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Project:

UCL Queen Square House

Title:

Plant Noise Impact Assessment

quietly moving forward

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0			

CONTENTS:

1 INTRODUCTION

1.01 Environmental Equipment Corporation Limited has been commissioned by Fowler Martin to undertake a noise assessment of a proposed new Air Handling Unit (AHU) to serve the University College London (UCL) premises at Queen Square House, Camden, London.

1.02 This noise assessment has been conducted in accordance with the policies and requirements of London Borough of Camden (LBC) and is based on a noise survey carried out at the site over a typical weekday period.

1.03 This assessment includes:

- the setting of plant noise limits in accordance with the requirements of LBC and national planning policy, standards and guidance; and
- the prediction of noise impacts at the worst affected noise sensitive receptors based on the proposed items of plant and their location.

1.04 This report is prepared solely for Fowler Martin. Environmental Equipment Corporation Limited accepts no responsibility for its use by any third party.

1.05 Whilst every effort has been made to ensure that this report is easy to understand, it is necessarily technical in nature. To assist the reader, an explanation of the terminology used in this report is contained in Appendix A.

2 SITE

2.01 UCL Queen Square House is a mixed use educational and research building located in a mixed commercial and residential area of Camden, adjacent to several Hospital sites.

2.02 The property is bound by the following:

- North – Guildford Street and residential premises;
- East – Great Ormond Street Hospital;
- South – National Hospital for Neurology and Neurosurgery; and
- West – Residential apartments and additional UCL premises.

2.03 This application is for the installation of a new AHU, model Nuaire B812T.LC/CO-L, which is to be located in an existing plant area/lightwell at the rear (South) of the site at first-floor level, as presented in Appendix B.

2.04 The proposed area for installation is an existing plant space, containing a significant quantity of existing plant, including several large AHUs and multiple condenser units.

2.05 The closest noise sensitive receptors to the proposed plant items are the following;

- The southern windows of the UCL property overlooking the plant area; and
- The front windows of 83 Guildford Street.

2.06 All other noise sensitive receptors are at a greater distance from the proposed location of the units, or are protected by more screening by the intervening structures, and as such will be subject to lower levels of noise.

3 GUIDANCE

3.01 London Borough of Camden's planning policy is set out in a range of documents that constitute its 'development plan'. This includes its Local Plan and proposed supplementary planning guidance (SPG's) documents. The Local Plan was adopted on 3 July 2017 and has replaced the 'Core Strategy' and 'Camden Development Policy' documents; as the basis for planning decisions and future development in the borough. The SPG's are in the process of being updated at time of writing (Sept 2017).

Policy A4 – Noise and Vibration outlines the following aims:

The Council will seek to ensure that noise and vibration is controlled and managed.

Development should have regard to Camden's Noise and Vibration Thresholds (Appendix 3). We will not grant planning permission for:

development likely to generate unacceptable noise and vibration impacts; or

development sensitive to noise in locations which experience high levels of noise, unless appropriate attenuation measures can be provided and will not harm the continued operation of existing uses.

We will only grant permission for noise generating development, including any plant and machinery, if it can be operated without causing harm to amenity. We will also seek to minimise the impact on local amenity from deliveries and from the demolition and construction phases of development.

3.02 Appendix 3 of the Local Plan outlines noise thresholds for both noise generating and noise sensitive developments and identifies three basic design criteria upon which the acceptability of any proposal is likely to be assessed:

- Green – where noise is considered to be at an acceptable level.
- Amber – where noise is observed to have an adverse effect level, but which may be considered acceptable when assessed in the context of other merits of the development.
- Red – where noise is observed to have a significant adverse effect.

3.03 In the context of National Planning Policy Framework and Noise Policy Statement for England, Camden Council consider the above criteria to fall into three associated categories in terms of their noise 'effects':

- LOAEL Green
- LOAEL to SOAEL Amber
- SOAEL Red

3.04 Table C of Appendix 3 defines the target noise levels for mechanical services plant and machinery:

Table C: Noise levels applicable to proposed industrial and commercial developments (including plant and machinery)

Existing Noise sensitive receptor	Assessment Location	Design Period	LOAEL (Green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dB L_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

*10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.

**levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.

The periods in Table C correspond to 0700 hours to 2300 hours for the day and 2300 hours to 0700 hours for the night. The Council will take into account the likely times of occupation for types of development and will be amended according to the times of operation of the establishment under consideration.

