Adamou, Tes

From: Adamou, Tes
Sent: 31 August 2016 12:35
To: Bob Page
Cc: 'c.plank@ucl.ac.uk'; John, Stephen; Orsi, Bianca
Subject: UCL Astor - Re: Redevelopment of Astor College, 99 Charlotte Street, London W1 (The Development)
Attachments: 1. Re - Redevelopment of Astor College etc - 26 August 2016.pdf

Categories: UCL - Astor

Dear Bob,

Please see attached our response to your letter (ref: BP/JM/J57.2) dated the 25 August 2016.

I trust that this reply is satisfactory in addressing your queries.

Please do not hesitate to contact me for any further information.

Kind regards,

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ARCADIS Design & Consultancy for natural and built assets

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Our ref: 33454100
Date: 30 August 2016

By email and post

Dear Bob

Subject: Re: Redevelopment of Astor College, 99 Charlotte Street, London W1 (the Development)

Further to your letter (Ref: BP/JM/J57.2) dated the 25 August 2016 (your Letter) and following the meeting between Colin Plank, Martin Jones and myself on Friday 26 August 2016 at the premises of MJ Media on 97 Charlotte Street, London W1, we would like to respond as follows:

Please note that the construction programme has not yet been finalised or agreed with Galliford Try (the Contractor), and as such any and all dates and activity scheduling, pertaining to construction activities referred to in this letter and its enclosures, are indicative and for information only, unless otherwise stated.

1. Status quo

   The Development is currently undergoing the last stage of design (RIBA Stage 4) prior to construction (RIBA Stage 5). A number of consultants have been appointed to undertake the design process (the Project Team). A team is currently on site undertaking all required surveys and investigations to enable us to proceed to the next phase.

2. Early Works

   The 'Early Works' I referred to in my email to Martin Jones on Tuesday 23 August 2016 include demolition works of the link between the sports hall and the main building, as well as the demolition of the ramps and stairs to the front of the building.

   The demolition works of the link between the sports hall and the main building will enable the Contractor to offload material from the delivery vehicles onto the space encompassed by the main building, sports hall,

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Middlesex Hospital Annex, and the Sainsbury's Wellcome Centre (the Courtyard) and aid in minimising any effects of the construction process to your Client.

The demolition of the ramps and stairs to the front of the building, will enable the access to the site at the front (North East corner).

A more detailed account can be found in the paragraphs below.

3. Liaison with Camden

A meeting was held with LB Camden on Wednesday 22 June 2016 at the LB Camden office at 5 Pancras Square in the presence of key Project Team members. At the meeting we discussed, among others, that the development is still undergoing the process of consultation with the neighbourhood. No further meetings with the Project Team and LB Camden were held.

The Construction Management Plan (CMP) was, likewise, never issued to the LB Camden, although its contents were discussed between the Deloitte LLP (the Planning Consultant) and the LB Camden.

4. Provision of the Draft CMP

We note and concur that there was only one preliminary discussion with your client. At that meeting we promised that a draft of the CMP be issued prior to submission to the LB Camden. We also note that no timescales of such issue of the draft CMP were discussed at the meeting.

Madigan Gill (the Logistics Sub-contractor) have recently been appointed by the Contractor and are in the process of defining the logistics approach to the Development for inclusion in the Draft CMP.

Consequently, the Draft CMP has not yet been fully developed. We are expecting to be in a position to submit the Draft CMP to LB Camden on 09 September 2016, subject to consultation, in line with paragraph 13 of the same.

In your Letter you requested a reply to the following matters by return. Please see below the reply pertaining to the same:

1. Appendices B, G, J, K, M and O to the CMP were not supplied – please supply them.

Please see below for an explanation of why Appendices B, G, J, K and M were not supplied, and a supply of Appendix O.

Appendix B
This appendix related to the site plan identifying the nearest potential receptors that are likely to be affected by the Astor College construction works, and will be provided following the finalisation of consultation. MJ Media will be represented accordingly on that appendix.

Appendix G
This appendix refers to the details of other developments in the local area or on the route, and will be supplied to the Contractor by Madigan Gill. We will provide this information with the updated draft CMP.

Appendix J
This appendix refers to the swept path drawings for any tight manoeuvres on vehicle routes to and from the site including proposed access and egress arrangements at the site boundary (if necessary), and will be supplied to the Contractor by Madigan Gill. We will provide this information with the updated draft CMP.

Appendix K
This appendix refers to the identification of an area of wheel washing facilities and will be supplied to the Contractor by Madigan Gill. We will provide this information with the updated draft CMP.

Appendix O
This appendix refers to the Plant Noise Assessment, and will be included from Section 5 Building Services Plant of the enclosed Astor College Acoustic Specification Report from WSP | Parsons Brickerhoff dated March 2016, report No 70017316-ACV1.

2. Please confirm of the date when the draft CMP supplied to us [your client and yourself] was submitted to LB Camden.

We confirm that the draft CMP supplied to you in my email to Martin Jones on Tuesday evening has not been submitted to LB Camden.

3. Please confirm if this [the draft CMP supplied to you in my email to Martin Jones on Tuesday evening] is the only draft of the CMP that was supplied to LB Camden, and if not when any previous drafts were submitted.

Following from item 2 above, we, likewise, confirm that there has been no formal submission of any other draft of the CMP to LB Camden.

4. Please confirm the identity of the Case Officer who is dealing with the matter on behalf of LB Camden and his/her contact details

The Case Officer is David Peres Da Costa. Telephone: 020 7974 5262

5. Please provide the scope of the ‘Early Works’ and state when exactly it is proposed they will commence.

   The scope of the Early Works includes the following items:
   - Demolition and rebuilding of the link bridge between the sports hall and the main building and associated temporary works
   - Demolition of the ramp and stairs to the front of the building
   - Temporary Structural Works
   - Erection of scaffolding
   - Excavation of crane base including piling
   - Site set up in sports hall

   Please refer to Enclosure 1. Noise and vibration management – Neighbourhood consultation (dated 25 August 2016) for information about the dates, notwithstanding that these are indicative and for information only, pending more information from sub-contractors, and the formation of the contract with the Contractor.

6. Please confirm the proposed start date for the construction works.

   The proposed start date for the main works is Wednesday, the 23 November 2016, notwithstanding the indicative nature of these dates, as previously described.

I trust that this reply to your Letter has been satisfactory in addressing your queries. For this, we ask for a workshop with your client in the forthcoming days to address any remainder questions they might havve.

Please do not hesitate to contact me for any further information.

Yours sincerely

Tes Adamou
Project Manager

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Enc. 1. Noise and vibration management – Neighbourhood consultation (25 August 2016)
2. Astor College Acoustic Specification Report – WSP | PB (March 2016)

CC.	Colin Plank	c.plank@ucl.ac.uk
	Stephen John	sjohn@kslaw.com
	Bianca Orsi	BOrsi@kslaw.com

ARCADIS Design & Consultancy for natural and built assets

Updated on: 25/08/2015

All dates are indicative and are to be confirmed upon contract formation.
Indicative duration periods - for information only.
Potential noise implications are indicative only, and require confirmation with noise consultants.

Task	Start (TBC)	Duration	Finish (TBC)	Potential noise & vibration (indicative)	Comments
Demolition of the link bridge between sports hall and main building	12 Oct 16	4 days	17 Oct 16	Medium	Controlled hours of demolition works. Between the hours of 8am and 5pm.
Demolition of ramp and stairs to the front	12 Oct 16	2 weeks	25 Oct 16	High	As above but and with regular break periods.
Excavation to crane base	01 Nov 16	1 week	07 Oct 16	Medium	As above but and with regular break periods.
Crane base preparation and piling	08 Nov 16	2 weeks	21 Nov 16	High	As above but and with regular break periods.
Site set up in sports hall	23 Nov 16	5 weeks	23 Dec 16	Low	Noise and vibration will only last within a period of a week when there is actual buiders work.
Structural works in front of building	23 Nov 16	17 weeks	21 Mar 17	Low	Noise and vibration will only take place when we are fixing the steels. Therefore, period of noise and vibration will be minimal and not over a 17 week period.
New build piling	06 Dec 16	5 weeks	18 Jan 17	High	Piling works will take place over 3 weeks (anticipated) with regular breaks
Replace windows to rear section (section 2)	08 Dec 16	8 weeks	13 Feb 17	Low	Minimal noise and almost nil vibration
External works in front elevation	15 Dec 16	8 weeks	15 Feb 17	Low	Minimal noise and almost nil vibration
External works in section 2	27 Feb 17	12 weeks	25 May 17	Low	These works include the cladding brick slips and thhe fitting of the windows in the Ground Floor section 1 & section 2.
Rebuild rear link structure and roof complete	06 Mar 17	5 weeks	07 Apr 16	Medium	Concrete frame will not be noisy or cause vibration. However the concrete pump may be noisy and this will be controlled with limited delivery of concrete daily.
Structural works in all floors (internal)	21 Mar 17	15 weeks	06 Jul 17	Low	Minimal noise and almost nil vibration
New build structure	10 Apr 17	16 weeks	09 Aug 17	Low	Minimal noise and almost nil vibration
Wall floor infils	01 May 17	11 weeks	20 Jul 17	Low	Minimal noise and almost nil vibration
Structure of new single storey build at the front	31 Oct 17	4 weeks	07 Dec 17	Low	Minimal noise and almost nil vibration
Vehicle deliveries				Medium	MJ Media will have access to Madigan Gill's delivery portal so that they are aware of any planned deliveries up to 48 hours ahead of time

REPORT N^{O} 70017316-ACV1

ASTOR COLLEGE

ACOUSTIC SPECIFICATION REPORT

PUBLIC

MARCH 2016

WSP | PARSONS BRINCKERHOFF

ASTOR COLLEGE

ACOUSTIC SPECIFICATION REPORT

University College London

Type of document (version)
Public

Project no: 70017316
Date: March 2016

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TABLE OF CONTENTS

1 INTRODUCTION

1.1.1 WSP | Parsons Brinckerhoff have been commissioned to provide acoustic design advice on the refurbishment and extension of student residential facilities at Astor College, University College London.

1.1.2 The purpose of this report is to outline the acoustic specification required including sound insulation between spaces, reverberation control and building services noise control.

1.1.3 General arrangements have been annotated to specify target acoustic performance requirements.

1.1.4 This report has assessed and specified the following:

- Sound insulation between separating spaces.
- Absorption requirements to achieve suitable reverberation times.
- Noise control from building services systems to internal spaces
- Noise control emissions from building services systems to nearby noise sensitive premises

1.1.5 A glossary of the acoustic terminology used within this report is included in ***Appendix A.***

2 ACOUSTIC REQUIREMENTS

2.1 PLANNING CONDITIONS

2.1.1 Planning permission for the site (Application Ref: 2015/1139/P) states the following:

> *" Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (LA90), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the LA90, expressed in dB(A). "*

2.1.2 As such, noise levels to nearby existing receptors are assessed, in accordance with the methods detailed in British Standard 4142: 1997, to the criteria above.

2.2 INTERNAL NOISE LEVELS

Student Residences

2.2.1 Kitchen and WC extract fans are proposed for both the refurbished and extension flats. Design ranges for indoor ambient noise levels in these areas are proposed in BS 8233: 2014 as follows:

- Kitchen: 50 – 55 dB $L_{Aeq,T}$
- Toilet: 45 – 55 dB $L_{Aeq,T}$

Communal Areas

2.2.2 CIBSE Guide A suggests that internal ambient noise levels in general lobbies/entrance halls should not exceed a noise rating level of NR 40.

3 INTERNAL SOUND INSULATION

3.1.1 This section considers the sound insulation of the architectural elements including walls, doors and floors.

3.2 WALLS

3.2.1 The following table stipulates the sound insulation requirements and suitable constructions for walls:

Table 3.1 – Required Sound Reduction

REQUIRED SOUND REDUCTION	EXAMPLE CONSTRUCTION
40 dB Rw	75mm block 1350-1450 kg/m3 plastered both sides
45 dB Rw	100mm block 1350-1450 kg/m3 plastered both sides
50 dB Rw	215mm block 1350-1450 kg/m3 plastered both sides (100mm block laid flat)
55 dB Rw + Ctr	215mm block 1900-2000 kg/m3 plastered both sides (100mm block laid flat)
Extension of Existing Bedrooms	Width to match existing blockwork including plaster on both sides. Density 1900-2000 kg/m3

3.2.2 Marked up drawings showing the sound reduction requirements of new walls are provided in ***Appendix B***.

3.3 DOORS

3.3.1 Bedroom doors should achieve a minimum sound reduction index of 29 dB Rw. All doors should have good perimeter sealing (including the threshold where practical) and a minimum mass per unit area of 25 kg/m2.

3.3.2 Internal door sets do not require acoustic rating (e.g. en-suite bathroom pods).

3.3.3 Access panels from the corridor to bedroom risers should achieve a minimum sound reduction of 35 dB Rw. No access panels should be in the bedrooms.

3.3.4 Doors to other spaces may require enhanced acoustic ratings, as shown on the mark-ups attached in ***Appendix B***.

