32/33 Torrington Square London

Environmental Noise Survey and Plant Noise Assessment Report

23591/PNA1

21 March 2019

For:
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Document Control

Rev	Date	Comment	Prepared by	Authorised by
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Contents

Attachments

1.0 Introduction

The proposed redevelopment of 32 Torrington Square is underway. As part of development works an annexe is proposed on the vacant site to the north of 32 Torrington Square (33 Torrington Square).

Hann Tucker Associates have therefore been commissioned to undertake an Environmental Noise Survey, provide guidance for plant noise emissions in accordance with the Local Authority's requirements and provide an assessment of the proposed plant in accordance with these requirements.

2.0 Objectives

To establish, by means of detailed daytime and night-time fully manned automated environmental noise monitoring, the existing A-weighted (dBA) L_{90}, L_{eq} and L_{max} environmental noise levels at 2No. accessible positions at the site, thought to be representative of the nearest affected properties.

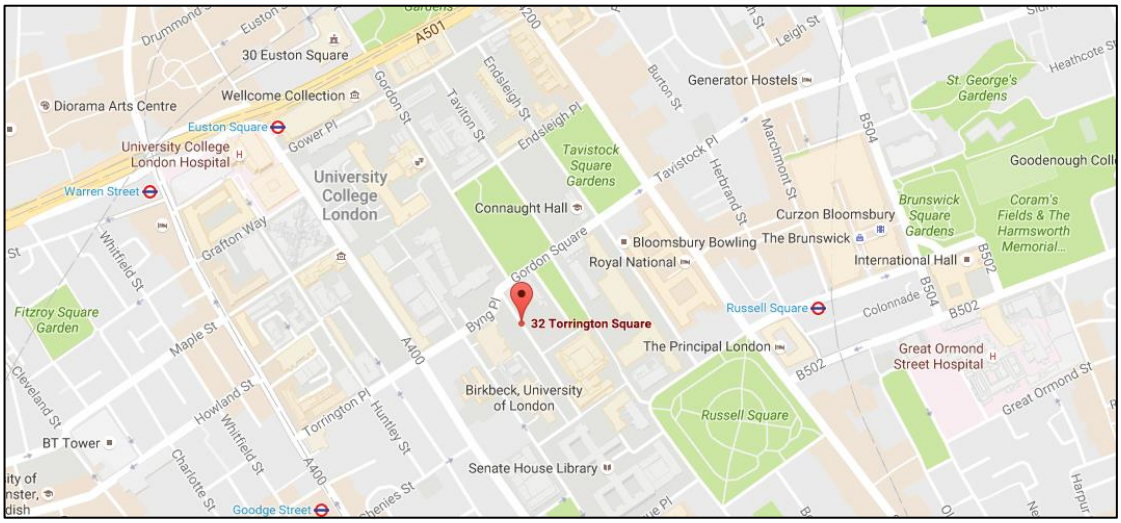
Based on the results of the noise survey and in conjunction with the Local Authority, to recommend suitable plant noise emission criteria.

To assess the proposed plant with respect to Local Authority requirements and advise on mitigation measures, if required.

3.0 Site Description

3.1 Location

The site is located at 32 Torrington Square, London WC1E 7JL. The location is shown in the Location Map below.