There are certain smaller pieces of equipment on commercial premises, such as extract ventilation, air conditioning units and condensers, where achievement of the rating levels (ordinarily determined by a BS:4142 assessment) may not afford the necessary protection. In these cases, the Council will generally also require a NR curve specification of NR35 or below, dependant on the room (based upon measured or predicted Leq,5mins noise levels in octave bands) 1 metre from the façade of affected premises, where the noise sensitive premise is located in a quiet background area.

4 MEASUREMENTS

4.01 Environmental noise measurements were carried out over a weekday period, between 14:00 hours on Tuesday 10th March 2020 and concluded 10:30 hours the following day, to establish the existing noise levels at the site. The survey methodology and results are set out below.

4.02 Noise measurements have been carried out at the following position, as shown in Appendix B and described as:

- Position 1: located at a height of approximately 1.5m above the first-floor flat roof of the existing plant area. The measurement was not located within 3.5 metres of any reflecting surfaces, other than the mounting surface.

4.03 This position was considered to be representative of the existing noise climate at the plant's proposed installation location.

5 EQUIPMENT

5.01 The equipment used for the survey was as follows:-

- 01dB Metravib Black Solo Integrating Sound Level Meter conforming to Class 1 BS EN 61672, Type 1 BS EN 60804 & BS EN 60651: 1994;
- 01dB Metravib MCE 212 Condenser Microphone, PRE 21 S Pre-amp and Connecting Leads;
- 01dB Outdoor Microphone Kit and a
- Tripod.

5.02 The equipment holds current UKAS or equivalent accreditation and serial numbers as follows:

Sound Level Meter 01dB Black Solo	Serial No.	61719
	Calibration Date	27th June 2018
	Cal Certificate No.	U28879
½" MCE 212 Condenser Mic.	Serial No.	166397
	Calibration Date	27th June 2018
	Cal Certificate No.	28878
Calibrator CAL 21	Serial No.	34634297
	Calibration Date	6th February, 2020
	Cal. Certificate No.	U33985

N.B. Copies of calibration certificates are available upon request.

5.03 The equipment was calibrated both before and after the survey with no difference noted in the levels.

6 RESULTS

6.01 The weather during the survey was suitable for noise measurement, it being dry with little wind for the duration of the survey.

6.02 The noise climate at the proposed installation location is controlled heavily by the operation of existing plant serving Queen Square House and the neighbouring properties. Due to the semi-reverberant nature of the plant well and equal distribution of existing plant, the existing noise

level was observed to be consistent across the plant area. Other noise sources included local and distant road traffic and the operation of a nearby refuse yard for the neighbouring Hospital.

6.03 A list of the levels measured is included in Appendix D and represented graphically in Appendix E.

6.04 A summary of the time averaged ambient levels and lowest measured background levels over the measurement periods are shown in Table 6.1. The minimum L_{A90} is the lowest fifteen-minute measurement in the specified period.

Position	Period	Average $L_{Aeq,T}$ – dB	Minimum L_{A90} – dB
1	Day time (0700-1900 hrs)	63	62
	Evening (1900-2300 hrs)	63	62
	Night-time (2300-0700 hrs)	63	62

Table 6.1: Free-Field Measured Ambient and Lowest Background Noise Levels

7 PLANT ASSESSMENT

7.01 This application is for the installation of a new AHU, model Nuaire B812T.LC/CO-L, which is to be located in an existing plant area/lightwell at the rear (South) of the site at first-floor level, as presented in Appendix B.

7.02 Based on the standard requirements of LBC and the lowest measured background noise level in each time period, Table 7.1 sets out the recommended noise limits that the proposed items of plant should meet.

7.03 Due to the heavily plant-controlled noise climate, the below noise limits have been specified so that the cumulative operation of the new plant does not increase the Specific Sound Level (L_{Aeq}) emitted from the plant area when assessed according to the principles of BS4142. These noise limits have therefore been set at 10dB below the measured L_{Aeq}.

Location	Period	Measured Existing Specific Sound Level L_{Aeq}	Proposed Noise Limit L_{Ar}
Queen Square House	Day	63 dB	53 dB
	Evening	63 dB	53 dB
	Night	63 dB	53 dB

Table 7.1: Suggested Plant Noise Emission Limits Based on Lowest Measured L_{A90}, Free-field dB

7.04 Note that the limits suggested above are rating levels and as such any design should take into account the acoustic characteristics of the plant. In this instance the proposed units display none of the characteristics whereby the acoustic correction should be applied.

7.05 Assuming the proposed items meet the noise limits set out in Table 7.1 noise will be below the NOEL with respect to the NPPF.

7.06 The proposed unit has the following published Sound Power Levels - copies of the manufacturer's plant data sheets are also included in Appendix F.

