UNIVERSITY OF LONDON

GARDEN HALLS, UNIVERSITY OF LONDON

Acoustic Report

March 2013

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Summary

This document accompanies the planning and conservation area consent applications made by the University of London (UoL) for the Site.

The design of the proposed development considers the noise criteria set out in Camden Council Development Policy DP28 as well as relevant British Standards including BS 4142 and BS 8233 and the Building Regulations Approved Document E.

An environmental noise survey was done in October 2012 to determine the existing ambient and background noise levels at the site. Enhanced glazing and ventilation will be installed on some facades to meet suitable internal noise levels. Glazing and ventilation requirements are led by high night time maximum noise levels on the surrounding roads.

Plant noise limits have been set so that the criteria set out in Table E of DP28 are met. These are based on assessment methodologies given in BS 4142.

Walls and floors within the development will be designed and built so that the sound insulation performance is 3 dB better than required by The Building Regulations 2010 Approved Document E. This satisfies the requirement of the first credit of BREEAM 2011 Hea 05 for multi-residential buildings.

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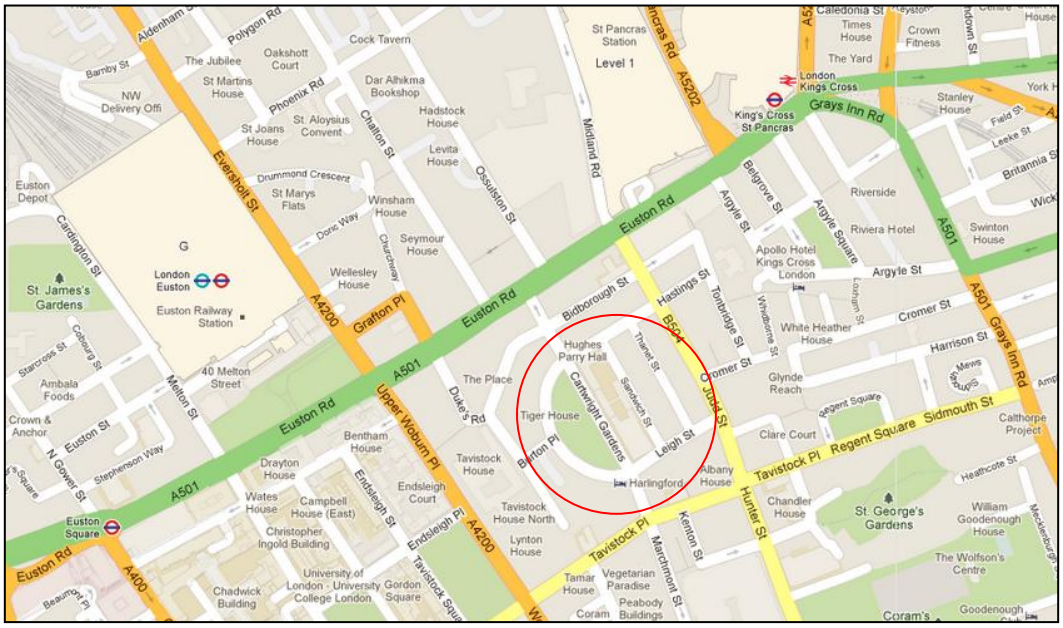
1.0 Introduction

This Report has been prepared to inform the redevelopment of the Garden Halls, Cartwright Gardens by the University of London. This report has been commissioned by the applicant's development manager, University Partnership Programme, to support the planning and conservation area consent applications.

The Site is bounded by Cartwright Gardens, Hastings Street, Sandwich Street and Leigh Street and includes the Cartwright Gardens open space.

The location of the Site in relation to the surrounding roads and receptors is shown in Figures 1.1 and 1.2 below. Detailed information regarding the noise environment and receptors is given in sections 3 to 7.

