11-13 Goodge Street
London

ENVIRONMENTAL NOISE SURVEY
& PLANT NOISE ASSESSMENT
REPORT 18919/PNA2

For:

Goodge Street (Tottenham Court Road LLP)
c/o Dukelease Properties
22 Old Bond Street
London
W1S 4PY

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REPORT 18919/PNA2

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1.0 INTRODUCTION

A mixed use residential and commercial development has been proposed at 11-13 Goodge Street, London. Neighbouring premises may be subject to noise from units of building services plant which are to be located at roof level.

Hann Tucker Associates have therefore been commissioned to undertake a detailed environmental noise survey of the site to determine the currently prevailing background noise levels. The survey data has been used to assess the proposed plant against the requirements of the Local Authority.

This report presents the survey methodology and findings.

2.0 OBJECTIVES

To establish, by means of detailed 24 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 selected accessible roof level positions around the site, thought to be representative of the nearest affected property.

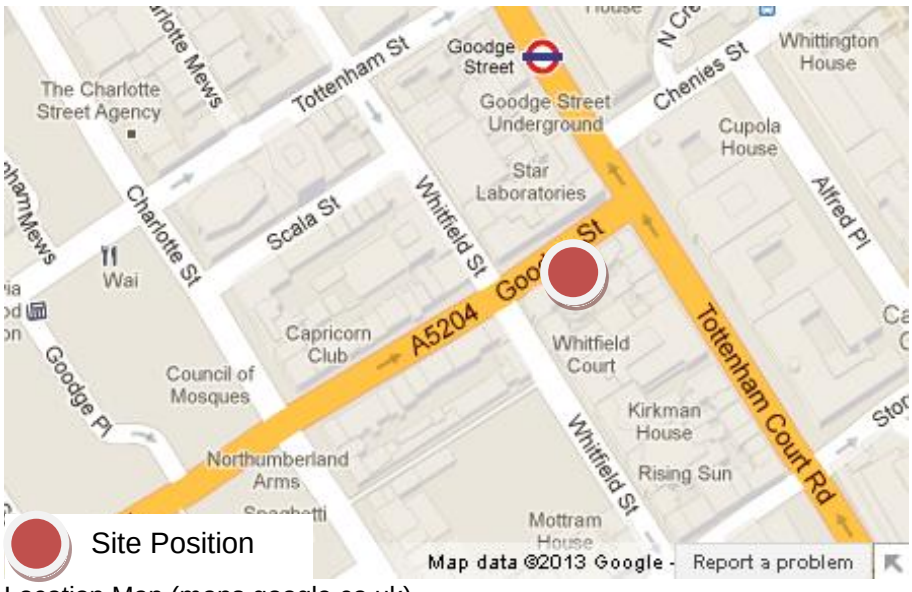
Based on the results of the noise survey, and in conjunction with the Local Authority, to recommend suitable plant noise emission criteria.

To assess the proposed plant and comment on its acceptability.

3.0 SITE DESCRIPTION

3.1 Location

The site is located at 11-13 Goodge Street and falls within Camden Council's jurisdiction. See Location Map below.



Location Map (maps.google.co.uk)

3.2 Description

The site is comprised of a four storey office building with commercial space at ground floor level. The site is bound by Goodge Street to the northwest, mixed use properties to the northeast and southwest, and a lightwell to the southeast. The surrounding properties are generally between four and six storeys in height.

The main source of noise at the site is considered to be traffic on the surrounding roads. See 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 METHODOLOGY

5.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 15:00 hours on Monday 4 February 2013 to 15:00 hours on Tuesday 5 February 2013.

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 and the sky was generally patchy cloud. 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 full 15 minute periods.

5.2 Measurement Positions

The noise level measurements were undertaken at two positions at the development site. The measurement positions are described in the table below.

