Appendix: Noise and Vibration

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ANNEX 1 – ACOUSTIC TERMINOLOGY

The acoustic terms used in the ES Chapter 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).

Vibration Units

The vibratory motion of a surface can be described by either:

(a) displacement (m),

(b) velocity (m/s), or

(c) acceleration (m/s^2).

Furthermore the vibration magnitude can be quantified in several ways:

peak to peak : This value gives the total excursion of the oscillation about the zero datum. The unit is often used where the vibratory displacement of a component is critical for maximum stress or mechanical clearance calculations.

peak : This value gives the maximum excursion of the oscillation above or below the zero datum. This value is useful for indicating the level of short duration shocks.

r.m.s : This value gives the root mean square of the time history over a specific time interval (time constant). This value is useful for indicating the energy content of the vibration.

dB : Decibel quantities are often encountered. A reference level of 10^{-6} m/s^2 r.m.s is typically used for acceleration.

Vibration Dose Value (V.D.V) ($m/s^{1.75}$)

This value assesses both the magnitude of vibration and its duration. Where possible the vibration dose value should be determined over the full exposure to vibration. It is often estimated from the frequency weighted r.m.s value of the acceleration and its duration and is then referred to as e.V.D.V.

Peak Particle Velocity (PPV)

The maximum value of the amplitude of the vibration velocity time-domain signal that refers to the movement within the ground of molecular particles and not surface movement. The displacement value in mm refers to the movement of particles at the surface (surface movement).

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Euston Tower
Regents Place
London

Environmental Noise Survey Report

29605/ENS1

16 November 2023

For:
British Land Property Management Limited
10 South Crescent
Bloomsbury
London
WC1E 7BD

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Environmental Noise Survey Report 29605/ENS1

Document Control

Rev	Date	Comment	Prepared by	Authorised by
1	16/11/2023	-		
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0	08/12/2022	-	Xiaoyi Li Senior Consultant MSc, BA(Hons), AMIOA	Gareth Evans Director BSc(Hons), MIOA

Hann Tucker Associates

Environmental Noise Survey Report
29605/ENS1

Contents

Attachments

1.0 Introduction

Hann Tucker Associates Limited (Hann Tucker) has been commissioned by British Land Property Management Limited to undertake a environmental noise survey for a site on Euston Road in the London Borough of Camden.

The proposals are for redevelopment of Euston Tower, including the partial retention (retention of existing core, foundations and basement), disassembly, reuse and extension of the existing building, to provide a 32-storey building for use as offices and research and development floorspace (Class E(g)) and office, retail, café and restaurant space (Class E) and learning and community space (Class F) at ground, first and second floors, and associated external terraces.

Our survey methodology and findings are presented herein.

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 noise survey the existing $L_{Amax,}$ L_{Aeq} and L_{A90} environmental noise levels at up to 5No. secure and accessible on-site positions, using fully computerised noise monitoring equipment.

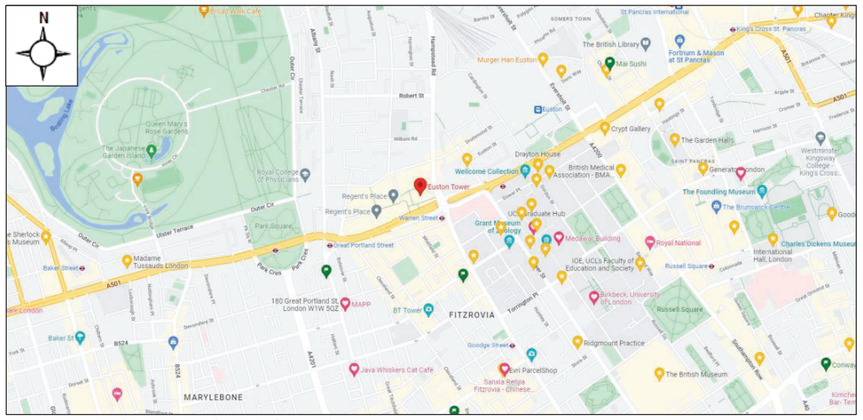
To establish by means of manned critical period noise measurements the existing daytime $L_{Amax,}$ L_{Aeq} and L_{A90} environmental noise levels, along with relevant octave band sound spectra, at suitable street level locations around the site.

To set noise emission limits from the development 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.

3.0 Site Description

3.1 Location

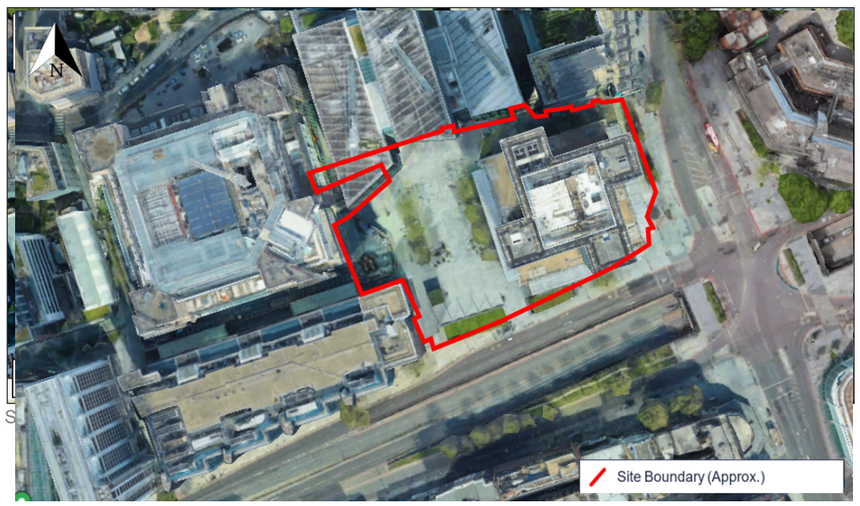
The site is located at 286 Euston Rd, London NW1 3DP. The location is shown in the Location Map below. The site falls within the jurisdiction of London Borough of Camden.

