

UCL, Central BSU London

Environmental Noise Survey and Plant Noise Assessment Report

28780/PNA1

14 April 2021

For:
Fulkers Bailey Russell



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Document Control

Rev	Date	Comment	Prepared by	Authorised by
0	14/04/2021	-		
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1.0 Introduction

It has been proposed to introduce new items of plant at UCL Gower St, Kings Cross, London WC1E 6BT, in Camden, London.

Hann Tucker Associates have therefore been commissioned to undertake a detailed environmental noise survey to determine the currently prevailing noise climate at the site, the results of which will be used in design assessments in order to assess compliance with the Local authority's requirements.

2.0 Objectives

To inspect the site to familiarise ourselves with its layout and surroundings in order to identify suitable accessible locations for environmental noise measurements.

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 1No. secure and accessible on-site position, using fully computerised noise monitoring equipment.

Measurement procedures shall be in general accordance with British Standard BS 7445 "Description and measurement of environmental noise".

Measurement procedures shall be in general accordance with those described in BS 4142: 2014, Method for rating industrial noise affecting mixed residential areas, published by the British Standards Institution.

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.

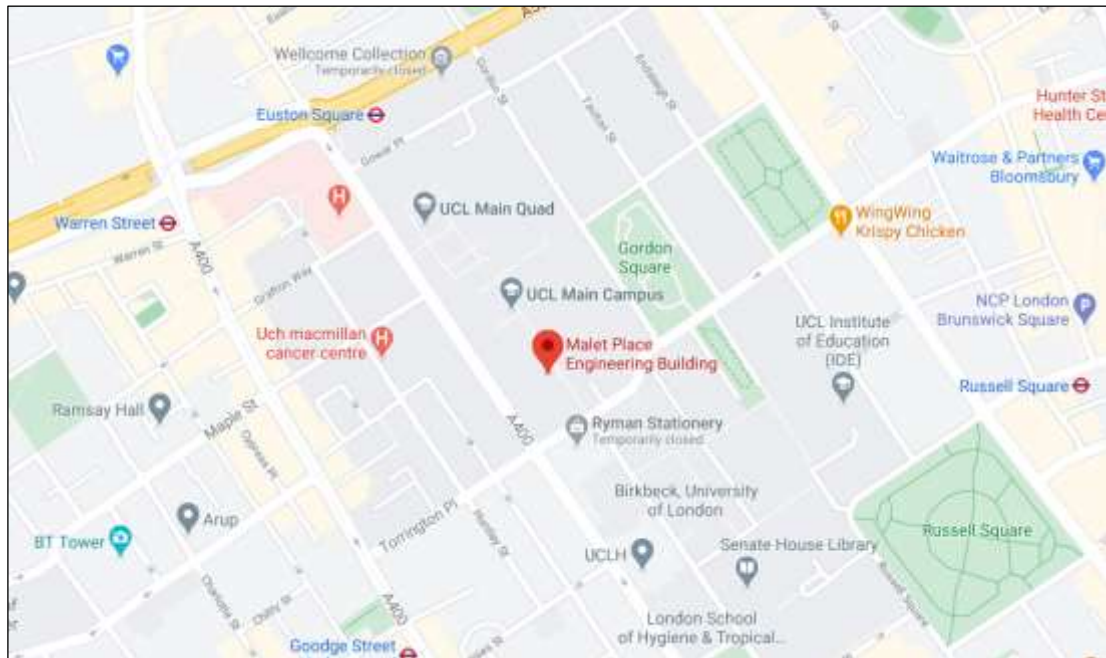


3.0 Site Description

3.1 Location

The site is located on Malet Place, Bloomsbury in London.

The location is shown in the Location Map below.

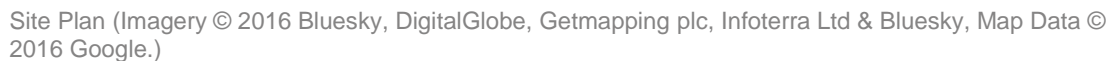


Location Map (Imagery © 2021 Bluesky, DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, Map Data © 2021 Google.)

3.2 Description

The new items of plant are to be positioned on Malet Place which is a private road with locked gates at the entrance and surrounding buildings are owned by UCL. Dominant noise sources were other items of plant from surrounding UCL buildings combined with minor construction noise and people.

The site is shown in the Site Plan below.



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

5.1 Noise Policy Statement for England

“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.

5.2 National Planning Policy Framework (NPPF)

The following paragraphs are from the NPPF (revised February 2019):

“180. 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.

182. 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 180 also references the Noise Policy Statement for England. 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.”

5.3 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

5.4 Local Authority Requirements

5.4.1 Noise Sensitive Developments

The LB of Camden determines in Policy A4 of their Camden Local Plan (2017) that a noise sensitive development is that which, “...includes housing, schools and hospitals as well as offices, workshops and open spaces...”