Position No	Description
1	The meter was located on the northwest façade of the existing building. The microphone was attached to a pole protruding out of a third storey window at a height of approximately 7m above ground level. The microphone was not considered to be in free field conditions.
2	The meter was located on the southeast façade of the existing building. The microphone was attached to a pole protruding out of a third storey window at a height of approximately 7m above ground level. The microphone was not considered to be in free field conditions.

The positions were selected in order to assess the lowest noise levels at the development site for subsequent use in setting plant noise emission criteria and are shown on the plan below.

Plan Showing Unmanned Measurement Positions (maps.google.co.uk)

5.3 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	3803	LD calibration on 28/08/2012
Position 1 Type 1 ½" Condenser Microphone	Larson Davis	377B02	107427	LD calibration on 28/08/2012
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3802	LD calibration on 28/08/2012
Position 2 Type 1 ½" Condenser Microphone	PCB	377B02	107040	LD calibration on 28/08/2012
Type 1 Calibrator	Larson Davis	CAL200	3082	LD calibration on 02/03/2012

Each sound level meter, including the extension cables, were calibrated prior to and on completion of the surveys. No significant changes were found to have occurred.

6.0 RESULTS

The results have been plotted on Time History Graphs 18919/TH1 to 18919/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.

7.0 DISCUSSION OF NOISE CLIMATE

Due to the nature of the survey, i.e. unmanned, it is not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However at the beginning and end of the survey period the dominant noise source was deemed to be road traffic from Tottenham Court Road and Goodge Street.

Measured $L_{A90,15\ min}$ noise levels at Position 1 were generally between 60dB and 65dB during day time and between 50dB and 55dB during night time. Measured $L_{A90,15\ min}$ noise levels at Position 2 were between 55dB and 60dB throughout the entire survey period.

8.0 PLANT NOISE EMISSION CRITERIA

We understand that the requirements of Camden Council are as follows:

"Noise levels at a point 1 metre external to sensitive facades shall be at least 5dBA less than the existing background measurement (L_{A90}), expressed in dBA when all plant/equipment are in operation. Where it is anticipated that any plant/equipment will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps) special attention should be given to reducing the noise levels from that piece of plant/equipment at any sensitive façade to at least 10dBA below the L_{A90}, expressed in dBA."

As the proposed plant has been judged to contain no tonal element and on the basis of the above and the survey results, we therefore propose the following plant noise emission limits to be achieved at 1m from the façades of the nearest neighbouring buildings:

	Plant Noise Emission Criteria (dB re $2x10^{-5}$ Pa)	
	Daytime (07:00 – 23:00 hours)	**Night-time (23:00 – 07:00 hours)**
Position 1	44	43
Position 2	47	46

It should be noted that the above plant noise emission limits are subject to approval from Camden Council.

9.0 PLANT NOISE ASSESSMENT

We understand that the following items of plant are to be installed at roof level of the site.

Plant Description	Location	Qty	Plant Make	Model Number
New Residential	Roof Plant Area	4	Mitsubishi	MX24C71CA
STA Travel	Roof Plant Area	2	Daikin	5MXS90E3V3B
Subway 1	Roof Plant Area	2	Daikin	RZQSG100
Subway 2	Roof Plant Area	1	Mitsubishi	SCM60ZJ-S

9.1 Plant Noise Emissions

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 at 1m**
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
New Residential	56.5	55.0	49.5	44.0	42.5	38.5	32.0	28.0	48.0
STA Travel*	60.5	59.0	53.5	48.0	46.5	42.2	36.0	32.0	52.0
Subway 1*	61.5	60.0	54.5	49.0	47.5	43.2	37.0	33.0	53.0
Subway 2*	60.5	59.0	53.5	48.0	46.5	42.2	36.0	32.0	52.0

* No octave band data was available for any of the existing units, therefore we have used typical data for these items.

9.2 Location of Plant

We understand that all the units will be located in a plant area at roof level on top of the 5th floor extension. The plant area will be surrounded by a solid barrier, which we understand will be tall enough to provide at least line-of-sight screening to nearby premises.