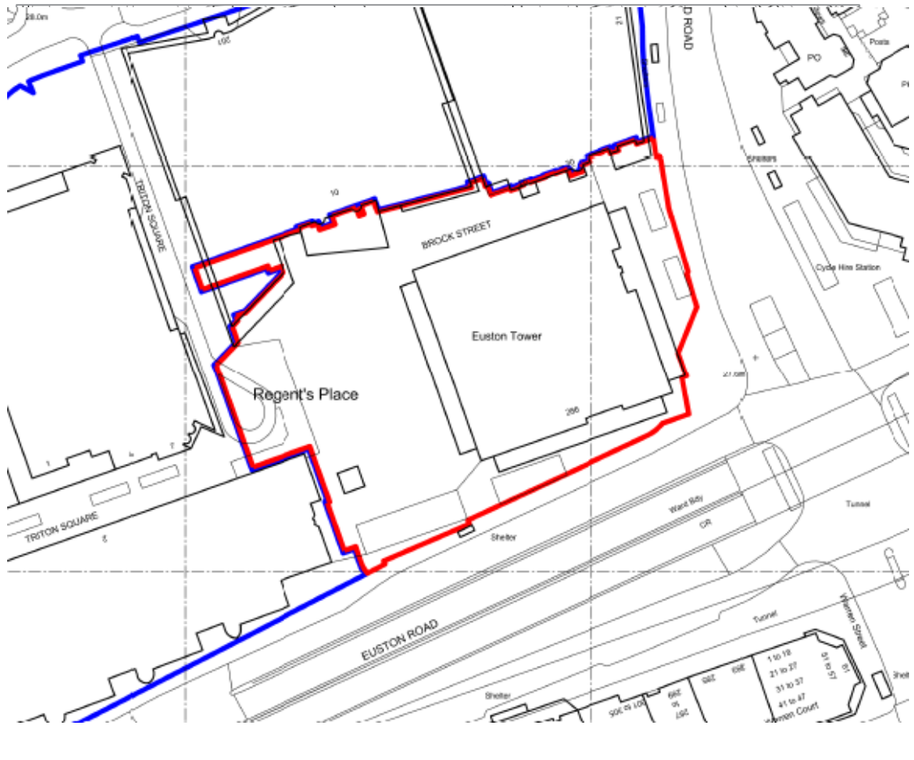


Location Map (Map Data ©2022 Google)

3.2 Description

The site is situated within a mixture of dwellings, offices and hospitals. The site is bound by Euston Road (A501) to the south, Hampstead Road to the east, Brock Street to the north, and Regent's Plaza to the west. The site is shown in the Site Plans below and overleaf.





4.0 Acoustic Terminology

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

5.0 Acoustic Standards and Guidelines

5.1 Noise Policy Statement for England

The Noise Policy Sttement 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.

5.2 National Planning Policy Framework (NPPF)

The following paragraphs are from the NPPF (published Sept 2023):

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."

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

The site lies within the jurisdiction of London Borough of Camden. Camden's planning policy for controlling atmospheric noise emissions from building service plant is detailed in Appendix 3 of Camden Local Plan (adopted in July 2017). See below extraction from the Camden Local Plan.

"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 88dBL_{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."

Section 6.100 of the Camden Local Plan (2017) also sets out requirements for controlling atmosphere noise emissions from emergency building services plant as follows:

"Emergency equipment such as generators which are only to be used for short periods of time will be required to meet the noise criteria of no more than 10dB above the background level (L90 15 minutes). During standby periods, emergency equipment will be required to meet the usual criteria for plant and machinery. Conditions to this effect may be imposed in instances where emergency equipment forms part of the application."

5.5 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".

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 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 $L_{Aeq,8hour}$*

5.8 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 $L_{90(15minutes)}$ 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 Methodology

The survey was undertaken by Xiaoyi Li MSc BA(Hons) AMIOA, Bo Ding PhD, MSc, MIOA and assisted by Stavros Tagios MSc.

6.1 Unmanned Survey

6.1.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 11:00 hours on 8th November 2022 for a period of 5-8 days.

Due to the nature of the survey (i.e unmanned) it is impossible to comment on the conditions throughout the survey. While we were on site the wind conditions were breezy. The sky was generally cloudy. There was moderate rainfall. We understand that throughout the survey period the conditions were similar or calmer/clearer. These conditions are considered suitable to obtain representative results.