Unit	63	125	250	500	1k	2k	4k	8k	SWL dBA
AHU Casing Radiated	69	56	65	53	42	34	24	16	57
AHU Intake	65	64	75	68	61	62	57	54	71
AHU Discharge	69	66	74	72	70	68	62	58	75

Table 7.2: Published Sound Power Levels for the Nuaire AHU.

7.07 The atmospheric duct terminations for this unit will incorporate EEC high-performance in-line attenuation offering no less than 14 dB attenuation of the AHU Intake and 21 dB attenuation of the AHU Discharge noise emissions. These attenuators will be designed to ensure suitably low externals static resistances to minimise the risk of audible regenerated noise.

7.08 Furthermore, this installation of this plant will incorporate effective vibration isolation mounts to reduce the level of acoustic energy transmitted into the building fabric and adjoining areas to ensure that the noise control solution is not compromised.

7.09 Predicted noise levels have been calculated at the boundary of the existing plant space so as to establish the noise contribution from this unit to the existing Specific Sound Level. Additionally, the noise emissions from this unit have been propagated to the nearest identified residential receiver in order to show that the plant will achieve a sufficiently low level so as to avoid any disturbance or impact.

7.10 Other residential receptors located further from the site will be subject to lower noise levels than those predicted at the above locations.

7.11 Tables 7.3-7.6 present the results of worst-case plant noise predictions at the boundary of the plant space.

Item	Noise Level	Notes
AHU Casing Radiated Noise	57 dBA	Published Sound Power Level
Parallelepiped Area Losses over 5m	-30 dB	Distance to boundary of plant area.
Local Reflections	+9 dB	Semi-reverberant nature of lightwell.
Total Noise Level	**40 dBA**	Boundary of plant area.

Table 7.3: AHU Casing Radiated Noise – Plant Space Boundary Calculation.

Item	Noise Level		Notes
	AHU Intake	AHU Discharge	
AHU Casing Radiated Noise	71 dBA	75 dBA	Published Sound Power Level
In-line Attenuation	-14 dB	-21 dB	Minimum attenuation performance
Duct Directivity	+8 dB	+8 dB	On-axis termination correction for laminar flow ductwork.
Spherical Area Losses over 5m	-25 dB		Distance to boundary of plant area.
Local Reflections	+9 dB		Semi-reverberant nature of lightwell.
Total Noise Level	**49 dBA**	**46 dBA**	Boundary of plant area.

Table 7.4: AHU Duct Termination Noise – Plant Space Boundary Calculation.

Item	Noise Emission Level, dBA	Cumulative Noise Emissions, dBA
AHU Casing Radiated	40	**52 dBA**
AHU Intake	49	
AHU Discharge	46	

Table 7.5: Cumulative Noise Emissions Summary for the Nuaire AHU – Plant Space Boundary Calculation.

Property	Period	Proposed Noise Limit L_{Ar}	Predicted $L_{Aeq,T}$	Exceedance of noise limit
Boundary of Plant Area	Daytime	53 dB	52 dB	-1 dB
	Evening	53 dB	52 dB	-1 dB
	Night-time	53 dB	52 dB	-1 dB

Table 7.6: Assessment of Predicted Noise Levels Based on Proposed Noise Limit, Free-field dB(A)

7.12 It can be seen from the above tables that the noise limits are not exceeded during any period of the plant's proposed operation. The introduction of the new plant noise will have no measurable effect on the noise emissions from the plant space.

7.13 Assuming that the proposed plant and in-line duct attenuation is included in the installation, predicted noise levels will meet the requirements of the Local Authority during all periods of operation and at the closest noise sensitive receptors.

7.14 The proposed scheme of vibration isolation will also mitigate the transfer of vibration to the supporting and connecting structures and ensure that the airborne sound mitigation design is not compromised.

7.15 With respect to the NPPF, achieving the noise limits would be classified as being below the NOEL.

7.16 In order to produce a robust assessment, the noise emissions from this plant have additionally been calculated at the windows of the nearest identified noise sensitive receptor, 83 Guildford Street, at approximately 50m from the boundary of the plant area. Due to the layout of the

plant area, noise will be radiated towards the identified receiver through a narrow 'slot' between two adjacent buildings, and will therefore will follow spherical propagation characteristics from the plant area boundary.

Item	Noise Level	Notes
AHU Noise Emissions	52 dBA	Specific Sound Pressure Level at boundary of plant area.
Spherical Area Losses over 50m	-34 dB	Distance to boundary of plant area.
Total Noise Level	**18 dBA**	Front windows of 83 Guildford Street

Table 7.7: Cumulative AHU Specific Sound Level at the nearest identified residential receiver.

