

22 Upper Woburn Place London

Environmental Noise Survey and Plant Noise Assessment Report

30738/PNA1 Rev2

28 November 2023

For:
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Environmental Noise Survey and Plant Noise Assessment Report Report 30738/PNA1 Rev2

Document Control

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1.0 Introduction

It is proposed to refurbish a 6500sqft office at 22 Upper Woburn Place. The project includes a building service renovation of the comfort cooling system, which includes the installation of new condensers.

Hann Tucker Associates have therefore been commissioned to undertake a detailed 24-hour daytime and night-time fully automated environmental noise survey of the site to establish the currently prevailing noise climate and propose suitable plant noise emission criteria, based on the results of the survey and the requirements of the Local Authority.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive window.

2.0 Objectives

To establish by means of an unmanned 24-hour survey the existing L_{Amax} , L_{Aeq} and L_{A90} environmental road, rail and air traffic noise levels at up to 2No. secure and accessible on-site positions, using fully computerised noise monitoring equipment.

The survey will enable noise emission limits from the development to be identified with reference to the requirements of the Local Authority and/or the application of BS 4142: 2014 and to minimise the possibility of noise nuisance to neighbours.

To assess the noise emissions from the proposed plant, based upon data with which we are provided, and comment upon the acceptability.

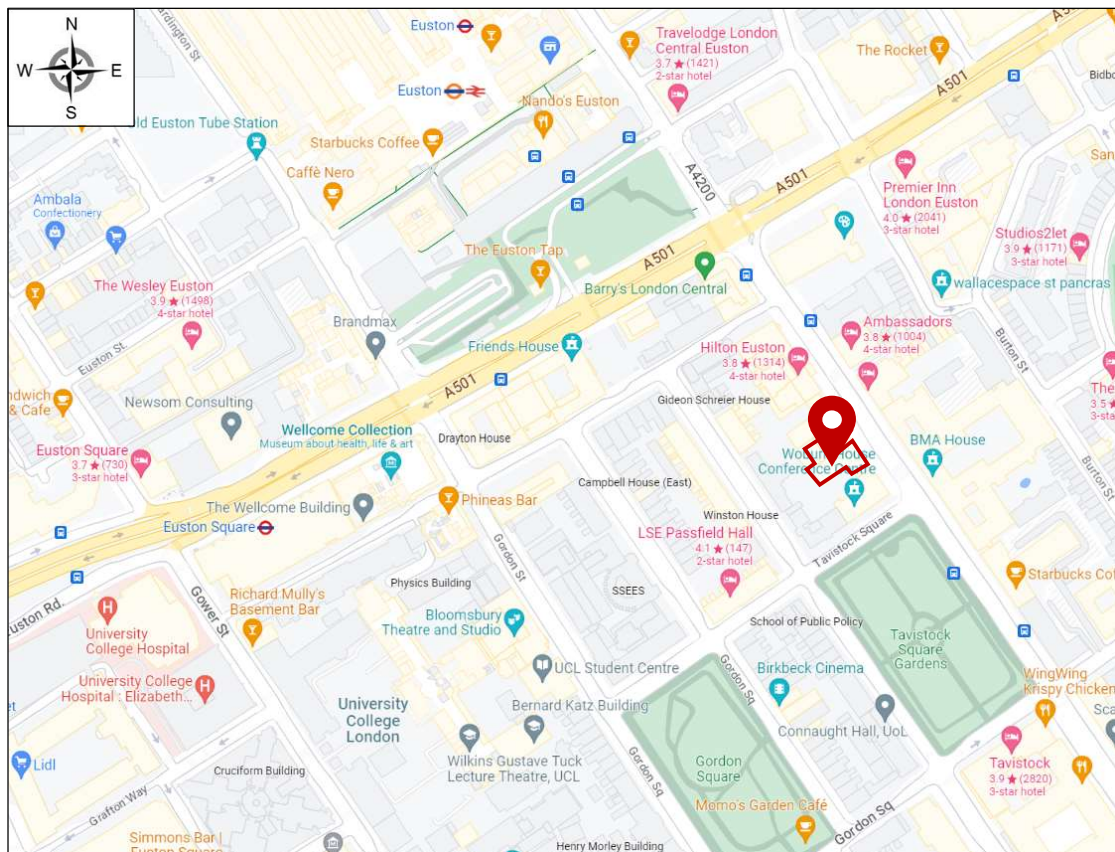
To advise on noise control measures if required with reference to the requirements of the Local Authority.



3.0 Site Description

3.1 Location

The site is located at 22 Upper Woburn Place, WC1H 0HW. The location is shown in the Location Map below.



Location Map (Map data © 2023 Google)

The site falls within the jurisdiction of London Borough of Camden.

3.2 Description

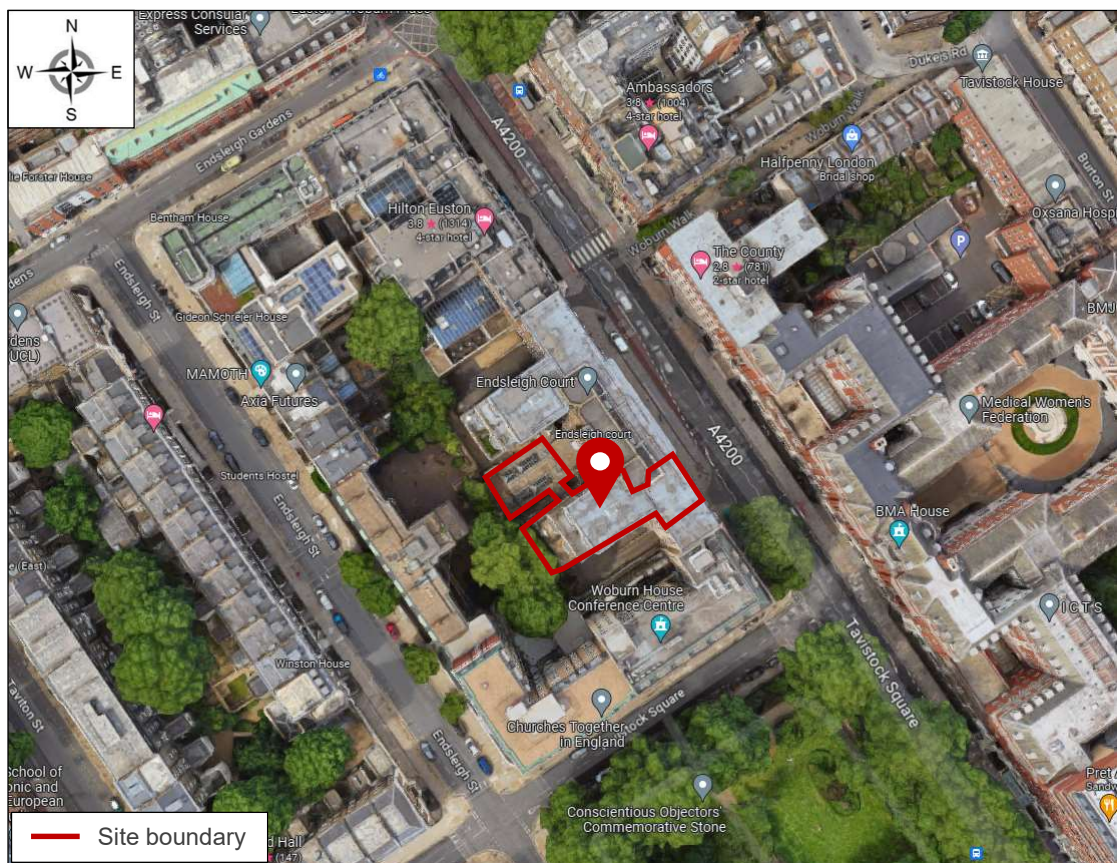
The property is located in a mixed-use area (residential and office premises). The site is bounded to the north and south with mixed-use buildings (residential and office premises), to the east with A4200 road, and to the west with residential dwellings. Several hotels (The County, Hilton Euston and Ambassadors) are approximately 25 metres away from the northern boundary of the site.