Figure 1.1 Site location – local area



Google Earth February 2013

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Figure 1.2 Site location – local receptors

Google Earth February 2013

There are currently a total of 1013 bed spaces (992 bedrooms) in three blocks - Hughes Parry Tower, Canterbury Hall and Commonwealth Hall, referred to collectively as the Garden Halls.

Hughes Parry Tower will be refurbished. The Hughes Parry Podium will be demolished and the internal layout of the remaining bed spaces will be amended to provide better quality accommodation. Canterbury Hall (including York Hall) and Commonwealth Hall will be demolished and redeveloped. The buildings proposed for demolition contain circa. 670 student bed spaces, catering and conferencing facilities. The bedrooms and accompanying facilities are no longer considered to meet acceptable standards, and the services are inefficient and need of substantial upgrade.

The new accommodation built on this site will be a mixture of rooms for residential purpose (single bedrooms) and townhouses. In total, following the redevelopment and renovation there will be 1200 student bedrooms on site – a net increase of 187 bed spaces. Figure A1 shows the proposed site layout. Figure A2 shows the existing site layout.

Within the redeveloped accommodation building there will also be on-site catering and dining facilities in the basement. On the ground floor there will be some teaching spaces and a flexible unit for the UoL services. The Cartwright Gardens open space will be enhanced and will be opened to the public between dawn and dusk.

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There will also be an inner courtyard enclosed by a roof. This inner courtyard will provide an open space for students to study and socialise without having any additional noise impact on the local residents.

This report addresses how the existing ambient noise environment will affect the new dwellings and noise break-in to the development. It also predicts how noise from the new development will affect the nearby residential receptors.

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2.0 Criteria

The design of the building considers the following criteria. These criteria are taken from the relevant British Standards identified below.

2.1 Local Policy

2.1.1 Camden Council Planning Guidance

CPG1 asks that the design of the development is considered to minimise the impact of noise on new and existing receptors.

CPG6 Amenity
Section 4 of CPG6 asks that the developer makes a commitment to *"ensure that noise and vibration is controlled and managed to:*
• Limit the impact of existing noise and vibration sources on new development
• Limit noise and vibration emissions from new development."

2.1.2 Camden Council Development Policy 28

"The Council will seek to ensure that noise and vibration is controlled and managed and will not grant planning permission for:
a) development likely to generate noise pollution; or
b) development sensitive to noise in locations with noise pollution, unless appropriate attenuation measures are provided.

Development that exceeds Camden's Noise and Vibration Thresholds will not be permitted. The Council will only grant permission for plant or machinery if it can be operated without cause harm [sic] to amenity and does not exceed our noise thresholds. The Council will seek to minimise the impact on local amenity from the demolition and construction phases of development. Where these phases are likely to cause harm, conditions and planning obligations may be used to minimise the impact."

Specific noise criteria are set in the policy. The design of this development meets all of the criteria set out in DP28.

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2.1 Noise break-in

The design is based on noise levels inside dwellings meeting 'Reasonable' internal noise standards defined in BS 8233: 1999 "*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 2.1 Indoor ambient noise levels in spaces when they are unoccupied
(Extract from Table 5 of BS 8233: 1999)

Criterion	Typical situations	Design range $L_{Aeq,T}$ dB
		Reasonable
Reasonable resting/sleeping conditions	Living rooms	40
	Bedrooms [a]	35

[a] For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{Amax}.

2.2 Noise from fixed plant

Plant noise limits are based on the assessment methodology set out in BS 4142: 1997 "*Method for rating industrial noise affecting mixed residential and industrial areas*" and Table E of DP28.

BS 4142 describes a method of comparing the measured existing background noise level ($L_{A90,T}$) at a noise sensitive receptor against the predicted Rating noise level from any new fixed plant. Simply put, the Rating level is calculated by adding 5 dB to the L_{Aeq} noise level due to plant if there are any tonal or impulsive characteristics of the noise.