7.17 A Specific Sound Level of 18dBA is expected outside the windows of 83 Guildford Street. World Health Organisation guidance suggests that an external noise level below 30dBA is representative of the "No Observable Effect Level". The operation of this plant will therefore achieve the NOEL when assessed according to the NPPF outside the nearest identified residence.

8 CONCLUSIONS

8.01 Fowler Martin has appointed Environmental Equipment Corporation Limited to undertake a noise assessment for a proposed new AHU to serve the UCL premise of Queen Square House.

8.02 The assessment has been carried out in accordance with national planning guidance and the requirements of LBC, and is based on an environmental noise survey conducted at the site over a mid-week period.

8.03 A noise assessment has been undertaken to evaluate the potential noise impact of the proposed plant on the existing Specific Sound Level of the plant area.

8.04 Plant noise limits have been set based on the methodology contained in BS4142, the results of a background noise survey and the requirements of LBC, to control the noise from the proposed AHU. In order to ensure that the plant will have no observable impact, the noise limit has been set 10dB below the existing noise emissions from the plant area.

8.05 Predictions have shown that the noise criterion is met at all assessment locations during all periods of the plant's proposed operation, assuming that the above outlined in-line duct attenuation is included in the installation.

8.06 Assessing the site in accordance with the principles of the National Planning Policy Framework has shown that predicted noise levels would be below the level at which no effects are observed to occur, the NOEL.

8.07 On the basis of this assessment it is considered that noise does not pose a material constraint to the operation of the condenser units.