3.3.5 The following constructions may be suitable for achieving the enhanced performance requirements:

R_w 35 door (54 mm thick timber door)

- This acoustic performance can be achieved by specialist doorsets although it can also be achieved by a well fitted FD60 fire doorset where the door is sealed effectively around its perimeter in a substantial frame with an effective stop.
- Timber FD60 doors often have particle core or laminated softwood cores with a mass per unit area ≈ 29 kg/m2 and a thickness of ≈ 54 mm. Using a core material with greater density than particle or laminated softwood can result in a door thickness of ≈ 44 mm.
- Frames for FD60 doors can have a 90 mm x 40 mm section with stops of at least 15 mm.

- Compression or wipe seals should be used around the door's perimeter along with a threshold seal beneath. A drop-down or wipe type threshold seal is suitable.
- Doors incorporating 900 mm x 175 mm vision panels comprising 7 mm fire resistant glass can meet this acoustic performance.

3.3.6 In addition gaps between door frames and the walls in which they are fixed should be not more than 10 mm. Where there are gaps between door frames and the walls in which they are fixed close to this size, the gaps should be packed to the full depth of the wall with mineral wool. In all cases frames should be sealed on both sides of the wall with sealant.

3.4 FLOORS

3.4.1 Floor slabs should be a minimum depth of 200mm full weight concrete (2300 – 2400 kg/m3).

3.4.2 All floor finishes will need nominally a 6mm crumb rubber resilient layer or carpet with integral 4.5mm uncompressed backing achieving a minimum impact sound reduction of ΔLw 19 dB.

3.4.3 Ceilings in bedrooms should consist of plasterboard hung from an MF grid with minimum mass per unit area of 10 kg/m2.

3.5 ELECTRICAL SOCKETS

3.5.1 To ensure that the presence of electrical plug sockets within the party walls do not undermine the sound insulation performance the following is recommended:

- No back to back boxes
- Minimum 400 mm separation between sockets

3.6 PLANT ROOMS

3.6.1 In existing plant rooms, if no new plant is being added and existing levels are reasonable, no further treatment will be required.

3.6.2 Riser shafts should achieve a minimum sound reduction of 45 dB Rw.

4 REVERBERATION AND ABSORPTION

4.1 ABSORPTION IN ANCILLARY SPACES

4.1.1 Teaching and resource spaces have a requirement for an absorbent ceiling, nominally 75% Class A absorber. Similarly in other communal spaces (lounge/music room), Class A/B absorption should be considered to manage reverberation times.

4.2 ABSORPTION IN COMMON AREAS

4.2.1 Requirement E3 of this document, *Reverberation in the Common Internal Parts of Buildings Containing Flats of Rooms for Residential Purposes*, states that the common internal parts of buildings which contain flats or rooms for residential purposes shall be designed and constructed in such a way as to prevent more reverberation than is reasonable.

4.2.2 In order to satisfy requirement E3, a suitable amount of acoustically absorptive material should be placed within common stairwells, corridors, and entrance halls/foyers that give access to the residential dwellings in order to control reverberant noise.

4.2.3 In general, this requires the addition of an acoustically absorbent ceiling as designated in Method A of the Building Regulations. A carpeted floor will reduce the amount of Class C absorption required.

4.2.4 However, if an underlay is placed below the carpet and with lightweight walls and a plasterboard ceiling, it may be possible to achieve the requirements using the more detailed assessment described in Method B.

4.2.5 Approved Document E describes the two methods as follows:

- *"**7.7 Method A:** Cover a specified area with an absorber of an appropriate class that has been rated according to BS EN ISO 11654:1997 Acoustics - Sound absorbers for use in buildings - Rating of sound absorption.*
- ***7.8 Method B:** Determine the minimum amount of absorptive material using a calculation procedure in octave bands. Method B is intended only for corridors, hallways and entrance halls as it is not well suited to stairwells.*

<u>METHOD A</u>

***7.10** For entrance halls, corridors or hallways, cover an area equal to or greater than the floor area, with a Class C absorber or better. It will normally be convenient to cover the ceiling area with the additional absorption.*

***7.11** For stairwells or a stair enclosure, calculate the combined area of the stair treads, the upper surface of the intermediate landings, the upper surface of the landings (excluding ground floor) and the ceiling area on the top floor. Either, cover at least an area equal to this calculated area with a Class D absorber, or cover an area equal to at least 50 % of this calculated area with a Class C absorber or better. The absorptive material should be equally distributed between all floor levels. It will normally be convenient to cover the underside of intermediate landings, the underside of the other landings, and the ceiling area on the top floor.*

***7.12** Method A can generally be satisfied by the use of proprietary acoustic ceilings. However, the absorptive material can be applied to any surface that faces into the space.*

METHOD B

7.13 *In comparison with Method A, Method B takes account of the existing absorption provided by all surfaces. In some cases, Method B should allow greater flexibility in meeting Requirement E3 and require less additional absorption than Method A.*

7.14 *For an absorptive material of surface area, **S** in m2, and sound absorption coefficient, α, the absorption area A is equal to the product of **S** and α.*

7.15 *The total absorption area, AT, in square metres is defined as the hypothetical area of a totally absorbing surface, which if it were the only absorbing element in the space would give the same reverberation time as the space under consideration.*

7.16 *For **n** surfaces in a space, the total absorption area, AT, can be found using the following equation.*

$$AT = \alpha 1\mathbf{S}1 + \alpha 2\mathbf{S}2 + ... + \alpha\mathbf{n}\mathbf{S}\mathbf{n}$$

7.17 *For entrance halls, provide a minimum of 0.20 m2 total absorption area per cubic metre of the volume. The additional absorptive material should be distributed over the available surfaces.*

7.18 *For corridors or hallways, provide a minimum of 0.25 m2 total absorption area per cubic metre of the volume. The additional absorptive material should be distributed over one or more of the surfaces.*

7.19 *Absorption areas should be calculated for each octave band. Requirement E3 will be satisfied when the appropriate amount of absorption area is provided for each octave band between 250 Hz and 4000 Hz inclusively."*

4.2.6 It should be noted that in a clarification by the Department for Central and Local Government, this requirement only applies to corridors or stairwells which have front doors to flats opening directly onto them. Provided a separating door is included in the stairwell on every floor then stairwells do not require treatment.

4.2.7 On this basis, all corridors should have carpet and a Class C ceiling covering a minimum of 80% of the corridor area. If the carpet is removed, this will become 100% of the ceiling area, or a better absorption class will be required.

4.2.8 Bedrooms themselves do not require absorbent ceilings.

5 BUILDING SERVICES PLANT

5.1 BUILDING SERVICES PLANT SELECTION

5.1.1 The following table details plant selections for Astor College. Detailed noise data can be found in ***Appendix C*** of this report.

Table 5.1 – Astor College plant selections

Reference	Description	Mfr/Model No.
F1	Existing North-West WC Extract	Nuaire DE2-ES
F2	North-West Kitchen Extract	Nuaire DE4-ES
F3	Extended Bed Extract	Nuaire TRCS350-41
F4	South-East WC Extract	Nuaire DE5-ES
F5	Extension WC Extract	Nuaire AM61ES
F6	Standalone Kitchen Extract	Nuaire ES-OPUSDC60-M
F7	Standalone WC/ Ensuite Extract	Nuaire MEVDC2
F8	Kitchen Extract Serving 2 NO Kitchens	Nuaire DE1-ES
HRU	LG/UG Communal Area Supply/Extract	Nuaire XBC75-H-LES
Roof Condenser	Serving LG/UG communal area FCU's	Daikin REYQ16T
Ground Floor Condenser	Serving AV/Comms room FCU's	Daikin RZQG71

5.2 ATTENUATORS

5.2.1 Issued mechanical services schedules suggest that selection of attenuators will be made by the contractor. Following assessment of the building services plant, attenuator specifications will be made, where necessary, to achieve compliance with relevant noise limits. (See **Section 5.5**)

5.3 INTERNAL NOISE LEVELS

5.3.1 Calculations of internal noise levels have been undertaken for each of the fans (referenced as per ***Appendix D***).

5.3.2 In instances of fans serving multiple spaces the level presented is at the worst case (usually the nearest to the fan) receptor.

5.3.3 For fans that serve only one space (e.g. standalone kitchen or WC extracts) a single calculation has been used.

Table 5.2 – Internal Noise Levels

Plant Ref.	Plant Description	Internal Sound Pressure Level (L_{Aeq} dB)	Internal Noise Criteria (L_{Aeq} dB)	Meets Criteria (Y/N)
F1	NW WC Extract	38	45 – 55	Y
F2	NW Kitchen Extract	45	50 – 55	Y
F3	Extended Bed Extract	50	45 – 55	Y

Plant Ref.	Plant Description	Internal Sound Pressure Level (L_{Aeq} dB)	Internal Noise Criteria (L_{Aeq} dB)	Meets Criteria (Y/N)
F4	SE WC Extract	50	45 – 55	Y
F5	Extension WC Extract	53	45 – 55	Y
F6	Kitchen Extract (Standalone)	46	50 – 55	Y
F7	Ensuite/WC Extract	49	45 – 55	Y
F8	Kitchen Extract (Serving 2 No. Kitchens)	49	50 – 55	Y
HRU Extract	HRU Serving Ground Floor	NR 37	NR 40	Y
HRU Intake	HRU Serving Ground Floor	NR 37	NR 40	Y

5.3.4 Current equipment selections meet the required internal noise criteria with the attenuator recommendations presented in **Section 5.5** of this report. If different equipment selections are made to those detailed in table 5.1 and **Appendix C** of this report, they will need to meet or better the criteria as specified in table 5.2, and attenuator requirements may need to be revised.

5.4 EXTERNAL NOISE LEVELS

OFF-SITE RECEPTORS

5.4.1 An environmental noise survey was undertaken by Parsons Brinckerhoff in 2014 in order to obtain environmental noise levels to advise plant selection. The following table summarises the results of the unattended noise survey:

Table 5.3 – Environmental Noise Survey Results

Measurement Location	Measurement Period	Average $L_{Aeq,T}$ (dB)	Minimum Background Noise Level $L_{A90,T}$ (dB)
7th Floor Roof	Daytime (0700 – 1900)	58	51
	Evening (1900 – 2300)	53	50
	Night (2300 – 0700)	52	47

5.4.2 Operating times of the plant serving the student residences are not known, but it is assumed that there is a possibility for operation during any time period outlined above. As such assessment of plant noise to off-site receptors is made with reference to the night-time period above, and in line with planning permission provided by Camden, and therefore the limit 1m from the façade of any noise sensitive receptor will be 42 dB $L_{Aeq,8h}$.

5.4.3 Nearby receptors have been identified and are presented as part of ***Appendix E***.

5.4.4 The following table presents cumulative noise levels of all plant items at the nearby, off-site, noise sensitive receptors. Plant items are referenced as illustrated in ***Appendix D***. Results of individual plant item calculations are presented in ***Appendix E.***

Table 5.4 - Noise Levels (from cumulative building services plant) at off-site receptors

Receptor	Location	Sound Pressure Level 1m From Receptor (L_{Aeq}, dB)	Criteria - (L_{A90} – 5dB)	Meets Criteria (Y/N)
R1	Building to south west of site. Approx. 3rd floor height.	41	42	Y
R2	Façade to north-west of site. Approx. 4th floor height.	38	42	Y
R3	Across Charlotte Street. Approx. 3rd Floor height	42	42	Y
R4	Building directly to south of site. Approx. 2nd floor height.	41	42	Y

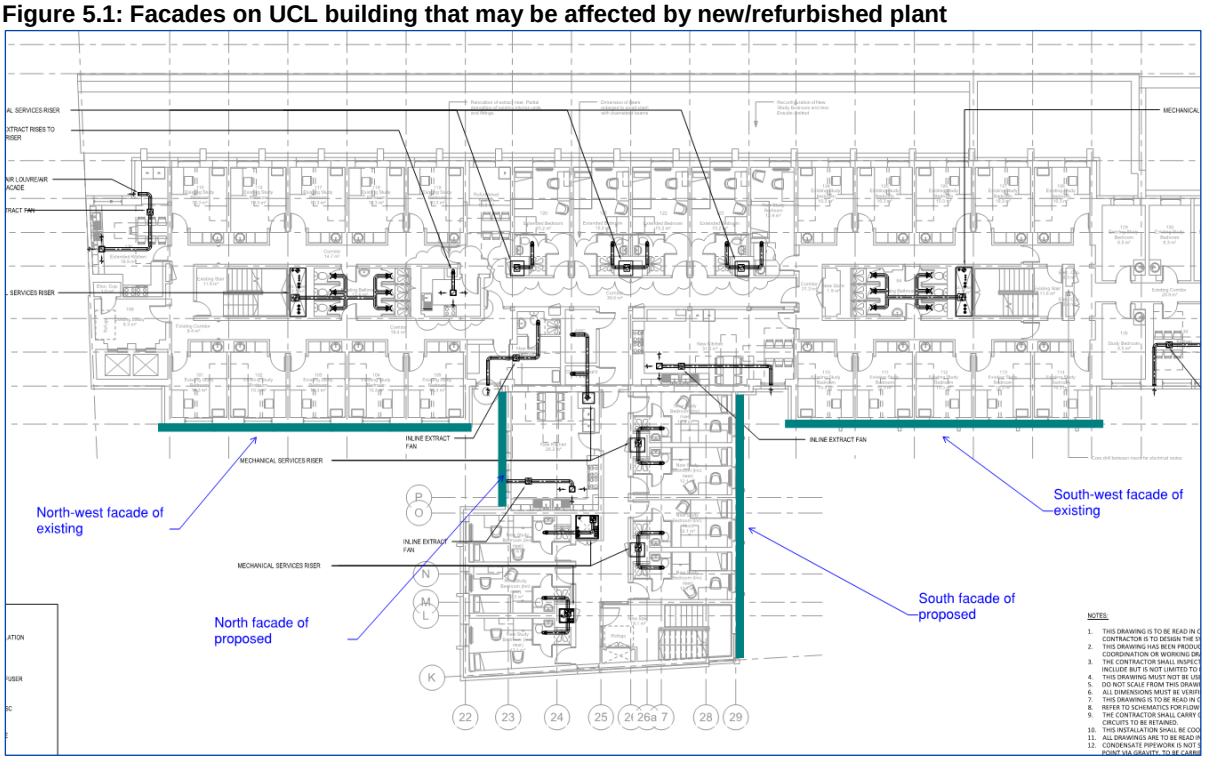
5.4.5 Cumulative building services plant noise levels are within the criteria of 42 dB L_{Aeq}, set by the existing background noise level and Camden's UDP requirements with the necessary attenuation measures as detailed later in **Section 5.5** of this report.