Current proposals are that the total noise from new fixed plant at the site is limited so that the Rating level is at least 5 dB(A) below the measured background level (L_{A90}). This means that the L_{Aeq} from fixed plant will need to be 10 dB(A) below the background level. By meeting this condition, the development will also satisfy the requirements for BREEAM 2011 credit Pol 05.

2.3 Internal sound insulation

The Building Regulations 2010 Approved Document E (ADE) sets out sound insulation requirements for walls and floors separating dwellings.

It has been agreed with the Approved Inspector (Assent Building Control) that the rooms in both Hughes Parry Tower and in the new building will be considered as rooms for residential purposes (RRPs). Townhouses will be considered as dwellings. Assent Building Control has agreed that we need to do 1 set of tests for every 20 bedrooms to satisfy the requirements of ADE providing initial test results are acceptable.

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Table 2.2 Performance standards for separating walls, separating floors, and stairs that have a separating function.
(Reproduced from Tables 0.1a and 0.1b from Section 0 of ADE)

	Airborne sound insulation $D_{nT,w} + C_{tr}$ dB (minimum values)	**Impact sound insulation $L'_{nT,w}$ dB (maximum values)**
Purpose built dwelling-houses		
Walls	45	-
Floors and stairs	45	62
Purpose built rooms for residential purposes		
Walls	43	-
Floors and stairs	45	62

As a minimum the criteria in this table will be met. If the first credit for BREEAM Hea 05 is targeted, the airborne and impact sound insulation performance of walls and floors will be 3 dB better than given in ADE.

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3.0 Survey results

3.1 Baseline noise survey

A baseline noise survey of the site was done on the 9th and 10th October 2012. Noise levels were measured at six positions around the site during both the day and night.

Figure 2 shows the location of the monitoring positions. Weather during the survey period was cool and dry with a light breeze.

Noise levels measured during the survey period are summarised in Tables 3.1 and 3.2 below. They show the daytime and night time noise levels affecting the development and the background noise levels at the site respectively.

Unless otherwise stated, daytime is 07:00 – 23:00 hours; night-time is 23:00 – 07:00 hours.

Table 3.1 Summary of ambient noise levels – dB(A)

Measurement Position	Day	Night	
	$L_{Aeq,16hr}$*	$L_{Aeq,8hr}$*	L_{Amax}
1	61	52	79
2	55	48	67
3	54	43	65
4	62	56	84
5	67	53	79
6	64	55	79

** 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 Summary of background noise levels – dB(A)

Measurement Position	Lowest measured background noise level L_{A90}	
	Day	Night
1	50	41
2	43	45
3	45	42
4	50	43
5	51	42
6	54	45

The dominant noise source at the site is road traffic on all facades. On Leigh Street, noise from the pub was the cause of measured night time maximum noise levels.

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4.0 Noise break-in

The internal noise levels in student bedrooms have been calculated based on the data given in Table 3.1 above.

Table 4.1 Summary of glazing and ventilation requirements

Facade	Glazing (No Trickle Vents)
Sandwich Street (GREEN)	Type 1
Hastings Street (BLUE)	Type 2
Cartwright Gardens (BLUE)	Type 2
Leigh Street (RED)	Type 3

Facade locations are indicated on the mark up shown in Figure A3 in the appendices.

Performance requirements for each glazing and ventilation type are given below. Glazing configurations given are indicative only and will need to be confirmed as appropriate before they are ordered.

Glazing type 1: Indicative configuration 4mm glass, 12mm cavity, 4mm glass

	Octave band centre frequency (Hz)						
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**
SRI	5	11	11	19	30	38	28

Glazing type 2: Indicative configuration 10mm glass, 12mm cavity, 4mm glass

	Octave band centre frequency (Hz)						
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**
SRI	19	25	21	32	38	40	36

Glazing type 3: Indicative configuration 10mm glass, 12mm cavity, 12mm glass

	Octave band centre frequency (Hz)						
	63	**125**	**250**	**500**	**1000**	**2000**	**4000**
SRI	26	30	28	39	37	39	49

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5.0 Noise from fixed plant

In order to meet the plant noise limits (section 2.2), 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 limit L_{Aeq} dB(A)	
	Day	Night
1	40	31
2	33	35
3	35	32
4	40	33
5	41	32
6	44	35

Figure A2 in the appendices shows the location of the assessment positions.