The mixed-use buildings have a height that ranges from ground plus 7 storeys to ground plus 8 storeys, with at least one basement level. The residential dwellings have a height of ground plus 5 storeys, with at least one basement level. The hotels have a height that ranges from ground plus 4 storeys to ground plus 7 storeys, with at least one basement level.

The nearby road network includes road A4200 to the east, Tavistock Square approximately 35 metres away from the south boundary of the property, and Endsleigh Street approximately 35 metres away from the west boundary of the property.

The site is shown in the Site Plan below.



Site Plan (Imagery © 2023 Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map Data © 2023 Google)

4.0 Acoustic Terminology

For an explanation of the acoustic terminology used in this report please refer to Appendix A enclosed.



5.0 Project Proposals

5.1 Proposed Plant

We understand the proposed plant comprises the following:

Plant Item	Plant Description	Location	Qty	Plant Make	Model Number
1	DVM S Eco Heat Recovery	Lower Ground Floor - Lightwell	5	Samsung	AM060NXMDGR/EU
2	DVM S Eco Heat Recovery	Lower Ground Floor - Lightwell	1	Samsung	AM060NXMDGR/EU
3	DVM S Eco Heat Recovery	Lower Ground Floor - Lightwell	1	Samsung	AM060NXMDGR/EU
4	DVM S Eco Heat Recovery	Ground Floor – Flat roof	1	Samsung	AM040NXMDER
5	DVM S Eco Heat Recovery	Ground Floor – Flat roof	1	Samsung	AM040NXMDER

5.2 Operating Hours

We understand that the proposed plant could be operational during daytime hours only (07:00 to 19:00 hours).

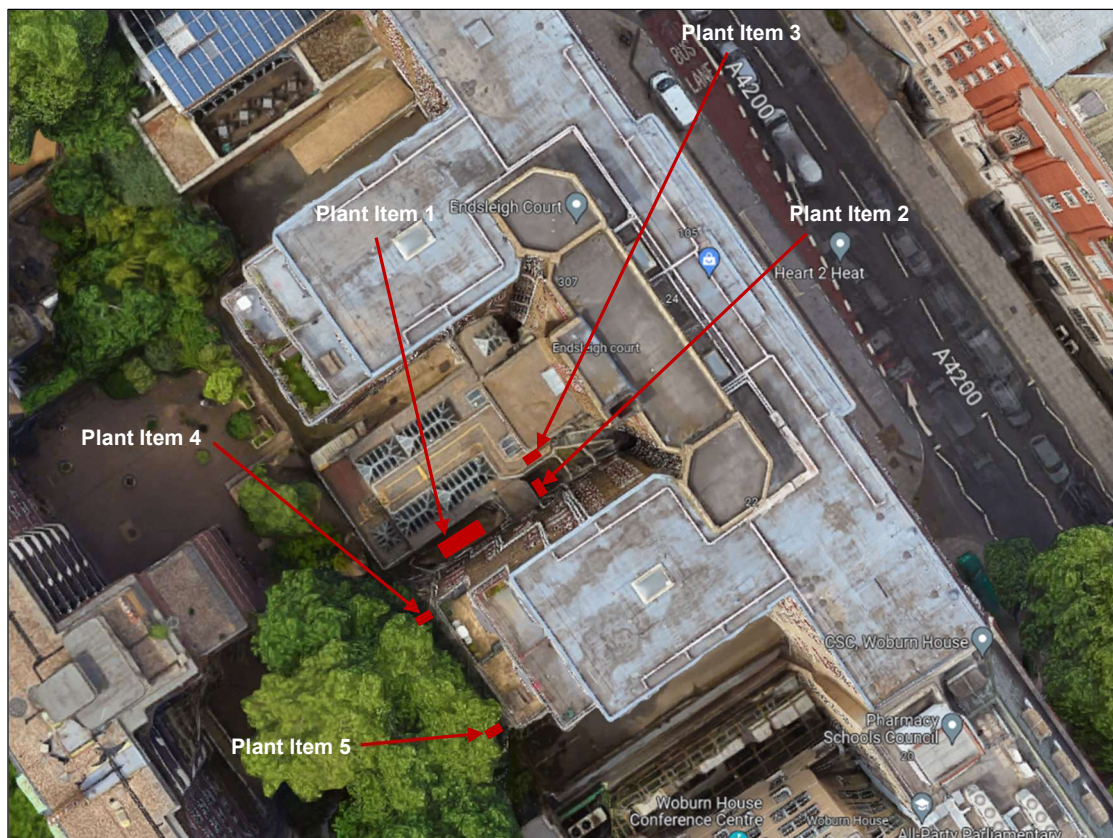
5.3 Drawings

Our acoustic analyses are based on the following drawings by Building Consultancy F & T and Quinn Ross Consultants Ltd.

Reference	Title	Date
25795-A-200-P3	Lower Ground Level proposed	July 2023
25795-A-401-P1	Front elevation existing	June 2023



A proposed site plan and elevation are shown below.



Plant location at lower ground floor level (Imagery © 2023 Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map Data © 2023 Google)

6.0 Acoustic Standards and Guidelines

6.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published in March 2010 (i.e. before the NPPF). The NPSE is the overarching statement of noise policy for England and applies to all forms of noise other than occupational noise, setting out the long term vision of Government noise policy which is to:

“Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.”

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on 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.”*

The Explanatory Note to the NPSE has three concepts for the assessment of noise in this country:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected and below which there is no detectable effect on health and quality of life due to noise.

