41-45 Neal Street
London
1st to 3rd Floor Office Spaces

Environmental Noise Survey and Plant Noise Assessment Report

24230/PNA4/Rev3

02 May 2019

For:
Shaftesbury Covent Garden Ltd
c/o Fresson & Tee
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Hann Tucker Associates

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Document Control

Rev	Date	Comment	Prepared by	Authorised by
0	15/04/2019	-	Giovanni De Rienzo Senior Consultant BSc(Hons), AMIOA	Gareth Evans Associate BSc(Hons), MIOA
1	26/04/2019	Changes made following comments from Fresson and Tee	Giovanni De Rienzo Senior Consultant BSc(Hons), AMIOA	Gareth Evans Associate BSc(Hons), MIOA
2	26/04/2019	Minor changes	Giovanni De Rienzo Senior Consultant BSc(Hons), AMIOA	Gareth Evans Associate BSc(Hons), MIOA
3	02/05/2019	Changes made following comments from Rolfe Judd	 Giovanni De Rienzo Senior Consultant BSc(Hons), AMIOA	 Gareth Evans Associate BSc(Hons), MIOA

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1.0 Introduction

New items of plant are proposed to be installed at 41-45 Neal Street, London, to serve the 1st to 3rd floor office units.

Hann Tucker Associates have therefore been instructed to undertake an environmental noise survey and plant noise assessment to determine the impact of the new plant items on nearby noise sensitive premises in line with Local Authority requirements.

2.0 Objectives

To establish the existing noise levels by means of fully automated noise monitoring over a period of approximately 24 hours at a single secure and accessible position.

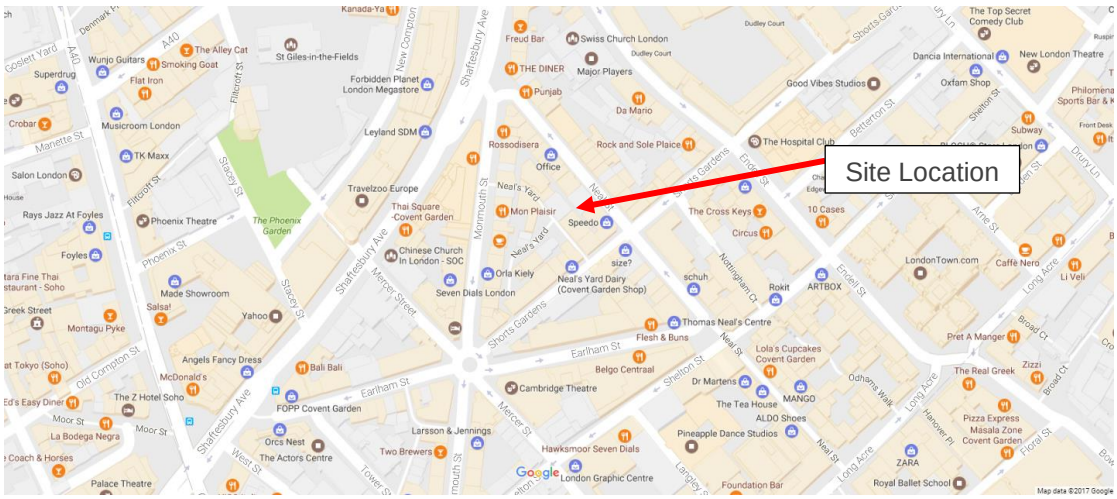
To assess the noise emissions from the proposed plant, based upon data with which we are provided, and comment upon the acceptability.