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6.0 Internal acoustic design

Initial proposals for construction details below are given on the assumption that you are aiming to gain 1 BREEAM credit for sound insulation (credit Hea 05). To do this the sound insulation performance of walls and floors at the development must be 3 dB better than given in Table 2.2 of this report.

6.1 Separating walls between townhouses – new build

These walls need to achieve an on-site airborne result of minimum 48 dB $D_{nT,w} + C_{tr}$. This can be achieved by the following typical wall:

2 x 15 mm dense acoustic plasterboard
2 x 60 mm I-studs with total cavity width 190 mm.
100 mm mineral wool in cavity
2 x 15 mm dense acoustic plasterboard

Precise components vary depending on manufacturer. These will be confirmed during detailed design.

6.2 Separating walls between individual bedrooms (RRPs)

These walls need to achieve an on-site airborne result of minimum 46 dB $D_{nT,w} + C_{tr}$. This can be achieved by the following typical wall:

2 x 15 mm dense acoustic plasterboard
Resilient bar
1 x 70 mm C-stud
Resilient bar
50 mm mineral wool in cavity
2 x 15 mm dense acoustic plasterboard

Precise components vary depending on manufacturer. These will be confirmed during detailed design.

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6.3 Internal walls within townhouses

We will show by manufacturers' data or calculation that these walls achieve an airborne laboratory result of minimum 40 dB R_w.

Part E suggests that to meet the criterion, lightweight internal walls can be constructed using one of the following partition build-ups.

Type A

- *Each lining to be two or more layers of plasterboard, each sheet of minimum mass per unit area 10kg/m^2;*
- *Linings fixed to ... metal frame with a minimum distance between linings of 45 mm;*
- *All joints well sealed.*

No insulation is required in the cavity.

Type B

- *Single layer of plasterboard of minimum mass per unit area 10kg/m^2;*
- *Linings fixed to ... metal frame with a minimum distance between linings of 45 mm;*
- *An absorbent layer of unfaced mineral wool batts or quilt (minimum thickness 25 mm, minimum density 10 kg/m^3) which may be wire reinforced suspended in the cavity;*
- *All joints well sealed.*

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6.4 Separating floors within new build blocks of RRPs

These floors need to achieve an on-site airborne result of minimum 48 dB $D_{nT,w} + C_{tr}$ and an impact result of 59 dB $L'_{nT,w}$ or less. This can be achieved by a solid concrete slab with a minimum depth of 150 mm. Hollow core slabs will need to be thicker. You will also need to either install a floating floor or resilient top layer to protect against impact sound and a ceiling underneath.

6.5 Internal floors within townhouses

We will show by manufacturers' data that these floors achieve an airborne laboratory result of minimum 40 dB R_w. There is no impact sound insulation requirement for floors within dwellings.

6.6 Doors to bedrooms

Doors will comply with the requirements of Part E of the Building Regulations. Part E states:

Ensure any door has a good peremiter sealing (including the threshold where practical) and a minimum mass per unit area of 25 kg/m^2. Alternatively use a doorset with a minimum sound reduction index of 29 dB R_w.