LOAEL – Lowest Observable Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

None of these three levels are defined numerically and for the SOAEL the NPSE makes it clear that the noise level is likely to vary depending upon the noise source, the receptor and the time of day/day of the week, etc. The need for more research to investigate what may represent an SOAEL for noise is acknowledged in the NPSE and the NPSE asserts that not stating specific SOAEL levels provides policy flexibility in the period until there is further evidence and guidance.

The NPSE concludes by explaining in a little more detail how the LOAEL and SOAEL relate to the three NPSE noise policy aims listed above. It starts with the aim of avoiding significant adverse effects on health and quality of life, then addresses the situation where the noise impact falls between the LOAEL and the SOAEL when *“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.”* The final aim envisages pro-active management of noise to improve health and quality of life, again taking into account the guiding principles of sustainable development which include the need to minimise travel distance between housing and employment uses in an area.

6.2 National Planning Policy Framework (NPPF)

The following paragraphs are from the NPPF (published July 2021):

185. 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.

187. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or ‘agent of change’) should be required to provide suitable mitigation before the development has been completed.”

Paragraph 185 also references the Noise Policy Statement for England (NPSE). This document does not refer to specific noise levels but instead sets out three aims:

- “Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.
- Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.”

6.3 Planning Practice Guidance on Noise

Planning Practice Guidance (PPG) under the NPPF has been published by the Government as a web based resource at <http://planningguidance.planningportal.gov.uk/blog/guidance/>. This includes specific guidance on Noise although, like the NPPF and NPSE the PPG does not provide any quantitative advice. It seeks to illustrate a range of effect levels in terms of examples of outcomes as set out in the following table:



Perception	Examples of Outcomes	Increasing effect level	Action
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable hard, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

6.4 Local Authority Requirements

The site lies within the jurisdiction of London Borough of Camden. Their advice regarding criteria for atmospheric noise emissions from building service plant is as follows:

“A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 ‘Methods for rating and assessing industrial and commercial sound’ (BS 4142) will be used. For such cases a ‘Rating Level’ of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion).

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 88dB L _{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."



6.5 BS 4142:2014 + A1:2019

When setting plant noise emission criteria reference is commonly made to BS 4142:2014 *“Methods for rating and assessing industrial and commercial sound”*.

The procedure contained in BS 4142:2014 provides an assessment of the likely effects of sound on people when comparing the specific noise levels from the source with representative background noise levels. Where the noise contains “a tone, impulse or other characteristic” then various corrections can be added to the specific (source) noise level to obtain the “rating level”.

BS 4142 states that: *“The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs”*. An estimation of the impact of the specific noise can be obtained by the difference of the rating noise level and the background noise level and considering the following:

- *“Typically, the greater this difference, the greater the magnitude of the impact.”*
- *“A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.”*
- *“A difference of around +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 sound level, the less likely it is that the specific sound source will have an adverse impact or a 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 impact, depending on the context.”*

The determination of the “rating level” and the “background level” are both open to interpretation, depending on the context.

In summary it is not possible to set plant noise emission criteria purely on the basis of BS 4142:2014+A1:2019. It is reasonable to infer from the above, however, that a difference of around -5dB corresponds to “No Observed Effect Level” as defined in the Noise Policy Statement for England. It is also reasonable to infer from the above that if the plant noise rating level does not exceed the existing background noise level outside any noise sensitive residential window then the plant noise is of “low impact”.



6.6 World Health Organisation Guidelines on Community Noise

BS8233:2014 is based upon the current World Health Organisation (WHO) guidance “Guidelines on Community Noise”. A summary of the noise guidelines relevant to the proposed scheme is presented in the table below.

Residential Environment	Critical Health Effect(s)	L _{Aeq}	L _{AFmax}	Time Base
Outdoor living area	Serious annoyance, daytime and evening	55	-	07:00-23:00
	Moderate annoyance, daytime and evening	50	-	07:00-23:00
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	-	07:00-23:00
Inside bedrooms	Sleep disturbance, night-time	30	45	23:00-07:00
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	60	23:00-07:00

These WHO guidelines are based, in almost all cases, on the lower threshold below which the occurrence rates of any particular effect can be assumed to be negligible.

6.7 British Standard BS8233: 2014

British Standard 8233: 2014 “Guidance on sound insulation and noise reduction for buildings” provides guidance for the control of noise in and around buildings.

BS8233:2014 Section 7.7.2 titled “Internal ambient noise levels for dwellings” states:

“In general for steady external noise sources, it is desirable that internal ambient noise levels do not exceed the following guideline values:

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 - 23:00	23:00 - 07:00
Resting	Living Rooms	35 dB L _{Aeq,16hour}	-
Dining	Dining Room/Area	40 dB L _{Aeq,16hour}	-
Sleeping (Daytime Resting)	Bedroom	35 dB L _{Aeq,16hour}	30 dB L _{Aeq,8hour}



7.0 Survey Methodology

The survey was undertaken by Rebeca Sanchez LArch, MSc(Hons), AMIOA.

7.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 12:30 hours on Wednesday 31 May 2023 to 12:30 hours on Thursday 01 June 2023.

During the periods we were on site the wind conditions were calm. The sky was generally patchy cloud. We understand that generally throughout the survey period the weather conditions were dry. These conditions are considered suitable for obtaining representative measurement results.

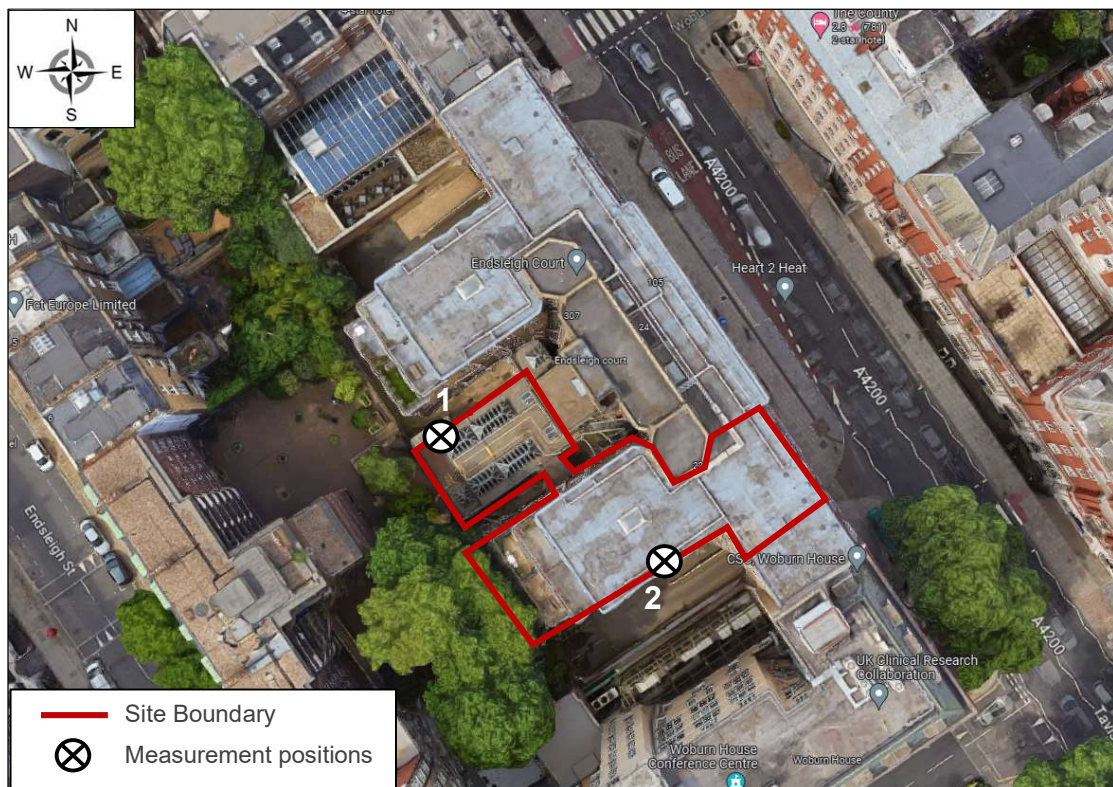
Measurements were taken continuously of the A-weighted (dBA) L_{90} , L_{eq} and L_{max} sound pressure levels over 15-minute periods.

