1 The Mount
Hampstead
London

Environmental Noise Survey and Plant Noise Assessment Report

25678/PNA1

22 June 2018

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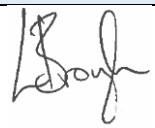
Document Control

Rev	Date	Comment	Prepared by	Authorised by
0	22/06/2018	-		
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Hann Tucker Associates

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Attachments

1.0 Introduction

Following proposals to install a new plant area at 1, The Mount, Hampstead, Hann Tucker Associates have been appointed to complete an environmental noise survey and plant noise assessment to establish the most suitable plant area and allow for indicative plant selection.

2.0 Objectives

To establish the existing noise levels by means of fully automated noise monitoring over a period of up to 24 hours.

To present plant noise emission criteria and survey results, based upon the requirements of the Local Authority.

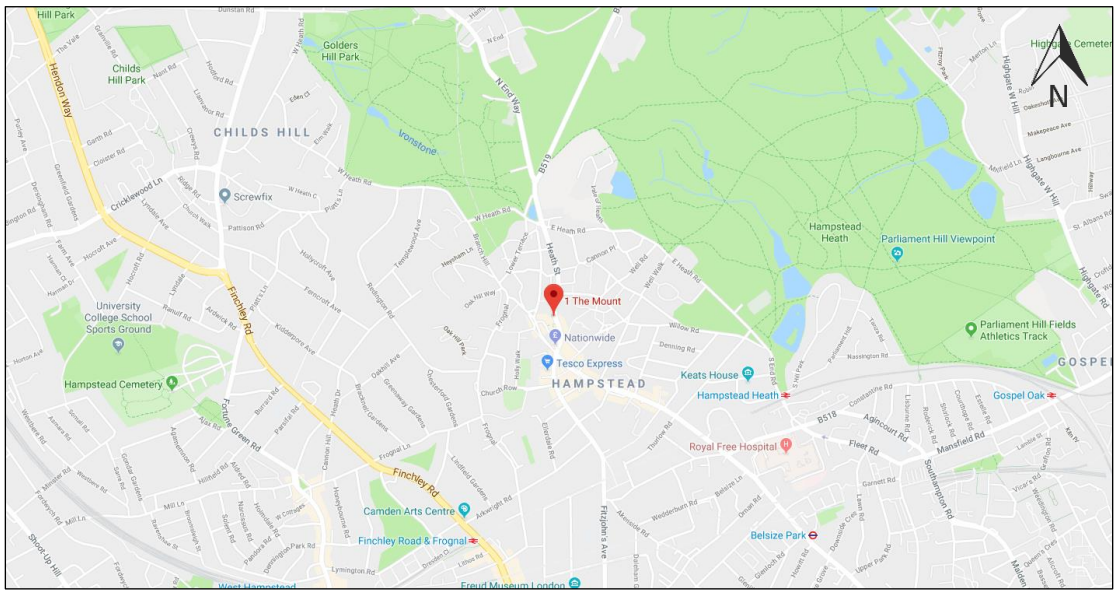
To assess the noise emissions from the proposed plant based upon data with which we are provided, and comment upon the acceptability.

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

3.0 Site Description

3.1 Location

The site is located on The Mount, just off Heath Street. The location is shown in the Location Map below.



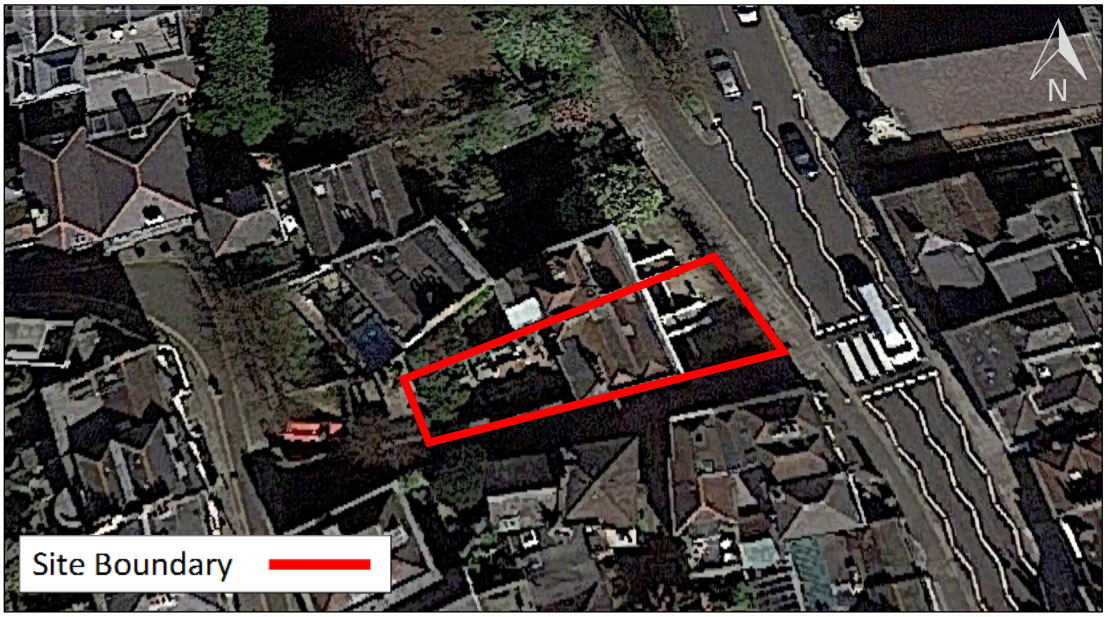
Location Map (Map Data ©2018 Google)