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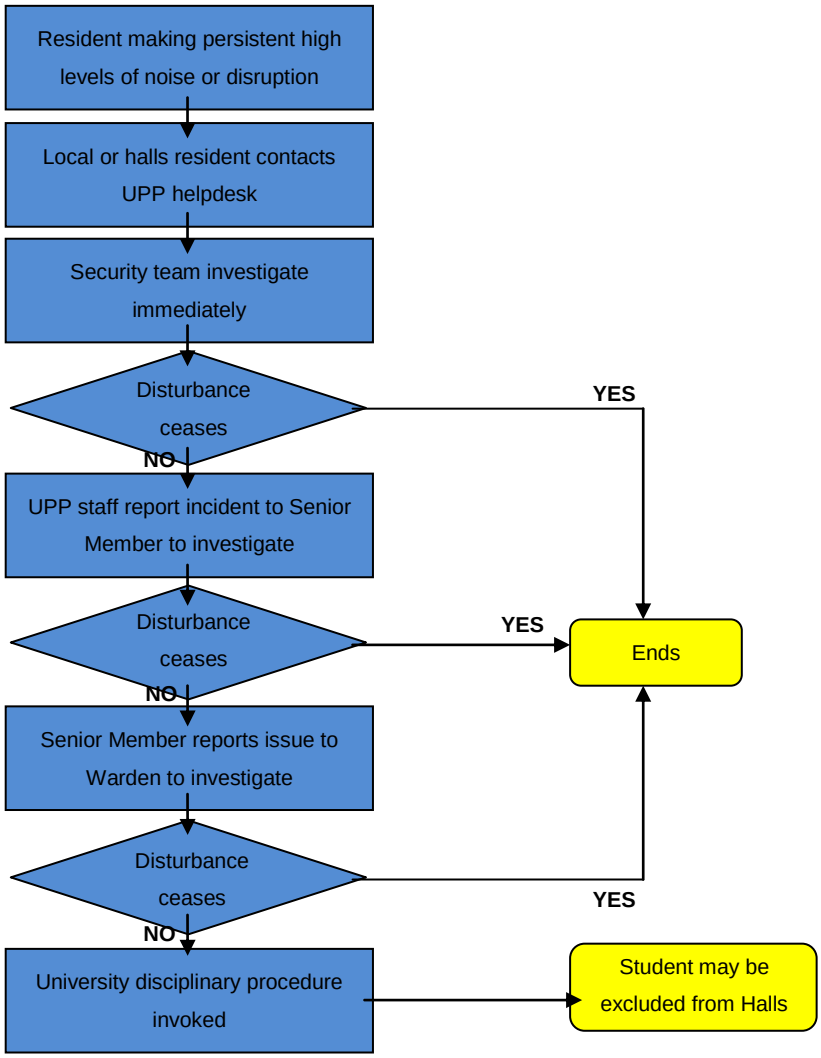
7.0 Noise from students

Noise from students inside and outside the development will need to be controlled using a management plan.

UPP have put together a draft student management plan for the Cartwright Gardens scheme. It describes the responsibilities of the UPP team and the UoL with regards to student welfare, pastoral care and disciplinary procedures.

Specific to this assessment is how UPP and the UoL with deal with any resident making excessive noise which may cause complaints from other residents of the student accommodation or any nearby receptor property. The flowchart is reproduced below.



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8.0 Conclusion

The design of the proposed development considers the noise criteria set out in DP28 as well as relevant British Standards including BS 4142 and BS 8233 and the Building Regulations Approved Document E. The acoustic assessment of the Site and proposed design shows that all relevant local and national design criteria are met.

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Appendix A

Survey Details

A1. Location of Survey

Cartwright Gardens Student Accommodation (Hughes Parry Hall, Commonwealth Hall and Canterbury Hall)

A2. Date of Survey

9th and 10th October 2012

A3. Personnel Present During Survey

Allen Smalls – SRL Technical Services Limited

A4. Instrumentation

Bruel & Kjaer

Type 4230 Sound Level Calibrator
Type 2231 Sound Level Meter (SRL Kit 'B') (serial no. 1470178)

A5. Calibration Procedure

Before and after the survey the measurement apparatus was check calibrated to an accuracy of± 0.3 dB using the type 4230 Sound Level Calibrator. The Calibrator produces a sound pressure level of 93.8 dB re 2 x 10^{-5} Pa at a frequency of 1 kHz.

A.6 Survey Procedure

Ambient noise levels were monitored at various positions around the site as shown on Figure 1. The measurements are tabulated in Appendix B, and explanations of the parameters used are listed in Appendix C.

