Cole Jarman

18-22 Haverstock Hill, Chalk Farm

Plant Noise Assessment

Report 19/0013/R3

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Report 19/0013/R3

Vabel

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Revision	Description	Date	Prepared	Approved
0	1st Issue	9 September 2020	Tim Fox	Ben Holcombe
1	2nd Issue	15 March 2021	Tim Fox	Ben Holcombe

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Plant Noise Assessment

1 Introduction

1.1 Planning consent has been granted for redevelopment at 18-22 Haverstock Hill, Chalk Farm, to provide residential dwellings with commercial units at ground floor level.

1.2 Cole Jarman have been instructed to undertake a plant noise assessment for the scheme so to discharge a planning condition relating to noise emissions from mechanical services plant.

1.3 This report details the methodology and results of the plant noise assessment along with any mitigation measures that may be required in order to achieve the noise limits.

2 Site Description

2.1 The site is located at 18-22 Haverstock Hill, London and falls within The London Borough of Camden.

2.2 Opposite the site and across Haverstock Hill to the south west lies Chalk Farm underground station. Haverstock Hill itself is a busy main road frequented by buses which stop outside Haverstock School, located adjacent to the west of the site.

2.3 The school grounds extend along the western and northern boundaries of the site. Adjacent to the east lies a Salvation Army building.

3 Planning Condition

3.1 As part of the planning consent, the following condition was set with regards to noise from plant:

14) Prior to first use of the relevant part of the development, details of plant machinery shall be submitted to and approved in writing by the Local Planning Authority. The measures shall ensure that the external noise level emitted from plant/machinery/equipment will be lower than the lowest existing background noise level by at least 5dBA, by 10dBA where the source is tonal, as assessed according to BS4142:2014 at the nearest and/or most affected noise sensitive premises, with all machinery operating together at maximum capacity. A post installation noise assessment shall be carried out where required to confirm compliance with the noise criteria and additional steps to mitigate noise shall be taken, as necessary. Approved details shall be implemented prior to occupation of the development and thereafter be permanently retained.

Reason: To ensure that the amenity of occupiers of the development site/surrounding premises is not adversely affected by noise from plant/mechanical installations/equipment in accordance with Camden Local Plan policy A1.

3.2 It is important to note that the condition wording requires noise to be controlled to the proposed apartments as part of the development as well as any nearby existing dwellings.

4 Plant Noise Limits

4.1 A noise survey was undertaken previously by Cole Jarman in July 2019, as detailed in Appendix A.

4.2 The lowest background level measured during proposed commercial operating, daytime and night time hours are presented in the table below.

Location	Lowest Background Level Measured, $L_{A90,15min}$ (dB)		
	Commercial (0800-2200)	**Daytime (0700-2300)**	**Night time (2300-0700)**
MP1	52	52	47
MP2	42	41	38

T1 Lowest background levels measured at measurement positions

4.3 In accordance with the planning condition, the plant noise limits associated with the measurements at the two positions are as follows.

Location	Plant Noise Limit, $L_{Ar,Tr}$ (dB)		
	Commercial (0800-2200)	**Daytime (0700-2300)**	**Night time (2300-0700)**
MP1	47	47	42
MP2	37	36	33

T2 Plant noise limits associated with measurement positions

4.4 Any receptors with a view of Haverstock Hill should be assigned the noise limits associated with MP1 and any receptors that are fully screened from Haverstock Hill should be assigned the noise limits associated with MP2.

5 Plant Noise Assessment

5.1 Overview

5.1.1 The site is located such that the nearest sensitivities to each of the plant areas are the proposed apartments. The nearest noise sensitivities not belonging to the site are well screened from the development, such that by controlling noise to the proposed apartments, noise levels will also be controlled to the nearest non-site sensitivities.

5.1.2 Multiple plant spaces are proposed on different levels of the site and are located such that any apartment affected by noise from one plant space is screened from the other plant spaces, therefore, each plant space has been reviewed in isolation.