ON-SITE RECEPTORS

5.4.6 The following façades on the UCL building have been identified as possibly being affected by the new and refurbished plant. These are illustrated in Figure 2 below.

- South-west façade of existing Astor College, UCL building
- North-west façade of existing Astor College, UCL building
- South façade of proposed extension
- North façade of proposed extension

Figure 5.1: Facades on UCL building that may be affected by new/refurbished plant



5.4.7 The following table summarises noise levels at the façade of the existing UCL building, and the proposed extension.

Table 5.5 – Noise Level at on-site receptors

Receptor	Sound Pressure Level 1m From Receptor (L_{Aeq}, dB)
South-west façade of existing UCL building	49
North-west façade of existing UCL building	49
South façade of proposed extension	52
North façade of proposed extension	43

5.5 NOISE CONTROL

INTERNAL NOISE LEVELS

5.5.1 With the exception of the heat recovery units that serve communal spaces on the ground floor, all internal building services plant noise levels of selected plant are within the ranges as per BS 8233:2014, and as such no attenuation is required.

5.5.2 The supply side of the ground floor heat recovery units minorly exceed the internal noise level criteria. Table 5.6 below details required attenuation to meet the noise criteria.

Table 5.6: Heat recovery unit intake & discharge attenuator requirements

Plant Item	Indicative Length / Free Area %	Octave Band Dynamic Insertion Loss (dB)							
		63	125	250	500	1000	2000	4000	8000
HRU – Supply	600mm / 50%	1	2	7	10	11	9	8	7

EXTERNAL OFF-SITE RECEPTORS

5.5.3 Predicted noise levels for the plant selections fall below external noise limits at all nearby receptors with the exception of Receptor 3. However with the noise control specified in table 5.7, the receptor meets the criteria.

5.5.4 The exceedance at this receptor is a result of the noise levels of the Heat Recovery Unit that serves the LG and UG communal areas. It is recommended that an attenuator commensurate with the following be installed on both the intake and discharge paths of the Heat Recovery Unit.

Table 5.7: Heat recovery unit intake & discharge attenuator requirements

Plant Item	Indicative Length / Free Area %	Octave Band Dynamic Insertion Loss (dB)							
		63	125	250	500	1000	2000	4000	8000
HRU – Intake/Discharge	600mm / 50%	1	2	7	10	11	9	8	7

EXTERNAL ON-SITE RECEPTORS

5.5.5 Predicted cumulative building services noise levels exceed the criteria on the south-west façade of the existing UCL building. The exceedance in level is due to the Extension WC Extract (Fan Reference F5).

5.5.6 It is recommended that an attenuator commensurate with the following be installed on the discharge path:

Table 5.8 Extension WC Extract (F5) discharge attenuator requirements

Plant Item	Indicative Length / Free Area %	Octave Band Dynamic Insertion Loss (dB)							
		63	125	250	500	1000	2000	4000	8000
Extension WC Extract (F5) - Discharge	600mm / 45%	2	4	8	12	13	13	9	8

5.6 GROUND FLOOR KITCHEN EXTRACT FAN

5.6.1 The refurbishment sees a new café/kiosk proposed on the south of the existing building at lower ground level. Associated with this is a kitchen extractor hood to be selected at the fit-out stage.

5.6.2 The kitchen extract hood should be selected such that the sound pressure level at 1m from the grille does not exceed 60 dBA.

Appendix A

GLOSSARY

GLOSSARY

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude, but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

An indication of the range of sound levels commonly found in the environment is given in the following table.

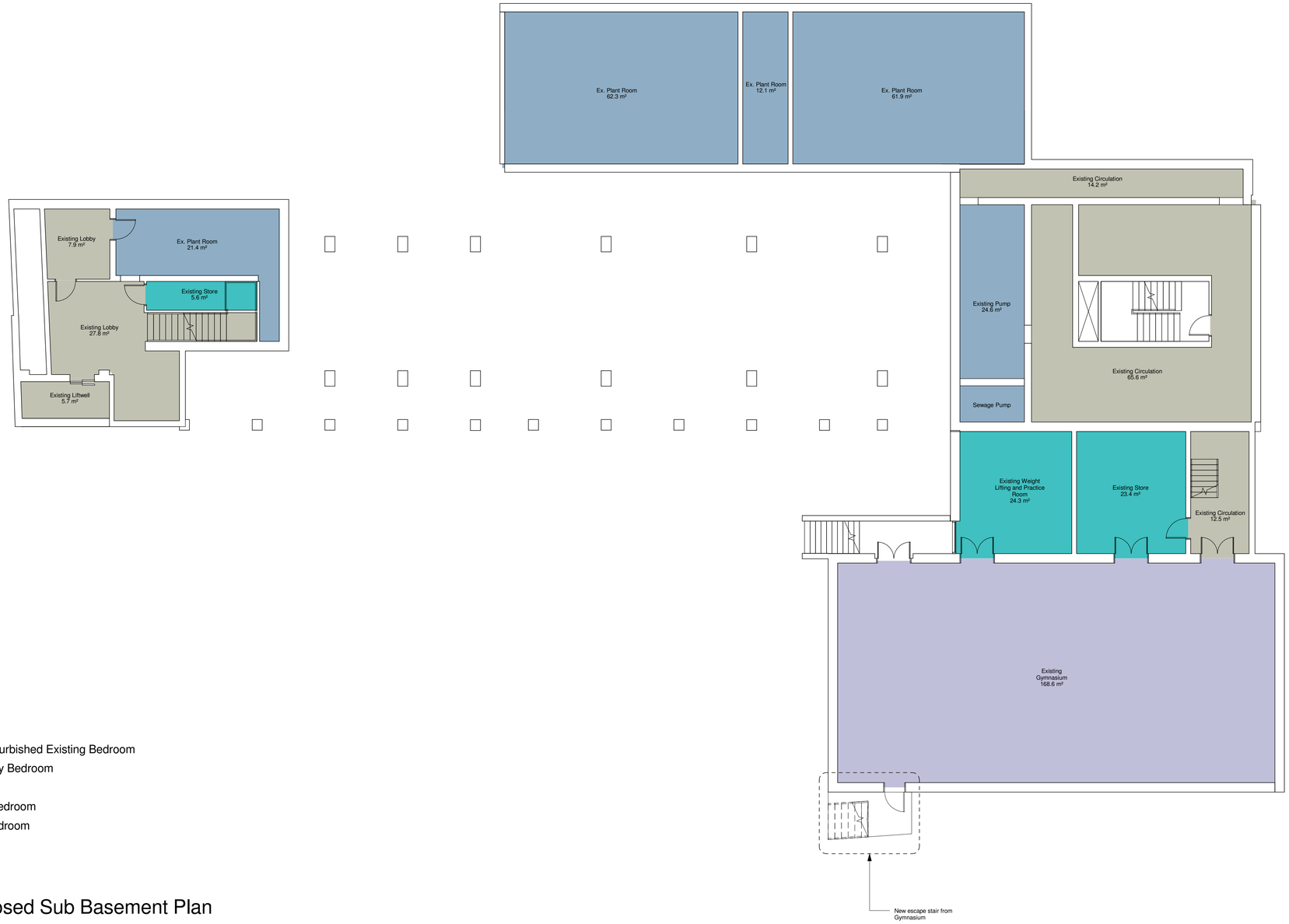
Sound Level	Location
0 dB(A)	Threshold of hearing
20 to 30 dB(A)	Quiet bedroom at night
30 to 40 dB(A)	Living room during the day
40 to 50 dB(A)	Typical office
50 to 60 dB(A)	Inside a car
60 to 70 dB(A)	Typical high street
70 to 90 dB(A)	Inside factory
100 to 110 dB(A)	Burglar alarm at 1m away
110 to 130 dB(A)	Jet aircraft on take off
140 dB(A)	Threshold of Pain

Term	Definition
Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20μPa ($20x10^{-6}$ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by $20 \log^{10} (s_1 / s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
Noise Rating	Noise Rating curves are a set of internationally agreed octave band sound pressure level curves, based on the concept of equal loudness. The NR value of a noise level is obtained by plotting the octave band sound pressure level spectrum on the set of standard curves. The highest value curve which is reached by the spectrum is the NR value. The NR curves are defined in the superseded standard ISO/R 1996:1971.
Reverberation Time	Reverberation time is the time taken in seconds for the sound level within a space to decay by 60 dB and an important indicator of the subjective acoustic quality within a room Reverberation time can be measured using the procedures set out in BS EN ISO 3382-2:2008 Acoustics -- Measurement of room acoustic parameters -- Part 2: Reverberation time in ordinary rooms
Displacement, Acceleration and Velocity **Root Mean Square (r.m.s.) and Peak Values** **Peak Particle Velocity (PPV)**	Vibration is an oscillatory motion. The magnitude of vibration can be defined in terms of displacement (how far from the equilibrium position that something moves), velocity (how fast something moves), or acceleration (the rate of change of velocity). When describing vibration, one must specify whether peak values are used (i.e. the maximum displacement or maximum velocity) or r.m.s. / r.m.q. values (effectively an average value) are used. Standards for the assessment of building damage are usually given in terms of peak velocity (usually referred to as Peak Particle Velocity, or PPV), whilst human response to vibration is often described in terms of r.m.s. or r.m.q. acceleration.
Vibration Dose Value (VDV)	This is a measure of the amount of vibration that is experienced over a specified period, and has been defined so as to quantify the human response to vibration in terms of comfort and annoyance. The Vibration Dose Value is used to assess the likely levels of adverse comment about vibration, and is defined mathematically as the fourth root of the time integral of the fourth power of the acceleration, after it has been frequency weighted to take into account the frequency response of the human body to a vibration stimulus. Measured in units of $ms^{-1.75}$.

Sound Level Difference (D)	The sound insulation required between two spaces may be determined by the sound level difference (D) be-tween them. Single figure descriptors include the weighted sound level difference (D_w) and the normalised weighted sound level difference (D_{nTw}) as defined in BS EN ISO 717-1:2013 Acoustics – Rating of sound insulation in buildings and of building elements. Part 1. Airborne sound insulation.
Sound Reduction Index (R)	The sound reduction index, R, (or transmission loss) of a building element is a measure of the loss of sound through the material, i.e. its attenuation properties. It is a property of the component, unlike the sound level difference which is affected by the common area between the rooms and the acoustic of the receiving room. Airborne sound insulation can be measured using the procedures set out in BS EN ISO 10140-1:2010 Acoustics – Laboratory measurement of airborne sound insulation of building elements.
Weighted Sound Reduction index (R_w) and Apparent weighted Sound Reduction index (R'_w)	The weighted sound reduction index, R_w, is a single figure description of sound reduction index which is defined in BS EN ISO 717-1: 1997. The R_w is calculated from measurements in an acoustic laboratory to BS EN ISO 140-3:1997 and ratings to BS EN ISO 717-1:1997. Sound insulation ratings derived from site (which are invariably lower than the laboratory figures) are referred to as the R'_w ratings and measured to BS EN ISO 140-4:1998.
Spectrum Adaptation Terms (C, C_{tr})	BS EN ISO 717-1:1997 defines certain spectrum adaptation terms based on spectra for A-weighted pink noise (C) and A-weighted urban traffic noise (C_{tr}). These terms provide adaptation to weighted sound reduction and level difference terms. C is based on a typical speech spectrum and C_{tr} is based on an urban traffic noise spectrum. However, C_{tr} is commonly used in defining the required performance of separating building elements as it assists in controlling low frequency content such as televisions and music systems.