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

3.0 Site Description

3.1 Location

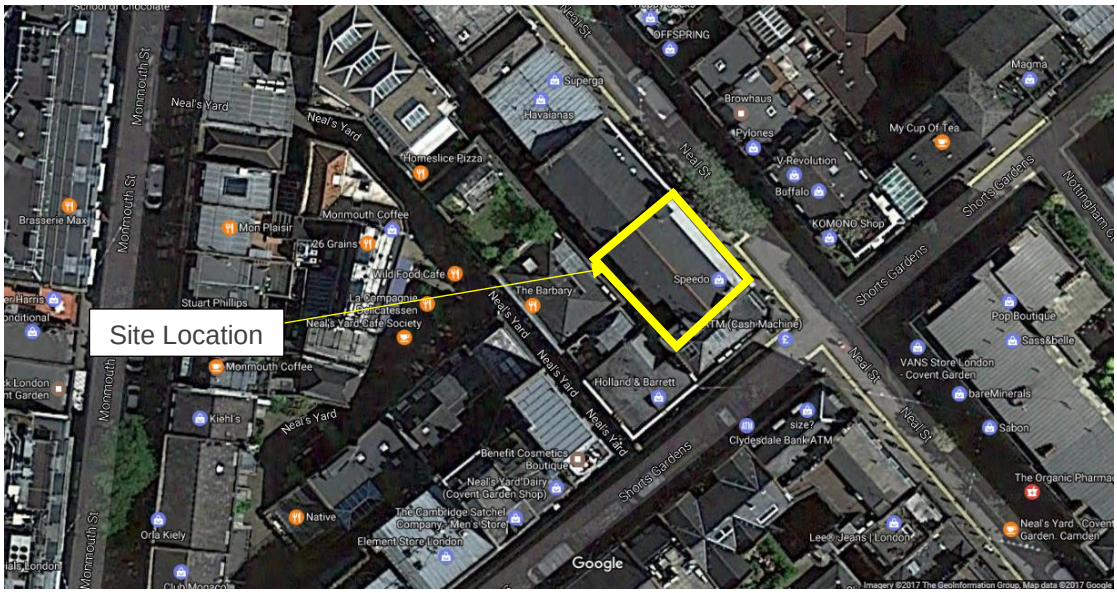
The site is located at 41-45 Neal Street, and falls within the jurisdiction of London Borough of Camden. The location is shown in the Location Map below.



Location Map (maps.google.co.uk)

3.2 Description

41-45 Neal Street is a basement, ground plus 3 storey building located in London Borough of Camden. The surrounding area is predominantly made up residential, office, and retail units. The site is shown in the Site Plan below.



Site Plan (maps.google.co.uk)

4.0 Acoustic Terminology

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

5.0 Survey Methodology

The survey was undertaken by G. De Rienzo BSc(Hons) AMIOA.

5.1 Procedure

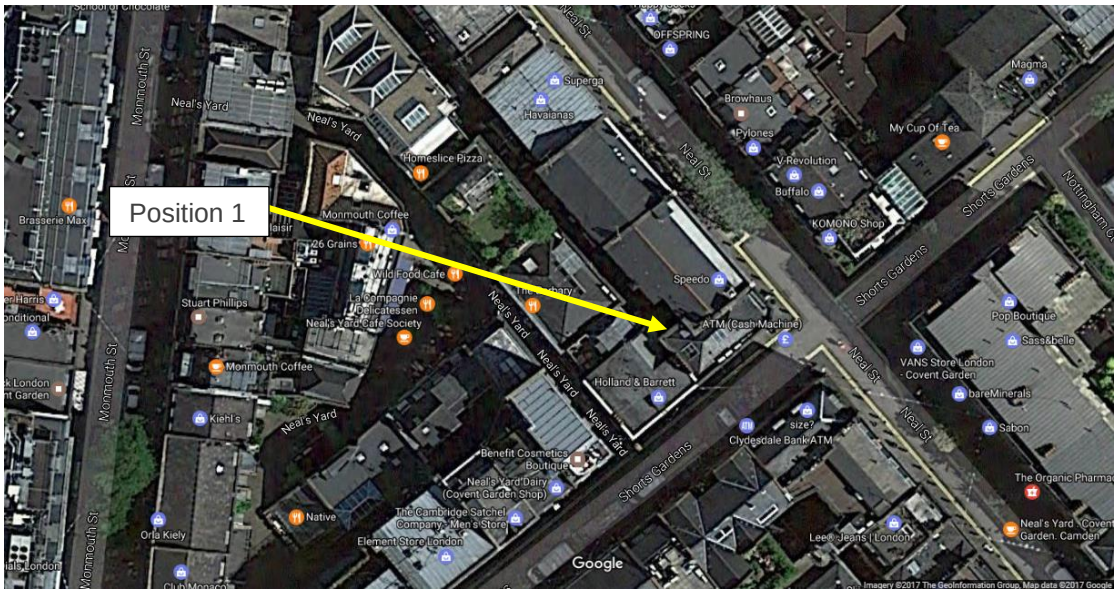
Fully automated environmental noise monitoring was undertaken from approximately 11:00 hours on 20 March 2019, to 11:00 hours on 21 March 2019.