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

6.1.2 Instrumentation

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

Pos	Description	Manufacturer	Type	Serial Number	Calibration
1	Type 1 Data Logging Sound Level Meter	Larson Davis	824	3839	Calibration on 05/07/2022
	Type 1 ½" Condenser Microphone	PCB	377B02	106753	Calibration on 05/07/2022
	Preamp	Larson Davis	PRM902	880	Calibration on 05/07/2022
2	Type 1 Data Logging Sound Level Meter	Larson Davis	824	3053	Calibration on 09/08/2022
	Preamp	Larson Davis	PRM902	4157	Calibration on 09/08/2022
	Type 1 ½" Condenser Microphone	PCB	377B07	107417	Calibration on 09/08/2022
3	Type 1 Data Logging Sound Level Meter	Larson Davis	824	3155	Calibration on 12/08/2022
	Type 1 ½" Condenser Microphone	PCB	377B02	107427	Calibration on 12/08/2022
	Preamp	Larson Davis	PRM902	4154	Calibration on 12/08/2022
4	Type 1 Data Logging Sound Level Meter	Larson Davis	824	3700	Calibration on 07/07/2022
	Type 1 ½" Condenser Microphone	PCB	377B02	135744	Calibration on 07/07/2022
	Preamp	PCB	PRM902	4812	Calibration on 07/07/2022
5	Type 1 Data Logging Sound Level Meter	Larson Davis	824	3541	Calibration on 05/11/2021
	Type 1 ½" Condenser Microphone	PCB	377B02	107842	Calibration on 05/11/2021
	Preamp	Larson Davis	PRM902	4199	Calibration on 05/11/2021
-	Type 1 Calibrator	Bruel & Kjaer	4230	1558535	Calibration on 25/07/2022

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).

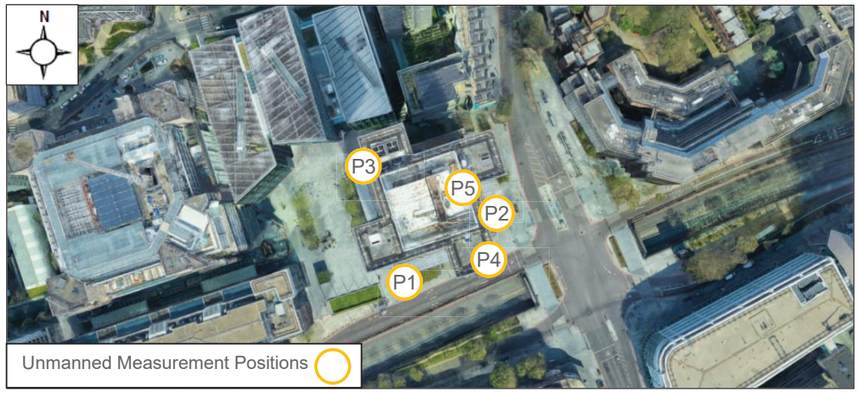
Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with a windshield.

6.1.3 Measurement Positions

The noise level measurements were undertaken at 5No. positions as described in the table below.

Position No	Description
1	The sound level meter was placed on the podium roof. The microphone was attached to a pole fixed along the podium roof edge overlooking Euston Road (A501), approximately 15m from roadside and 8m above ground level.
2	The sound level meter was placed on the podium roof. The microphone was attached to a pole fixed along the podium roof edge overlooking the road junction, approximately 14m from Euston Road, 16m from Hampstead Road and 8m above ground level.
3	The sound level meter was placed on the podium roof. The microphone was attached to a pole fixed along the podium roof edge overlooking Regent's Plaza and Brock Street (pedestrians only/no motor vehicles), approximately 63m from Euston Road, 70m from Hampstead Road and 8m above ground level.
4	The sound level meter was placed on the tower roof. The microphone was attached to a pole fixed along the tower roof edge overlooking nearby road network, approximately 120m above ground level and 1.5m above the roof.
5	The sound level meter was placed on Level 11 East Staircase. The microphone was attached to a pole extruding a window overlooking nearby road network, approximately 40m above ground level and 1m from façade.

The positions are shown on the plan overleaf.



Site Plan Showing Unmanned Measurement Positions (Map Data © 2022 Google)

6.2 Manned Survey

6.2.1 Procedure

Fully manned environmental noise monitoring was undertaken from approximately 13:00 hours to 15:00 hours on Tuesday 8th November 2022.

During the survey period the wind conditions were breezy. The sky was generally cloudy. There was light rainfall between approximately 13:00 hours and 15:00 hours during the survey. Road surfaces were wet throughout the majority of the survey period.

Measurements were taken of the A-weighted (dBA) L_{90}, L_{eq} and L_{max} sound pressure levels over periods of not less than 10-15 minutes in each hour. Atypical noises were excluded as far as reasonably possible. The noise levels measured are therefore assumed to be representative of the noise climate during the hour in which the measurements were taken.

In addition, at each position typical L_{90}, L_{eq} and L_{max} octave band spectra (from 63Hz to 8kHz) were taken for a daytime period in order to gain a more detailed description of the prevailing noise climate.

6.2.2 Measurement Positions

The noise level measurements were undertaken at 2No. position around the development site. The measurement positions are described in the table below.

Position No	Description
M1	The sound level meter was hand-held. The microphone was positioned approximately 1.5m above ground level and 3m from Euston Road (A501).
M2	The sound level meter was hand-held. The microphone was positioned approximately 1.5m above ground level and 6m from Hampstead Road.

The manned measurements positions are shown on the plan below.