Appendix B

SOUND REDUCTION REQUIREMENTS MARK-UPS



- Amenity
- Bathroom
- Circulation
- Existing / Refurbished Existing Bedroom
- Existing Study Bedroom
- Kitchen
- New Study Bedroom
- New Wch Bedroom
- Plant
- Store

1/098 Proposed Sub Basement Plan
1 : 100

Minimum Sound Insulation of Separating Walls (Laboratory dB Rw)		*Typical design sound insulation level / wall type (site, dB R'w)*
45		40
50		45
55		50
55 dB Rw + Ctr		

Minimum Sound Insulation of Doors, dB Rw	
29	
35	
40	

Date	Rev	Description	By

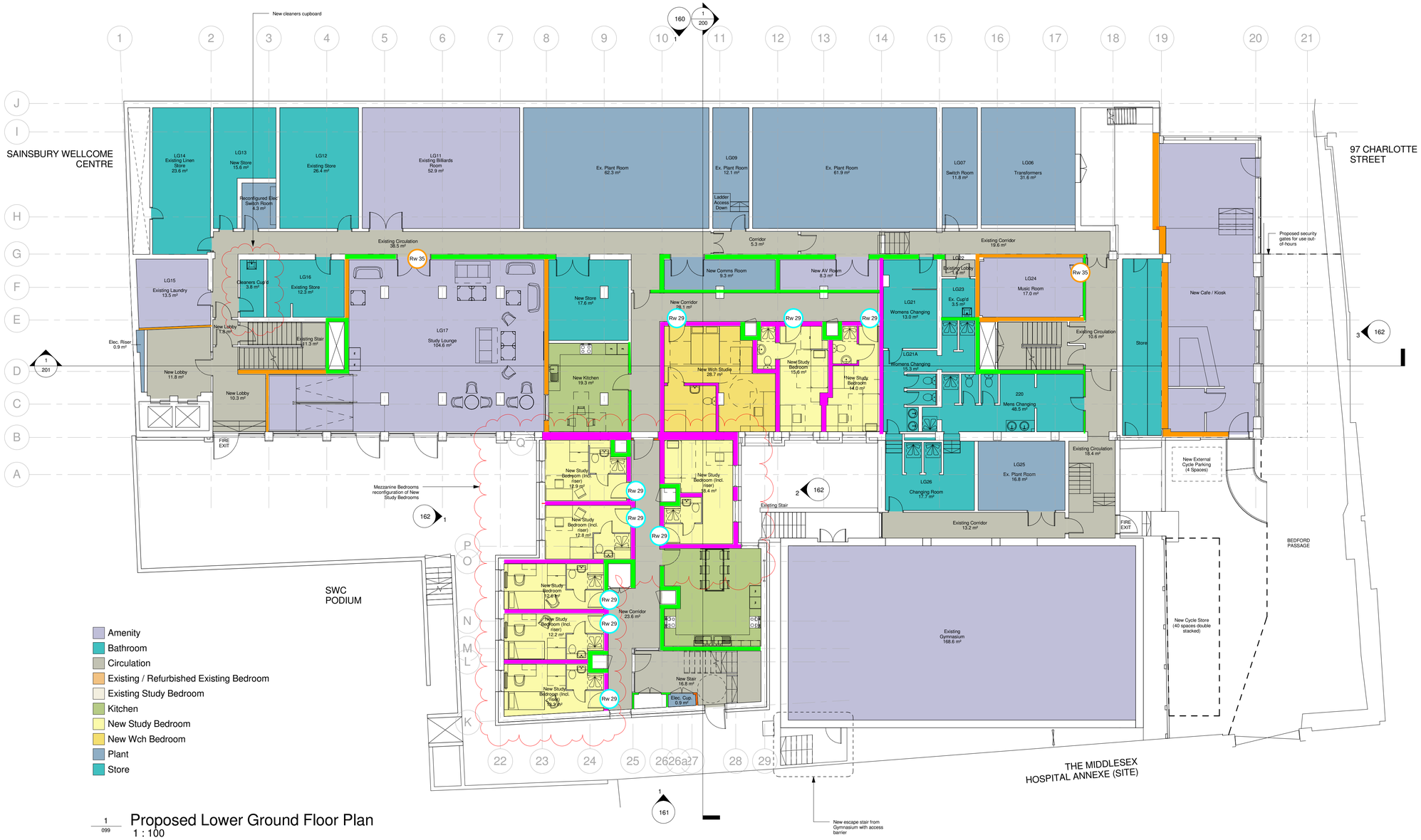
WSP Acoustics Drawing Number:

70017316 SK01

Title:

2869_L_098 P2 Proposed Sub Basement Plan

WSP
ACOUSTICS



1/099 Proposed Lower Ground Floor Plan
1 : 100

Minimum Sound Insulation of Separating Walls (Laboratory dB Rw)		Typical design sound insulation level / wall type (site, dB R'w)
45		40
50		45
55		50
55 dB Rw + Ctr		

Minimum Sound Insulation of Doors, dB Rw	
29	
35	
40	

Date	Rev	Description	By

WSP Acoustics Drawing Number:

70017316 SK02

Title:

2869_L_099 P24 Proposed Lower Ground Floor Plan

WSP ACOUSTICS

- Amenity
- Bathroom
- Circulation
- Existing / Refurbished Existing Bedroom
- Existing Study Bedroom
- Kitchen
- New Study Bedroom
- New Wch Bedroom
- Plant
- Store

1/100 Proposed Ground Floor Plan
1 : 100

Minimum Sound Insulation of Separating Walls (Laboratory dB Rw)		*Typical design sound insulation level / wall type (site, dB R'w)*
45		40
50		45
55		50
55 dB Rw + Ctr		

Minimum Sound Insulation of Doors, dB Rw	
29	
35	
40	

Date	Rev	Description	By

WSP Acoustics Drawing Number:

70017316 SK03

Title:

2869_L_100 P26 Proposed Upper Ground Floor Plan

WSP ACOUSTICS

1 / 101 Proposed First Floor Plan
1 : 100

Minimum Sound Insulation of Separating Walls (Laboratory dB Rw)		*Typical design sound insulation level / wall type (site, dB R'w)*
45		40
50		45
55		50
55 dB Rw + Ctr		
As existing wall		

Minimum Sound Insulation of Doors, dB Rw	
29	
35	
40	

Date	Rev	Description	By

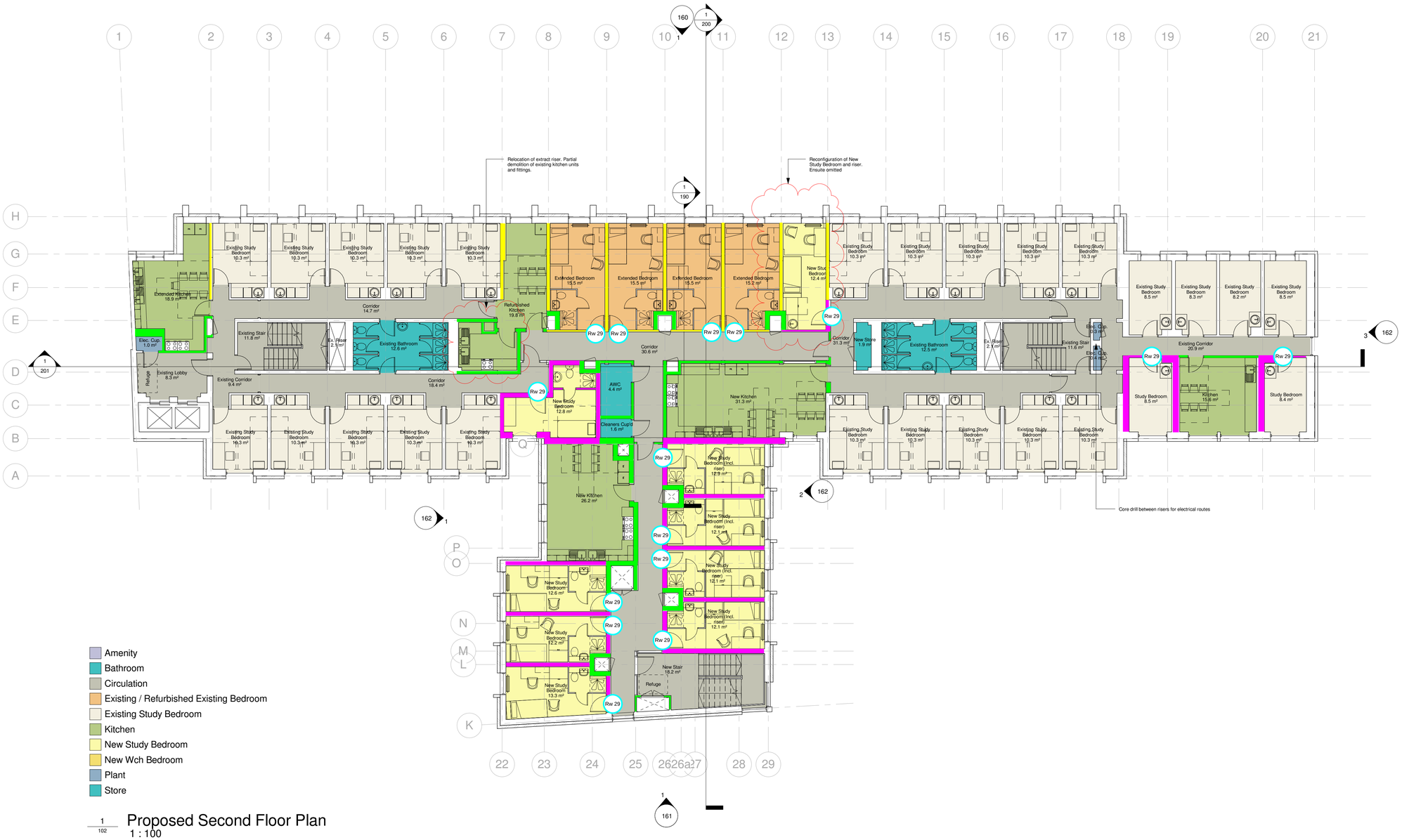
WSP Acoustics Drawing Number:

70017316 SK04

Title:

2869_L_101 P21 Proposed First Floor Plan

WSP ACOUSTICS



1/102 Proposed Second Floor Plan
1 : 100

Minimum Sound Insulation of Separating Walls (Laboratory dB Rw)		*Typical design sound insulation level / wall type (site, dB R'w)*
45		40
50		45
55		50
55 dB Rw + Ctr		
As existing wall		

Minimum Sound Insulation of Doors, dB Rw	
29	
35	
40	

Date	Rev	Description	By

WSP Acoustics Drawing Number:

70017316 SK05

Title:

2869_L_102 P2 Proposed Second Floor Plan

WSP
ACOUSTICS

1/103 Proposed Third Floor Plan
1 : 100

Minimum Sound Insulation of Separating Walls (Laboratory dB Rw)		*Typical design sound insulation level / wall type (site, dB R'w)*
45		40
50		45
55		50
55 dB Rw + Ctr		
As existing wall		

Minimum Sound Insulation of Doors, dB Rw	
29	
35	
40	

Date	Rev	Description	By

WSP Acoustics Drawing Number:

70017316 SK06

Title:

2869_L_103 P2 Proposed Third Floor Plan

WSP ACOUSTICS

Minimum Sound Insulation of Separating Walls (Laboratory dB Rw)		*Typical design sound insulation level / wall type (site, dB R'w)*
45		40
50		45
55		50
55 dB Rw + Ctr		
As existing wall		

Minimum Sound Insulation of Doors, dB Rw	
29	
35	
40	

Date	Rev	Description	By

WSP Acoustics Drawing Number:

70017316 SK07

Title:

2869_L_104 P2 Proposed Fourth Floor Plan

WSP ACOUSTICS

1 / 105 Proposed Fifth Floor Plan
1 : 100

Minimum Sound Insulation of Separating Walls (Laboratory dB Rw)		*Typical design sound insulation level / wall type (site, dB R'w)*
45		40
50		45
55		50
55 dB Rw + Ctr		
As existing wall		

Minimum Sound Insulation of Doors, dB Rw	
29	
35	
40	

Date	Rev	Description	By

WSP Acoustics Drawing Number:

70017316 SK08

Title:

2869_L_105 P2 Proposed Fifth Floor Plan

WSP
ACOUSTICS

1/106 Proposed Sixth Floor Plan
1 : 100

Minimum Sound Insulation of Separating Walls (Laboratory dB Rw)		*Typical design sound insulation level / wall type (site, dB R'w)*
45		40
50		45
55		50
55 dB Rw + Ctr		
As existing wall		