During the periods we were on site the wind conditions were moderate. The sky was generally clear and there was no rain during the survey. We understand that generally throughout the survey period the weather conditions were similar to this. 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.

5.2 Measurement Position

The noise level measurements were undertaken at a single position at the rear of 39 Neal Street which best represents the nearest noise sensitive receivers to the proposed plant locations. The microphone was located outside the 3rd floor rear facing window and was attached to a telescopic pole.



Plan Showing Measurement Position (maps.google.co.uk)

5.3 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	71839	Calibration on 27/09/2018
Preamp	Svantek	SV18	75733	Calibration on 27/09/2018
Type 1 Data Logging Sound Level Meter	Svantek	971	74368	Calibration on 27/09/2018
Type 1 Calibrator	Larson Davis	CAL200	3082	Calibration on 08/08/2018

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

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.

6.0 Results

The results have been plotted on Time History Graph 24230/TH2 enclosed, presenting the 15 minute A-weighted (dBA) L_{90}, L_{eq} and L_{max} noise levels at the measurement position throughout the duration of the survey.

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

Representative 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**	**24 Hours**
49 dBA	47 dBA	47 dBA

7.0 Discussion of Noise Climate

During the periods we were on site the dominant noise sources were noted to be existing plant at the rear of the building and distant road traffic.

8.0 Plant Noise Emission Criteria

8.1 Local Authority Criteria

41-45 Neal Street falls within the London Borough of Camden. Camden's advice 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)."

8.2 Definition of Tonal Plant

Annex C of BS 4142 provides the following objective methodology for identifying a distinctive tone in a noise source:

"For a prominent, discrete tone to be identified as present, the time-averaged sound pressure level in the one-third-octave band of interest is required to exceed the time-averaged sound pressure levels of both adjacent one-third-octave bands by some constant level difference.

The level differences between adjacent one-third-octave bands that identify a tone are:

- *15 dB in the low-frequency one-third-octave bands (25 Hz to 125 Hz);*

- *8 dB in the middle-frequency one-third-octave bands (160 Hz to 400 Hz);*

and

- *5 dB in the high-frequency one-third-octave bands (500 Hz to 10 000 Hz)."*

8.3 Proposed Criteria

In order to meet the above advice, noise emissions from the proposed plant should not exceed a level of 10dB below the lowest measured $L_{A90(15min)}$. Therefore, based on the results of the noise survey and the advice above, we would recommend the following plant noise emission levels should be achieved with all plant running simultaneously at 1m external to the nearest noise sensitive façade.

Plant Noise Emission Criteria (dBA re:2x10^{-5}Pa)		
Daytime (07:00 – 23:00 hours)	**Night-time (23:00 – 07:00 hours)**	**24 Hours**
39 dBA	37 dBA	37 dBA

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.

