Athlone House
Hampstead

Environmental Noise Survey And PPG24 Assessment Report

22828/ENS/PPG24

18 March 2016

For:
SHH Architects Ltd
1 Vencourt Place
Ravenscourt Park
London
W6 9NU

Hann Tucker Associates
Consultants in Acoustics Noise & Vibration

Head Office: Duke House, 1-2 Duke Street, Woking, Surrey, GU21 5BA (t) +44 (0) 1483 770 595
Manchester Office: First Floor, 346 Deansgate, Manchester, M3 4LY (t) +44 (0) 161 832 7041
(w) hanntucker.co.uk (e) enquiries@hanntucker.co.uk

Hann Tucker Associates

Environmental Noise Survey Report
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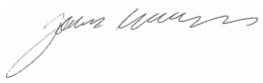
0	18/03/2016	-		
			James Mackenzie Trainee Assistant Consultant BSc(Hons), MA, AMIOA	Andrew Fermer Director BSc(Hons), MIOA

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Attachments

1.0 Introduction

A Planning application is being submitted to Camden Borough Council to restore, remodel and extend the building at Athlone House.

New items of building services will need to be installed. Hann Tucker Associates have therefore been commissioned to undertake an environmental noise survey at the site and specify the plant noise emission criteria taking into account the current background noise levels from the local environment, and to assess site noise levels to residential planning requirements.

This report presents the survey methodology and findings. The survey data may be used as the bases for various acoustic assessment purposes.

This report has followed the PPG24 standard as Camden Council requires more details than that asked for in the current NPPF guidelines.

2.0 Objectives

To establish, by means of detailed, daytime, fully manned environmental noise monitoring, the existing A-weighted (dBA) L_{90}, L_{eq} and L_{max} environmental noise levels at selected accessible ground level positions around the site.

Use the data from the manned survey to validate more extensive daytime and night-time noise survey data previously undertaken in 2012. This previous survey had been undertaken in order to establish, by means of detailed 72 hour daytime and night-time fully automated environmental noise monitoring, the existing A-weighted (dBA) L_{90}, L_{eq} and L_{max} environmental noise levels at 2No. positions. Additionally, L_{eq}, L_{90} and L_{max} octave band spectra noise levels for typical daytime and night-time periods were taken at each measurement position in order to obtain a more detailed description of the noise climate.

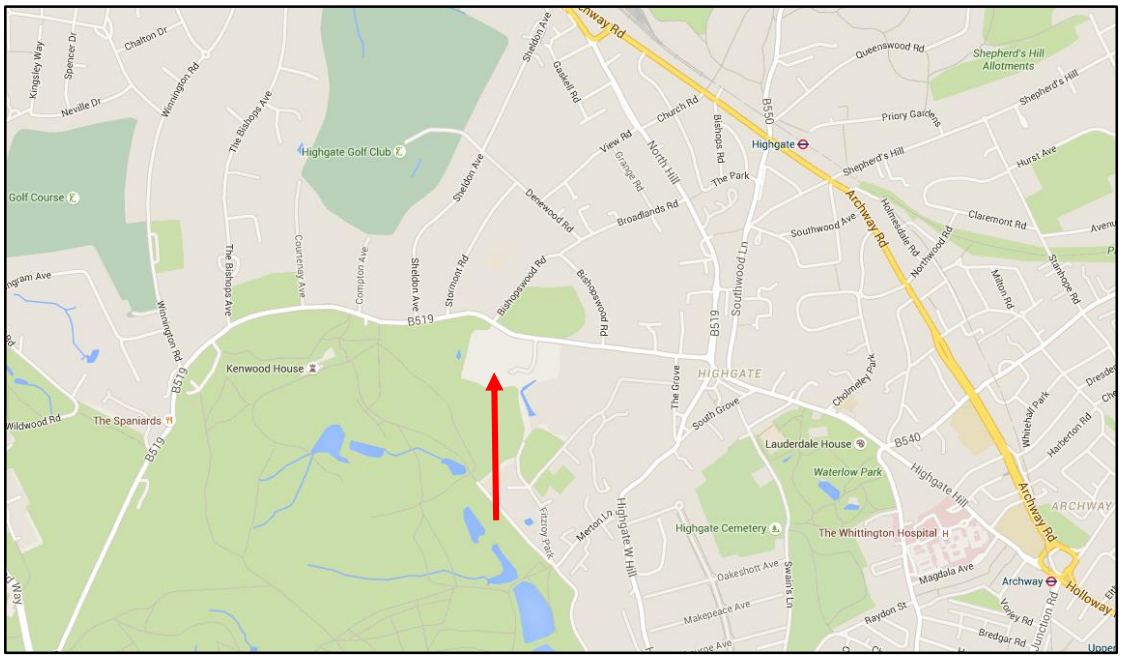
Based on the results of the two noise surveys, and with reference to the requirements of the Local Authority, to recommend suitable plant noise emission criteria and to determine the Noise Exposure Category (NEC) at the development site in accordance with Planning Policy Guidance (PPG) 24: Planning and Noise.