Minimum Sound Insulation of Doors, dB Rw	
29	
35	
40	

Date	Rev	Description	By

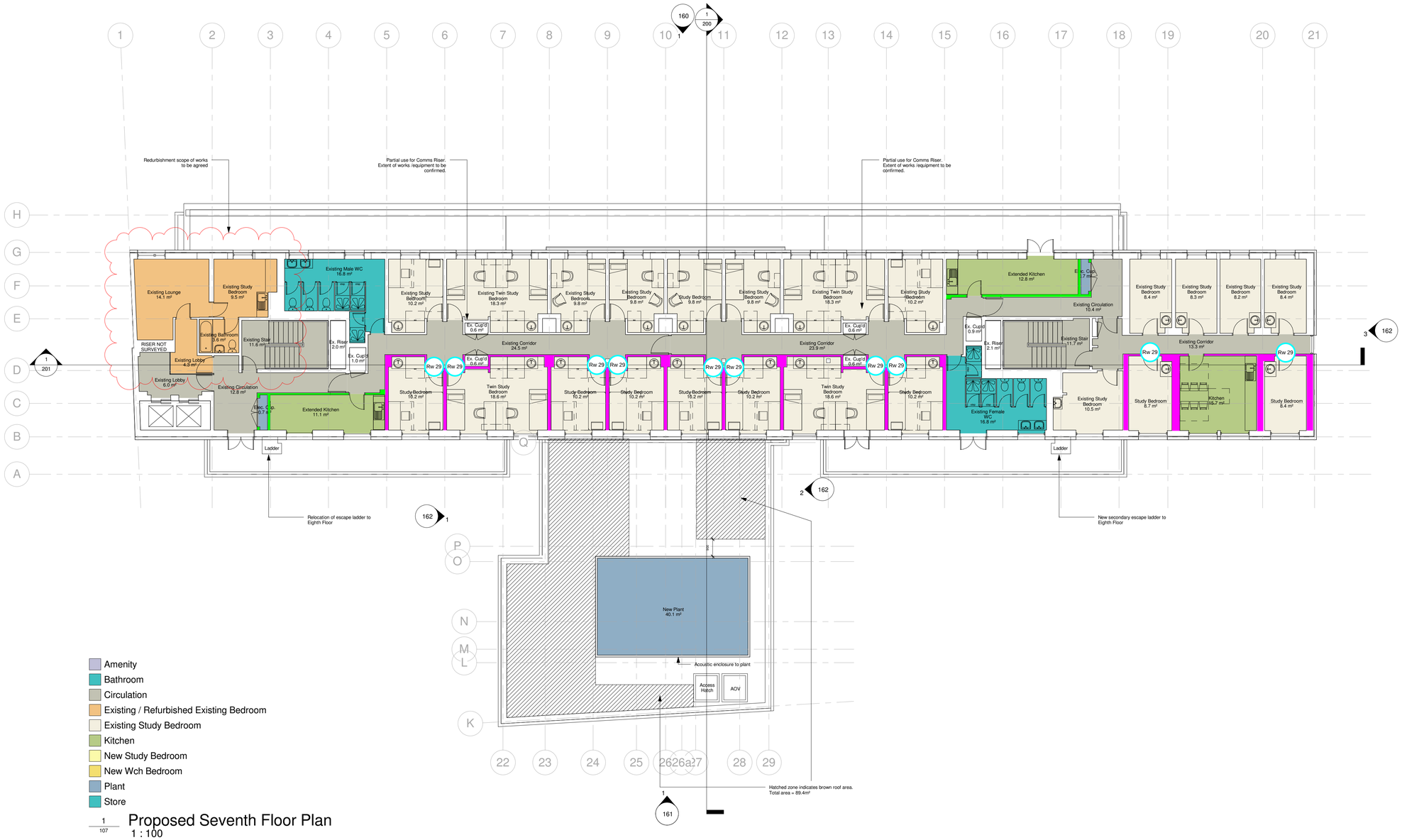
WSP Acoustics Drawing Number:

70017316 SK09

Title:

2869_L_106 P2 Proposed Sixth Floor Plan

WSP
ACOUSTICS



Proposed Seventh Floor Plan
1 : 100

Minimum Sound Insulation of Separating Walls (Laboratory dB Rw)		*Typical design sound insulation level / wall type (site, dB R'w)*
45		40
50		45
55		50
55 dB Rw + Ctr		

Minimum Sound Insulation of Doors, dB Rw	
29	
35	
40	

Date	Rev	Description	By

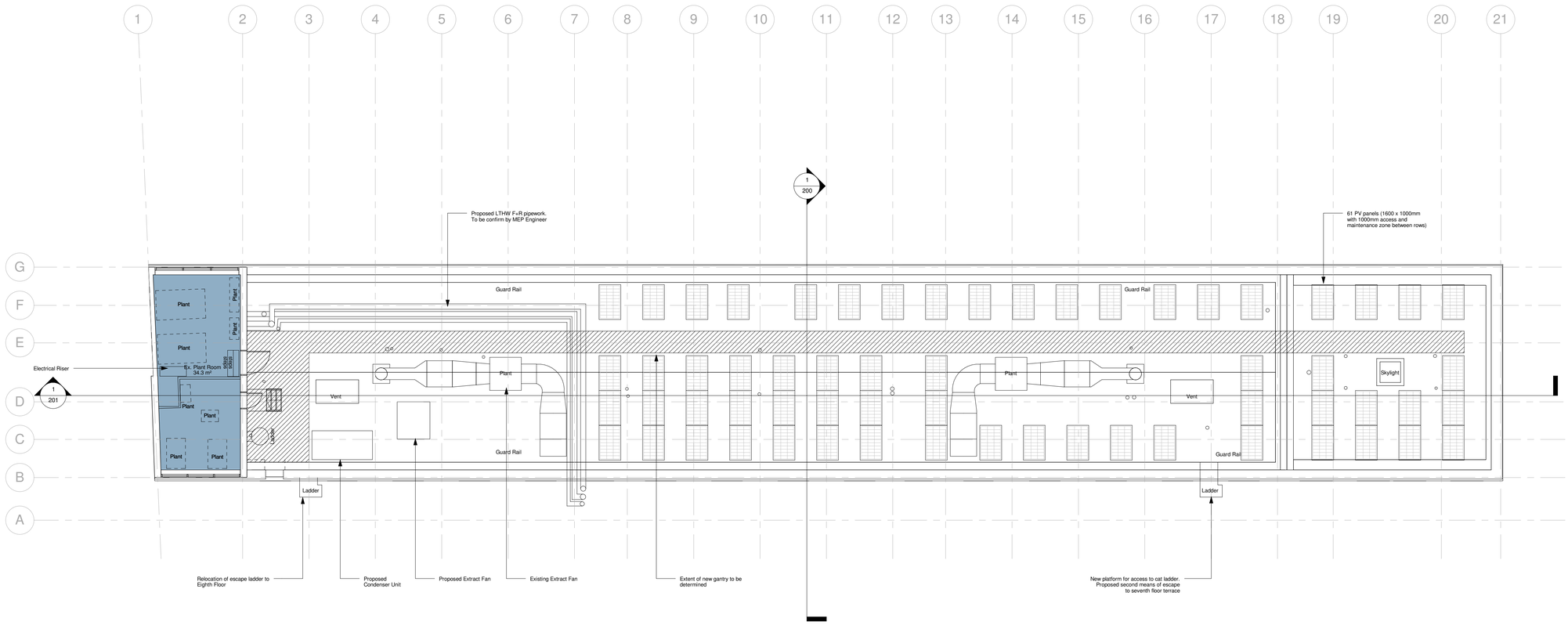
WSP Acoustics Drawing Number:

70017316 SK10

Title:

2869_L_107 24 Proposed Seventh Floor Plan

WSP ACOUSTICS



- Amenity
- Bathroom
- Circulation
- Existing / Refurbished Existing Bedroom
- Existing Study Bedroom
- Kitchen
- New Study Bedroom
- New Wch Bedroom
- Plant
- Store

1/108 Proposed Eighth Floor Plan
1 : 100

Minimum Sound Insulation of Separating Walls (Laboratory dB Rw)		*Typical design sound insulation level / wall type (site, dB R'w)*
45		40
50		45
55		50
55 dB Rw + Ctr		

Minimum Sound Insulation of Doors, dB Rw	
29	
35	
40	

Ambient Noise Level Criteria

Predicted Noise Rating / Required Noise Rating

Date	Rev	Description	By

WSP Acoustics Drawing Number:

70017316 SK09

Title:

2869_L_108 P8 Proposed Eighth Floor Plan

WSP ACOUSTICS

Appendix C

MECHANICAL PLANT INFORMATION

MECHANICAL PLANT INFORMATION

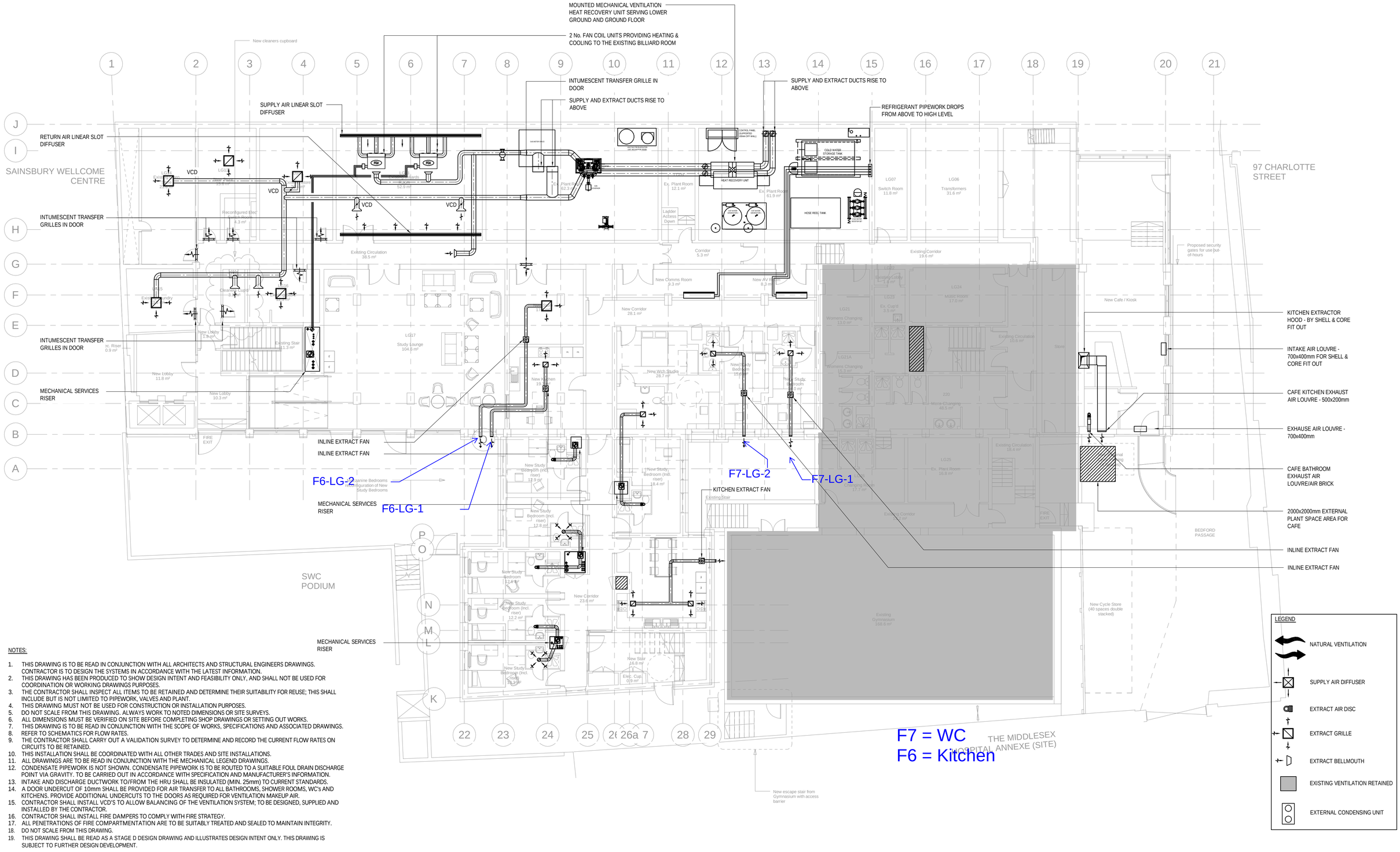
Plant Description		Details			Octave Band Noise Level (dB)								dBA
Plant Ref.	Location	Space Served	Mfr/Emp Data	SWL / SPL	63	125	250	500	1K	2K	4K	8K	
F1	Level 8 (Roof)	NW WC Extract - Inlet	Mfr	SWL	68	64	58	56	50	48	49	48	58
	Level 8 (Roof)	NW WC Extract - Outlet	Mfr	SWL	73	65	64	55	53	54	50	49	61
	Level 8 (Roof)	NW WC Extract - Breakout	Mfr	SWL	54	48	45	39	33	32	29	26	42
F2	Level 8 (Roof)	NW Kitchen Extract - Inlet	Mfr	SWL	71	70	59	59	51	49	50	49	61
	Level 8 (Roof)	NW Kitchen Extract - Outlet	Mfr	SWL	79	80	62	56	54	54	48	50	66
	Level 8 (Roof)	NW Kitchen Extract - Breakout	Mfr	SWL	55	54	45	39	32	28	23	19	43
F3	Level 8 (Roof)	Extension Bed Extract - Inlet	Mfr	SWL	71	80	68	61	50	51	50	55	67
	Level 8 (Roof)	Extension Bed Extract - Outlet	Mfr	SWL	61	75	66	60	50	51	50	55	64
	Level 8 (Roof)	Extension Bed Extract - Breakout	Mfr	SWL	61	75	69	63	53	55	54	59	66
F4	Level 8 (Roof)	SE WC Extract - Inlet	Mfr	SWL	86	85	69	65	53	52	51	46	71
	Level 8 (Roof)	SE WC Extract - Outlet	Mfr	SWL	88	86	71	66	59	54	49	43	72
	Level 8 (Roof)	SE WC Extract - Breakout	Mfr	SWL	71	66	61	50	43	34	29	24	56
F5	Level 7	Extension WC Extract - Inlet	Mfr	SWL	82	85	77	72	65	63	59	53	75
	Level 7	Extension WC Extract - Outlet	Mfr	SWL	84	74	76	77	68	65	59	53	76
	Level 7	Extension WC Extract - Breakout	Mfr	SWL	76	69	64	54	37	34	37	27	59
F6	All Levels	Kitchen Extract (Standalone) - Inlet	Mfr	SWL	71	68	53	46	40	35	23	20	54
	All Levels	Kitchen Extract (Standalone) - Outlet	Mfr	SWL	71	71	62	55	51	50	45	39	60
	All Levels	Kitchen Extract (Standalone) - Breakout	Mfr	SWL	44	41	46	44	36	32	24	17	44