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Figure A1

Proposed site location and layout

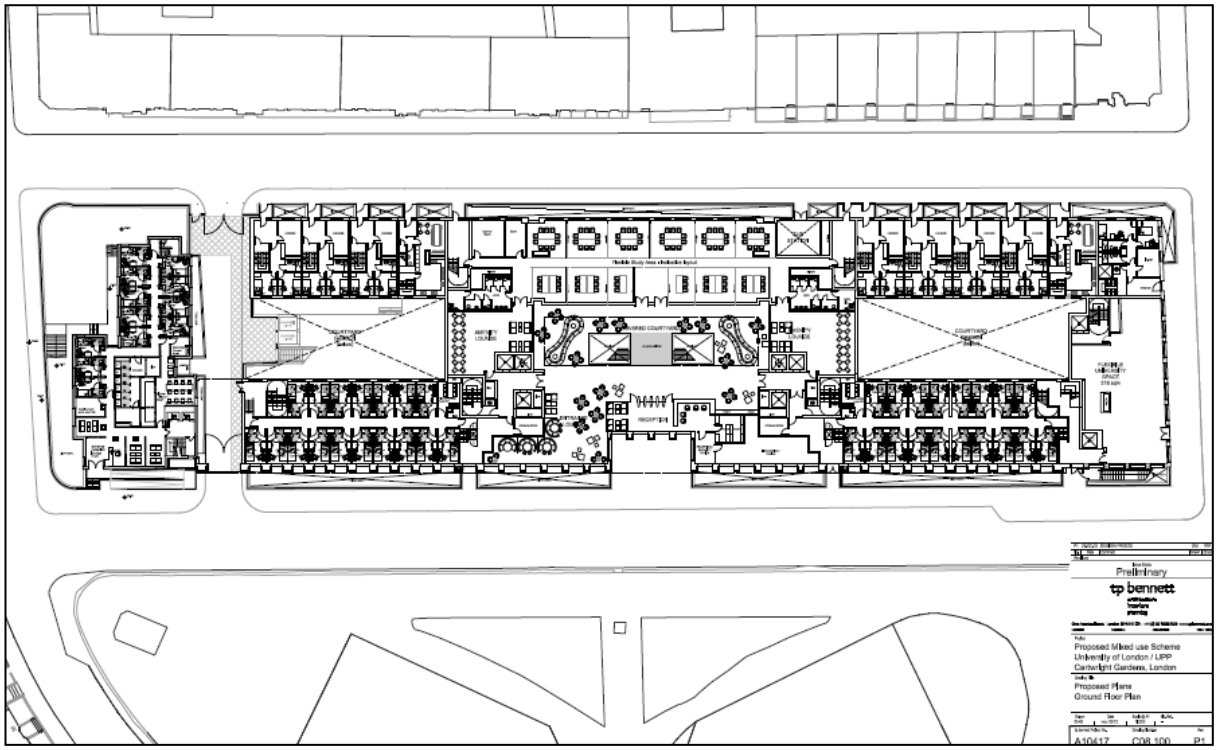

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Figure A2
Noise monitoring locations and existing site layout