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

3.2 Description

The site is a ground plus two storey building with a lower ground level. The building lies at the junction between The Mount and Heath Road. Surrounding properties are a mix of residential and commercial.

The site is shown in the Site Plan below.



Site Plan (©2018 The GeoInformation Group)

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 proposal comprises the installation of the plant detailed in Section 11 of this report.

5.2 Operating Hours

We understand that the operating hours of the proposed plant are as detailed in Section 11 of this report.

5.3 Drawings

Our acoustic analyses is based on the following drawings provided by BB Partnership Ltd.

Reference	Title	Date
FWG_104	Proposed Front & Rear Elevation	Apr 18
FWG_101	Site Location Map & Layout Plan	Jun 18

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. 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."

That vision is supported by the following aims which are reflected in three of the four aims for planning policies and decisions in paragraph 123 of the NPPF (see paragraph 8.2 (b) below):

"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 acknowledge 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 aims listed in paragraph (b) 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 National Planning Policy Framework (NPPF) was published in March 2012 and replaced the previous national planning guidance document Planning Policy Guidance 24: *Planning and Noise* (PPG24).

The main reference to noise within the NPPF is at paragraph 123, reproduced below:

> *"123. Planning policies and decisions should aim to:*
>
> - *Avoid noise from giving rise to significant adverse impacts[27] on health and quality of life as a result of new development;*
> - *Mitigate and reduce to a minimum other adverse impacts[27] on health and quality of life arising from noise from new development, including through the use of conditions;*
> - *Recognise that development will often create some noise and existing*

businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established;[28] and

- *Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

The reference numbers 27 and 28 point respectively to the Explanatory Note to the NPSE and the provisions of the Environmental Protection Act 1990 *"and other relevant law".*

The spirit of the Localism Act and the NPPF would suggest that of the guidelines cited, it is guidelines adopted as policy by the Local Planning Authority (if such exist) that should prevail, at least until the Government publishes relevant technical guidance under the NPPF.

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	Significant Observed Adverse Effect	Avoid

	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.		
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 The 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)."

6.5 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".*

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.

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.

7.0 Survey Methodology

The survey was undertaken by Robin Honey BA(Hons), MIOA.

7.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 12:15 hours on 7 June 2018 to 15:15 hours on 8 June 2018.

During the periods we were on site the wind conditions were calm. The sky was generally clear. We understand that generally throughout the survey period the weather conditions were similar. 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 2 positions as described in the table below.

Position No	Description
1	The microphone was mounted to a pole protruding from a first floor window at the front of the site.
2	The microphone was fixed to a pole at the rear of the site, approximately 2m above ground level.

Plan Showing Measurement Positions (©2018 The GeoInformation Group)

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 ½" Condenser Microphone	PCB	377B02	122885	Calibration on 16/05/2017
Position 1 Type 1 Preamp	Larson Davis	PRM902	3692	Calibration on 16/05/2017
Position 1 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3444	Calibration on 16/05/2017
Position 2 Type 1 ½" Condenser Microphone	PCB	377B02	105093	Calibration on 21/03/2018
Position 2 Type 1 Preamp	Larson Davis	PRM902	4005	Calibration on 21/03/2018
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3542	Calibration on 21/03/2018

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 0.1dB).

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 25678/TH1 and 25678/TH2 enclosed, presenting the 15 minute A-weighted (dBA) L_{90} and L_{eq} noise levels at each measurement position throughout the duration of the survey.