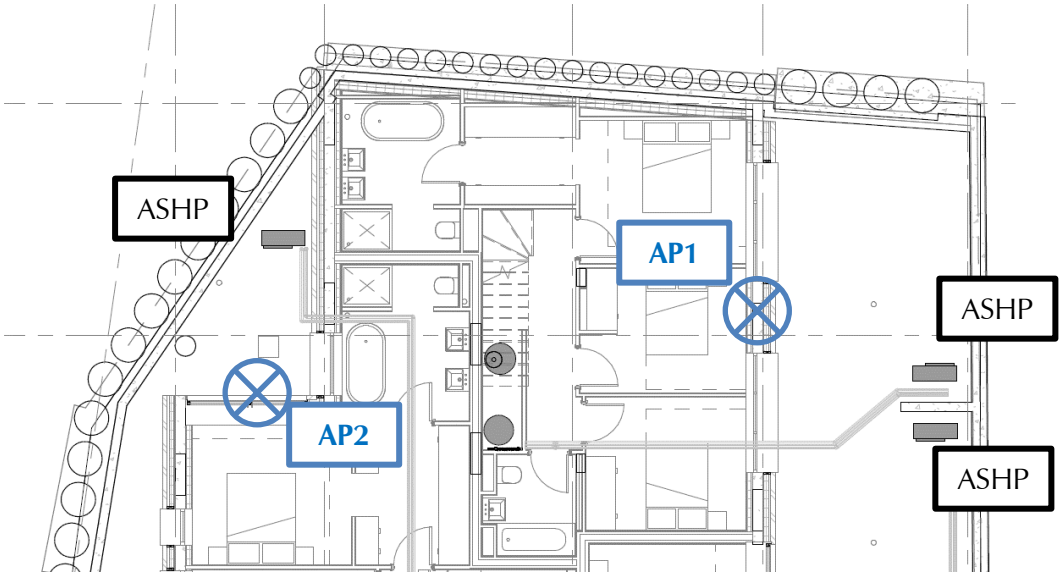
5.1.3 A list of the proposed plant and associated noise levels used in the assessment can be found in the attached schedule 19/0013/SCH1.

5.1.4 Third-octave band data is not available for the proposed units. However, available octave band noise data suggests the associated units do not have a notable tonal character.

5.1.5 Our calculations have taken into account radiation and distance losses along with room corrections depending on where the units are proposed to be located. Plant associated with the commercial spaces are expected to only operate during commercial hours (0800 – 2200) whilst plant associated with the residential spaces could operate 24 hours a day, so has been assessed to night time limits as these are the most onerous.

5.2 Basement Units

5.2.1 Three units are proposed within the basement lightwells, in close proximity to bedroom windows, as shown on the image below.



5.2.2 Noise has been assessed to the nearest windows, defined as AP1 for the eastern basement apartment and AP2 for the western basement apartment (as labelled on the previous figure). The noise limits associated with the MP2 measurements have been used for these positions.

5.2.3 Due to the close proximity, it will be necessary to enclose the units so as to control noise to the apartments. The enclosure will need to achieve the following insertion losses:

	Required Insertion Losses (dB) at Octave Band Centred Frequency (Hz)							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Basement plant enclosures	9	10	14	18	26	26	25	24

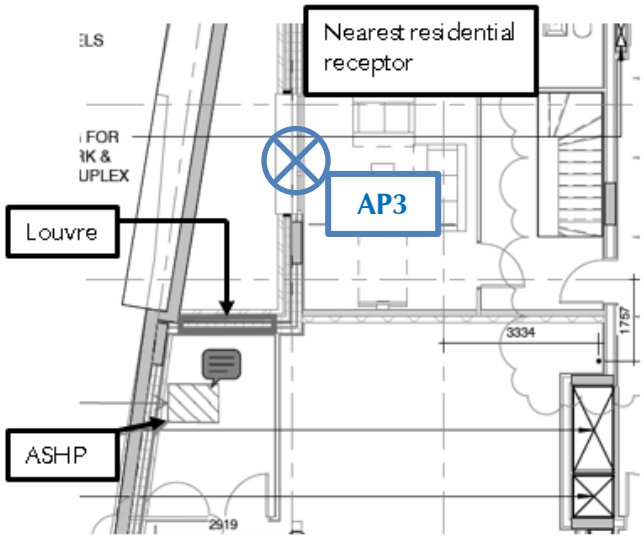
T3 Basement enclosures insertion losses requirements

5.2.4 Such enclosures can be provided by *Environ* or *Caice* but it should be reviewed whether airflow requirements can still be achieved within the lightwells.

5.2.5 With the enclosures, noise levels are calculated to be 33 dB(A) and 32 dB(A) at positions AP1 and AP2 respectively, meeting the night-time noise limits.

5.3 Ground Floor Plant Spaces

5.3.1 Within the north-west side of the ground floor a single air source heat pump (ASHP) is proposed within a plant room associated with one of the commercial units, with air provided naturally through a louvre, as shown on the image below.



5.3.2 Noise has been assessed to the nearest window, defined as AP3 for the ground floor apartment (as labelled on the previous figure). The noise limits associated with the MP2 measurements and commercial operating hours have been used for this position.

5.3.3 To reduce reverberant levels within the plant space, it will be necessary to line the soffit with mineral fibre absorption, in accordance with the attached specification 19/0013/SPC1.