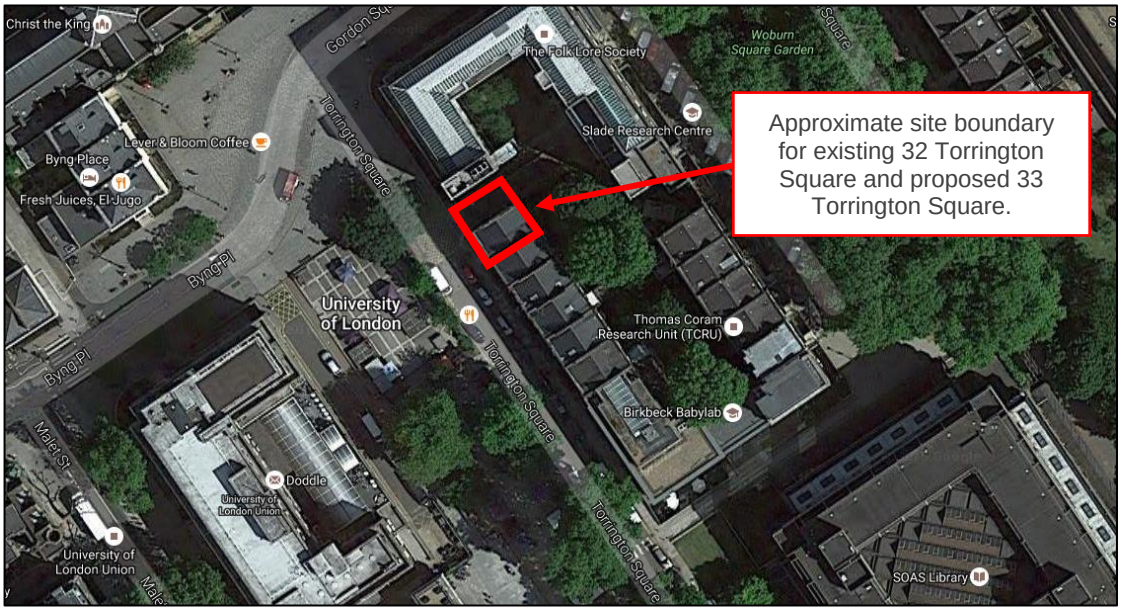


Location Map (Map Data © 2016 Google)

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

3.2 Description

The site is bound by the Worburg Institute to the north and Torrington Square to the west. The site overlooks a large open area just to the south of Byng Place, which is used on a weekly basis for the Bloomsbury Farmer's Market. There are buildings of academic use on all sides and no known residential properties in close proximity to the site. The site is shown in the Site Plan below.



Site Plan (Imagery © 2016 Bluesky, DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, Map Data © 2016 Google.)

4.0 Acoustic Terminology

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

5.0 Methodology

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

5.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 13:00 hours on Friday 18 November 2016 to 13:00 hours on Monday 21 November 2016.

During the periods we were on site the wind conditions were moderate and the sky was generally overcast. 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.

5.2 Measurement Positions

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

Position No	Description
1	The sound level meter was located at first floor level at the front of the property. The microphone was mounted on a pole and attached to the scaffold, approximately 3m above ground level and greater than 1m from the façade.
2	The sound level meter was located at third floor level at the rear of the property. The microphone was mounted on a pole protruding out of the window, approximately 10m above ground level and just less than 1m from the façade.

The positions are shown on the plan below.

Plan Showing Unmanned Measurement Positions (Imagery © 2016 Bluesky, DigitalGlobe, Getmapping plc, Infoterra Ltd & Bluesky, Map Data © 2016 Google.)

5.3 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	Larson Davis	824	3701	HT calibration on 06/01/2016
Position 1 Type 1 ½" Condenser Microphone	Larson Davis	2541	8523	HT calibration on 06/01/2016
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3541	HT calibration on 06/01/2016
Position 2 Type 1 ½" Condenser Microphone	PCB	377B02	139312	HT calibration on 06/01/2016
Type 1 Calibrator	Larson Davis	CAL200	3082	LD calibration on 09/06/2016

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

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.

6.0 Results

The results have been plotted on Time History Graphs 23591/TH1.1 to 23591/TH1.2 enclosed presenting the 15 minute A-weighted (dBA) L_{90}, L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

The following table presents the modal L_{A90} background noise levels during the survey:

Position	Modal Measured L_{A90} 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
1	50	48	48
2	48	45	45

7.0 Discussion Of Noise Climate

During the periods we were on site the dominant noise source was noted to be road traffic and mild construction noise from Byng Place.

8.0 Plant Noise Emission Criteria

The site lies within the London borough of Camden's jurisdiction. We understand from correspondence with Camden that their advice regarding criteria for atmospheric noise emissions from building service plant is as follows:

> *"In this particular case, based on the information you have provided, the development should be designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (LA90) level at the nearest noise sensitive location. As long as the typical background is representative of the range of values measured, please feel free to use the mode."*

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 location.