The most common (modal) $L_{A90\ (15\ min)}$ measurements recorded during the survey are presented in the table below:

Position	Modal Measured $L_{A90(15min)}$ Background Noise Level (dB re 2 x 10^{-5} Pa)	
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours
1	59dBA	34dBA
2	43dBA	32dBA

9.0 Discussion Of Noise Climate

During the periods we were on site the dominant noise source was noted to be local traffic noise.

10.0 Plant Noise Emission Criteria

On the basis of the aforementioned acoustic standards and guidance, together with 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 residential window with all plant operating simultaneously.

Plant Noise Emission Criteria (dB re 2x10-5 Pa)	
Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)
33dBA	22dBA

The above criteria are to be achieved with all plant operating simultaneously.

If plant contains tonal or impulsive characteristics the external design criteria should be reduced by 5dBA.

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 one Daikin RXY5Q10TY1 condenser.

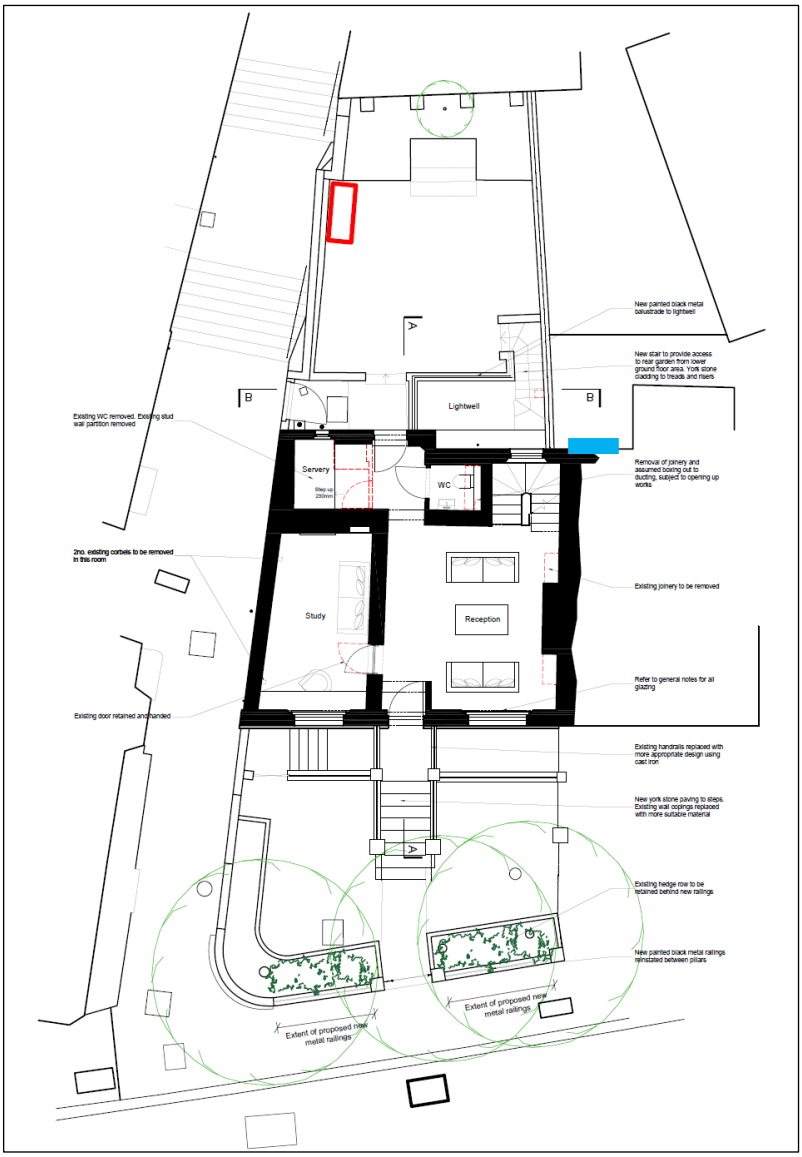
11.1 Plant Noise Data

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

Plant Description	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at 1 metre at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
RXY5Q10TY1	65	57	54	53	50	46	41	33	55

11.2 Location of Plant

The proposed plant area is marked in red on the plan below. The nearest noise sensitive window is in the adjacent property, marked in blue on the plan below.



Plan showing proposed plant area and nearest noise sensitive window.

11.3 Plant Noise Impact Assessment

We understand that the proposed unit will be operational during daytime and night-time hours.