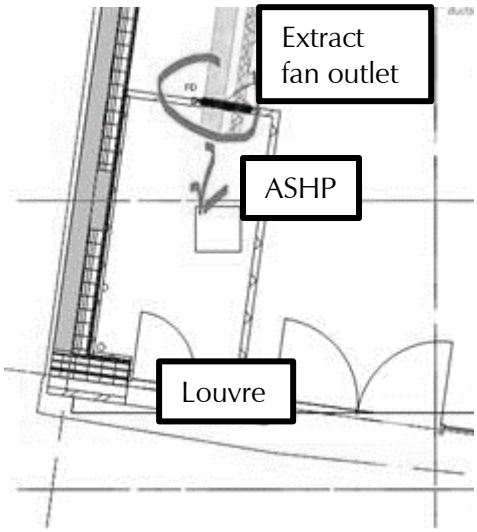
5.3.4 Additionally, it will be necessary for the louvre to be acoustically rated, so to achieve the following insertion losses:

	Required Insertion Losses (dB) at Octave Band Centred Frequency (Hz)							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
GF acoustic louvre	5	7	10	12	14	16	13	12

T4 Ground floor acoustic louvre insertion losses requirements

5.3.5 Based on the mitigation measures presented above, noise levels are calculated at the nearest window to be 36 dB(A), 1 dB below the noise limit.

5.3.6 A second plant room is proposed on the ground floor to contain a single ASHP with termination of an extract fan also located within the space, as shown on the figure below.



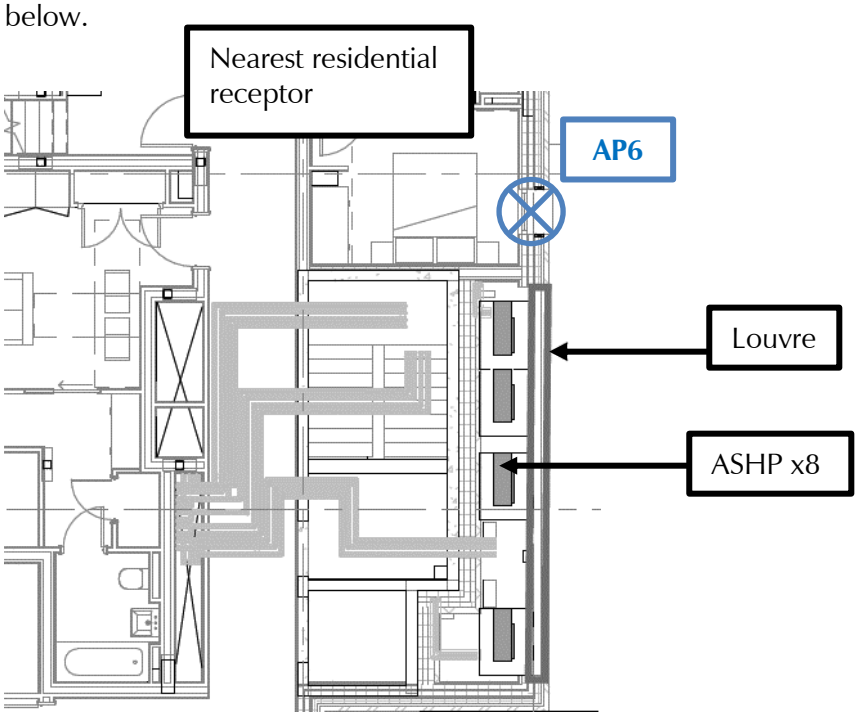
5.3.7 Noise levels have been calculated from the plant room through the louvre to the window of the residential apartment proposed directly above at 1st floor (AP4).

5.3.8 As AP4 has a view of Haverstock Road, the noise limits associated with MP1 apply. Noise levels have been calculated to be 40 dB(A), 7 dB(A) below the commercial hours noise limit.

5.3.9 Additionally, a supply fan inlet termination is located on the eastern side of the side at ground floor level. Noise levels have been calculated to the 1st floor residential apartment above (AP5) and are calculated to 45 dB(A), 2 dB(A) below the commercial hours noise limit associated with MP1.

5.4 Fourth Floor Plant Space

5.4.1 Within the fourth floor eight ASHPs are proposed within a plant room associated with the residential apartments, with air provided naturally through a louvre, as shown on the image below.