APPENDIX A

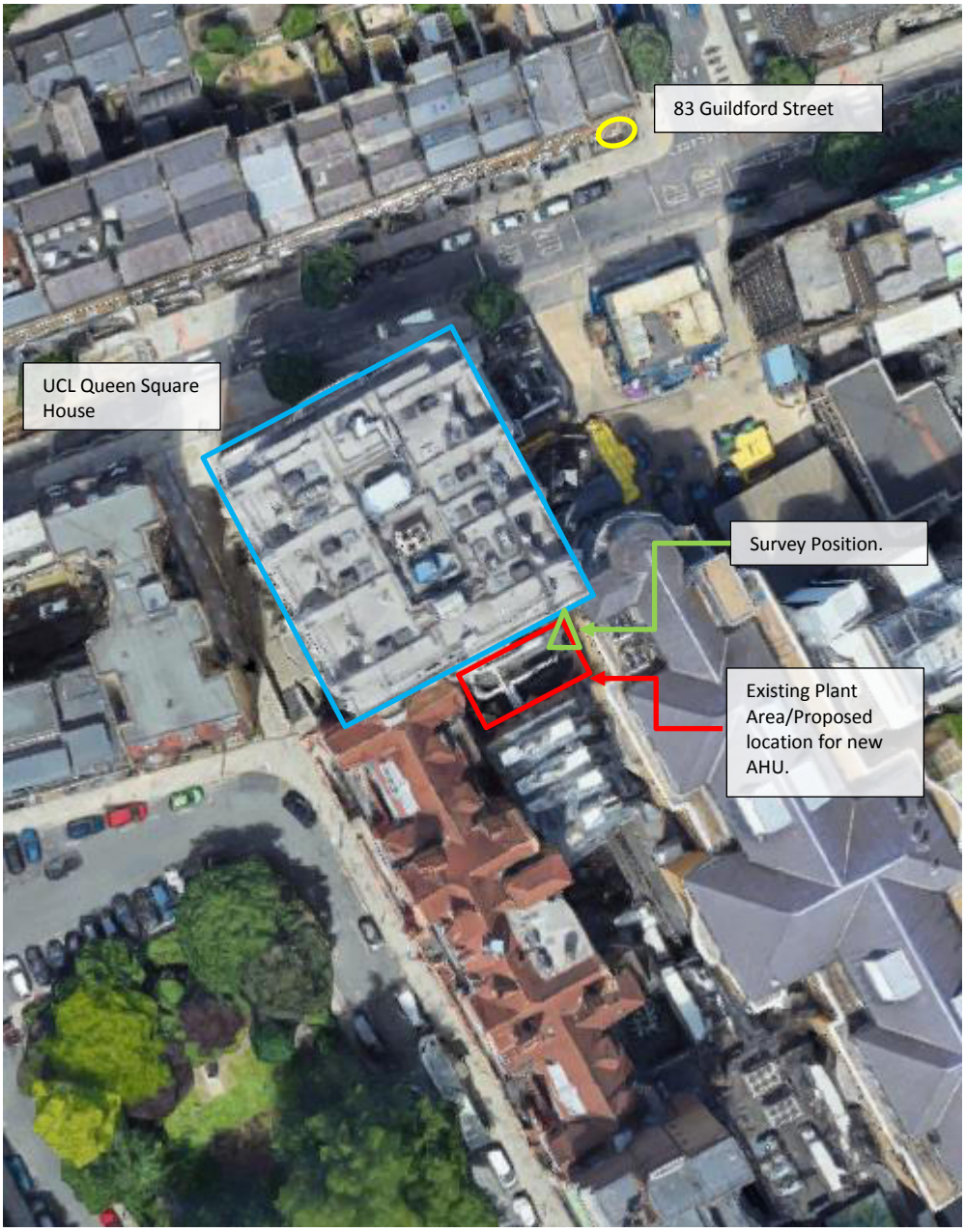
GLOSSARY OF TECHNICAL TERMS

ACOUSTIC TERMINOLOGY

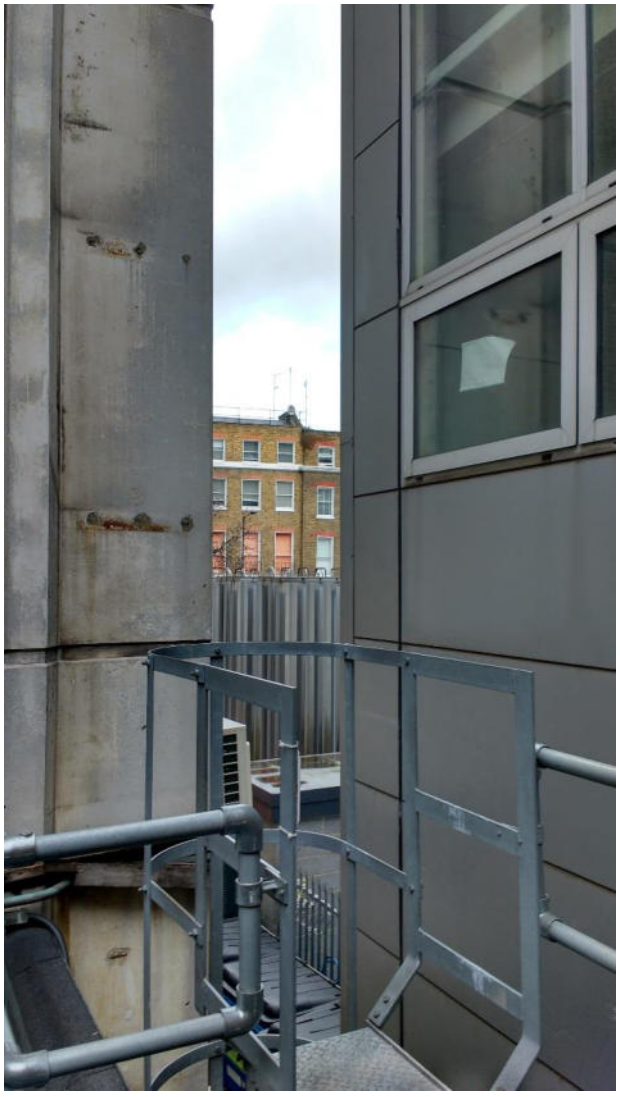
Absorption Classes	The sound absorption of a material is rated from Class A to Class E, where Class A materials provide the highest level of sound absorption.
Ambient Noise Levels	Noise levels measured in the absence of noise requiring control, frequently measured to determine the situation prior to the additional of a new noise source.
dB	Decibel. The logarithmic unit of sound level.
dBA	A-weighted decibel. The A-weighting approximates the response of the human ear.
$D_{nT,w}$	Weighted standardized level difference. A single number quantity of the sound level difference between two rooms. $D_{nT,w}$ is typically used to measure the on-site sound insulation performance of a building element such as a wall, floor or ceiling. Measured in accordance with BS EN ISO 16283-1 and weighted in accordance with BS EN ISO 717-1.
$D_{n,e,w}$	The weighted element-normalized level difference. A single number rating of the sound reduction provided by a sound passing through an individual element. $D_{n,e,w}$ is typically used to define the sound insulation provided by ventilators. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Flanking	Transmission of sound energy through paths adjacent to the building element being considered. For example, sound may be transmitted around a wall by travelling up into the ceiling space and then down into the adjacent room.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4kHz, roughly equal to the range of frequencies on a piano.
Impact Sound	Sound produced by an object impacting directly on a building structure, such as footfall noise or chairs scrapping on a floor.
$L_{Aeq,t}$	The equivalent continuous sound level measured in dBA. This is commonly referred to as the average noise level. "t" is the interval time for the measurement which is most often 30 minutes when demonstrating compliance with BB93.
$L_{A90,t}$	The noise level exceeded for 90% of the measurement period, measured in dBA. This is commonly referred to as the background noise level.
$L'_{nT,w}$	Weighted, standardized impact sound pressure level. A single number rating of the impact sound insulation of a floor/ceiling when impacted on by a standard "tapper" machine. The lower the $L'_{nT,w}$, the better the acoustic performance. Measured in accordance with BBS EN ISO 140-7 and rated in accordance with BS EN ISO 717-2.
NR	Noise Rating. A single number rating which is based on the sound level in the octave bands 31.5Hz – 8kHz inclusive, generally used to assess noise from mechanical services in buildings.
Octave Band	Frequencies are often grouped together into octaves for analysis. Octave bands are labelled by their centre frequency which are: 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz and 4kHz.
Reverberation Time (T_{mf})	Reverberation time is used for assessing the acoustic qualities of a space. It is defined as the time it takes for an impulse to decay by 60dB. T_{mf} is the arithmetic average of the reverberation time in the mid frequency bands (500Hz, 1kHz and 2kHz).
R_w	Weighted sound reduction index. A single number rating of the sound insulation performance of a specific building element. R_w is measured in a laboratory. R_w is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Sound Absorption	When sound hits a surface, some of the sound energy is absorbed by the surface material. Sound absorption refers to the ability of a material to absorb sound, rated from 0, complete reflection, to 1, complete absorption.
Sound Insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to the ability of a material to prevent the travel of sound.
Structure-borne transmission	Transmission of sound energy as vibrations via the structure of a building.