Position	Plant Noise Emission Criteria (dB re $2x10^{-5}$ Pa)		
	Daytime (07:00 – 23:00) Hours	Night-Time (23:00 – 07:00) Hours	24 Hours
1	45	43	43
2	43	40	40

The above criteria are to be achieved with all of the proposed 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 following external plant is proposed to be located at roof level.

Quantity	Description	Manufacturer/model
1	Air Handling Unit	DencoHappel Ref 132753
1	Condenser	Mitsubishi PURY P200 YLM
1	Condenser	Mitsubishi PURY P300 YLM
2	Condenser	Mitsubishi PUHZ-ZRP50KVA

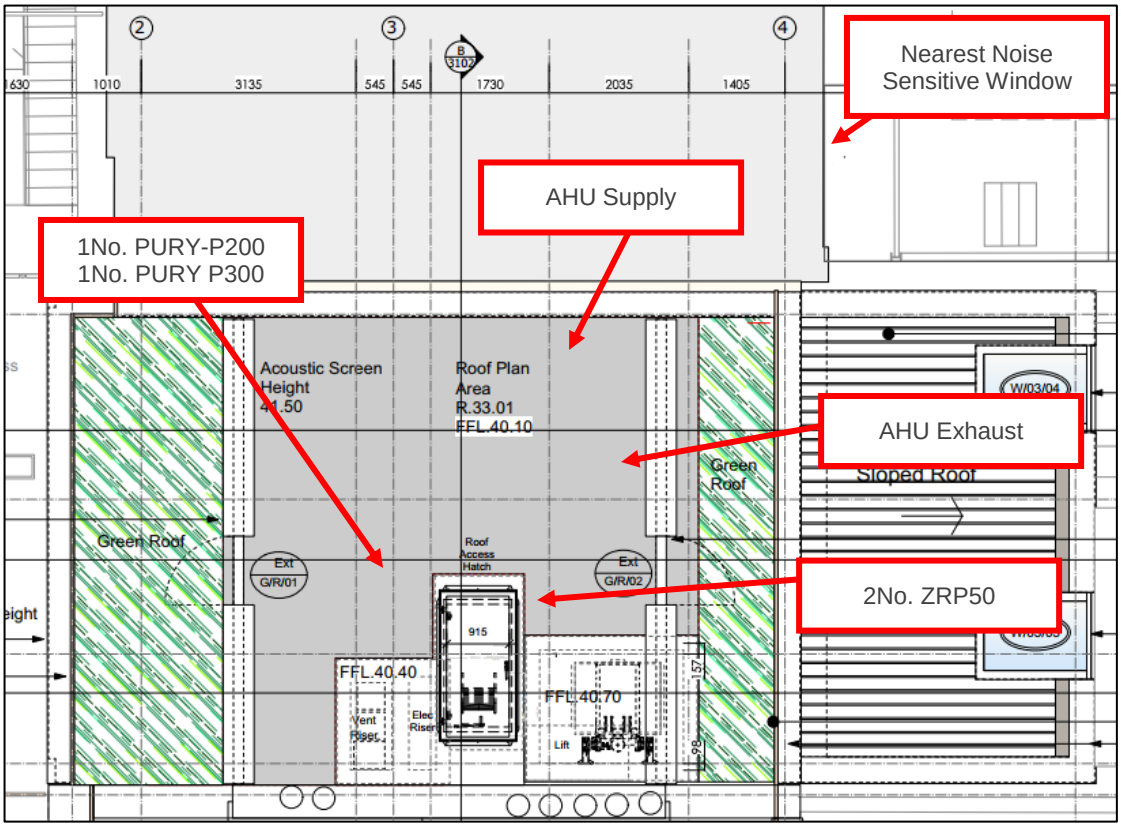
9.1 Plant Noise Data

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

Plant Description	Sound Level at 1 metre at Octave Band Centre Frequency (Hz)								dB/ dBA
	63	125	250	500	1k	2k	4k	8k	
AHU In-Duct SWL (Atmospheric Supply)	76	74	72	71	71	69	72	67	81 dB
AHU In-Duct SWL (Atmospheric Extract)	70	70	79	76	78	77	72	73	85 dB
Mitsubishi PURY P200 YLM (SPL at 1m)	75	65	62	58	51	45	39	33	59 dBA
Mitsubishi PURY P300 YLM (SPL at 1m)	74	69	65	62	56	48	41	37	63 dBA
Mitsubishi PUHZ-ZRP50KVA (SPL at 1m)	62	52	49	45	38	32	26	20	46 dBA

9.2 Location of Plant

We have annotated the drawing below, provided by Bisset Adams, to show the approximate location of the proposed plant.