Site Plan Showing Manned Measurement Positions (Map Data © 2022 Google)

6.2.3 Instrumentation

The instrumentation used during the manned survey is presented in the table below:

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 ½" Condenser Microphone	ACO Pacific	7052E	71752	Calibration on 08/08/2022
Type 1 Preamp	Bruel & Kjaer	ZC0032	27782	Calibration on 08/08/2022
Type 1 Data Logging Sound Level Meter	Bruel & Kjaer	2250	3025254	Calibration on 08/08/2022
SLM Calibrator	Bruel & Kjaer	4231	2308993	Calibration on 04/08/2022

The sound level meter was hand-held and was fitted with a Brüel and Kjær microphone windshield.

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

7.0 Results

7.1 Results of Unmanned Survey

The results have been plotted on Time History Graphs 29605/TH1 to 29605/TH5 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 lowest measured L_{A90} background noise levels during the survey:

Position	Lowest 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	59	53	53
2	53	47	47
3	51	47	47
4	52	51	51
5	58	55	55

The following table presents the measured $L_{Aeq,T}$ noise levels during the survey:

Position	Measured $L_{Aeq,T}$ Noise Level (dB re 2 x 10^{-5} Pa)	
	Daytime (07:00 – 23:00) Hours, $L_{Aeq,16hr}$	Night-time (23:00 – 07:00) Hours, $L_{Aeq,8hr}$
1	68	67
2	66	63
3	62	57
4	60	57
5	70	67

7.2 Results of Manned Survey

The fully manned survey measurements A-weighted (dBA) L_{90}, L_{eq} and L_{max} sound levels are recorded below.

Position	Time	Sound Levels dBA		
		L_{90}	L_{eq}	L_{max}
M1	13:00 to 13:15 hours	63	69	81

Position	Time	Sound Levels dBA		
		L_{90}	L_{eq}	L_{max}
M2	14:45 to 14:55 hours	66	71	85

8.0 Discussion Of Noise Climate

During the periods we were on site the dominant noise sources were noted to be continuous road traffic on Euston Road (A501) and Hampstead Road. This included regular buses and heavy goods vehicles (HGVs).

Regular acceleration of road vehicles was noted as they accelerated from the traffic lights on Euston Road (A501) and Hampstead Road.

Passing conversing pedestrians was also noted during the attended measurements at street level.

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.

On the basis of the aforementioned Local Authority's requirements 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 residential/UCLH windows.

Pos.	Noise Sensitive Receptors	BS 4142 Rating Level Limit (dBA)		
		Daytime (07:00 – 23:00 hours)	Night-time (23:00 – 07:00 hours)	24 hours
1	Lizman House, Warren Court	49	43	43
2	UCLH, 175 Drummond St	43	37	37
3	20 Brock St	41	37	37
4	177 Drummond St	42	41	41
5	-	48	45	45

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.

For life safety standby plant, only used in emergencies and occasional testing - e.g. smoke extract fans and life safety generators - relaxations of the internal and external criteria are normally acceptable but should comply with local authority and occupational requirements and must not interfere with internal audible emergency alarms.

10.0 Conclusions

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

Results of the noise survey have been presented herein which will be used to inform various aspects of the acoustic design.

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

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).

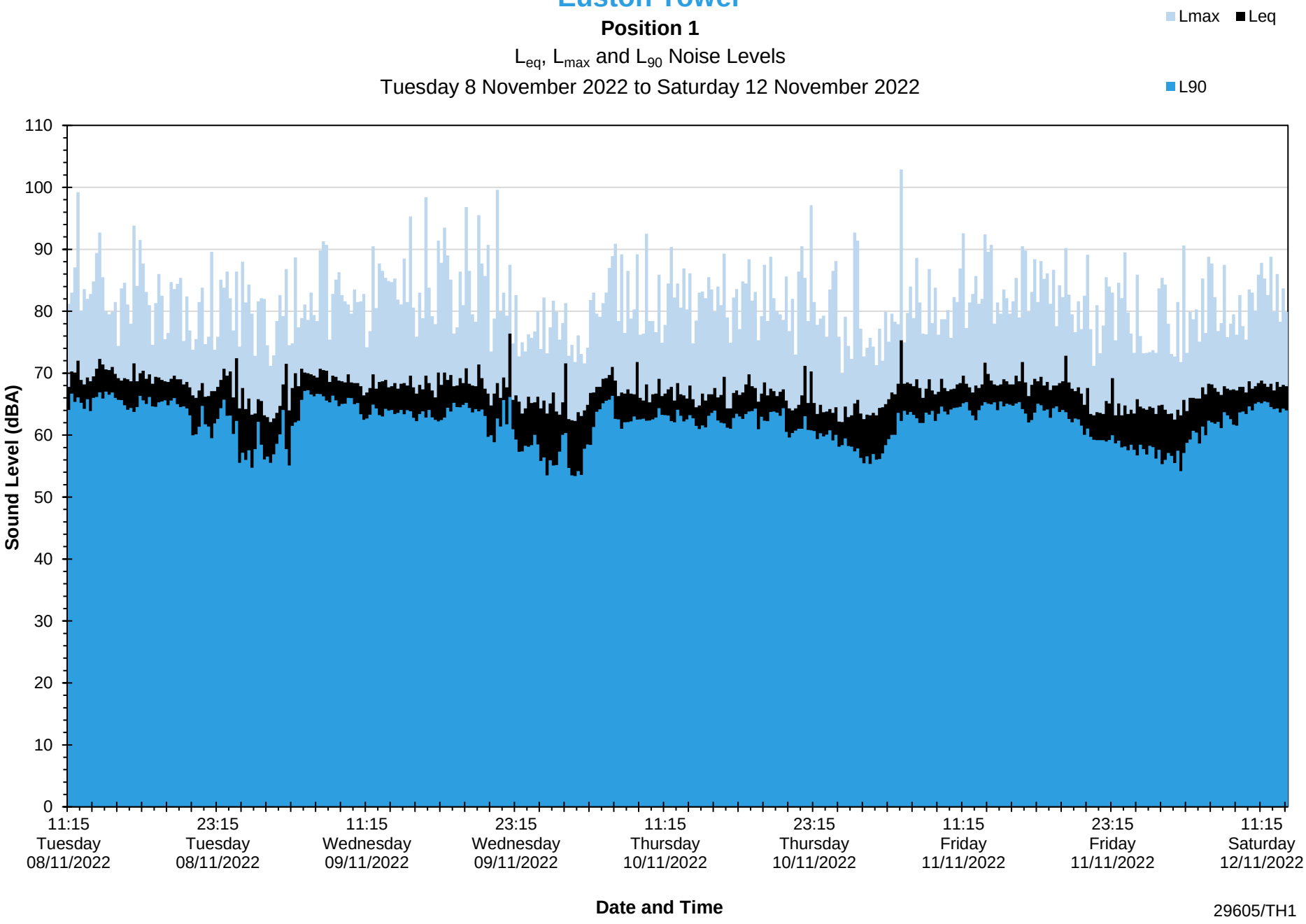
L_w — Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Euston Tower