7.2 Measurement Positions

The noise level measurements were undertaken at 2No. positions as described in the table below.

Position No	Description
1	The microphone was positioned on the north-western boundary of the property, near a noise sensitive receptor, at a height of approximately 5 metres above ground floor level.
2	The microphone was positioned on the south boundary of the property, near a noise sensitive receptor, at a height of approximately 2 metres above roof level.

The positions are shown on the plan below.



Plan Showing Measurement Positions (Imagery © 2022 Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map Data © 2022 Google)

7.3 Instrumentation

The instrumentation used during the survey is presented in the Table below:

Description	Manufacturer	Type	Serial Number	Calibration
Position 1 Type 1 Data Logging Sound Level Meter	Svantek	971	74415	Calibration on 09/08/2022
Position 1 Type 1 ½" Condenser Microphone	ACO Pacific	7052E	71786	Calibration on 09/08/2022
Position 1 Preamp	Svantek	SV18	75754	Calibration on 09/08/2022
Position 2 Type 1 Data Logging Sound Level Meter	Svantek	971	87087	Calibration on 19/07/2022
Position 2 Type 1 ½" Condenser Microphone	ACO Pacific	7052E	75560	Calibration on 19/07/2022
Position 2 Preamp	Svantek	SV18	83547	Calibration on 19/07/2022



Description	Manufacturer	Type	Serial Number	Calibration
Type 1 Calibrator	Brüel & Kjær	4230	1558535	Calibration on 25/07/2022

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.2dB).

Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with a windshield.

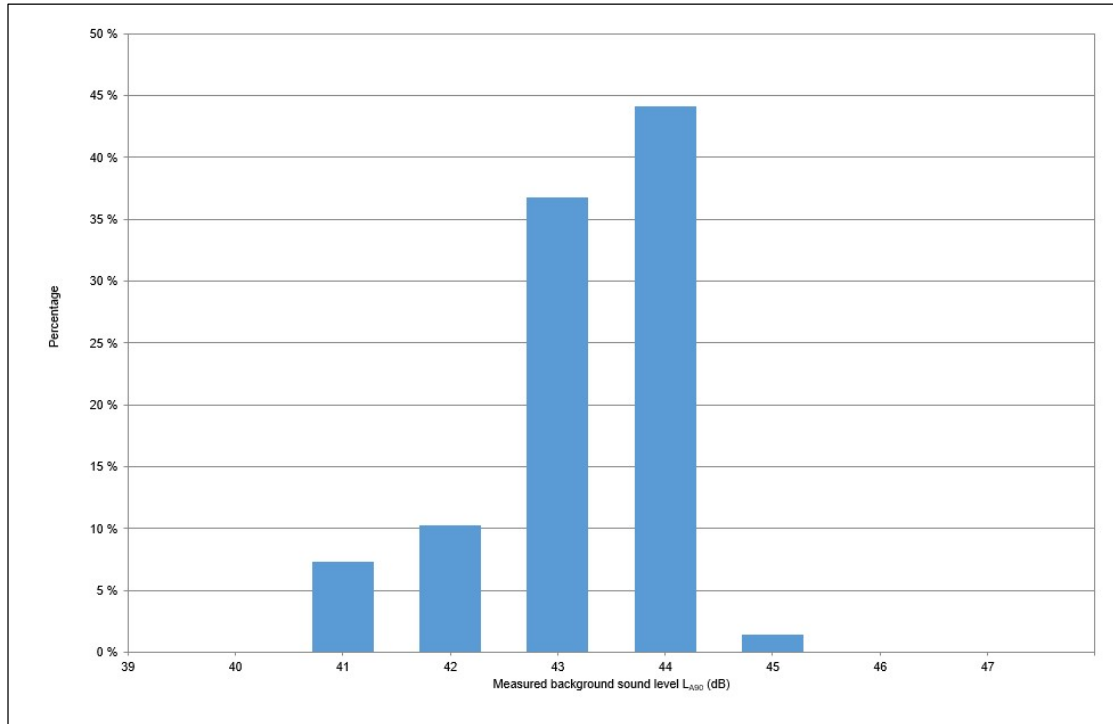
8.0 Results

The results have been plotted on Time History Graphs 30738/TH1 and 30738/TH2 enclosed, presenting the 15 minute A-weighted (dBA) L_{90} , L_{max} and L_{eq} noise levels at each measurement position throughout the duration of the survey.