9.0 Plant Noise Impact Assessment

We understand the proposed plant comprises the following:

Plant Description	Location	Qty	Plant Make	Model Number
Condenser Unit	Sunken Middle Roof Area	3	Mitsubishi	PUMY-SP140VKMR1
Condenser Unit	Roof Parapet Area	3	TBC	TBC

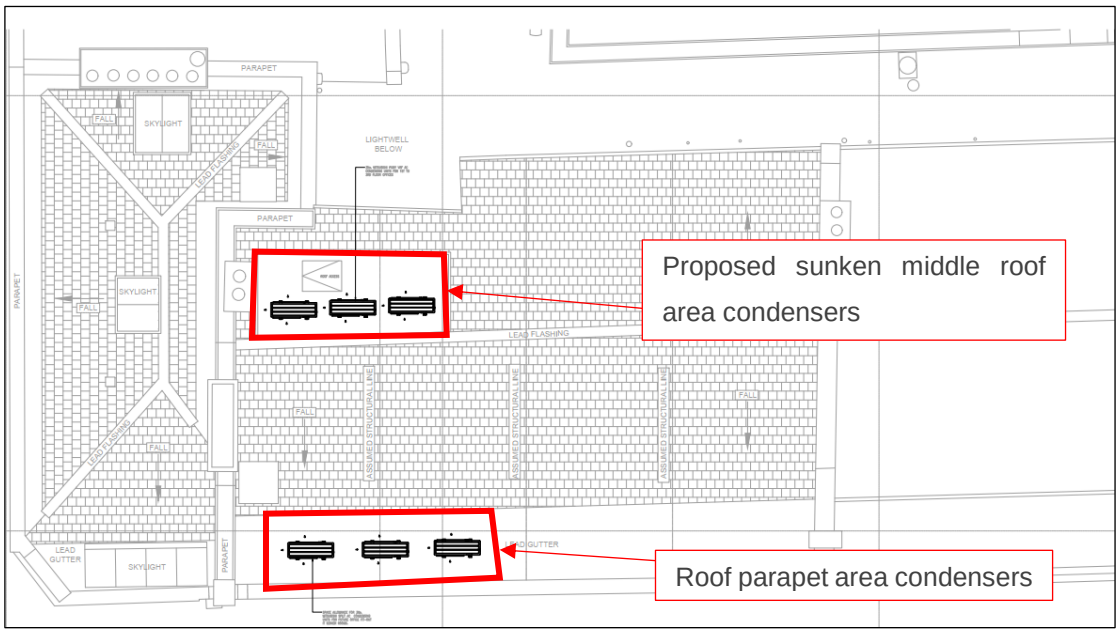
9.1 Plant Noise Data

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	
PUMY-SP140VKMR1 Worst Case - Heating	62	58	56	54	52	47	41	33	56

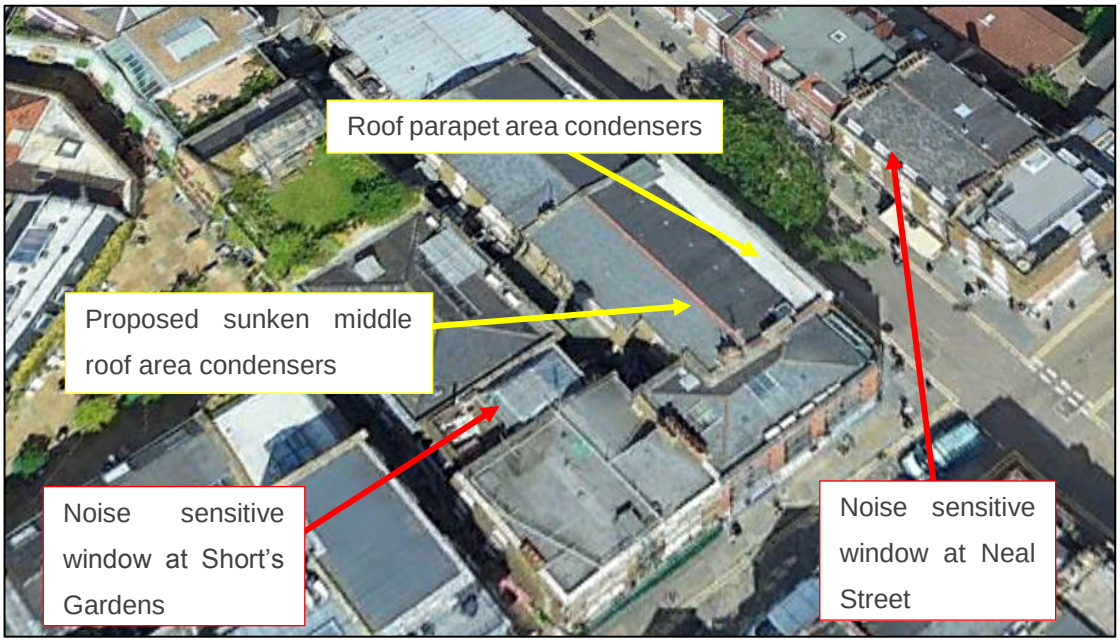
9.2 Location of Plant and Nearest Noise Sensitive Windows