Plant Description		Details			Octave Band Noise Level (dB)								dBA
Plant Ref.	Location	Space Served	Mfr/Emp Data	SWL / SPL	63	125	250	500	1K	2K	4K	8K	
F7	All Levels	Ensuite/WC Extract - Inlet	Mfr	SWL	49	51	58	42	42	42	37	33	52
F8	All Levels	Kitchen Extract (Standalone) - Inlet	Mfr	SWL	70	60	62	52	50	45	44	42	57
	All Levels	Kitchen Extract (Standalone) - Outlet	Mfr	SWL	72	64	66	60	54	49	49	42	62
	All Levels	Kitchen Extract (Standalone) - Breakout	Mfr	SWL	51	51	44	41	29	27	24	16	42
HRU	Ground Floor	HRU - Intake	Mfr	SWL	77	76	75	78	71	65	59	55	77
	Ground Floor	HRU - Supply	Mfr	SWL	78	74	68	75	72	62	46	46	75
	Ground Floor	HRU - Discharge	Mfr	SWL	81	80	75	83	82	74	67	63	85
	Ground Floor	HRU - Extract	Mfr	SWL	75	69	67	69	64	59	55	54	70
RZQG71	Ground Floor Condenser	Serving LG/UG Communal Area FCU's	Mfr	SWL	52	53	58	59	61	57	54	47	64
REYQ16T	Roof Condenser	Serving AV/Comms room FCU's	Mfr	SPL	70	68	68	63	57	53	48	42	64

Appendix D

PLANT LOCATIONS

DO NOT SCALE



NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND STRUCTURAL ENGINEERS DRAWINGS. CONTRACTOR IS TO DESIGN THE SYSTEMS IN ACCORDANCE WITH THE LATEST INFORMATION.
2. THIS DRAWING HAS BEEN PRODUCED TO SHOW DESIGN INTENT AND FEASIBILITY ONLY, AND SHALL NOT BE USED FOR COORDINATION OR WORKING DRAWINGS PURPOSES.
3. THE CONTRACTOR SHALL INSPECT ALL ITEMS TO BE RETAINED AND DETERMINE THEIR SUITABILITY FOR REUSE; THIS SHALL INCLUDE BUT IS NOT LIMITED TO PIPEWORK, VALVES AND PLANT.
4. THIS DRAWING MUST NOT BE USED FOR CONSTRUCTION OR INSTALLATION PURPOSES.
5. DO NOT SCALE FROM THIS DRAWING. ALWAYS WORK TO NOTED DIMENSIONS OR SITE SURVEYS.
6. ALL DIMENSIONS MUST BE VERIFIED ON SITE BEFORE COMPLETING SHOP DRAWINGS OR SETTING OUT WORKS.
7. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE SCOPE OF WORKS, SPECIFICATIONS AND ASSOCIATED DRAWINGS.
8. REFER TO SCHEMATICS FOR FLOW RATES.
9. THE CONTRACTOR SHALL CARRY OUT A VALIDATION SURVEY TO DETERMINE AND RECORD THE CURRENT FLOW RATES ON CIRCUITS TO BE RETAINED.
10. THIS INSTALLATION SHALL BE COORDINATED WITH ALL OTHER TRADES AND SITE INSTALLATIONS.
11. ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE MECHANICAL LEGEND DRAWINGS.
12. CONDENSATE PIPEWORK IS NOT SHOWN. CONDENSATE PIPEWORK IS TO BE ROUTED TO A SUITABLE FOUL DRAIN DISCHARGE POINT VIA GRAVITY. TO BE CARRIED OUT IN ACCORDANCE WITH SPECIFICATION AND MANUFACTURER'S INFORMATION.
13. INTAKE AND DISCHARGE DUCTWORK TO/FROM THE HRU SHALL BE INSULATED (MIN. 25mm) TO CURRENT STANDARDS.
14. A DOOR UNDERCUT OF 10mm SHALL BE PROVIDED FOR AIR TRANSFER TO ALL BATHROOMS, SHOWER ROOMS, WC's AND KITCHENS. PROVIDE ADDITIONAL UNDERCUTS TO THE DOORS AS REQUIRED FOR VENTILATION MAKEUP AIR.
15. CONTRACTOR SHALL INSTALL VCD'S TO ALLOW BALANCING OF THE VENTILATION SYSTEM; TO BE DESIGNED, SUPPLIED AND INSTALLED BY THE CONTRACTOR.
16. CONTRACTOR SHALL INSTALL FIRE DAMPERS TO COMPLY WITH FIRE STRATEGY.
17. ALL PENETRATIONS OF FIRE COMPARTMENTATION ARE TO BE SUITABLY TREATED AND SEALED TO MAINTAIN INTEGRITY.
18. DO NOT SCALE FROM THIS DRAWING.
19. THIS DRAWING SHALL BE READ AS A STAGE D DESIGN DRAWING AND ILLUSTRATES DESIGN INTENT ONLY. THIS DRAWING IS SUBJECT TO FURTHER DESIGN DEVELOPMENT.

LEGEND

- NATURAL VENTILATION
- SUPPLY AIR DIFFUSER
- EXTRACT AIR DISC
- EXTRACT GRILLE
- EXTRACT BELLMOUTH
- EXISTING VENTILATION RETAINED
- EXTERNAL CONDENSING UNIT

NOTES:

1. DO NOT SCALE FROM THIS DRAWING.
2. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL OTHER ARCHITECTURAL, STRUCTURAL, CIVIL, MECHANICAL, ELECTRICAL AND PUBLIC HEALTH DRAWINGS AND ALL RELEVANT SECTIONS AND REPORTS
3. THIS DRAWING SHALL BE READ AS A STAGE D DESIGN DRAWING AND ILLUSTRATES DESIGN INTENT ONLY. THIS DRAWING IS SUBJECT TO FURTHER DESIGN DEVELOPMENT.

REV	DATE	BY	DESCRIPTION	CHK	APD
T1	29.01.2016	JG	TENDER ISSUE	SB	DC
1	15.01.2015	JG	FOR INFORMATION ISSUE	SB	DC
0	23.01.2015	RK	STAGE D ISSUE	SD	DC

DRAWING STATUS: TENDER

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www.wspgroup.com

CLIENT: UCL

ARCHITECT: LEVITT BERNSTEIN

PROJECT: ASTOR COLLEGE
CHARLOTTE STREET, W1T 4QB

TITLE: LOWER GROUND FLOOR VENTILATION LAYOUT

SCALE @ A1:	CHECKED:		APPROVED:
1:100	SD		DC
PROJECT No:	DESIGNED:	DRAWN:	DATE:
3512445J	SB	JG	29.01.2016

DRAWING No: L(57)-LG-01 REV: T1

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File name \\EAGDLFIL02\VOB$COMMON\PROJECTS-CONTENT SERVER\351\72\445J-BBL - 351710-BBL - UCL ASTOR COLLEGE MEP AND BREEAM\5. TECHNICAL AND DESIGN MANAGEMENT\1. DESIGN\2. DRAWINGS\1. CURRENT\MECHANICAL\(57)-LG-01.DWG, printed on 29 January 2016 11:27:15, by Johnson, Fin

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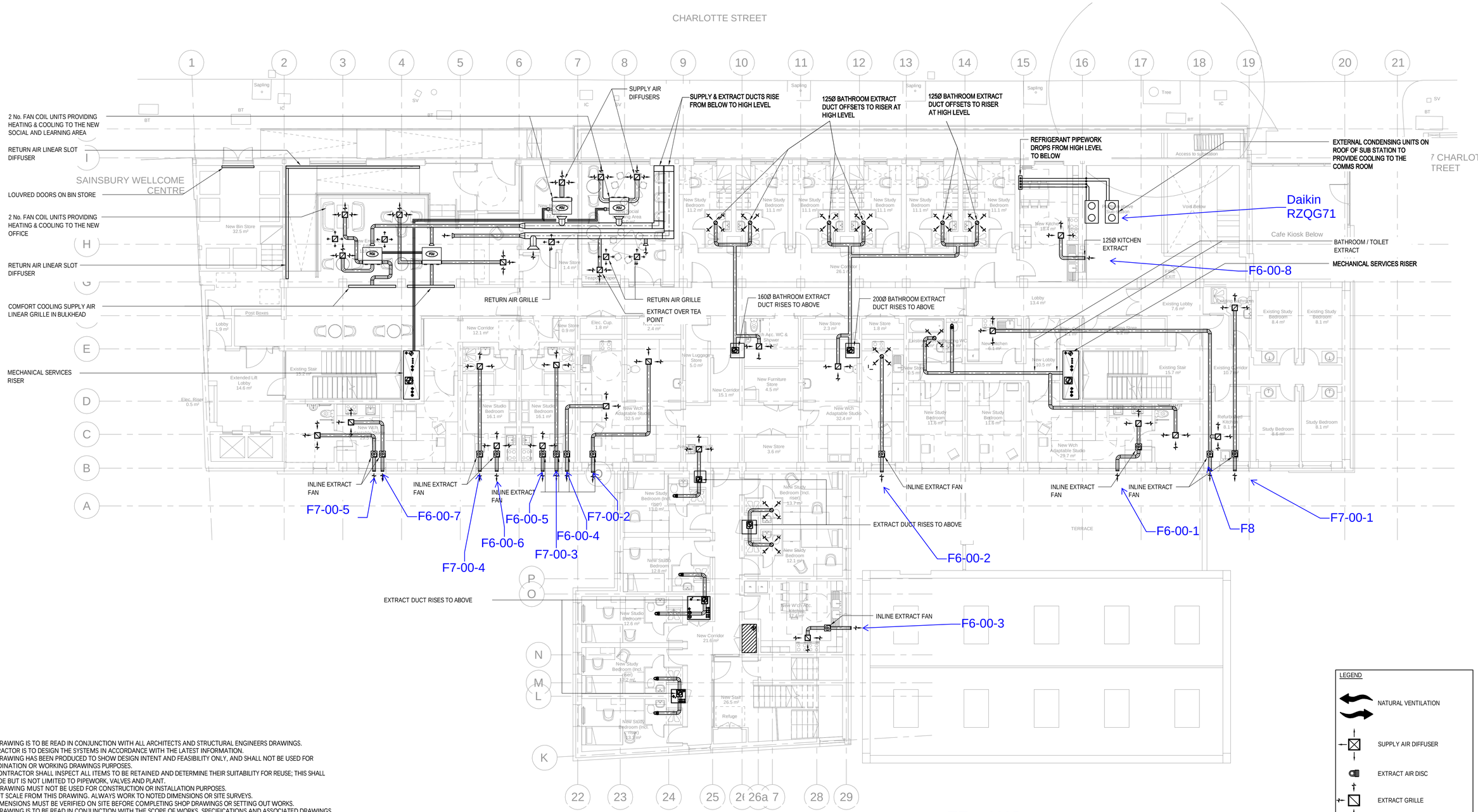

NOTES:

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL ARCHITECTS AND STRUCTURAL ENGINEERS DRAWINGS. CONTRACTOR IS TO DESIGN THE SYSTEMS IN ACCORDANCE WITH THE LATEST INFORMATION.
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T1	29.01.2016	JG	TENDER ISSUE	SB	DC
1	15.01.2016	JG	FOR INFORMATION ISSUE	SB	DC
0	23.01.2015	RK	STAGE D ISSUE	SD	DC