Position 1

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

Tuesday 8 November 2022 to Saturday 12 November 2022



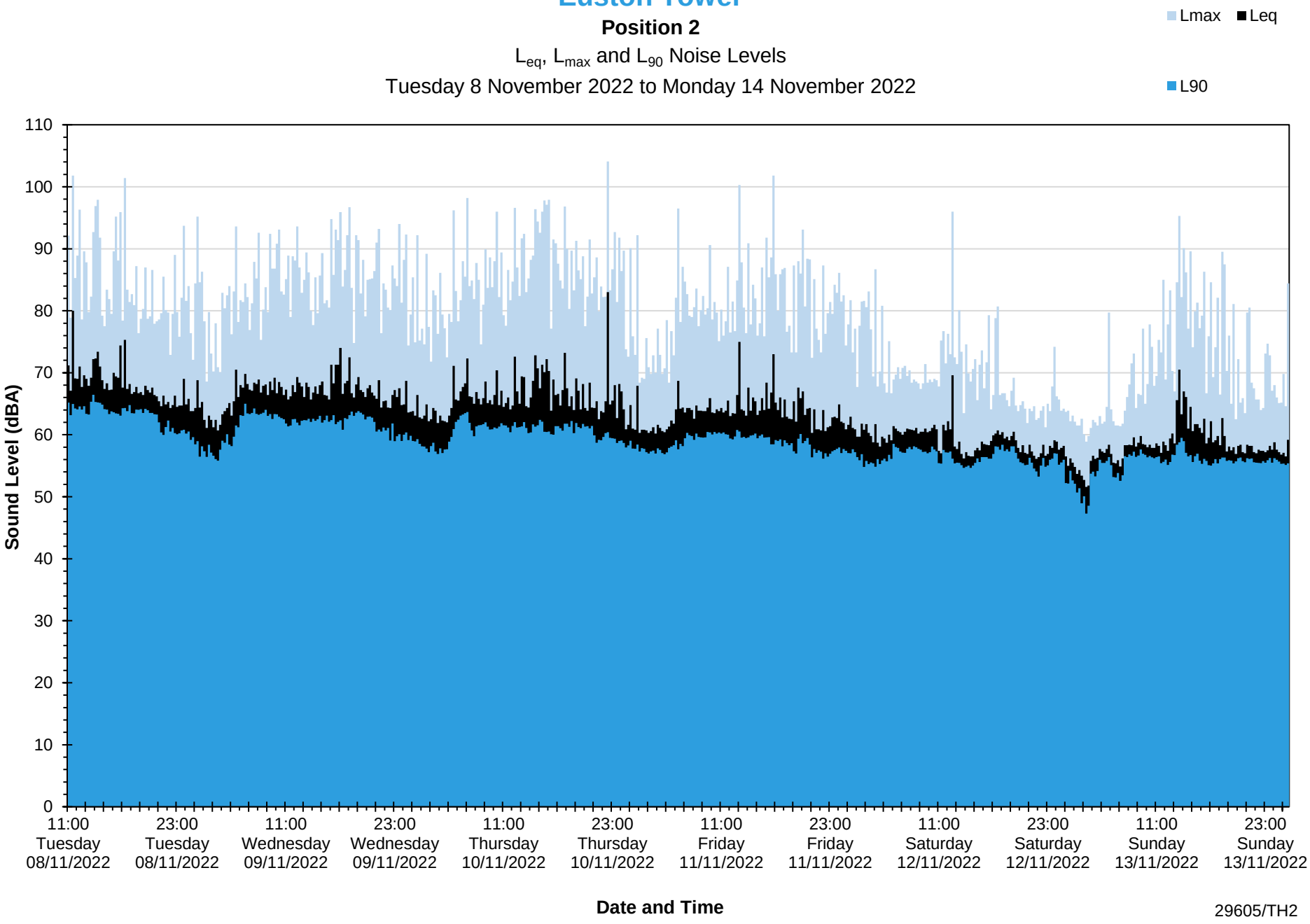
29605/TH1

Euston Tower

Position 2

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

Tuesday 8 November 2022 to Monday 14 November 2022



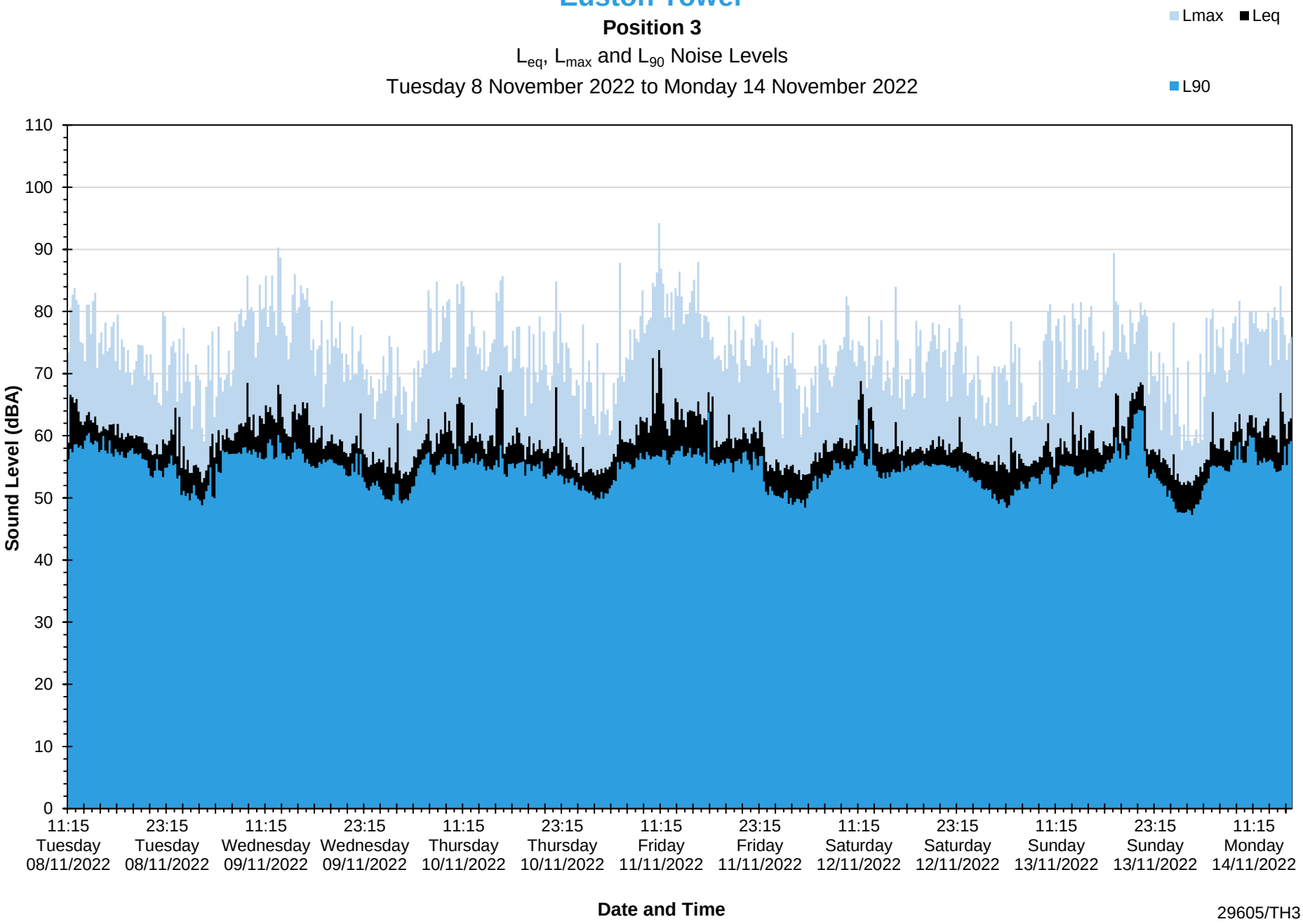
29605/TH2

Euston Tower

Position 3

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

Tuesday 8 November 2022 to Monday 14 November 2022



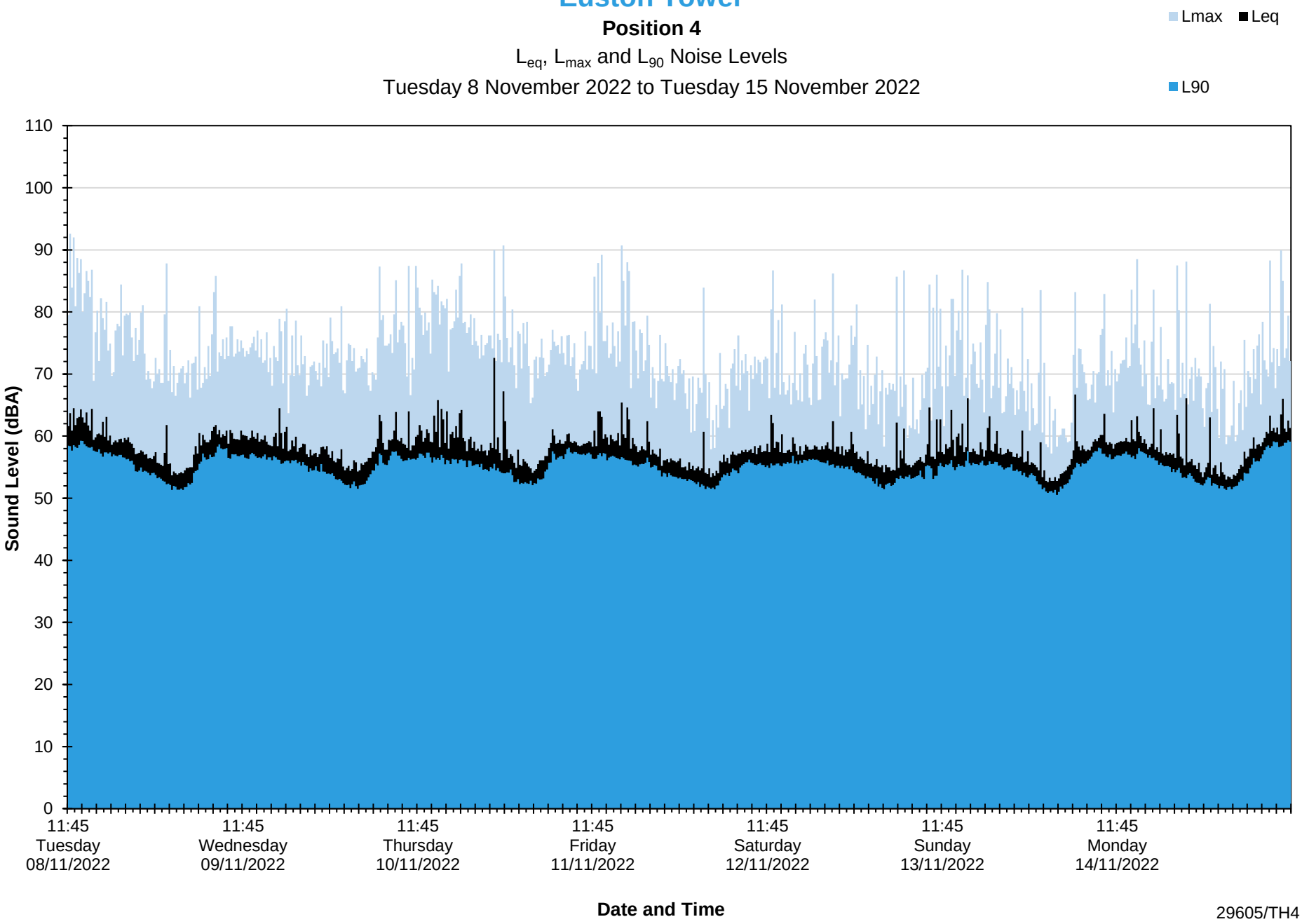
29605/TH3

Euston Tower

Position 4

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

Tuesday 8 November 2022 to Tuesday 15 November 2022



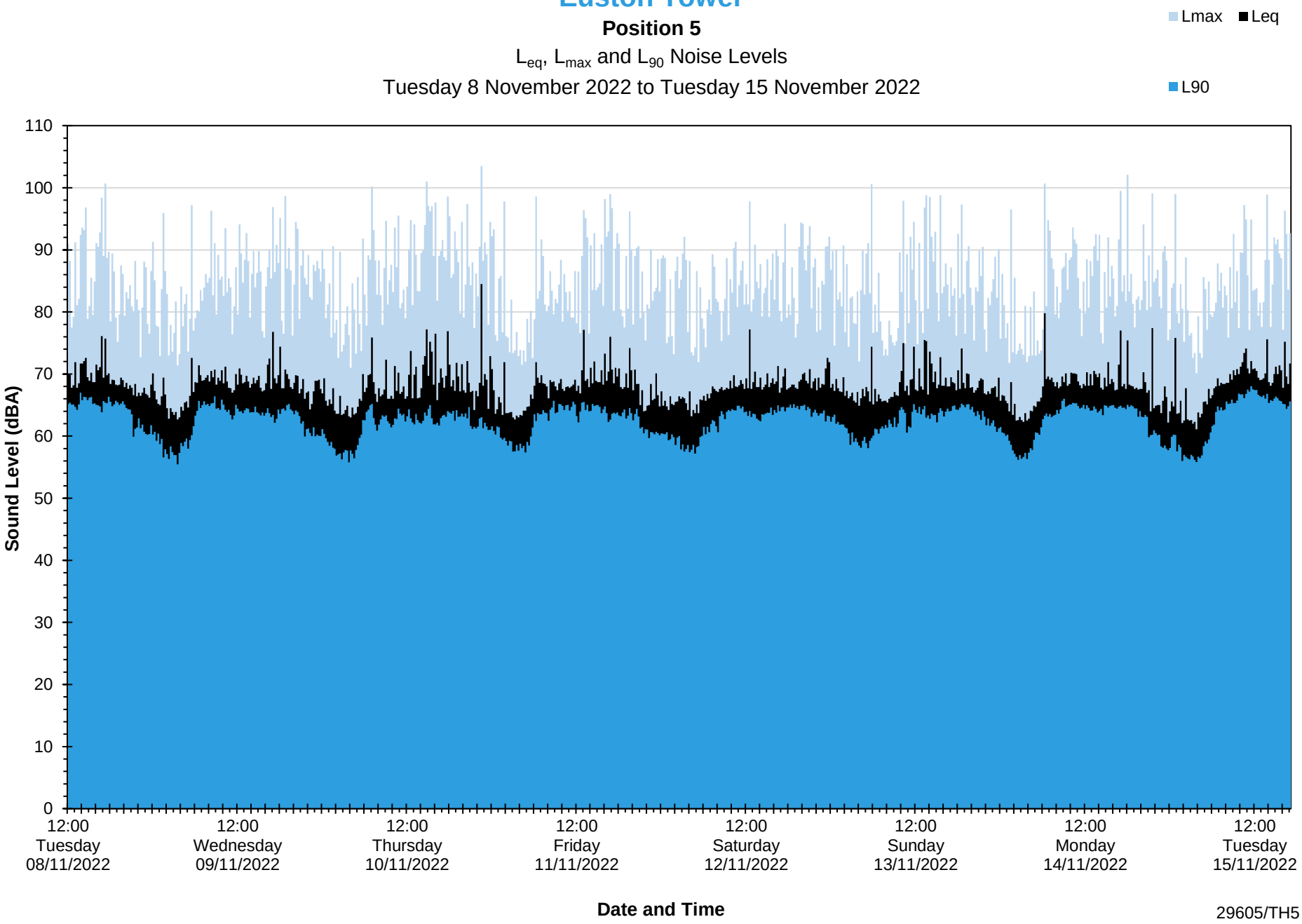
29605/TH4

Euston Tower

Position 5

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

Tuesday 8 November 2022 to Tuesday 15 November 2022



29605/TH5

Appendix: Noise and Vibration