These objectives are as set out in sections 1 - 6 of our Outline Brief dated11 January 2016 and SHH's written instructions received on 16 February 2016.

3.0 Site Description

3.1 Location

The site of Athlone House is located on Hampstead Lane (B519), London and falls within the London Borough of Camden's jurisdiction. See Location Map below.



Location Map (Imagery © 2016 Google Inc.)

3.2 Description

The current site comprises of a large residential building and is bounded by Hampstead Lane to the north and Hampstead Heath to the south and west. To the east of the site are three residential buildings approximately 45m away. See Site Plan below.

Site Plan (Imagery © 2016 Google Inc.)

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 James Mackenzie MA BSc(Hons) AMIOA.

5.1 Unmanned Survey

5.1.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 11:00 hours on 03 August 2012 to 11:00 hours on 06 August 2012.

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However at the beginning and end of the survey period the wind conditions were calm. The sky was generally clear. 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_{10}, L_{90}, L_{eq} and L_{max} sound pressure levels over 15 minute periods.

5.1.2 Measurement Positions

The noise level measurements were undertaken at 2 positions around the development site. The measurement positions are described in the following table and shown on the plan below.

Position No	Description
1	The sound level meter was attached to a top corner of a steel shipping container currently used as security office, towards the northern site boundary in a free field location.
2	The sound level meter was attached to a metal railing in front of the east face of the property, towards the southern site boundary in a free field location.

Plan Showing Unmanned Measurement Positions (Imagery © 2016 Google Inc.)

5.1.3 Instrumentation

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

Description	Manufacturer	Type	Serial Number	Latest Verification
Position 1 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3802	LD calibration on 18/08/2010
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3542	LD calibration on 24/02/2012
Type 1 Calibrator	Larson Davis	CAL200	3082	LD calibration on 02/03/2012

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 Larson Davis windshield.

5.2 Manned Survey

In order to validate the noise survey data previously undertaken in 2012 (section 5.1), a short period manned daytime survey of noise levels at selected accessible positions around the site was undertaken.

5.2.1 Procedure

Fully manned environmental noise monitoring was undertaken from approximately 13:00 hours to 14:30 hours on 8 March 2016.

During the survey period the wind conditions were calm and the sky was generally clear. There was no rain throughout the duration of the survey. Road surfaces were dry 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 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 in order to gain a more detailed description of the prevailing noise climate.

5.2.2 Measurement Positions

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

Position No	Description
1	The sound level meter was attached to a tripod located near the security cabin at the north of the site. The microphone was approximately 1.5m above the ground and 20m from Hampstead Lane.
2	The sound level meter was attached to a tripod located towards the south-east corner of the property with the microphone approximately 1.5m above the ground.