APPENDIX B

SITE PLAN
&
MEASUREMENT LOCATION



View from the plant area to 83 Guildford Street



APPENDIX C

PLANNING POLICY AND GUIDANCE

PLANNING POLICY AND GUIDANCE

National Planning Policy Framework and the Noise Policy Statement for England

The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) on 27th March 2012 (as amended on 19th June 2019) and upon its publication, the majority of planning policy statements and guidance notes were withdrawn, including Planning Policy Guidance 24 Planning and Noise, which previously presented the government's overarching planning policy on noise.

Paragraph 170 in Section 15 of the NPPF (2019), entitled Conserving and enhancing the natural environment, states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability…"*

Paragraph 180 in Section 15 also states that:

> "*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
>
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason…"*

The Department for Environment Food and Rural Affairs published the Noise Policy Statement for England (NPSE) in March 2010. The explanatory note of NPSE defines the following terms used in the NPPF:

> *"NOEL – No Observed Effect Level*
>
> *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*
>
> *LOAEL – Lowest Observed Adverse Effect Level*
>
> *This is the level above which adverse effects on health and quality of life can be detected.*
>
> *2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.*
>
> *SOAEL – Significant Observed Adverse Effect Level*
>
> *This is the level above which significant adverse effects on health and quality of life occur."*

The NPSE does not define any of the above effect levels numerically.

The NPSE presents the Noise Policy Aims as:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy and sustainable development:

avoid significant adverse impacts on health and quality of life;

mitigate and minimise adverse impacts on health and quality of life; and

where possible, contribute to the improvement of health and quality of life."

It can be seen that the first two bullet points are similar to Section 11 of the NPPF, with a third aim that seeks to improve health and quality of life. The NPSE later expands on the Noise Policy Aims, stating:

2.23 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).

2.24 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

2.25 This aim (the third aim)*, seeks where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."*

It is clear that noise described in the NPSE as SOAEL that would lead to significant adverse effects should be avoided, although there is no definition as to what constitutes a significant adverse effect. Similarly, noise should be mitigated where it is high enough to lead to adverse effects, termed the LOAEL, but not so high that it leads to significant adverse effects.

British Standard 4142

To assess the acceptability of the resultant noise levels we have consulted the relevant standards. BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' has been used to assess the likelihood any adverse impacts based on the resultant noise level from the new plant item, including any corrections for the character of the noise against the existing background noise level.

BS4142 gives guidance on assessing the likelihood of adverse impacts by calculating a 'rating level' of the new noise source and comparing its magnitude at noise sensitive locations to the existing or underlying background noise level. The background noise level is subtracted from the 'rating level' to assess the likelihood of complaints:

- The greater the difference the greater the likelihood of complaints.
- A difference of around +10dB or more is an indication of a significant adverse impact, depending on the context.
- A difference of +5dB is likely to be an indication of an adverse impact, depending on the context.