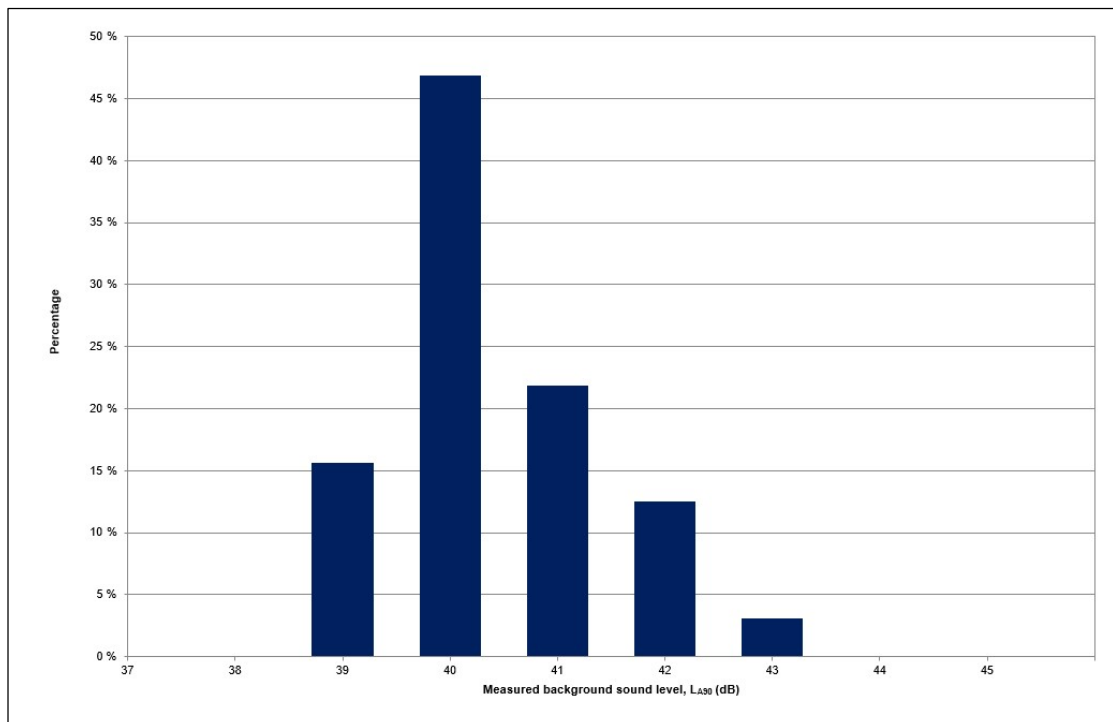
BS 4142 states that *“the background sound level must be reliable and suitably represent the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.”*



The following histograms show the occurrence of each sound level (L_{90}) as a percentage for the day and night-time periods in Position 1.



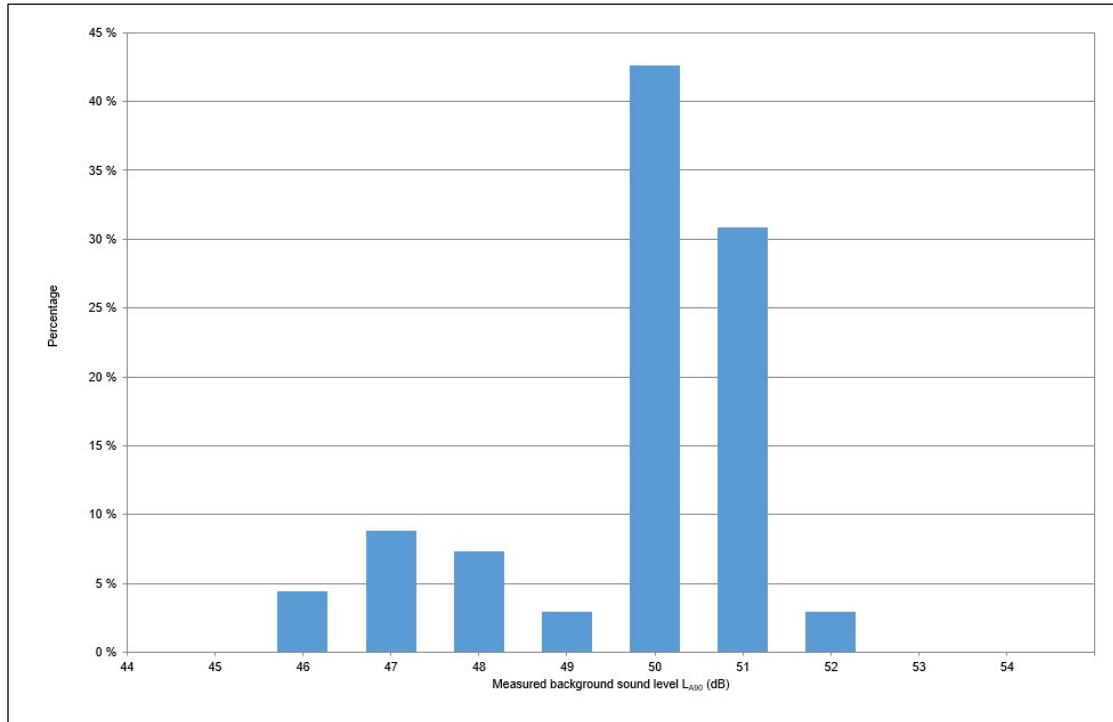
Statistical analysis of daytime background noise levels (7:00-23:00 hrs) at Position 1



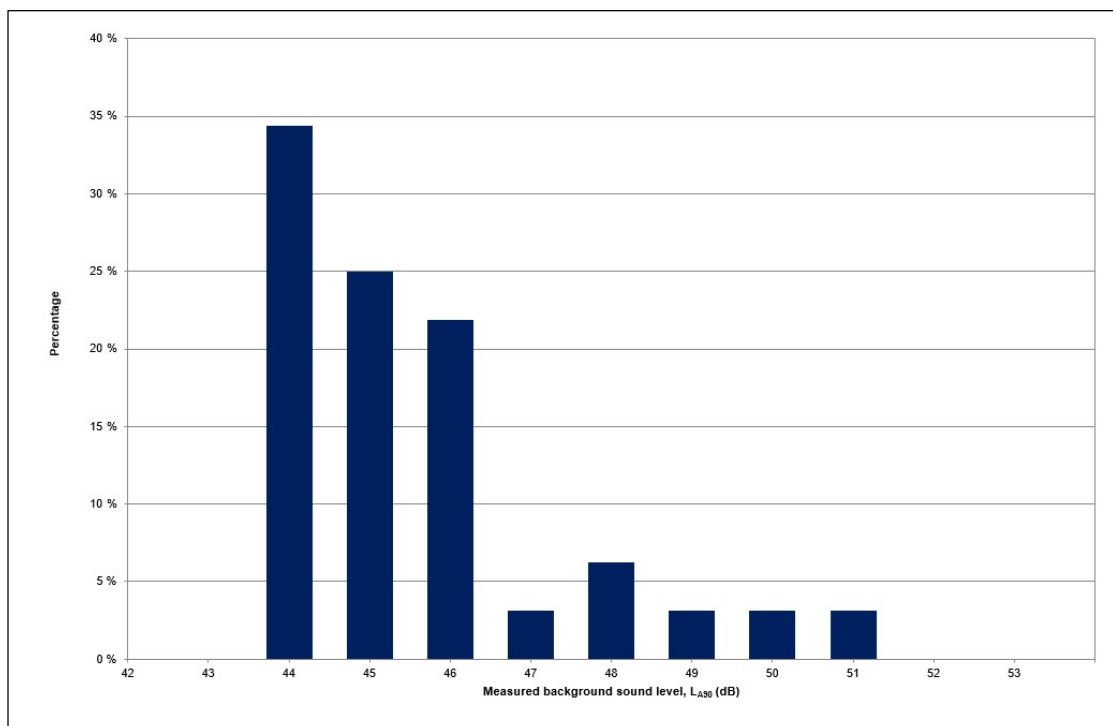
Statistical analysis of night-time background noise levels (23:00-7:00 hrs) at Position 1



The following histograms show the occurrence of each sound level (L_{90}) as a percentage for the day and night-time periods in Position 2.