These positions were chosen in order to collect data that could be used to validate the unmanned survey data collected in 2012. The positions are shown on the plan below.

Plan Showing Manned Measurement Positions (Imagery © 2016 Google Inc.)

5.2.3 Instrumentation

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

Description	Manufacturer	Type	Serial Number	Calibration
Type 1 Precision Sound Level Meter	Brüel and Kjær	2260	2180670	B & K calibration on 07/12/2015
Type 1 Calibrator	Brüel and Kjær	4231	2115545	B & K calibration on 18/11/2015

The sound level meter was mounted on a tripod and was fitted with a Brüel and Kjær microphone windshield.

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

6.0 Results

6.1 Results of Unmanned survey

The results have been plotted on Time History Graphs 22828/TH1 and 22828/TH2 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.

6.1.1 L_{eq} Noise Levels

In order to compare the results of our survey with the guidelines stated within PPG24, it is necessary to convert the measured $L_{Aeq(15\ minute)}$ noise levels into single figure daytime $L_{Aeq(16\text{-}hour)}$ (07:00-23:00 hours) and night-time $L_{Aeq(8\text{-}hour)}$ (23:00-07:00 hours) levels.

The daytime $L_{Aeq(16\text{-}hour)}$ and night-time $L_{Aeq(8\text{-}hour)}$ noise levels for each position are presented in the tables below.

Date	Position 1		Position 2	
	Daytime $L_{Aeq(16\text{-}hour)}$	Night-Time $L_{Aeq(8\text{-}hour)}$	Daytime $L_{Aeq(16\text{-}hour)}$	Night-Time $L_{Aeq(8\text{-}hour)}$
03/08/2012	60 dB	55 dB	48 dB	44 dB
04/08/2012	60 dB	56 dB	53 dB	44 dB
05/08/2012	60 dB	55 dB	48 dB	43 dB
Arithmetic Average	60 dB	55 dB	50 dB	44 dB

6.1.2 L_{90} Noise Levels

The lowest measured daytime and night-time L_{A90} noise levels for each position are presented in the table below.

Date	Position 1		Position 2	
	Daytime L_{A90}	Night-Time L_{A90}	Daytime L_{A90}	Night-Time L_{A90}
03/08/2012	40 dB	36 dB	38 dB	35 dB
04/08/2012	35 dB	35 dB	35 dB	33 dB
05/08/2012	37 dB	33 dB	35 dB	32 dB

6.1.3 Night-Time L_{max} Results

The following Table presents the number of L_{max} events which exceeded 82dBA during the night-time period.

Time	No of Events	
	Position 1	Position 2
23:00-00:00	0	0
00:00-01:00	1	0
01:00-02:00	0	0
02:00-03:00	0	0
03:00-04:00	1	0
04:00-05:00	0	0
05:00-06:00	0	0
06:00-07:00	0	0

6.2 Results of Manned survey

The A-weighted (dBA) L_{90}, L_{eq} and L_{max} sound levels of the fully manned survey are presented in the table below.

Position	Time	Sound Levels dBA		
		L_{A90}	L_{Aeq}	L_{Amax}
1	13:00 – 13:15	46	54	69
	13:45 – 14:00	44	53	67
2	13:30 – 13:45	43	49	67
	14:00 – 14:15	43	47	63

The L_{A90} and L_{Amax} values measured during the manned survey are comparable to those recorded at a similar time of day during the unmanned survey, as are the L_{Aeq} values measured

at Position 2. The L_{Aeq} values measured at Position 1 are lower during the manned survey. We believe that this is due to the lower microphone height used when compared to the unmanned survey, where the microphone was higher and had a direct line of site towards Hampstead Lane.

We believe that the results of the manned survey validate the more extensive data previously collected in 2012, and therefore both surveys have been used as a basis for our acoustic assessment.