- The lower the rating level is relative to the measured background noise level, the less likely it is that the specific sound source will have an adverse impact or significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low sound impact, depending on the context.

This assessment is carried out over a one hour period for the daytime and a fifteen minute period for the night-time. For the purposes of the standard it states that daytime and night-time are typically 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

The 'rating level' of the noise source is obtained taking the following factors into consideration:

- The new plant noise (the specific noise) is measured or predicted in terms of L_{Aeq}.
- An additional correction shall be included if the noise contains a distinguishable, discrete continuous note, if the noise contains distinct impulses or if the noise is irregular enough to attract attention. The value for any tonal noise can be an addition of up to 6dB and for impulsive noise of up to 9dB.

BS 4142 goes onto state 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 source exceeds the background sound level and the context in which the sound occurs. An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.'

BS4142 has been referenced in setting noise limits for any fixed plant proposed as part of the proposed development.

APPENDIX D

SURVEY RESULTS
(TABULAR)

EC 17480 - UCL QSH

Fowler Martin

Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
14:00	*63*	*69*	*62*
14:15	*63*	*71*	*62*
14:30	*63*	*76*	*62*
14:45	*63*	*65*	*62*
15:00	*63*	*76*	*62*
15:15	*63*	*68*	*62*
15:30	*63*	*65*	*62*
15:45	*63*	*67*	*62*
16:00	*63*	*66*	*62*
16:15	*63*	*68*	*62*
16:30	*63*	*66*	*62*
16:45	*63*	*67*	*62*
17:00	*63*	*66*	*62*
17:15	*63*	*69*	*62*
17:30	*63*	*68*	*62*
17:45	*63*	*80*	*62*
18:00	*63*	*68*	*62*
18:15	*63*	*79*	*62*
18:30	*63*	*67*	*62*
18:45	*63*	*71*	*62*
19:00	*63*	*66*	*62*
19:15	*63*	*65*	*62*
19:30	*63*	*66*	*62*
19:45	*63*	*66*	*62*
20:00	*63*	*68*	*62*
20:15	*63*	*64*	*62*
20:30	*63*	*64*	*62*
20:45	*63*	*64*	*62*
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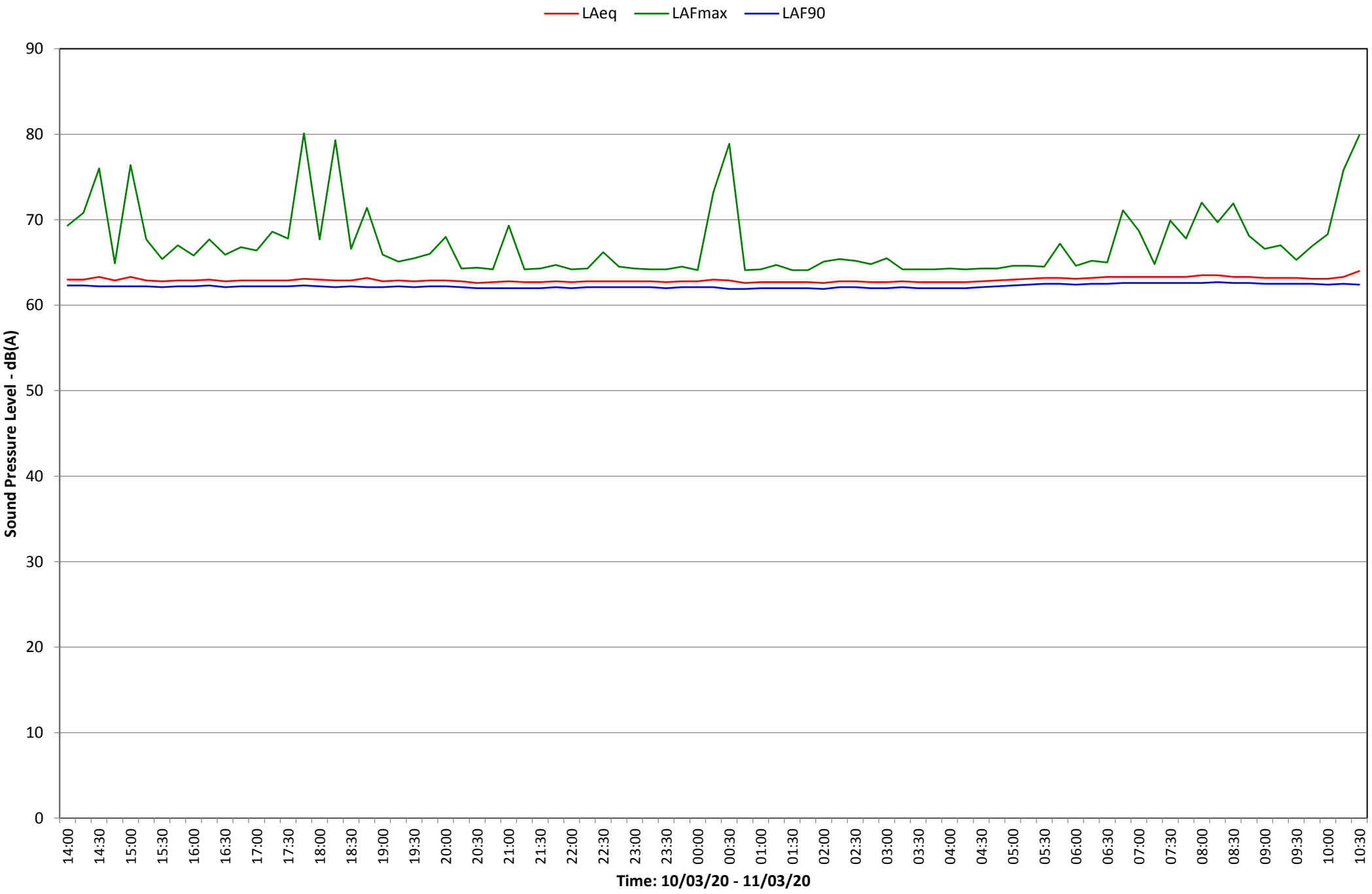
22:30	*63*	*66*	*62*
22:45	*63*	*65*	*62*
23:00	*63*	*64*	*62*
23:15	*63*	*64*	*62*
23:30	*63*	*64*	*62*
23:45	*63*	*65*	*62*
00:00	*63*	*64*	*62*
00:15	*63*	*73*	*62*
00:30	*63*	*79*	*62*
00:45	*63*	*64*	*62*
01:00	*63*	*64*	*62*
01:15	*63*	*65*	*62*
01:30	*63*	*64*	*62*
01:45	*63*	*64*	*62*