5.4.2 It will be necessary for the louvre to be acoustically rated, so to achieve the following insertion losses:

	Required Insertion Losses (dB) at Octave Band Centred Frequency (Hz)							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
4F acoustic louvre	4	3	4	6	11	13	12	10

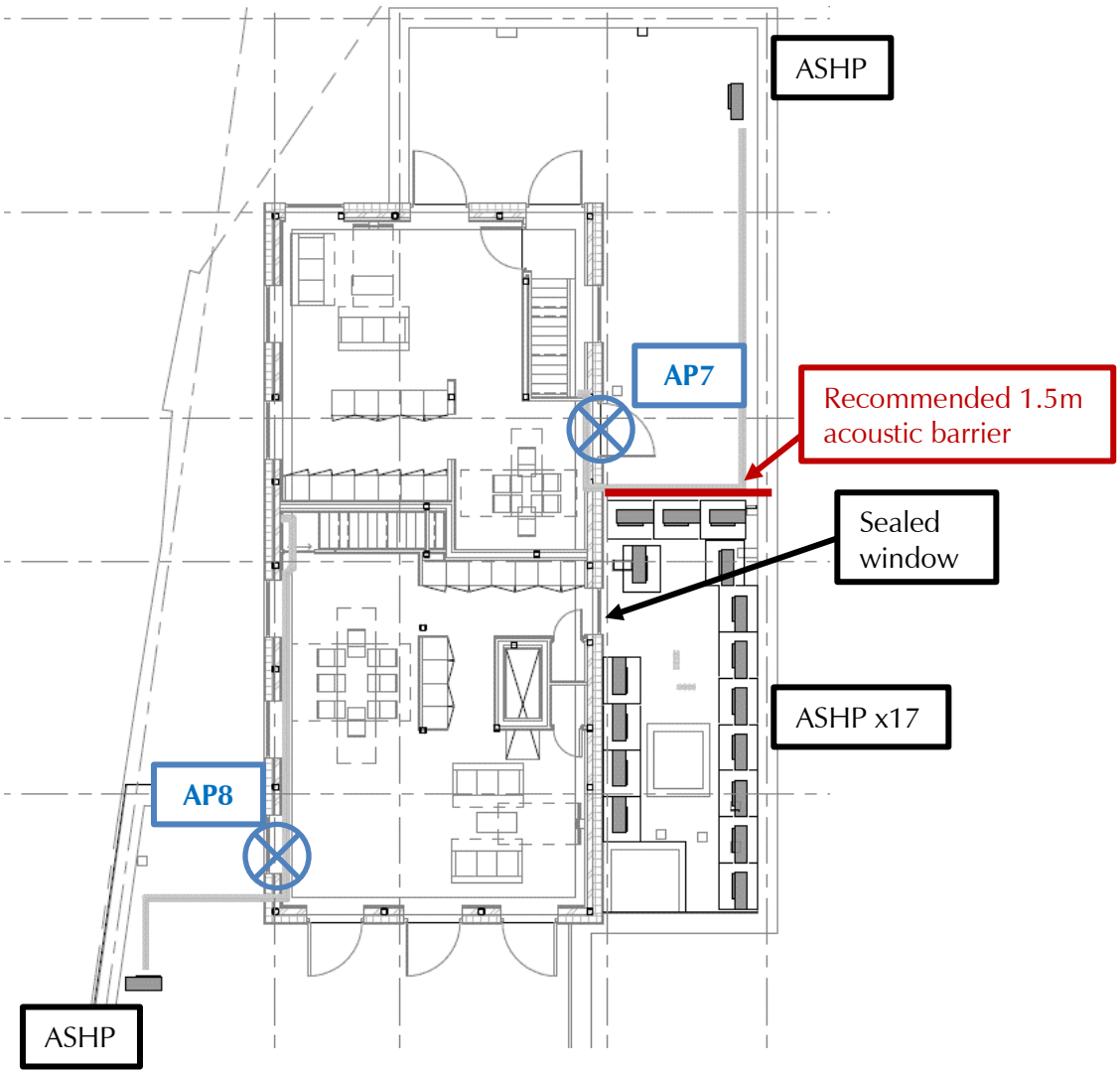
T5 Fourth floor acoustic louvre insertion losses requirements

5.4.3 The nearest receptor (AP6) does have a view of Haverstock Hill and therefore the noise limits associated with MP1 apply. As the units serve residential, the night-time noise limits need to be met.

5.4.4 Based on the mitigation measures presented above, noise levels are calculated at the nearest window to be 41 dB(A), 1 dB below the noise limit.

5.5 Fifth Floor Plant Space

5.5.1 On the fifth floor roof level, seventeen ASHPs are proposed within a plant area, along with an additional two ASHPs (ERGA08DV units) located elsewhere on the roof, as shown on the image below.



