Cornwall Buildings
45 Newhall Street
Birmingham
B3 3QR
Tel: +44 (0)121 213 6342

South Africa Consultancy

Ground Floor, Liesbeek House
River Park
Gloucester Road
Mowbray
7700
South Africa
Tel: +27 (0)21 680 5305

Laboratory

Holbrook House
Little Waldingfield
Sudbury
Suffolk
CO10 0TF
Tel: +44 (0)1787 247595

Website: www.srltsl.com
e-mail: srl@srltsl.com

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