Statistical analysis of daytime background noise levels (7:00-23:00 hrs) at Position 2



Statistical analysis of night-time background noise levels (23:00-7:00 hrs) at Position 2



The typical L_{A90} (15 min) measurements recorded during the survey are presented in the table below:

Position	Typical Measured $L_{A90(15min)}$ Background Noise Level (dB re 2×10^{-5} Pa)		
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	24 Hours
1	43 dBA	40 dBA	40 dBA
2	50 dBA	44 dBA	44 dBA

9.0 Discussion Of Noise Climate

Due to the nature of the survey, i.e. unattended, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the noise climate was noted to be dominated by noise from the nearby road network.

10.0 Plant Noise Emission Criteria

The development would incorporate various items of fixed plant, which would have the potential to generate noise – especially when operating at night when background noise levels are at their lowest.

Atmospheric noise emissions from the proposed building services plant will be designed to comply with the typical requirements of London Borough of Camden, as presented on Section 6.4 of this report.

On the basis of the above and the results of the environmental noise survey, we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive windows.

Position/Location	Plant Noise Emission Criteria (dB re 2×10^{-5} Pa)		
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)	24 hours
1 North and West façades	33 dBA	30 dBA	30 dBA
2 South façade	40 dBA	34 dBA	34 dBA

The above criteria are to be achieved with all of the proposed plant operating simultaneously. It should be noted that the above are subject to the final approval of the Local Authority.



11.0 Plant Noise Impact Assessment

We understand the proposed plant comprises the following:

Plant Item	Plant Description	Location	Qty	Plant Make	Model Number
1	DVM S Eco Heat Recovery	Lower Ground Floor - Lightwell	5	Samsung	AM060NXMDGR/EU
2	DVM S Eco Heat Recovery	Lower Ground Floor - Lightwell	1	Samsung	AM060NXMDGR/EU
3	DVM S Eco Heat Recovery	Lower Ground Floor - Lightwell	1	Samsung	AM060NXMDGR/EU
4	DVM S Eco Heat Recovery	Ground Floor – Flat roof	1	Samsung	AM040NXMDER
5	DVM S Eco Heat Recovery	Ground Floor – Flat roof	1	Samsung	AM040NXMDER

11.1 Plant Noise Data

We understand the manufacturer's noise data for the equipment to be as follows:

Plant Item	Description	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa) at 1m
1, 2 & 3	DVM Model AM060NXMDGR/EU	53
4 & 5	DVM Model AM040NXMDER	52

11.2 Location of Plant

We understand that Plant Items 1, 2 and 3 will be located at Lower Ground Floor Level, in the lightwell, and Plant Items 4 & 5 will be located on the flat roof over the basement at ground floor level. All plant items will be mounted on flexi-feet.

We have identified the worst affected noise sensitive properties near the site (residential), which are located at Endsleigh Court, 24 Upper Woburn Place. The building has residences facing the lightwell from Level 1 to Level 8.



The approximate distance from each plant item to noise sensitive window 1 at first floor level is as follows.

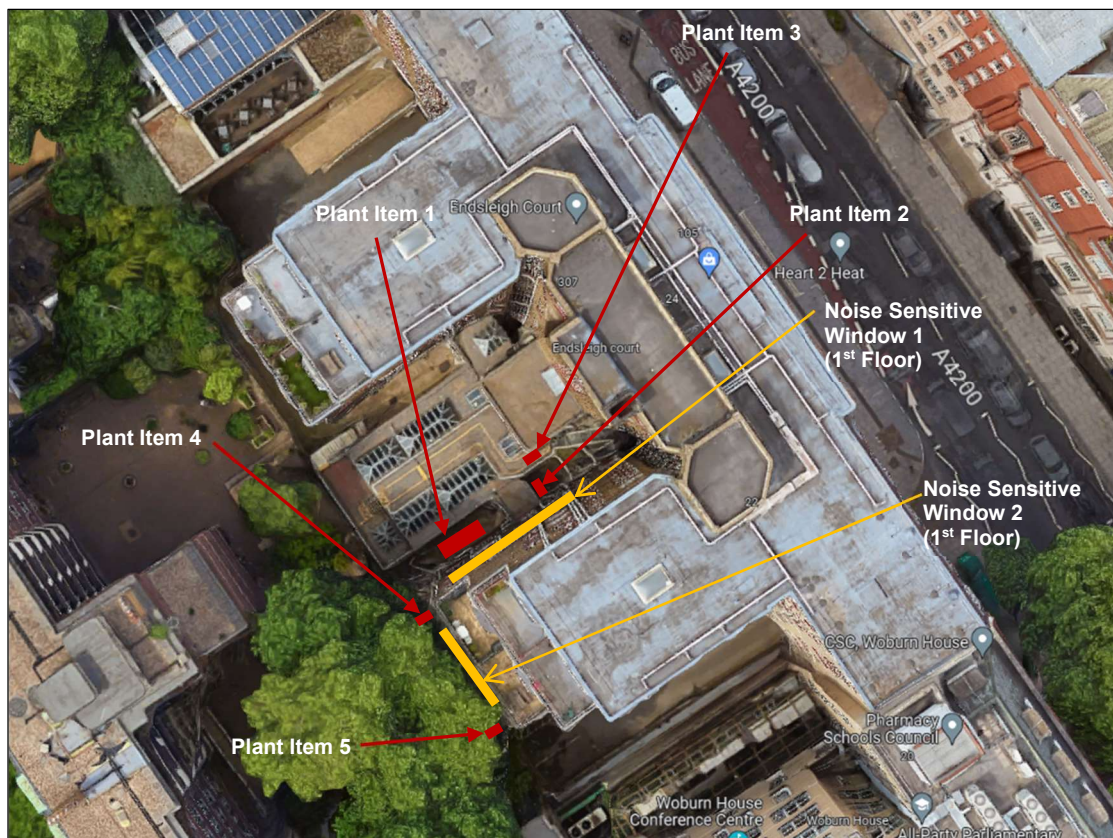
Plant item	Plant Description	Approximate distance to the nearest noise sensitive window (metres)
1	DVM Model AM060NXMDGR/EU	5 m
2	DVM Model AM060NXMDGR/EU	5 m
3	DVM Model AM060NXMDGR/EU	6 m
4	DVM Model AM040NXMDER	6 m
5	DVM Model AM040NXMDER	12 m

The approximate distance from each plant item to noise sensitive window 2 at first floor level is as follows.