5.5.2 The apartment window overlooking the plant area is proposed to be sealed and tripled glazed, such that internal levels will be controlled through the glazing system. Therefore, noise levels

have been assessed to the next nearest windows, as labelled AP7 and AP8 or the previous image.

5.5.3 The receptors do have a view of Haverstock Hill and therefore the noise limits associated with MP1 apply. As the units serve residential, the night-time noise limits need to be met.

5.5.4 To control noise from the plant area, it is recommended for a 1.5m acoustic barrier to form as a screen between the units and the receptor, as indicated on the previous figure. The barrier should have a minimum mass of 10 kg/m^2 and be of imperforate construction.

5.5.5 Based on the mitigation measures presented above, noise levels are calculated at the nearest windows to be 41 dB(A), 1 dB below the noise limit.

5.6 Resultant Noise Levels

5.6.1 To provide a summary of the calculated noise levels, the table below lists each of the assessed positions, the relevant worst case noise limit and the calculated noise level, providing the recommended mitigation measures have been put in place.

Assessment Position	Location	Worst Case Noise Limit, $L_{Ar,Tr}$ (dB)	Calculated Noise Level, $L_{Ar,Tr}$ (dB)
AP1	Basement east	33 MP2 – night-time hours	33
AP2	Basement west	33 MP2 – night-time hours	32
AP3	GF west (rear)	37 MP2 – commercial hours	37
AP4	1F south	47 MP1 – commercial hours	40
AP5	1F east	47 MP1 – commercial hours	45
AP6	4F east	42 MP1 – night-time hours	42
AP7	5F east	42 MP1 – night-time hours	41
AP8	5F west	42 MP1 – night-time hours	41

T6 Summary of calculated noise levels

5.6.2 The table presents that the noise limits will be met at all positions, based on installation of the proposed mitigation measures.

6 Conclusions

6.1 Planning consent has been granted for redevelopment at 18-22 Haverstock Hill, Chalk Farm, to provide residential dwellings with commercial units at ground floor level. Cole Jarman have undertaken an assessment of noise from the proposed plant as part of the scheme.

6.2 Noise limits have been set at the proposed apartments based on noise survey data undertaken on site in line with condition 14.

6.3 An assessment of noise from the proposed plant items has been undertaken to specify necessary mitigation measures, which include absorptive lining to plant rooms, acoustic louvres, acoustic enclosures and a screen, the locations for which are set out within the report.

6.4 With the mitigation measures in place, noise levels have been calculated to meet the agreed noise limits.

End of Section

Glossary of Acoustic Terms

L_{Aeq}:

The notional steady sound level (in dB) which over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measurement over that period. Values are sometimes written using the alternative expression dB(A) L_{eq}.

L_{Amax}:

The maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise when occasional loud noises occur, which may have little effect on the L_{Aeq} noise level. Unless described otherwise, L_{Amax} is measured using the "fast" sound level meter response.

L_{A10} & L_{A90}:

If non-steady noise is to be described, it is necessary to know both its level and degree of fluctuation. The L_{An} indices are used for this purpose. The term refers to the A-weighted level (in dB) exceeded for n% of the time specified. L_{A10} is the level exceeded for 10% of the time and as such gives an indication of the upper limit of fluctuating noise. Similarly L_{A90} gives an indication of the lower levels of fluctuating noise. It is often used to define the background noise.

L_{A10} is commonly used to describe traffic noise. Values of dB L_{An} are sometimes written using the alternative expression dB(A) L_n.

L_{AX}, L_{AE} or SEL

The single event noise exposure level which, when maintained for 1 second, contains the same quantity of sound energy as the actual time varying level of one noise event. L_{AX} values for contributing noise sources can be considered as individual building blocks in the construction of a calculated value of L_{Aeq} for the total noise. The L_{AX} term can sometimes be referred to as Exposure Level (L_{AE}) or Single Event Level (SEL).

End of Section

Schedule of Plant and Air Handling Equipment Sound Levels, dB

Reference	Description	Data Source[1]	Noise Level Type	Noise Levels (dB)							
				63	125	250	500	1k	2k	4k	8k
ERGA04DV	4F x4 and 5F x9	Man	Sound Pressure, Lp @ 1m	50	53	50	47	42	36	30	26
ERGA06DV	4F x4 and 5F x8	Man	Sound Pressure, Lp @ 1m	51	54	51	47	43	37	30	27
ERGA08DV	Basement x3 and 5F x2	Man	Sound Pressure, Lp @ 1m	52	54	52	48	44	38	32	23
REYQ8U	GF x1	Man	Sound Power, Lw	88	81	79	77	71	68	64	59
RXYSCQ4TV1	GF x1	Man	Sound Power, Lw	71	71	67	67	64	55	49	43
Extract fan	GF	Man	Sound Power, Lw	73	69	66	65	61	56	52	46
Supply fan	GF	Man	Sound Power, Lw	81	76	66	69	63	62	58	60