DRAWING STATUS: TENDER

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CLIENT: UCL

ARCHITECT: LEVITT BERNSTEIN

PROJECT: ASTOR COLLEGE, CHARLOTTE STREET, W1T 4QB

TITLE: GROUND FLOOR VENTILATION LAYOUT

SCALE @ A1:	CHECKED:		APPROVED:
1:100	SD		DC
PROJECT No:	DESIGNED:	DRAWN:	DATE:
3512445J	SB	JG	29.01.2016

DRAWING No: L(57)-00-01 REV: T1

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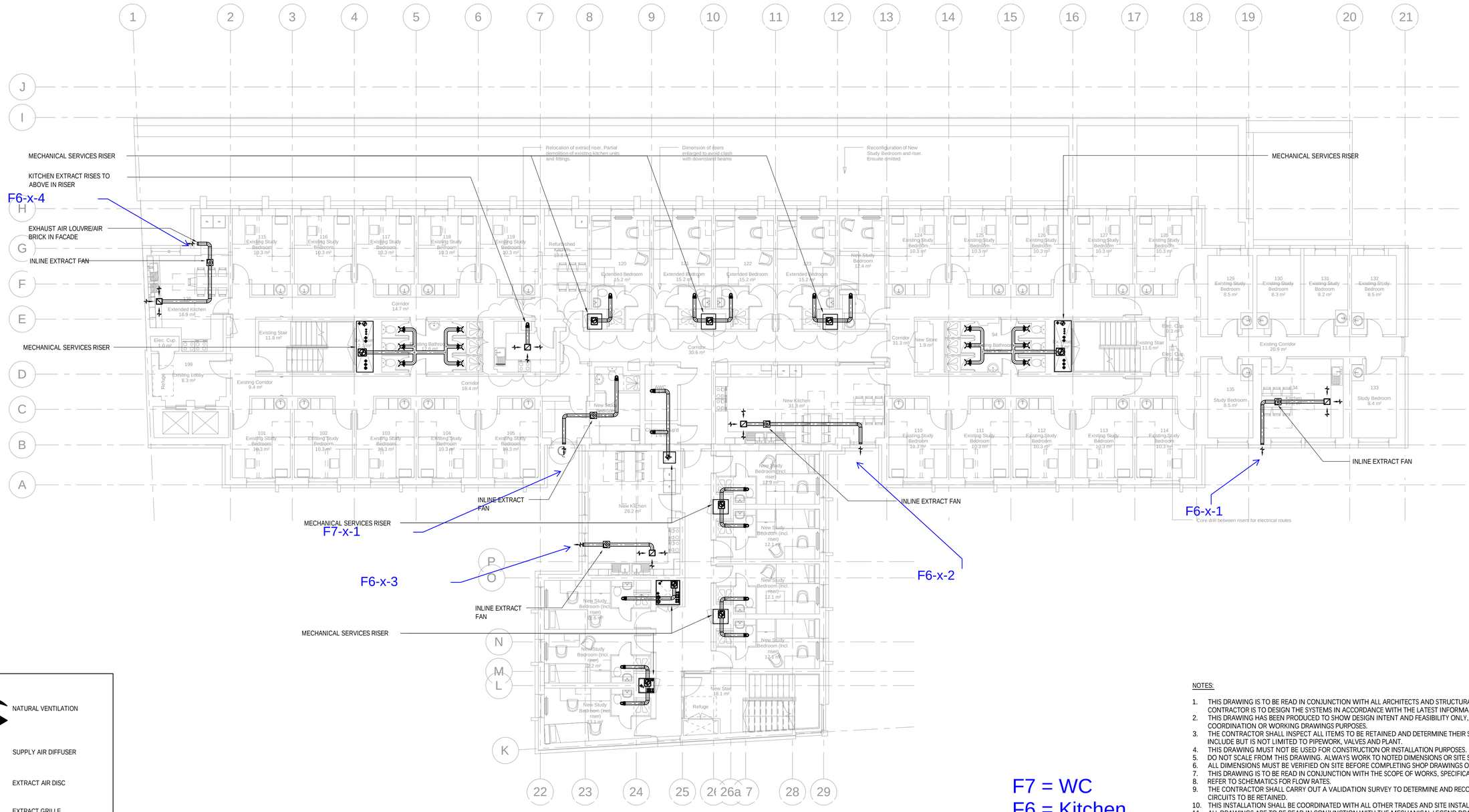

LEGEND

- NATURAL VENTILATION
- SUPPLY AIR DIFFUSER
- EXTRACT AIR DISC
- EXTRACT GRILLE
- EXTRACT BELLMOUTH
- EXISTING VENTILATION RETAINED
- EXTERNAL CONDENSING UNIT

F7 = WC
F6 = Kitchen

NOTES:

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DRAWING STATUS: TENDER

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www.wspgroup.com

CLIENT: UCL

ARCHITECT: LEVITT BERNSTEIN

PROJECT: ASTOR COLLEGE
CHARLOTTE STREET, W1T 4QB

TITLE: 1ST TO 6TH FLOORS
VENTILATION LAYOUT

SCALE @ A1:	CHECKED:	APPROVED:
1:100	SD	DC

PROJECT No:	DESIGNED:	DRAWN:	DATE:
3512445J	SB	JG	29.01.2016

DRAWING No: L(57)-0X-01 REV: T1

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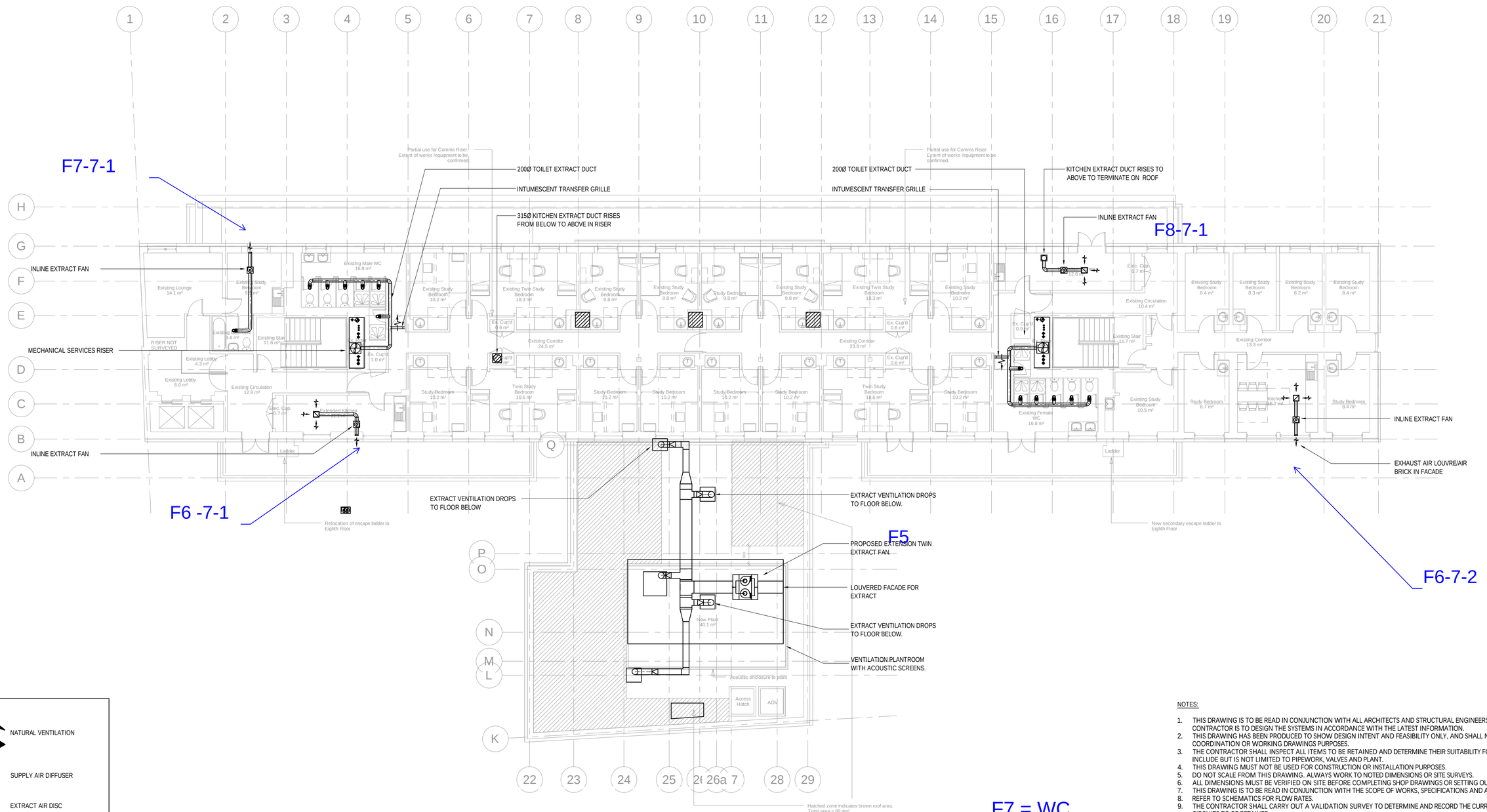

LEGEND

- NATURAL VENTILATION
- SUPPLY AIR DIFFUSER
- EXTRACT AIR DISC
- EXTRACT GRILLE
- EXTRACT BELLMOUTH
- EXISTING VENTILATION RETAINED
- EXTERNAL CONDENSING UNIT

F7 = WC
F6 = Kitchen

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CLIENT: UCL

ARCHITECT: LEVITT BERNSTEIN

PROJECT: ASTOR COLLEGE
CHARLOTTE STREET, W1T 4QB

TITLE: 7TH FLOOR
VENTILATION LAYOUT

SCALE @ A1:	CHECKED:		APPROVED:
1:100	SD		DC
PROJECT No:	DESIGNED:	DRAWN:	DATE:
3512445J	AC	AC	29.01.2016
DRAWING No:			REV:
L(57)-07-01			T1

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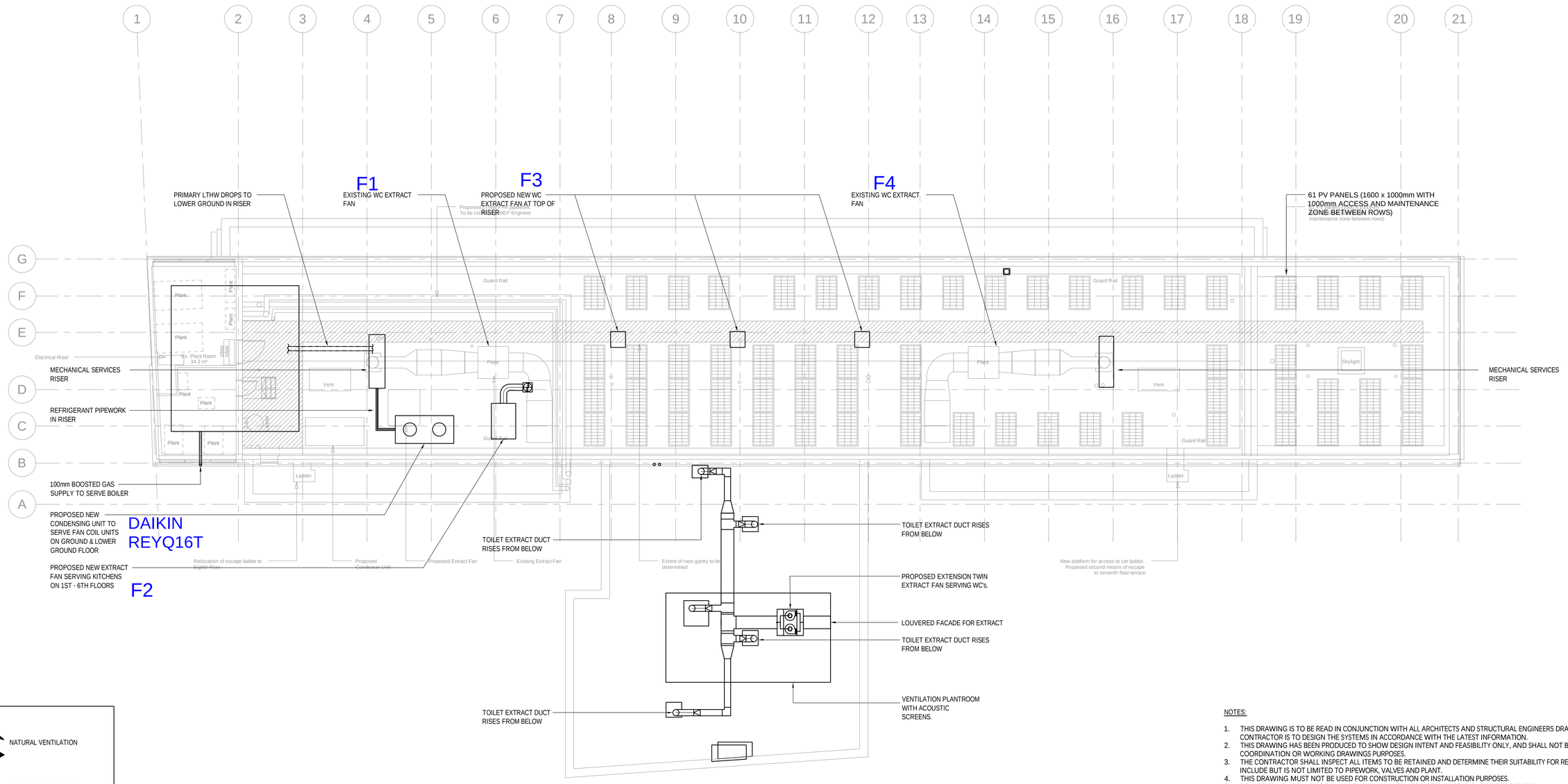