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

	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
RXY5Q10TY1 Sound Pressure Level at 1m	65	57	54	53	50	46	41	33	55
12dB Acoustic Enclosure	-12	-12	-12	-12	-12	-12	-12	-12	-
Barrier Loss (ISO 9613-2) from wall	-5	-5	-4	-4	-3	-1	0	0	-
Distance Loss (1m to 10.6m)	-21	-21	-21	-21	-21	-21	-21	-21	-
Façade Reflection	+3	+3	+3	+3	+3	+3	+3	+3	-
Calculated Noise Level at Receptor	**30**	**22**	**20**	**19**	**17**	**15**	**11**	**3**	**22**

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 8.0.

11.4 Mitigation Measures

In order to control plant noise emissions in line with the proposed criterion, we recommend the plant is installed in an enclosure with a sound reduction of at least 12dB.

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 window.

The assessment indicates that the proposed plant, in conjunction with the proposed attenuation, an enclosure with a sound reduction of at least 12dB, should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive 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.

$L_{90,T}$ — L_{90} 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).

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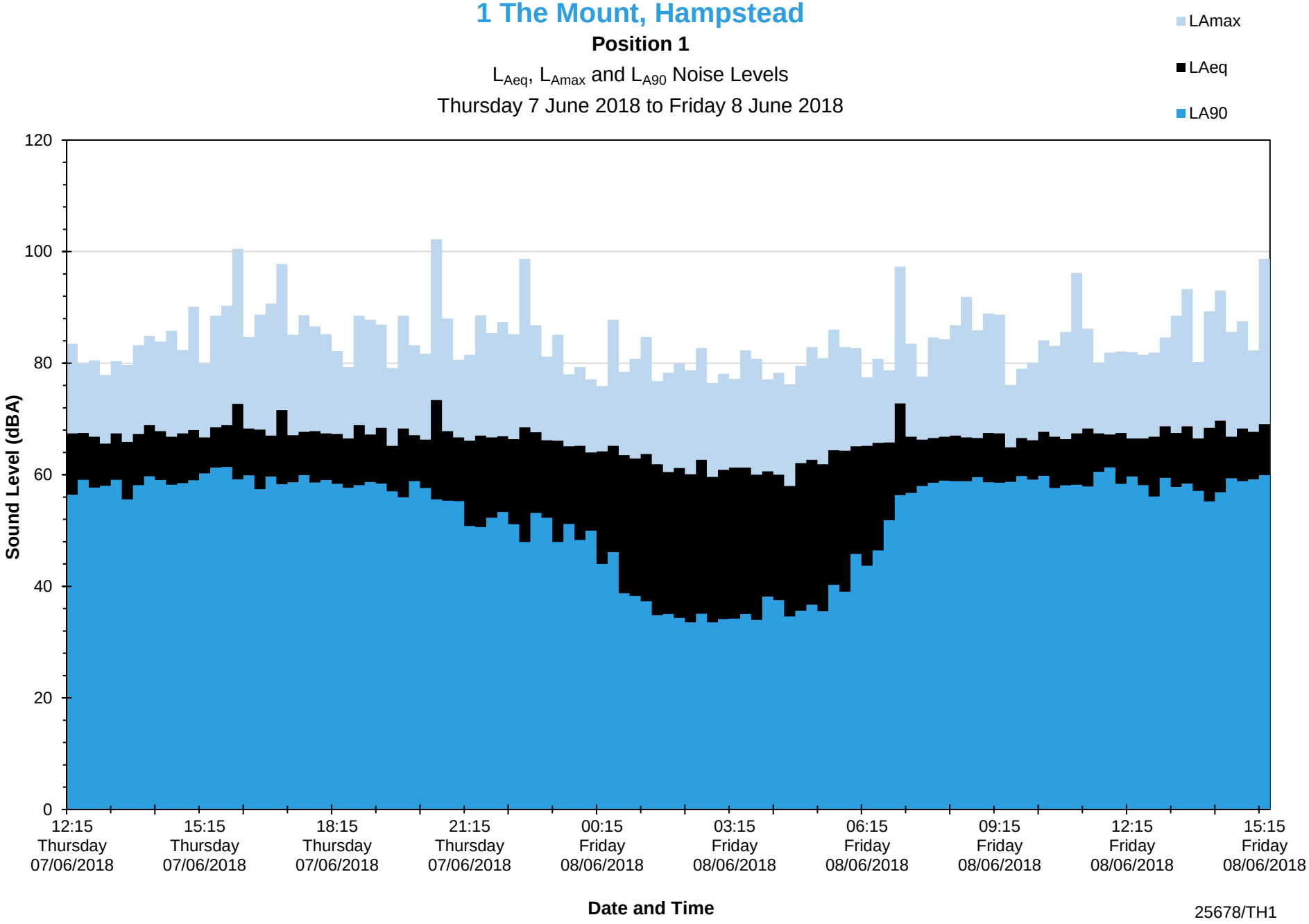
Position 1