Notes

1 - Man refers to data supplied by the equipment manufacturer or supplier, Emp refers to data calculated using empirical formulae, and Meas refers to data measured by Cole Jarman

Cole Jarman

Specification 19/0013/SPC1

Project: **18-22 Haverstock Hill, Chalk Farm**
Subject: **Acoustic Lining**
Date: **September 2020**

1 General

This specification defines the applicable requirements for black faced, mineral fibre lining to the condenser and emergency generator plant rooms. The suppliers of the materials shall provide the necessary information and data to verify the required performance.

The supplier shall be responsible for ensuring that all the performance criteria set out herein are met by the product being offered.

2 Products

The acoustic lining is to be supplied in the minimum thickness stated and shall be inorganic glass fibre material with a minimum density of 48 kg/m^3. The material shall be provided with an erosion resistive acoustically transparent coating suitable for airflow velocities up to 15 m/s.

The sound absorption provided by the material (with and/or without the erosion resistive facing) shall meet or exceed the values tabulated below:

Minimum Thickness (mm)	**Octave Band Centred Frequency (Hz)**					
	125	**250**	**500**	**1k**	**2k**	**4k**
75	0.30	0.50	0.75	0.95	0.95	0.95

T1 Absorption coefficients of acoustically absorbent plant area lining

3 Execution

3.1 Attach to the entire surface of the respective plant room ceilings.

3.2 All available portions of the area designed to receive the acoustic liner shall be completely covered. All joints shall be neatly butted and there shall be no interruptions or gaps.

3.3 The erosion resistive face shall be orientated toward the plant room (not the wall).

3.4 The acoustic liner shall be secured with mechanical fasteners which shall compress the liner sufficiently to hold it firmly in place.