7.0 Discussion Of Noise Climate

The dominant noise source at both measurement positions at the site was noted to be road traffic noise from Hampstead Lane.

8.0 Plant Noise Emission Criteria

The site lies within the jurisdiction of the London Borough of Camden. Their advice regarding plant installation within their jurisdiction is as follows:

"Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (LA90), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, click, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the LA90, expressed in dB(A)".

Based on the above criterion, and the results of the two environmental noise surveys, we recommend 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)**
30dBA	27dBA

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 PPG24 Assessment

9.1 PPG24 Planning Policy Guidance

Annex 1 of PPG24 states the following:

"Noise Exposure Categories for Dwellings

When assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories (NECs) the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then take into account the advice in the appropriate NEC, as below:"

NEC	
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

Recommended Noise Exposure Categories for New Dwellings Near Existing Noise Sources

Noise Levels Corresponding to the Noise Exposure Categories for New Dwellings $L_{Aeq,T}$ dB				
Noise Source	**Noise Exposure Category**			
	A	**B**	**C**	**D**
Road Traffic 07.00 – 23.00 23.00 – 07.00	<55 <45	55 - 63 45 - 57	63 - 72 57 - 66	>72 >66
Rail Traffic 0700 – 2300 2300 – 0700	<55 <45	55 - 66 45 - 59	66 - 74 59 - 66	>74 >66
Mixed Sources 0700 – 2300 2300 – 0700	<55 <45	55-63 45-57	63-72 57-66	>72 >66

In addition to the above, PPG 24 also states that during the night (23:00 - 07:00 hrs):

"Sites where individual noise events regularly exceed 82dB L_{Amax} several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq(8\text{-}hour)}$ (except where the $L_{Aeq(8\text{-}hour)}$ already puts the site into NEC D)."

9.2 Local Authority Discretion

The table in the previous section contains the recommended range of traffic noise levels for each NEC covering daytime and night-time periods. However, paragraph 9 of the main text of PPG24 states:

"The table in Annex 1 contains a recommended range of noise levels for each NEC covering day and night-time periods. However, in some cases it may be appropriate for local planning authorities to determine the range of noise levels which they wish to attribute to any or each of the NECs. For example, where there is a clear need for new residential development in an already noisy area, some or all NECs might be increased by up to 3dBA above the recommended level. In other cases, a reduction of up to 3dBA may be justified."

9.3 Measured NECs

With reference to the above noise exposure categories for road traffic noise sources, the measured noise levels fall within the following categories for daytime and night-time periods.

Position	Noise Exposure Category	
	Daytime (07:00 – 23:00)	Night-Time (23:00 – 07:00)
1	B	B
2	A	A

9.4 Discussion

With reference to the noise exposure categories for dwellings, as detailed in Section 9.1, when assessing planning application for sites which fall into NEC B, PPG24 advises noise should be taken into account when determining planning applications, and where appropriate, conditions imposed to ensure an adequate level of protection against noise.

The NEC measured at the location of the property falls into NEC A, PPG24 advises that noise need not be considered as a determining factor in granting planning permission.

10.0 Suitable Internal Noise Levels

PPG24 and the previous sections of this report consider the external noise levels. However

noise levels within the proposed dwellings should be the overriding consideration.

10.1 BS 8233

PPG24 states in Annex 6: Paragraph 8 that *"Guidance on suitable internal noise levels can be found in BS 8233: 1987".*

BS 8233: 1987 has been withdrawn and replaced by British Standard 8233: 2014: "Guidance on sound insulation and noise reduction for buildings". Section 7.7.2 of BS 8233: 2014 states that it is desirable that the internal ambient noise level does not exceed the guideline values in the table below:

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35 dB $L_{Aeq, 16hour}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq, 16hour}$	-
Sleeping (daytime resting)	Bedrooms	35 dB $L_{Aeq, 16hour}$	30 dB $L_{Aeq, 8hour}$

10.2 World Health Organisation

The World Health Organisation document on "Guidelines for Community Noise" states the following guideline values for community noise in specific environments.