5.4.2 Building Services Plant Noise Criteria

The site lies within the jurisdiction of the London Borough of Camden. Their policy stated within the *Camden Local Plan (2017)* regarding criteria for atmospheric noise emissions from building service plant is as follows:



“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 ‘Rating level’ greater than 5dB above background and/or events exceeding 88dBL _{Amax}

5.5 BS 4142:2014

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. 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”.

5.6 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.



5.7 Statutory Noise Nuisance

There is no quantitative definition of statutory noise nuisance. It is generally accepted however, that if the plant noise level is at least 5dB (or 10dB if tonal) below the minimum background $L_{90(15\text{minutes})}$ at 1m from the nearest noise sensitive residential window, then the risk of a statutory noise nuisance is avoided. By adopting this as a design criterion the guidance contained in BS 4142:2014 should also be complied with.

6.0 Survey Methodology

The survey was undertaken by Alastair Grieves MEng (Hons) AMIOA, AMIMechE.

6.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 14:00 hours on 7th April 2021 to 14:00 hours on 8th April 2021

During the periods we were on site the wind conditions were calm and from approximately a westerly direction. The sky was generally overcast. We understand that generally throughout the survey period the weather 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 10 minute periods.

6.2 Measurement Position

The microphone was attached to a pole approximately 1 metre above ground level.



Microphone Position



Plan Showing Measurement Positions (Imagery © 2021 Bluesky, DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, Map Data © 2021 Google.)

6.3 Instrumentation

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

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 ½" Condenser Microphone	ACO Pacific	7052E	52450	Calibration on 08/03/2021
Preamp	SvanteK	SV12L	30424	Calibration on 08/03/2021
Type 1 Data Logging Sound Level Meter	SvanteK	957	28035	Calibration on 08/03/2021

The sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes was found to have occurred (no more than 0.1dB).

The sound level meter was located in an environmental case with the microphone connected



to the sound level meter via an extension cable.

The microphone was fitted with a windshield.

7.0 Results

The results have been plotted on Time History Graph 28780/TH1 enclosed, presenting the 10 minute A-weighted (dBA) L_{90} and L_{eq} noise levels at each measurement position throughout the duration of the survey.

The L_{A90} (10 min) measurements recorded during the survey are presented in the table below:

Position	Lowest Measured $L_{A90}(10min)$ Background Noise Level (dB re 2×10^{-5} Pa)	
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours
Lowest	40 dBA	39 dBA
Typical (modal)	43 dBA	43 dBA

8.0 Discussion Of Noise Climate

During the periods we were on site the dominant noise sources were noted to be plant noise combined with construction and people.

9.0 Plant Noise Emission Criteria

Building services plant external noise emission levels will need to comply with local planning/environmental authority requirements and statutory noise nuisance legislation.

We understand that the requirements/planning condition imposed by Local Borough Council states as follows:

9.1 Noise Sensitive Developments

The LB of Camden determines in Policy A4 of their Camden Local Plan (2017) that a noise sensitive development is that which, *"...includes housing, schools and hospitals as well as offices, workshops and open spaces..."*

9.2 Building Services Plant Noise Criteria

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the *Camden Local Plan (2017)* regarding criteria for atmospheric noise emissions from building service plant is as follows:

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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 neighbouring window.

Noise Emission Limit (dBA)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
33	33

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.

10.0 Plant Noise Impact Assessment

We understand the proposed plant comprises an Andrew Sykes HPAC 90 chiller unit.



10.1 Plant Noise Data

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

Plant Description	Sound Pressure Level (dB re 2×10^{-5} Pa) At 3m (dBA)
HPAC 90	75

10.2 Location of Plant

The proposed plant is to be positioned at street level in Malet Place. The nearest neighbouring noise sensitive receptors are in Gower Street and Gower Square circa 80 metres from the proposed plant and significantly screened by intervening UCL buildings.

The plant location is shown in the image below.



Location Map (Imagery © 2021 Bluesky, DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, Map Data © 2021 Google.)

10.3 Plant Noise Impact Assessment

We understand that the proposed units could be operational during daytime and night time hours.

It should be noted that the proposed plant is not anticipated to exhibit any tonal or impulsive



characteristics provided it is well maintained. All proposed external plant will be inverter driven and, therefore, will gently ramp up and down depending on the demands on the various systems. In order to be robust, however, a +3dB feature correction as advised in BS 4142:2014 has been applied for the possible present of “... *characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment* ...”.

The following tables summarises our predictions of atmospheric noise emissions from the plantroom louvres to the nearest noise sensitive residential window.