3.5 Liner shall be compressed to assure overlapped and compressed longitudinal corner joints.

End of Section

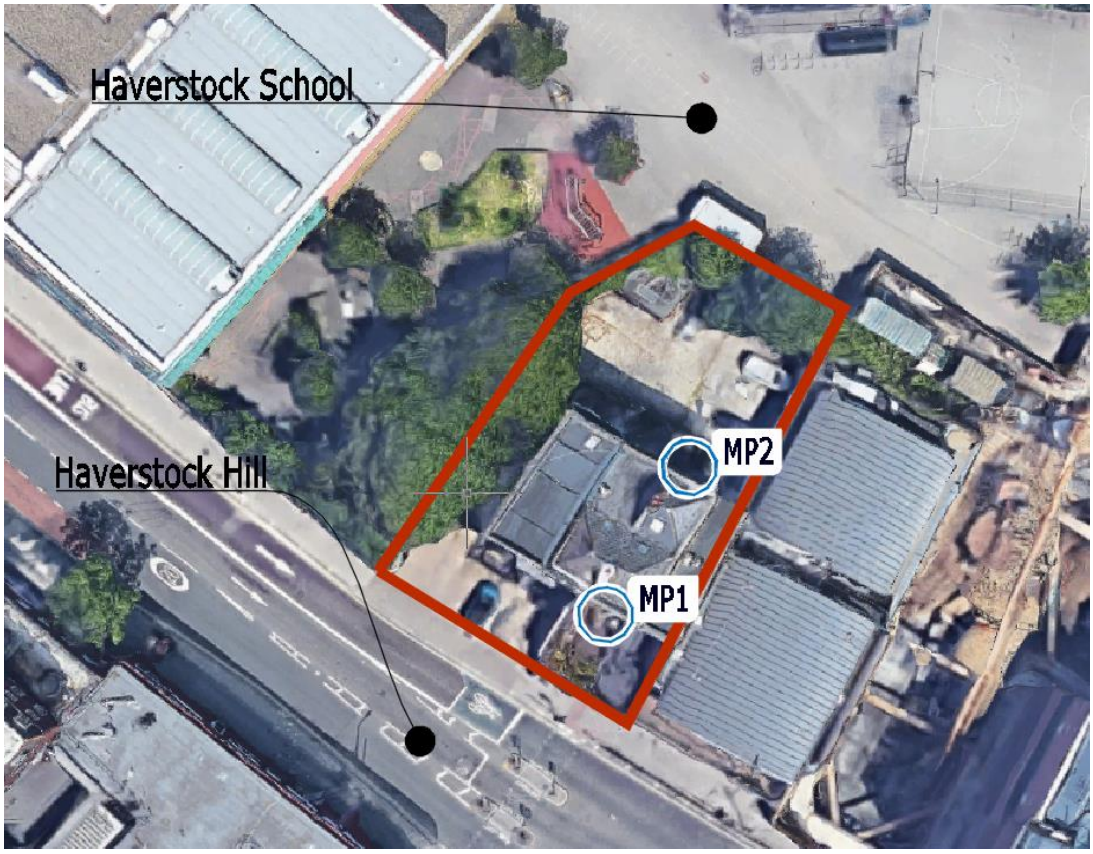
Appendix A

Environmental Noise Survey

Methodology & Instrumentation

A noise survey was undertaken at the site between 11:15 on 23rd July and 12:15 on 25th July 2019. Two unattended noise monitoring positions were used, as described below and presented on the subsequent figure:

- MP1 – Unattended measurement position located on the south western façade to the front of the building facing onto Haverstock Hill at 2nd floor level, approximately 1m from the façade. Deemed to be representative of noise in this area.
- MP2 – Unattended measurement position located on the north eastern façade to the rear of the building facing onto Haverstock School at 2nd floor level, approximately 1m from the façade. Deemed to be representative of noise in this area.



Plant Noise Assessment

Measurements of the L_{Aeq}, L_{Amax} and L_{A90} indices were recorded using the equipment listed within table T7 below:

Item	Manufacturer	Type
2x Sound Level Analyser	Rion	NL-52
2x Acoustic Calibrator	Rion	NC-74
2x Weatherproof windshield	Rion	WS-15

T7 Equipment used during noise survey.

The measurements were taken over consecutive 15-minute periods.

The microphones were fitted with windshields, and the sound level meters were calibrated before and after the survey in order to confirm an acceptable level of accuracy. No significant drift was noted to have occurred.

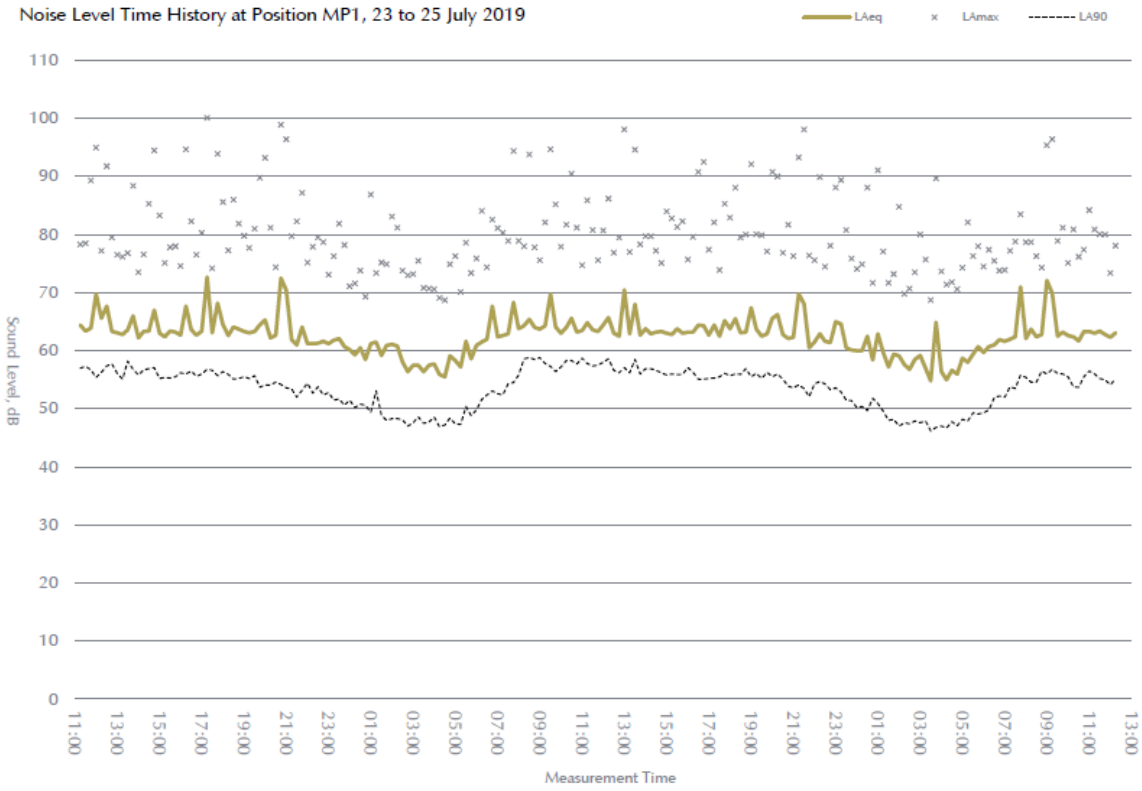
The weather conditions when setting up and collecting the equipment were warm with clear skies. These conditions are not deemed to have affected measurements taken during the survey.