Specific Environment	Critical Health Effect(s)	L_{Aeq}	$L_{Amax,fast}$
Dwelling, indoors	Speech intelligibility and moderate annoyance	35dB	-
Inside Bedrooms	Sleep disturbance, night-time	30dB	45dB

The document also states *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dBA L_{Amax} more than 10-15 times per night, (Vallet & Varnet 1991)."*

The above levels are however the subject of much controversy, as indicated by one of the feature articles in the January/February 2003 edition of the Institute of Acoustics' publication.

In our opinion the above criteria for bedrooms should thus be regarded as preferred, rather than mandatory maxima to be achieved in all cases.

10.3 Local Unitary Development Plan

We are not aware that Camden Council has any internal design criteria in their current planning policy.

10.4 Proposed Criteria

On the basis of the above we would propose the following internal noise levels be adopted as *minimum* design targets in the *worst* affected dwellings.

Activity	Location	Desirable Internal Ambient Criteria	
		07:00 – 23:00	23:00 – 07:00
Resting	Living Areas	35dB $L_{Aeq, 16hr}$	-
Dining	Dining Room/Area	40dB $L_{Aeq, 16hr}$	-
Sleeping (Daytime Resting)	Bedrooms	35dB $L_{Aeq, 16hr}$	30dB $L_{Aeq, 8hr}$

If planning permission is granted, planning conditions should be imposed to ensure an adequate level of protection against external noise, and the above criteria would form a reasonable basis for a condition.

11.0 Achievable Internal Noise Levels

We have predicted the levels that would be achievable in the worst-case habitable rooms closest to the dominant noise source.

Annex 6 of PPG24 states the following:

"Typical noise reduction of a dwelling façade with windows set in brick/block wall."

Difference Between External and Internal Noise Levels			
Noise Source	Single Glazing	Thermal Double Glazing	Secondary Glazing
Road Traffic	28dBA	33dBA	34dBA
Civil Aircraft	27dBA	32dBA	35dBA
Military Aircraft	29dBA	35dBA	39dBA
Diesel Train	28dBA	32dBA	35dBA
Electric Train	30dBA	36dBA	41dBA

A simple assessment based on the above indicates the following noise levels may be expected within the proposed worst case dwellings with single glazing. We have used the levels measured at position 2 of the unmanned survey as these are representative of the new buildings façade location.

Daytime $L_{Aeq(16\text{-}hour)}$ dBA	Night-time $L_{Aeq(8\text{-}hour)}$
28 dBA	19 dBA

These predicted worst case internal noise levels meet the proposed criteria. It is thus demonstrated that acceptable internal noise levels are achievable with conventional glazing.

12.0 Conclusions

A fully manned environmental noise survey has been undertaken to validate more extensive data previously recorded in 2012 in order to establish the currently prevailing environmental noise climate around the site.

From the measured environmental noise levels the corresponding noise exposure category of the site has been determined.

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

The worst case position falls into Noise Exposure Category B. At the proposed building location the position falls into Noise Exposure Category A. With reference to the noise exposure categories for dwellings, noise should be taken into account when determining planning applications and, where appropriate conditions imposed to ensure an adequate level of protection against noise.

Appropriate internal noise criteria have been proposed. These are achievable using conventional glazing systems.

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).