10.3.1 Noise Sensitive Gower Street & Gower Square

	Sound Pressure Level (dBA)	
	Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
Cumulative Plant Noise Emission	75 @ 3m	75 @ 3m
Feature Correction	+3	+3
Distance Correction (80m)	-29	-29
Building Screening	-20	-20
Calculated Noise Level at Receptor	29	29

Our calculations indicate that the proposed plant, in conjunction with the propose mitigation measures, should be capable of achieving the requirements of the Local Authority outlined in Section 9.0.

11.0 Conclusions

A detailed daytime and night-time fully automated environmental noise survey has been undertaken in order to establish the currently prevailing environmental noise climate around the development site. The results are presented herein.

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

An assessment has been carried out to determine the proposed plant noise emissions at the worst affected neighbouring residential window.

The assessment indicates that the proposed plant should be capable of achieving the proposed environmental noise criteria at the worst affected neighbouring residential window.

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).

UCL Central BCU

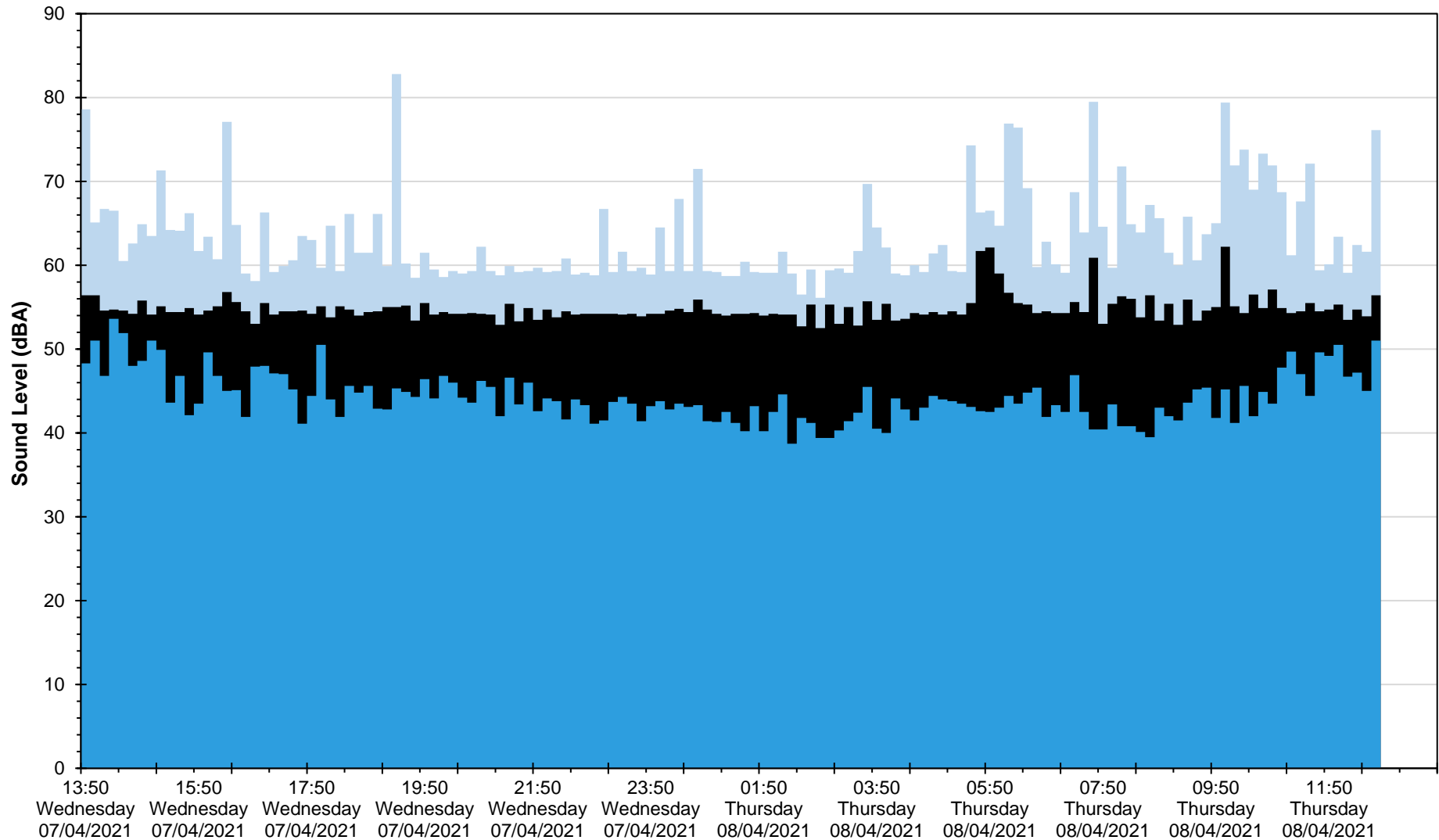
Position 1

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

Wednesday 7 April 2021 to Thursday 8 April 2021

L_{max} L_{eq}

L_{90}



Date and Time

28780/TH1