9.3 Mitigation Measures

We propose the following mitigation measures for atmospheric noise:

- AHU Intake and Exhaust in-duct attenuation as per the table below.
- The louvered screens at the front and rear of the plant area should be uprated to solid imperforate screens constructed of materials comprising a minimum mass per unit area of 10kg/m^2. They should each extend to a height at least 500mm above the tallest item of plant (when mounted on anti-vibration mounts).

As per the above, we propose the following in-duct attenuation on the atmospheric side of the AHU:

Description	Minimum Insertion Loss (dB) at Octave Band Centre Frequency (Hz)							
	63	125	250	500	1k	2k	4k	8k
Supply (Atmospheric side)	4	8	14	21	27	27	21	16
Exhaust (Atmospheric side)	5	11	19	29	36	37	29	18

9.4 Plant Noise Impact Assessment

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

	Sound Level at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
AHU Supply Calculated SWL at Grille (SWL)	64	67	68	70	71	69	72	67	77
Proposed Attenuator (See Section 9.3)	-4	-8	-14	-21	-27	-27	-21	-16	
Distance Correction (SWL to SPL)	-25	-25	-25	-25	-25	-25	-25	-25	
Barrier Correction	-8	-9	-11	-14	-17	-20	-20	-20	
Façade Reflection	+3	+3	+3	+3	+3	+3	+3	+3	
Calculated Noise Level at Receptor	30	28	21	13	5	0	9	9	18

	Sound Level at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
AHU Extract Calculated SWL at Grille (SWL)	58	63	75	75	78	77	72	73	83
Proposed Attenuator (See Section 9.3)	-5	-11	-19	-29	-36	-37	-29	-18	
Distance Correction (SWL to SPL)	-24	-24	-24	-24	-24	-24	-24	-24	
Barrier Correction	-8	-9	-12	-14	-17	-20	-20	-20	
Façade Reflection	+3	+3	+3	+3	+3	+3	+3	+3	
Calculated Noise Level at Receptor	24	22	23	11	4	-1	2	14	18

	Sound Pressure Level (dB re 2x10^{-5} Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
PURY-P300 at 1m	74	69	65	62	56	48	41	37	**63**
Distance Correction	-13	-13	-13	-13	-13	-13	-13	-13	
Barrier Correction	-13	-16	-19	-20	-20	-20	-20	-20	
Façade Reflection	+3	+3	+3	+3	+3	+3	+3	+3	
Calculated Noise Level at Receptor	51	43	36	32	26	18	11	7	34

	Sound Pressure Level (dB re 2x10^{-5} Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
PURY-P200 at 1m	75	65	62	58	51	45	39	33	**59**
Distance Correction	-13	-13	-13	-13	-13	-13	-13	-13	
Barrier Correction	-8	-10	-12	-15	-18	-20	-20	-20	
Façade Reflection	+3	+3	+3	+3	+3	+3	+3	+3	
Calculated Noise Level at Receptor	57	45	40	33	23	15	9	3	37

	Sound Pressure Level (dB re 2x10-5 Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
ZRP50 at 1m	62	52	49	45	38	32	26	20	**46**
Distance Correction	-12	-12	-12	-12	-12	-12	-12	-12	
Barrier Correction	-5	-6	-6	-8	-9	-11	-14	-17	
Façade Reflection	+3	+3	+3	+3	+3	+3	+3	+3	
Calculated Noise Level at Receptor	51	40	37	31	23	15	6	-3	33

	Sound Pressure Level (dB re 2x10^{-5} Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
Calculated Cumulative Noise Level at Receptor	59	48	43	37	29	21	15	16	**40**

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 8.0.

10.0 Conclusions

A detailed 72 hour daytime and night-time fully automated environmental noise survey has been undertaken in order to establish the currently prevailing roof level environmental noise climate around the site.