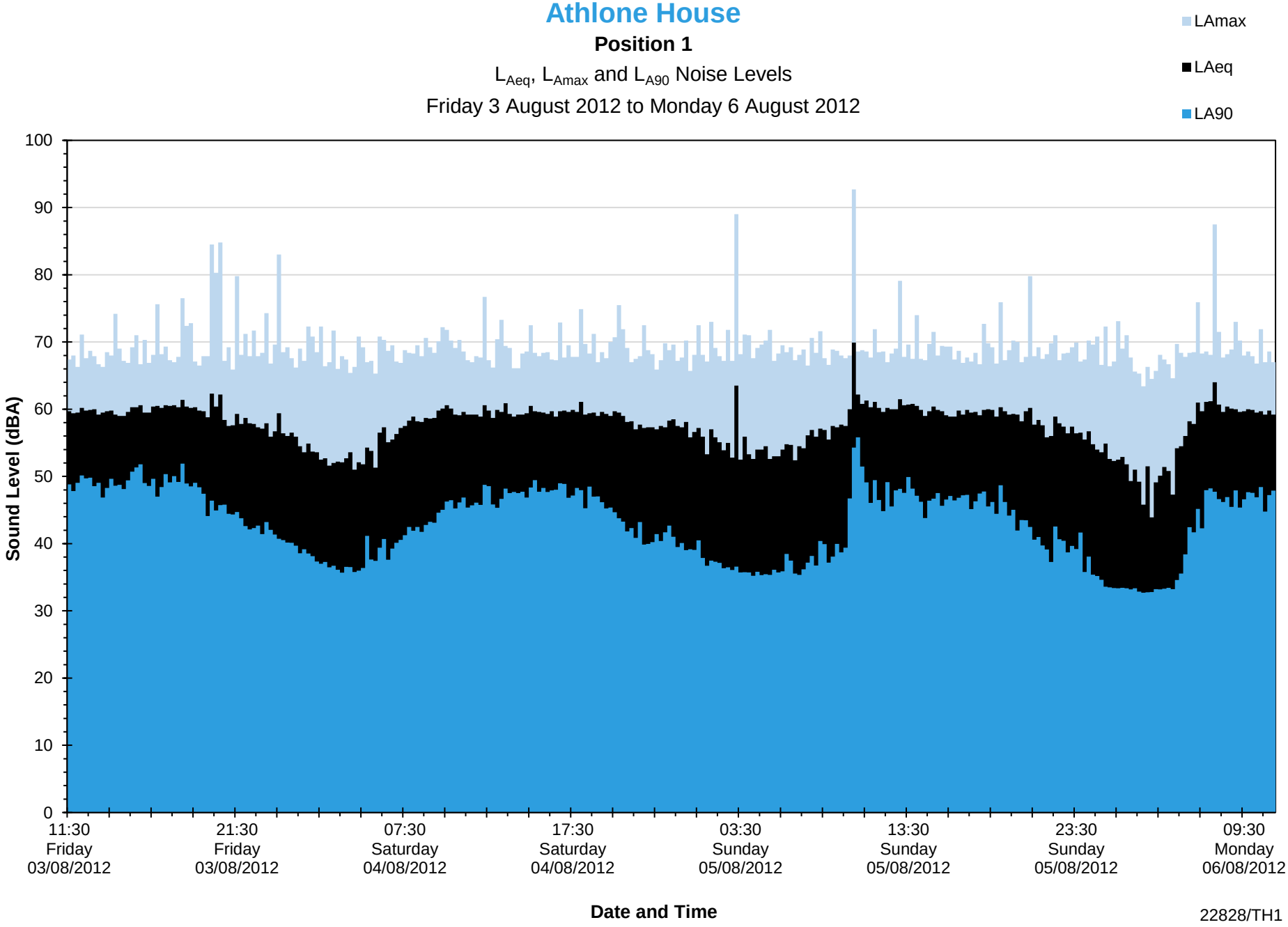
L_w — Sound Power Level (SWL) is the total amount of sound energy inherent in a particular sound source, independent of its environment. It is a logarithmic measure of the sound power in comparison to a specified reference level (usually 10^{-12} W).