Condensers serving the office spaces are to be located within the proposed sunken middle roof area, and the roof parapet area as shown below.



Drawing provided by Fresson & Tee

The nearest noise sensitive residential windows are located on Neal Street and at Short's Gardens as shown below.



Plan showing plant and nearest noise sensitive window location (maps.google.co.uk)

9.3 Plant Noise Impact Assessment

We understand that the proposed units will be operational during daytime hours only.

The following tables summarise our predictions of atmospheric noise emissions from the plant location to the nearest noise sensitive residential window.

9.3.1 Assessment to Neal Street Window

	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Cumulative Noise Level for 3No. PUMY-SP140VKMR1 at 1m	67	63	61	59	57	52	46	38	61
Hemispherical Distance Correction	-25	-25	-25	-25	-25	-25	-25	-25	
Façade Screening from Sunken Roof	-5	-5	-6	-6	-8	-9	-12	-14	
Façade Reflection	+3	+3	+3	+3	+3	+3	+3	+3	
Calculated Noise Level at Receptor	40	36	33	31	27	21	12	2	32

Middle Roof Section Assessment

Our calculations indicate that the proposed plant should be capable of achieving the requirements of the Local Authority outlined in Section 8.1.

9.3.2 Assessment to Short's Gardens Window

	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Cumulative Noise Level for 3No. PUMY-SP140VKMR1 at 1m	67	63	61	59	57	52	46	38	61
Hemispherical Distance Correction	-21	-21	-21	-21	-21	-21	-21	-21	
Façade Screening from Sunken Roof and Existing Building Fabric	-6	-7	-9	-11	-13	-16	-20	-24	
Directionality	-5	-7	-7	-7	-7	-7	-7	-7	
Façade Reflection	+3	+3	+3	+3	+3	+3	+3	+3	
Calculated Noise Level at Receptor	38	31	27	23	19	11	1	-11	25

Middle Roof Section Assessment

Our calculations indicate that the proposed plant should be capable of achieving the requirements of the Local Authority outlined in Section 8.1.

9.3.3 Limiting Noise Levels for Roof Parapet Condensers

In order that the plant noise emission criteria set out in Section 8.1 are achieved, the following limiting sound pressure levels should not be exceeded when measured at 1 metre in any direction on-site from all 3No. condenser units running simultaneously.

Unit	Liming A-weighted sound pressure level at 1 metre
Roof Parapet Condensers (Cumulative)	55 dB

If plant contains tonal or impulsive characteristics the limiting noise levels shown above should be reduced by 5dBA.

10.0 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 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).