L_{Aeq}, L_{Amax} and L_{A90} Noise Levels

Thursday 7 June 2018 to Friday 8 June 2018



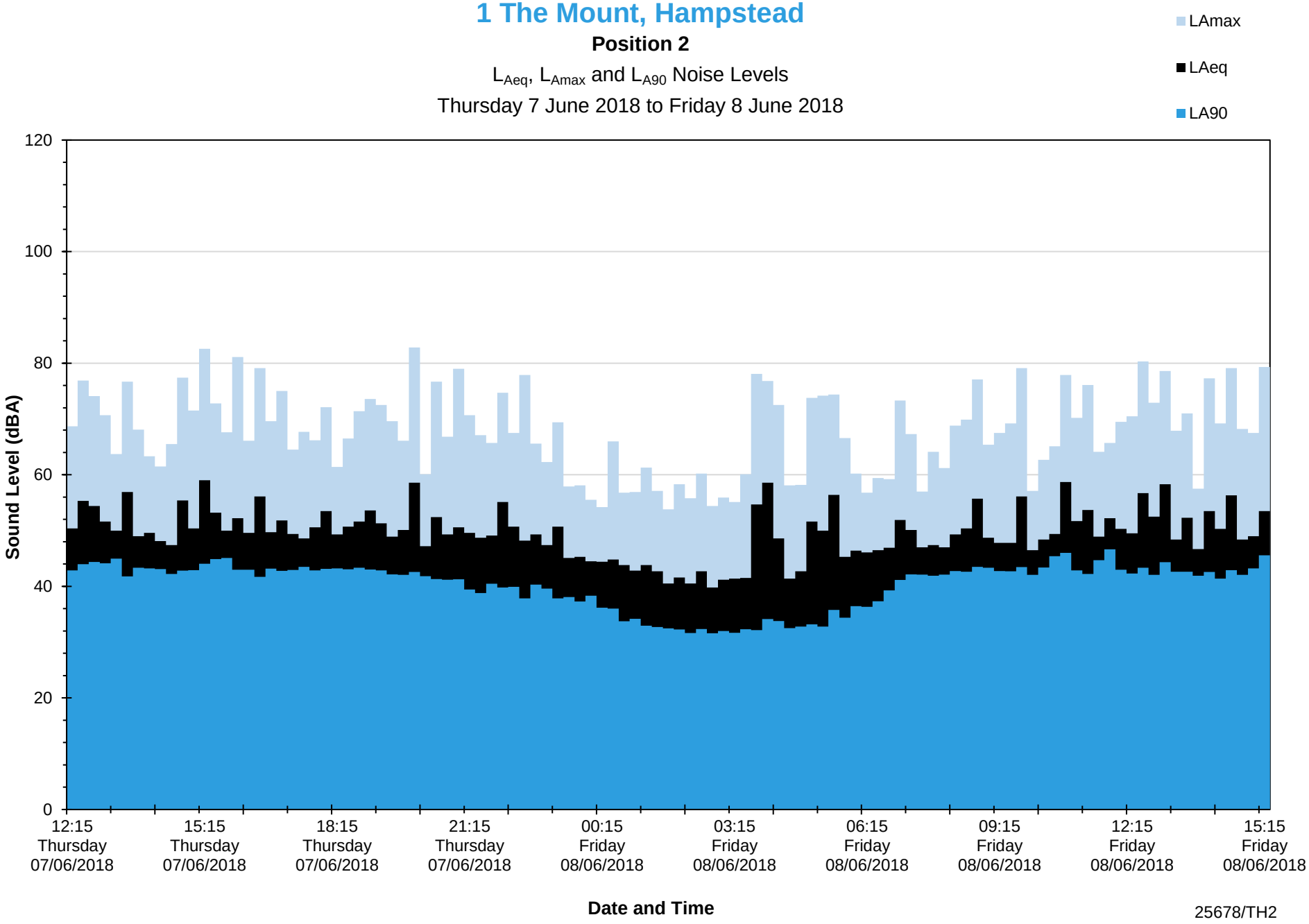
25678/TH1

1 The Mount, Hampstead

Position 2

L_{Aeq}, L_{Amax} and L_{A90} Noise Levels

Thursday 7 June 2018 to Friday 8 June 2018



25678/TH2