Annex 1: Acoustic Terminology

Annex 2: Environmental Noise Survey Report

Annex 3: Noise Modelling Assumptions

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ANNEX 3 – NOISE MODELLING ASSUMPTIONS

Introduction

Hann Tucker have reviewed **ES Volume 1, Chapter 5: Demolition and Construction** and communicated with the design team to formulate an assumed list of fixed and mobile plant items, number of, operational durations and locations during the following key stages:

Timeslice 1

- Demolition: deconstruction of the existing concrete frame structure
- Earthworks: decommissioning and relocation of existing services and utilities within the basement level of the site

Timeslice 2

- Substructure Construction: installation of concrete superstructure

Timeslice 3

- Installation of Envelope and Cladding; installation of unitised cladding panels to the outer face of the superstructure

Noise data for the assumed plant equipment has been derived from the sound level data set out in Annex C of ‘BS 5229-1 Code of practice for noise and vibration control on construction and open sites’.

The table overleaf presents the plant items and associated noise data considered in predictive noise modelling for each timeslice.

Timeslice	Activity	Equipment	No.	% Operating Time (of the day)	BS5228 Ref	SWL	LAeq @10
1	Enabling Works, Demo/Deconstruction and Piling/Basement Box Construction	9T Dumper	1	15	C.1.19	97	69
		5T excavator with hydraulic breaker attachment	2	60	C.1.9	118	90
		14T Excavator	2	50	C.1.17	111	83
		Mobile Crane	1	50	C.4.45	110	82
		Tower Crane (core top)	1	60	C.4.49	105	77
		Diamond Core Drill	1	50	C.4.69	113	85
		Hand Held Breaker	1	50	C.1.7	121	93
		Angle Grinder cutting concrete	1	40	C.4.73	115	84
		Hand Tools	4	40	C.1.19	97	69
		HGV Delivery trucks	1	20	C.6.21	108	80
		Muck Wagons Away	4	40	C.2.27	109	81