Plant noise emission criteria have been recommended based on the results of the noise survey and in conjunction with the Local Authority.

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, should be capable of achieving the proposed environmental noise criteria at the nearest noise sensitive 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.

L_p — Sound Pressure Level (SPL) 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).

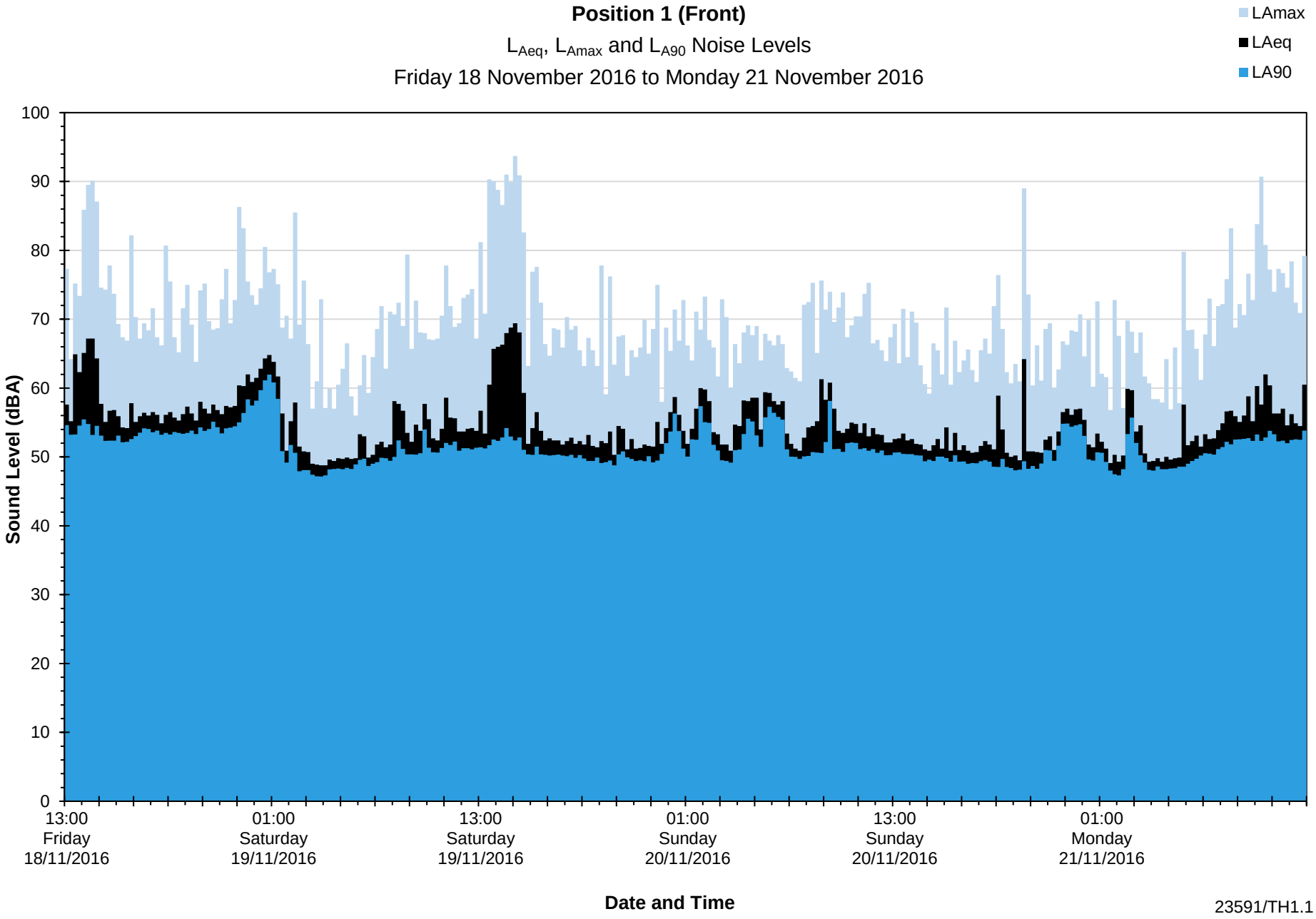
L_w — Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