Plant item	Plant Description	Approximate distance to the nearest noise sensitive window (metres)
1	DVM Model AM060NXMDGR/EU	6 m
2	DVM Model AM060NXMDGR/EU	12 m
3	DVM Model AM060NXMDGR/EU	13 m
4	DVM Model AM040NXMDER	2 m
5	DVM Model AM040NXMDER	2 m



The location of the plant and the nearest noise sensitive window is shown on the plan below.



Plant location at lower ground floor level (Imagery © 2023 Getmapping plc, Infoterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map Data © 2023 Google)

11.3 Mitigation Measures

Our calculations indicate that, in the absence of additional mitigation measures, the proposed plant could exceed the requirements of the Local Authority outlined in Section 10.0 at the nearest noise sensitive windows.

In order to control atmospheric plant noise emissions from the proposed plant units in line with the Local Authority requirements, we recommend installing individual or combined acoustic enclosures such that all plant items are attenuated by the following:

Plant Item	Attenuation required
1	25 dBA
2	25 dBA
3	25 dBA
4	25 dBA
5	25 dBA



Please find our acoustic specification for small acoustic enclosures at the end of the report.

11.4 Plant Noise Impact Assessment

We understand that the proposed units will be operational during daytime hours only (07:00 to 19:00 hours).

It should be noted that the proposed plant is not anticipated to exhibit any tonal, impulsive or intermittent characteristics, provided it is well maintained. No acoustic feature corrections are deemed applicable.

The following table summarises our predictions of atmospheric noise emissions from the plant to the noise sensitive window 1.

Plant item	Description	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa)
1	Manufacturer's Sound Pressure Level at 1m	53
	Correction for 5No.	+7
	Conformal Area Distance Loss (0m to 5m) (1/4 Spherical On-site Radiating Conditions)	-7
	Proposed enclosure	-25
	Calculated Noise Level at Window	28
2	Manufacturer's Sound Pressure Level at 1m	53
	Conformal Area Distance Loss (0m to 5m) (1/4 Spherical On-site Radiating Conditions)	-7
	Proposed enclosure	-25
	Calculated Noise Level at Window	21
3	Manufacturer's Sound Pressure Level at 1m	53
	Conformal Area Distance Loss (0m to 6m) (1/4 Spherical On-site Radiating Conditions)	-8
	Proposed enclosure	-25
	Calculated Noise Level at Window	20
4	Manufacturer's Sound Pressure Level at 1m	52
	Barrier Loss	-5
	Conformal Area Distance Loss (0m to 6m) (1/4 Spherical On-site Radiating Conditions)	-9
	Proposed enclosure	-25
	Calculated Noise Level at Window	13
5	Manufacturer's Sound Pressure Level at 1m	52
	Barrier Loss	-11
	Conformal Area Distance Loss (0m to 12m) (1/4 Spherical On-site Radiating Conditions)	-15
	Proposed enclosure	-25
	Calculated Noise Level at Window	1
Specific Sound Level, dB L _{As}		29
BS4142 Acoustic Feature Correction		0
Façade Reflection, dB		+3
Rating Level, dB L _{Ar}		32



The following table summarises our predictions of atmospheric noise emissions from the plant to the noise sensitive window 2.

Plant item	Description	Sound Pressure Level (dB re 2x10 ⁻⁵ Pa)
1	Manufacturer's Sound Pressure Level at 1m	53
	Correction for 5No.	+7
	Conformal Area Distance Loss (0m to 6m) (1/4 Spherical On-site Radiating Conditions)	-8
	Barrier Loss	-14
	Proposed enclosure	-25
	Calculated Noise Level at Window	13
2	Manufacturer's Sound Pressure Level at 1m	53
	Conformal Area Distance Loss (0m to 12m) (1/4 Spherical On-site Radiating Conditions)	-14
	Barrier Loss	-18
	Proposed enclosure	-25
	Calculated Noise Level at Window	<0
3	Manufacturer's Sound Pressure Level at 1m	53
	Conformal Area Distance Loss (0m to 13m) (1/4 Spherical On-site Radiating Conditions)	-14
	Barrier Loss	-18
	Proposed enclosure	-25
	Calculated Noise Level at Window	<0
4	Manufacturer's Sound Pressure Level at 1m	52
	Conformal Area Distance Loss (0m to 2m) (1/4 Spherical On-site Radiating Conditions)	-2
	Proposed enclosure	-25
	Calculated Noise Level at Window	25
5	Manufacturer's Sound Pressure Level at 1m	52
	Conformal Area Distance Loss (0m to 2m) (1/4 Spherical On-site Radiating Conditions)	-2
	Proposed enclosure	-25
	Calculated Noise Level at Window	25
Specific Sound Level, dB L _{As}		28
BS4142 Acoustic Feature Correction		0
Façade Reflection, dB		+3
Rating Level, dB L _{Ar}		31

Our calculations indicate that the proposed plant, in conjunction with the proposed mitigation measures, should be capable of achieving the requirements of the Local Authority outlined in Section 10.0.



12.0 Conclusions

An environmental noise survey has been undertaken in order to establish the currently prevailing noise levels.

Plant noise emission criteria have been recommended based on the results of the noise survey and with reference to the Local Authority's requirements.

An assessment has been carried out to determine the plant noise emissions at the nearest noise sensitive windows.

The assessment indicates that the proposed plant, in conjunction with the recommended attenuation, should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive windows in line with the requirements of the Local Authority.

Appendix A

The acoustic terms used in this report are defined as follows:

dB Decibel - Used as a measurement of sound level. Decibels are not an absolute unit of measurement but an expression of ratio between two quantities expressed in logarithmic form. The relationships between Decibel levels do not work in the same way that non-logarithmic (linear) numbers work (e.g. 30dB + 30dB = 33dB, not 60dB).

dBA The human ear is more susceptible to mid-frequency noise than the high and low frequencies. The 'A'-weighting scale approximates this response and allows sound levels to be expressed as an overall single figure value in dBA. The _A subscript is applied to an acoustical parameter to indicate the stated noise level is A-weighted

It should be noted that levels in dBA do not have a linear relationship to each other; for similar noises, a change in noise level of 10dBA represents a doubling or halving of subjective loudness. A change of 3dBA is just perceptible.

L_{90,T} L₉₀ is the noise level exceeded for 90% of the period *T* (i.e. the quietest 10% of the measurement) and is often used to describe the background noise level.

L_{eq,T} L_{eq,T} is the equivalent continuous sound pressure level. It is an average of the total sound energy measured over a specified time period, *T*.

L_{max} L_{max} is the maximum sound pressure level recorded over the period stated. L_{max} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the L_{eq} noise level.

Sound Pressure Level (L_p) is the sound pressure relative to a standard reference pressure of 2×10^{-5} Pa. This level varies for a given source according to a number of factors (including but not limited to: distance from the source; positioning; screening and meteorological effects).