Time	L_{Aeq}	L_{AMax}	L_{A90}
02:00	*63*	*65*	*62*
02:15	*63*	*65*	*62*
02:30	*63*	*65*	*62*
02:45	*63*	*65*	*62*
03:00	*63*	*66*	*62*
03:15	*63*	*64*	*62*
03:30	*63*	*64*	*62*
03:45	*63*	*64*	*62*
04:00	*63*	*64*	*62*
04:15	*63*	*64*	*62*
04:30	*63*	*64*	*62*
04:45	*63*	*64*	*62*
05:00	*63*	*65*	*62*
05:15	*63*	*65*	*62*
05:30	*63*	*65*	*63*
05:45	*63*	*67*	*63*
06:00	*63*	*65*	*62*
06:15	*63*	*65*	*63*
06:30	*63*	*65*	*63*
06:45	*63*	*71*	*63*
07:00	*63*	*69*	*63*
07:15	*63*	*65*	*63*
07:30	*63*	*70*	*63*
07:45	*63*	*68*	*63*
08:00	*64*	*72*	*63*
08:15	*64*	*70*	*63*
08:30	*63*	*72*	*63*
08:45	*63*	*68*	*63*
09:00	*63*	*67*	*63*
09:15	*63*	*67*	*63*
09:30	*63*	*65*	*63*
09:45	*63*	*67*	*63*
10:00	*63*	*68*	*62*
10:15	*63*	*76*	*63*
10:30	*64*	*80*	*62*

APPENDIX E

SURVEY RESULTS
(GRAPHICAL)

Noise Level Time History at UCL QSH



APPENDIX F

PUBLISHED PLANT NOISE DATA

Sound Data

Noise calculated speed controlled to required duty (56.94%)

Sound Power Levels re 1 pWatts (Hz):

Hz	63	125	250	500	1k	2k	4k	8k	dBA
Breakout	69	56	65	53	42	34	24	<16	36
Open Intake	65	64	75	68	61	62	57	54	50
Open Supply	69	66	74	72	70	68	62	58	54
Open Extract	65	64	75	68	61	62	57	54	50
Open Discharge	69	66	74	72	70	68	62	58	54
For 100% speed:	+4	+5	+7	+9	+13	+13	+13	+13	

dBA is spherical at 3 metres. For hemi-spherical add 3 dBA.

Please note that the noise data stated on this data sheet for the unit and/or silencer is tested in accordance with UK, European and International industry laboratory standards. However onsite conditions may vary and we would recommend that this information is verified by an acoustic specialist in order to ensure its suitability for the intended application.