32 Torrington Square

Position 1 (Front)

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

Friday 18 November 2016 to Monday 21 November 2016



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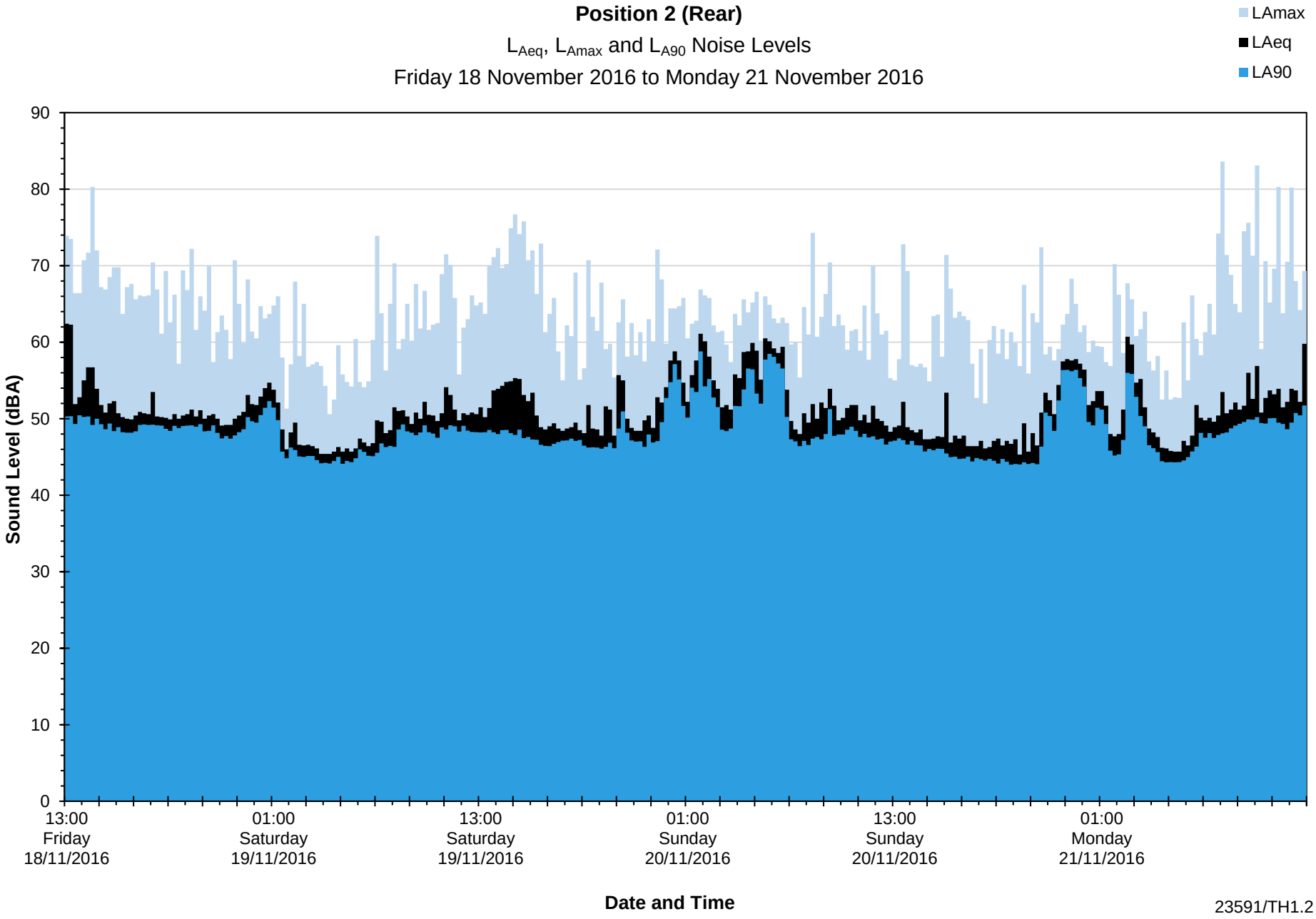
32 Torrington Square

Position 2 (Rear)

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

Friday 18 November 2016 to Monday 21 November 2016



23591/TH1.2