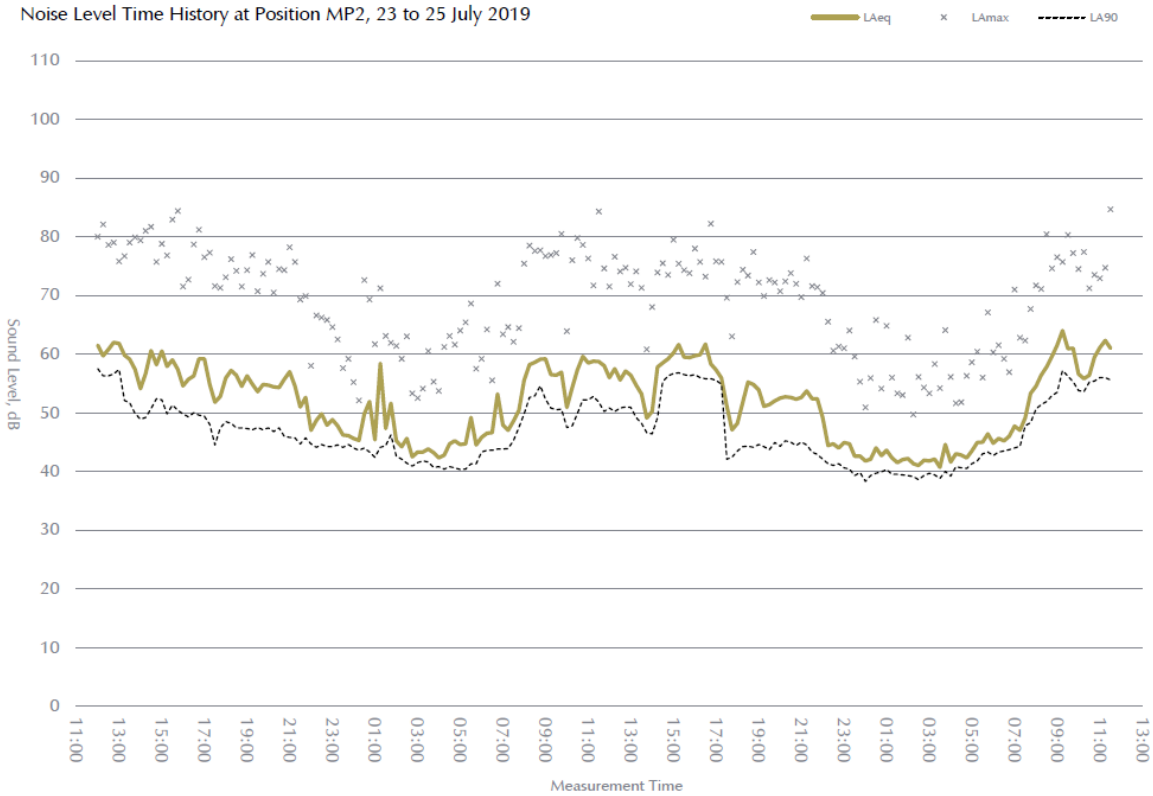
Results

The noise climate at the front of the site was noted to be dominated by road traffic noise from Haverstock Hill. Foot traffic was also reasonably frequent with the underground station in close proximity, and noise from school students passing was also audible.

To the rear of the site, road traffic noise from Haverstock Hill was quiet but still audible, and noise from the overlooked school grounds could also be heard.

The results of the monitoring are presented graphically on the time history graphs presented overleaf.


Noise Level Time History at Position MP1, 23 to 25 July 2019
LAeq
LAmax
LA90
110
100
90
80
70
60
50
40
30
20
10
0
Sound Level, dB
11:00
13:00
15:00
17:00
19:00
21:00
23:00
01:00
03:00
05:00
07:00
09:00
11:00
13:00
15:00
17:00
19:00
21:00
23:00
01:00
03:00
05:00
07:00
09:00
11:00
13:00
Measurement Time


Noise Level Time History at Position MP2, 23 to 25 July 2019
LAeq
LAmax
LA90
110
100
90
80
70
60
50
40
30
20
10
0
Sound Level, dB
11:00
13:00
15:00
17:00
19:00
21:00
23:00
01:00
03:00
05:00
07:00
09:00
11:00
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19:00
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05:00
07:00
09:00
11:00
13:00
Measurement Time

End of Section

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