Sound Power Level (SWL or L_w) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

22 UPPER WOBURN PLACE

SPECIFICATION FOR

SMALL ACOUSTIC ENCLOSURES

The plant units (Plant Items 1, 2, 3, 4 and 5) shall be supplied complete with acoustic treatment which shall achieve adequate levels of attenuation to ensure that the following limiting sound pressure levels are not exceeded when measured at a distance of 1m (free field over a reflecting plane) in any horizontal or vertical direction under any load conditions.

Plant item	A-weighted Limiting Sound Pressure Level @ 1m (dB re 2 x 10 ⁻⁵ Pa)
	Duty/Time: 24 hours
1, 2 & 3	28 dB per unit/ 36 dB cumulative
4 & 5	27 dB/ 30 dB cumulative

Furthermore they shall not exhibit any significant tonal content.

Exceedances in excess of the measurement tolerance for a Type 1 sound level meter shall constitute a failure.

The enclosed outer panels shall be constructed from galvanized sheet steel having a minimum thickness of 1.6mm and fixed at 300mm (max) centres. The enclosure inner panels shall be constructed from punch-perforated (round-hole) galvanised sheet steel facing, having a minimum thickness of 0.7mm fixed at 300mm (max) centres. Flattened-expanded ("Expamet") sheet shall not be used, unless all edges of the sheet are mechanically fixed to the panel casing and galvanised steel cover strips are used to prevent rivet heads pulling through the perforated sheet (trapping the Expamet between two solid steel layers).

The inert, rot and vermin proof, non-hygroscopic and non-combustible mineral wool or glass fibre acoustic medium shall be packed to a density of not less than 48kg/m³. This shall be faced with a glass fibre cloth, or other approved infill protection membrane. Panels shall be constructed and assembled so that no egress of the acoustic medium will occur under the operating conditions.

Doors, access panels, windows and ventilation ducts or electrical cable penetrations shall be treated so as to maintain the specified acoustic insulation of the assembled enclosure.

Demountable sections shall be designed to allow easy disassembly and reassembly by unskilled personnel without affecting the acoustic performance.

The supplier shall ensure that the assembled enclosure is designed and constructed to withstand site operating conditions such as wind and snow loads, roof mounted plant, etc., as appropriate, and if outside, to be suitably weatherproofed.

The acoustic media shall not comprise materials which are generally composed of mineral fibres, either man made or naturally occurring, which have a diameter of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to ensure that fibre migration is prevented.

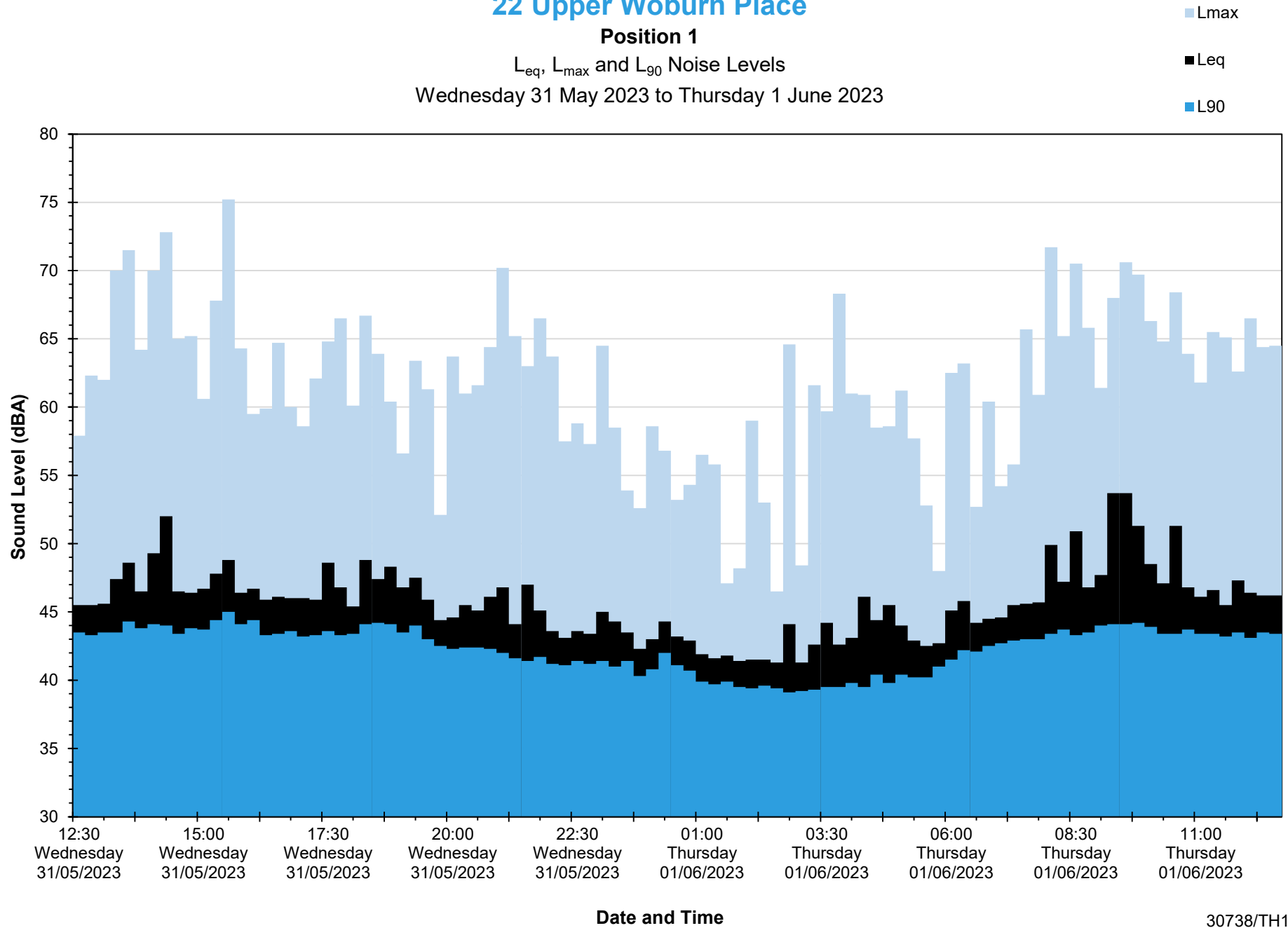
Any deviations from the above specification must be agreed by, and confirmed in writing to, Hann Tucker Associates.

22 Upper Woburn Place

Position 1

L_{eq} , L_{max} and L_{90} Noise Levels

Wednesday 31 May 2023 to Thursday 1 June 2023



22 Upper Woburn Place

Position 2

L_{eq} , L_{max} and L_{90} Noise Levels
Wednesday 31 May 2023 to Thursday 1 June 2023