		Concrete Pump	2	50	C.4.28	103	75
		Concrete Mixer	2	50	D.6.7	104	76
		CFA Rig	2	50	C.3.21	107	79
		Platform Hoist	2	75	D.7.98	104	77
2	Superstructure: installation of concrete superstructure	Tower Crane (core top, N & S)	3	60	C.4.49	105	77
		Cherry picker	6	60	C.4.53	105	77
		Hand Tools	8	40	C.1.19	97	69
		Concrete Pump	2	50	C.4.28	103	75
		Concrete Mixer	2	50	D.6.7	104	76
		Muck Wagons Away	4	40	C.2.27	109	81
		HGV Delivery trucks	4	20	C.6.21	108	80
		Platform Hoist	4	75	D.7.98	104	77
3	Installation of Envelope and Cladding; installation of unitised cladding panels to the outer face of the superstructure	Mobile Spider / Floor Crane	1	60	C.4.45	110	82
		Tower Crane (core top, N & S)	3	80	C.4.49	105	77
		HGV Delivery trucks	10	20	C.6.21	108	80

Timeslice	Activity	Equipment	No.	% Operating Time (of the day)	BS5228 Ref	SWL	LAeq @10
		Angle Grinder	2	40	C.4.93	108	80
		Hand Tools	8	40	C.1.19	97	69
		Platform Hoist	4	75	D.7.98	104	77