Athlone House

Position 1

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

Friday 3 August 2012 to Monday 6 August 2012



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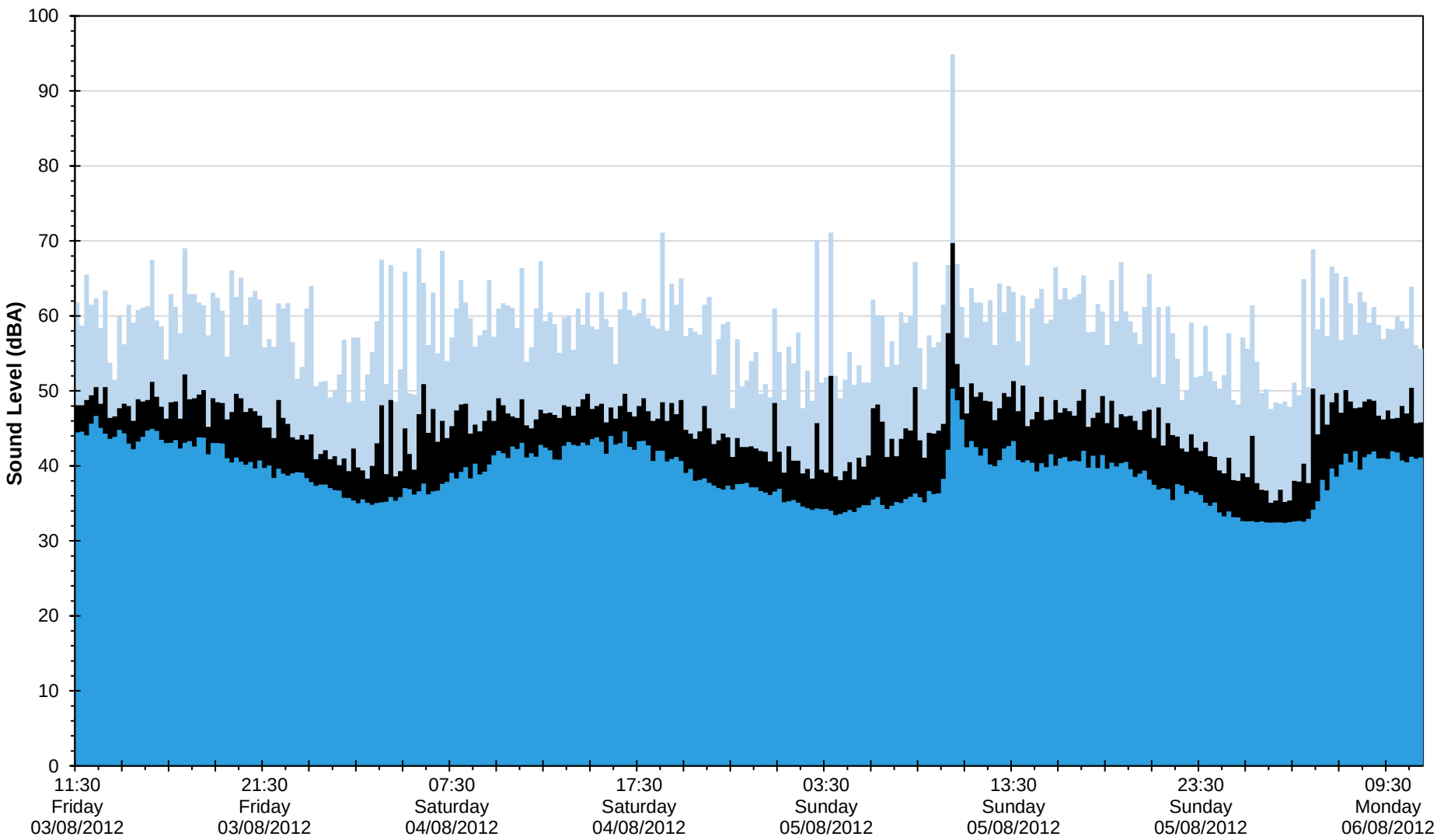
Position 2

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

Friday 3 August 2012 to Monday 6 August 2012



22828/TH2