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CLIENT: UCL

ARCHITECT: LEVITT BERNSTEIN

PROJECT: ASTOR COLLEGE
CHARLOTTE STREET, W1T 4QB

TITLE: ROOF LEVEL VENTILATION LAYOUT

SCALE @ A1:	CHECKED:		APPROVED:
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PROJECT No:	DESIGNED:	DRAWN:	DATE:
3512445J	SB	JG	29.01.2016

DRAWING No: L(57)-08-01 REV: T1

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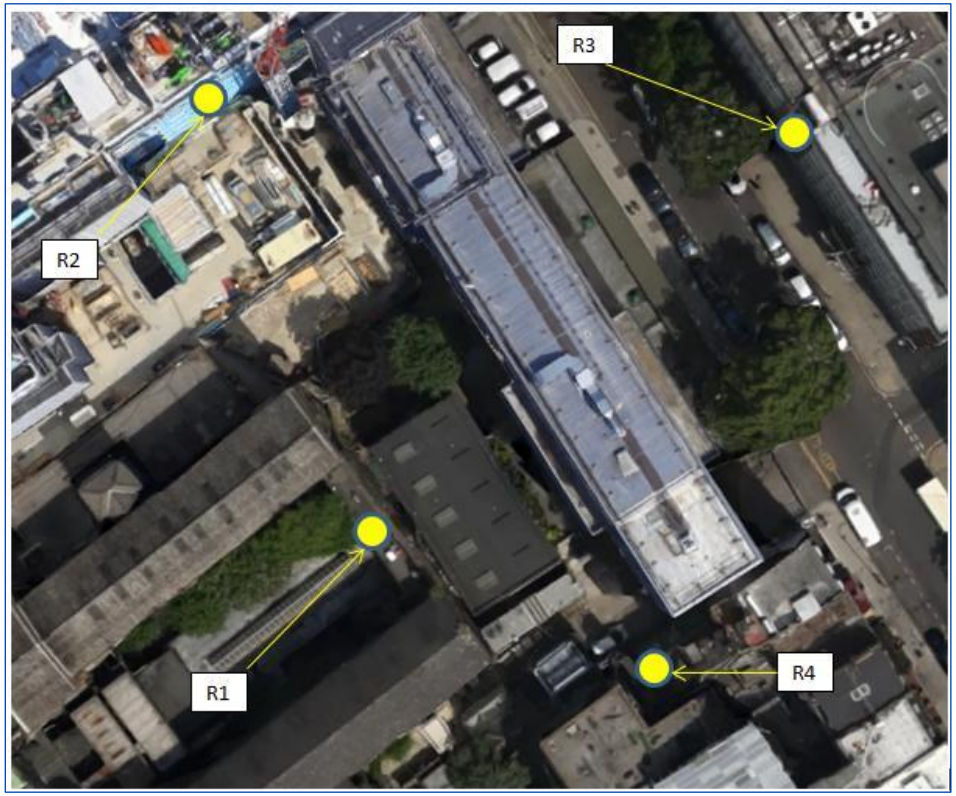
Appendix E

DETAILED EXTERNAL NOISE LEVEL CALCULATIONS

DETAILED EXTERNAL OFF-SITE NOISE LEVEL CALCULATIONS

RECEPTORS



Cumulative building services noise level at Receptor 1

Plant Location	Plant Ref.	Plant Description	Distance to Receptor (m)	Sound Pressure Level at Receptor (dBA)
Ground	F6-00-1	Kitchen Extract (Standalone)	19	**25**
	F6-00-2	Kitchen Extract (Standalone)	17	**30**
	F7-00-1	Ensuite/WC Extract	19	**17**
	F8-00-1	Kitchen Extract (Serving 2 No. Kitchens)	19	**28**
Levels 1 - 6	F6-01-1	Kitchen Extract (Standalone)	18	**26**
	F6-02-1	Kitchen Extract (Standalone)	17	**26**
	F6-03-1	Kitchen Extract (Standalone)	16	**27**
	F6-04-1	Kitchen Extract (Standalone)	17	**26**
	F6-05-1	Kitchen Extract (Standalone)	18	**26**
	F6-06-1	Kitchen Extract (Standalone)	19	**24**
Level 7	F5-07-1	Extension WC Extract	25	**38**
	F6-07-2	Kitchen Extract (Standalone)	20	**25**
Level 8 (Roof)	F1-08-1	NW WC Extract	36	**18**
	F2-08-1	NW Kitchen Extract	36	**22**
	F3-08-1	Extension Bed Extract	26	**23**
	F4-08-1	SE WC Extract	26	**34**
		Total Free-Field Sound Pressure Level at **Receptor 1** (dBA)		**41**

Cumulative building services noise level at Receptor 2

Plant Location	Plant Ref.	Plant Description	Distance to Receptor (m)	Sound Pressure Level at Receptor (dBA)
Lower Ground	F6-LG-1	Kitchen Extract (Standalone)	19	**23**
	F6-LG-2	Kitchen Extract (Standalone)	19	**22**
Ground	F6-00-4	Kitchen Extract (Standalone)	20	**23**
	F6-00-5	Kitchen Extract (Standalone)	20	**23**
	F6-00-6	Kitchen Extract (Standalone)	17	**25**
	F6-00-7	Kitchen Extract (Standalone)	13	**27**
	F7-00-2	Ensuite/WC Extract	20	**15**
	F7-00-3	Ensuite/WC Extract	20	**15**
	F7-00-4	Ensuite/WC Extract	17	**17**
	F7-00-5	Ensuite/WC Extract	13	**20**
Levels 1 - 6	F6-01-3	Kitchen Extract (Standalone)	21	**25**
	F6-02-1	Kitchen Extract (Standalone)	21	**25**
	F6-03-3	Kitchen Extract (Standalone)	20	**26**
	F6-04-3	Kitchen Extract (Standalone)	20	**26**
	F6-05-3	Kitchen Extract (Standalone)	20	**26**
	F6-06-3	Kitchen Extract (Standalone)	21	**25**
Level 7	F5-07-1	Extension WC Extract	30	**28**
	F6-07-1	Kitchen Extract (Standalone)	18	**26**

Plant Location	Plant Ref.	Plant Description	Distance to Receptor (m)	Sound Pressure Level at Receptor (dBA)
Level 8 (Roof)	F1-08-1	NW WC Extract	25	**25**
	F2-08-1	NW Kitchen Extract	25	**27**
	F3-08-1	Extension Bed Extract	35	**20**
	F4-08-1	SE WC Extract	47	**28**
		Total Free-Field Sound Pressure Level at **Receptor 2** (dBA)		**38**

Cumulative building services noise level at Receptor 3

Plant Location	Plant Ref.	Plant Description	Distance to Receptor (m)	Sound Pressure Level at Receptor (dBA)
Lower Ground	HRU Discharge	HRU Serving Ground Floor	25	**37**
	HRU Intake	HRU Serving Ground Floor	25	**40**
Ground	RZQG71	Condenser Serving Ground Floor	25	**31**
Level 7	F7-07-1	Ensuite/WC Extract	30	**15**
	F8-07-1	Kitchen Extract (Serving 2 No. Kitchens)	30	**22**
Level 8 (Roof)	F3-08-1	Extension Bed Extract	30	**27**
		Total Free-Field Sound Pressure Level at Receptor (dBA)		**42**

Cumulative building services noise level at Receptor 4

Plant Location	Plant Ref.	Plant Description	Distance to Receptor (m)	Sound Pressure Level at Receptor (dBA)
Ground	F6-00-1	Kitchen Extract (Standalone)	15	**23**
	F6-00-3	Kitchen Extract (Standalone)	33	**21**
	F7-00-1	Ensuite/WC Extract	7	**25**
	F8-00-1	Kitchen Extract (Serving 2 No. Kitchens)	7	**35**
Levels 1-6	F6-01-1	Kitchen Extract (Standalone)	8	**31**
	F6-02-1	Kitchen Extract (Standalone)	11	**29**
	F6-03-1	Kitchen Extract (Standalone)	13	**26**
	F6-04-1	Kitchen Extract (Standalone)	15	**24**
	F6-05-1	Kitchen Extract (Standalone)	17	**23**
	F6-06-1	Kitchen Extract (Standalone)	19	**22**
Level 7	F6-07-2	Kitchen Extract (Standalone)	20	**23**
	F5-07-1	Extension WC Extract	41	**37**
		Total Free-Field Sound Pressure Level at Receptor (dBA)		**41**

DETAILED EXTERNAL ON-SITE NOISE LEVEL CALCULATIONS

Cumulative building services noise level at the north façade of the proposed extension

Plant Location	Plant Ref.	Plant Description	Distance to Receptor (m)	Sound Pressure Level at Receptor (dBA)
Lower Ground	F6-LG-1	Kitchen Extract (Standalone)	2	**43**
	F6-LG-2	Kitchen Extract (Standalone)	2	**42**
Ground	F6-00-4	Kitchen Extract (Standalone)	4	**38**
	F6-00-5	Kitchen Extract (Standalone)	5.5	**35**
	F6-00-6	Kitchen Extract (Standalone)	8	**32**
	F6-00-7	Kitchen Extract (Standalone)	14.5	**27**
	F7-00-2	Ensuite/WC Extract	3	**33**
	F7-00-3	Ensuite/WC Extract	4.5	**29**
	F7-00-4	Ensuite/WC Extract	9	**23**
	F7-00-5	Ensuite/WC Extract	15	**19**
Levels 1 - 6	F7-01-1	Ensuite/WC Extract	7	**26**
	F7-02-1	Ensuite/WC Extract	4	**30**
	F7-03-1	Ensuite/WC Extract	3	**34**
	F7-04-1	Ensuite/WC Extract	4	**30**
	F7-05-1	Ensuite/WC Extract	7	**26**
	F7-06-1	Ensuite/WC Extract	10	**22**

Plant Location	Plant Ref.	Plant Description	Distance to Receptor (m)	Sound Pressure Level at Receptor (dBA)
Level 7	F6-07-1	Kitchen Extract (Standalone)	14	**28**
Level 8 (Roof)	REYQ16T	Condenser Unit	11.5	**43**
	F1-08-1	NW WC Extract	6.5	**34**
	F2-08-1	NW Kitchen Extract	8.5	**35**
		Total Free-Field Sound Pressure Level at Receptor (dBA)		**49**

Cumulative building services noise level at the south façade of the proposed extension

Plant Location	Plant Ref.	Plant Description	Distance to Receptor (m)	Sound Pressure Level at Receptor (dBA)
Lower Ground	F7-LG-1	Ensuite/WC Extract	7	**26**
	F7-LG-2	Ensuite/WC Extract	4.5	**30**
Ground	F6-00-1	Kitchen Extract (Standalone)	15	**27**
	F6-00-2	Kitchen Extract (Standalone)	2.7	**42**
	F7-00-1	Ensuite/WC Extract	22	**15**
	F8-00-1	Kitchen Extract (Serving 2 No. Kitchens)	21	**26**
Levels 1 - 6	F6-01-2	Kitchen Extract (Standalone)	7	**32**
	F6-02-2	Kitchen Extract (Standalone)	3.7	**38**
	F6-03-2	Kitchen Extract (Standalone)	2.2	**42**
	F6-04-2	Kitchen Extract (Standalone)	3.7	**38**
	F6-05-2	Kitchen Extract (Standalone)	6	**32**
	F6-06-2	Kitchen Extract (Standalone)	9.3	**29**
Level 7	F6-07-2	Kitchen Extract (Standalone)	25	**21**
Level 8 (Roof)	F4-08-1	SE WC Extract	8.5	**43**
		Total Free-Field Sound Pressure Level at Receptor (dBA)		**49**

Cumulative building services noise level at the south-west façade of the existing UCL building

Plant Location	Plant Ref.	Plant Description	Distance to Receptor (m)	Sound Pressure Level at Receptor (dBA)
Ground	F6-00-3	Kitchen Extract (Standalone)	9	**30**
Level 7	F5-07-1	Extension WC Extract (Breakout)	10	**21**
	F5-07-1	Extension WC Extract	9	**52**
		Total Free-Field Sound Pressure Level at Receptor (dBA)		**52**

Cumulative building services noise level at the north-west façade of the existing UCL building

Plant Location	Plant Ref.	Plant Description	Distance to Receptor (m)	Sound Pressure Level at Receptor (dBA)
Level 7	F6-01-3	Kitchen Extract (Standalone)	8	**33**
	F6-02-3	Kitchen Extract (Standalone)	5	**36**
	F6-03-3	Kitchen Extract (Standalone)	4	**38**
	F6-04-3	Kitchen Extract (Standalone)	5	**36**
	F6-05-3	Kitchen Extract (Standalone)	7	**33**
	F6-06-3	Kitchen Extract (Standalone)	10	**30**
		Total Free-Field Sound Pressure Level at Receptor (dBA)		**43**