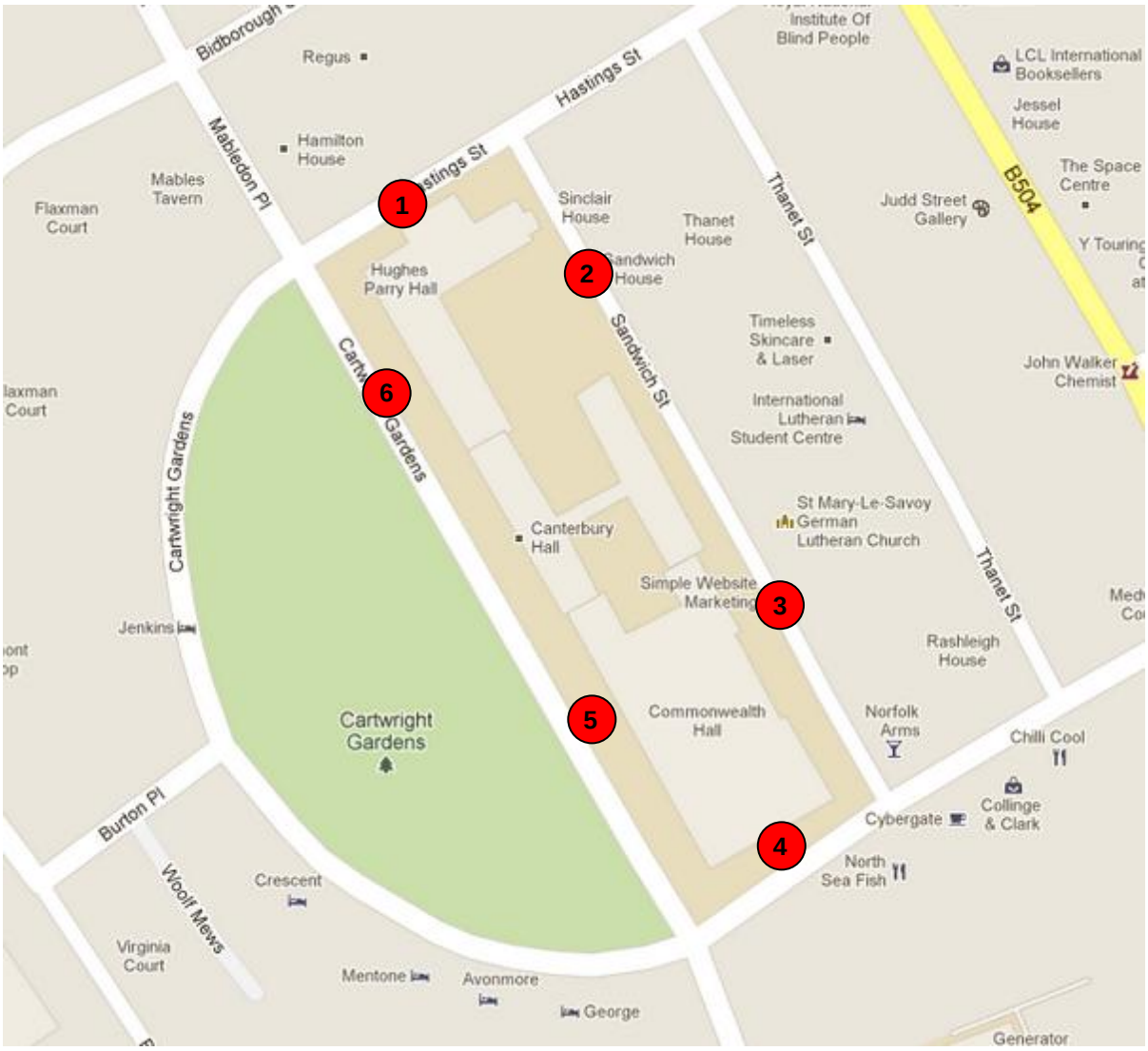

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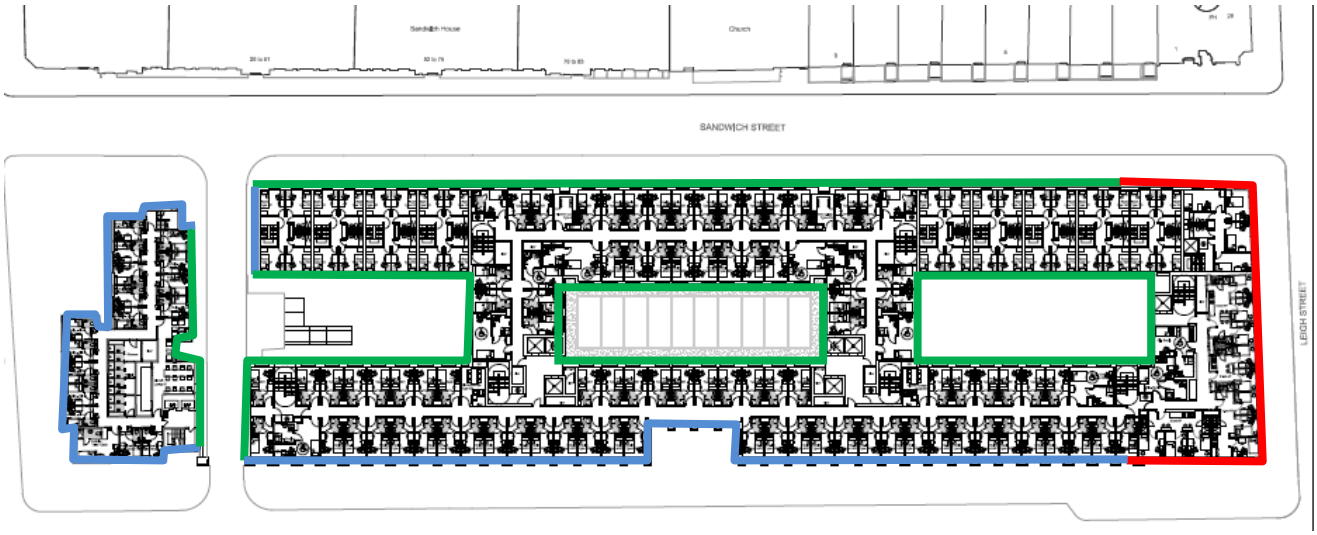
Figure A3
Glazing and ventilation requirements

To be read in conjunction with section 4 of the report



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Appendix B

Measured ambient noise levels – dB(A) re: 20 µPa

Night time data

Measurement Position	Start	End	LAeq	LA10	LA90	LAmax
6	22:58	23:02	61	63	53	79
1	23:03	23:07	56	59	48	68
2	23:08	23:12	51	53	46	67
3	23:14	23:18	48	50	43	65
4	23:19	23:23	58	59	45	77
5	23:25	23:29	58	56	47	79
6	23:30	23:34	60	60	49	78
1	23:36	23:40	52	54	45	69
2	23:41	23:45	47	48	45	60
3	23:47	23:51	44	45	41	62
4	23:52	23:56	54	57	45	70
5	23:57	00:01	53	56	45	71
5	05:58	06:02	56	53	42	76
6	06:04	06:08	50	53	45	57
1	06:10	06:14	60	60	44	79
2	06:15	06:19	50	54	45	63
3	06:21	06:25	44	44	42	54
4	06:26	06:30	54	56	43	72
5	06:31	06:35	56	59	44	75
6	06:36	06:40	61	61	51	78
1	06:40	06:44	50	52	45	62
2	06:46	06:50	53	56	48	64
3	06:52	06:56	47	49	44	58
4	06:57	07:01	69	72	54	84

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Daytime data

Measurement Position	Start	End	LAeq	LA10	LA90	LAmax
5	09:57	10:06	69	71	63	78
6	10:07	10:08	66	68	60	79
1	10:18	10:27	63	65	53	78
2	10:28	10:38	53	54	49	72
3	10:39	10:48	57	59	46	73
4	10:49	10:59	63	66	50	81
5	11:01	11:11	69	72	53	81
6	11:10	11:19	63	65	56	81
1	11:20	11:29	60	61	51	80
2	11:30	11:39	54	55	49	73
3	11:40	11:49	53	55	46	73
4	11:50	11:59	62	65	54	79
5	12:00	12:09	64	66	51	86
6	12:10	12:19	64	67	54	81
1	12:20	12:29	61	63	50	84
2	12:30	12:39	57	59	43	78
3	12:40	12:49	53	55	45	82
4	12:50	13:00	61	64	52	79

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Appendix C

Noise measurement parameter definitions

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_{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.

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