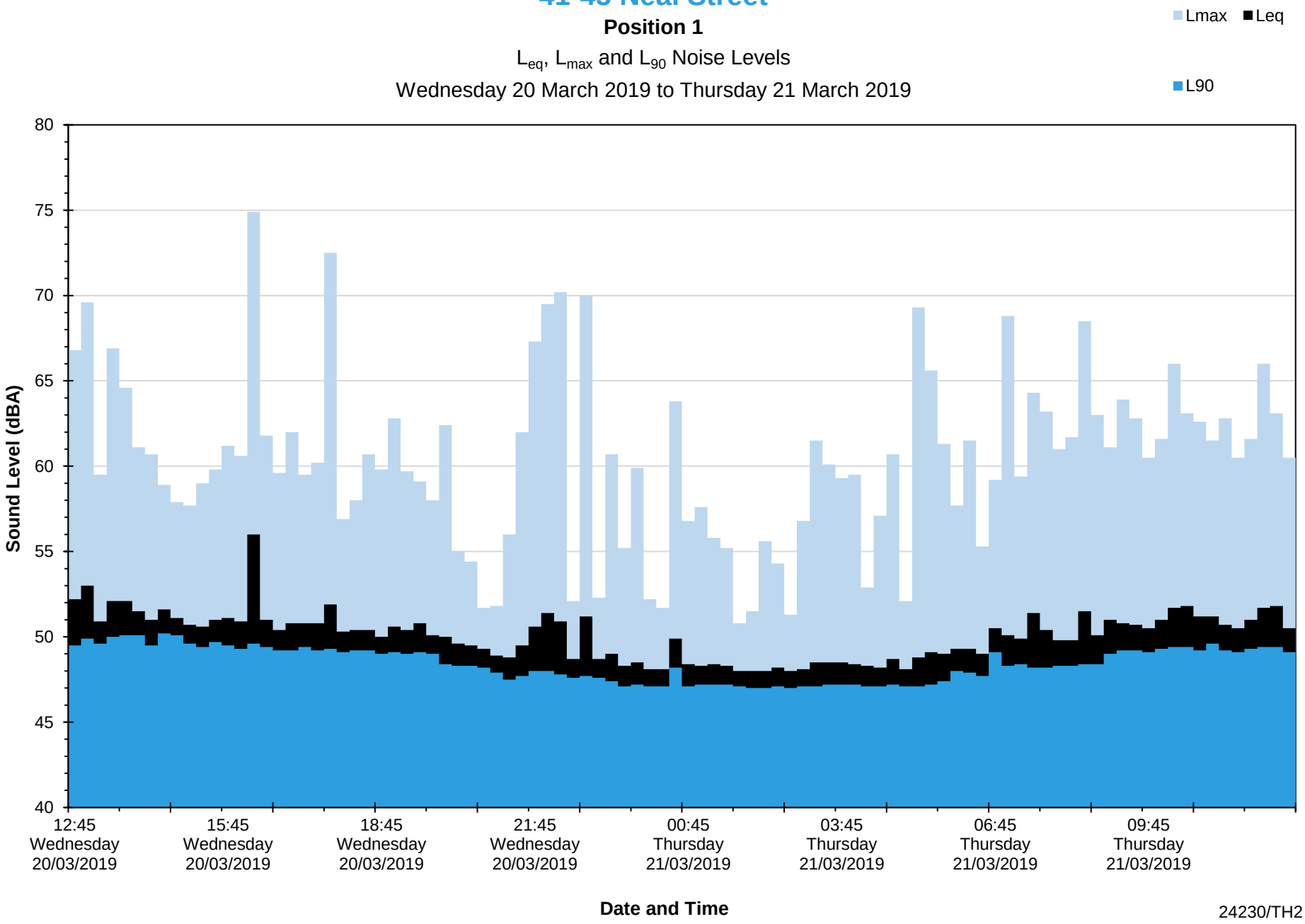
Sound Power Level (SWL or L_w) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

41-45 Neal Street

Position 1

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

Wednesday 20 March 2019 to Thursday 21 March 2019



24230/TH2