The closest noise sensitive premises to the plant area are located to the southwest, at 26-28 Whitfield Street at a horizontal distance of approximately 5m and one floor below. Some of the plant serves the commercial areas of 11-13 Goodge Street at ground floor level. This plant must also be assessed for its impact on the proposed new residential premises, the closest windows of which are to the north at approximately 4m horizontally but one floor below.

9.3 Plant Noise Impact Assessment

Our calculations for the 9No. roof level units are as follows.

Item	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	
New Residential	57	55	50	44	43	39	32	28	48
4 units	6	6	6	6	6	6	6	6	
Barrier loss	-7	-8	-9	-11	-13	-15	-18	-22	
Distance loss 4m	-9	-9	-9	-9	-9	-9	-9	-9	
Total New Resi	47	45	38	31	27	21	11	4	35
STA Travel*	61	59	54	48	47	42	36	32	52
2 units	3	3	3	3	3	3	3	3	
Barrier loss	-7	-8	-9	-11	-13	-15	-18	-22	
Distance loss 4m	-9	-9	-9	-9	-9	-9	-9	-9	
Total STA	48	46	39	32	28	21	12	5	36
Subway 1*	62	60	55	49	48	43	37	33	53
2 units	3	3	3	3	3	3	3	3	
Barrier loss	-7	-8	-9	-11	-13	-15	-18	-22	
Distance loss 4m	-9	-9	-9	-9	-9	-9	-9	-9	
Total Sub1	49	47	40	33	29	22	13	6	37
Subway 2*	61	59	54	48	47	42	36	32	52
1 unit	0	0	0	0	0	0	0	0	
Barrier loss	-7	-8	-9	-11	-13	-15	-18	-22	
Distance loss 4m	-9	-9	-9	-9	-9	-9	-9	-9	
Total Sub2	45	43	36	29	25	18	9	2	33
Total All	**54**	**51**	**45**	**37**	**34**	**27**	**18**	**10**	**41**

It should be noted that the above calculations are quite pessimistic whereby we have assumed all plant can run at full duty at all times of day. Therefore the above calculations indicate that the proposed plant installation should be capable of achieving the requirements of the Local Authority.

Our assessment indicates that to meet the requirements of the Local Authority the screen surrounding the plant area must be at least as tall as the tallest item of plant within it. The screen must be constructed and installed as per our Acoustic Specification for Acoustic Screen enclosed.

10.0 CONCLUSIONS

A detailed 24 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.

It should be noted that our calculations are quite pessimistic whereby we have assumed all plant can run at full duty at all times of day. Therefore the calculations indicate that the proposed plant installation should be capable of achieving the requirements of the Local Authority.

The assessment indicates that to meet the requirements of the Local Authority the screen surrounding the plant area must be at least as tall as the tallest item of plant within it. The screen must be constructed and installed as per our Acoustic Specification for Acoustic Screening enclosed.

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Appendix A

The acoustic terms used in this report are as follows:

dB : Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.

dBA : The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dBA level.

Because of being a logarithmic scale noise 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_{10} & L_{90}: If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.

It is common practice to use the L_{10} index to describe traffic noise, as being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic noise.

L_{eq} : The concept of L_{eq} (equivalent continuous sound level) has up to recently been primarily used in assessing noise in industry but seems now to be finding use in defining many other types of noise, such as aircraft noise, environmental noise and construction noise.

L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 1 hour).

The use of digital technology in sound level meters now makes the measurement of L_{eq} very straightforward.

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.

11-13 GOODGE STREET

ACOUSTIC SPECIFICATION FOR

ACOUSTIC SCREEN

Acoustic screening shall extend:

- continuously around the entire plant area;
- from the roof up to a minimum height of equal to the highest part of the plant.

The screen shall be imperforate (solid) and have a minimum mass per unit area of at least 10kg/m^2. This could be achieved with a wide range of materials including, for example, 1.3mm galvanised steel sheet, or plywood (or equivalent sheeting board) to a suitable thickness required to achieve the mass per unit area. All joints/junctions should be staggered.

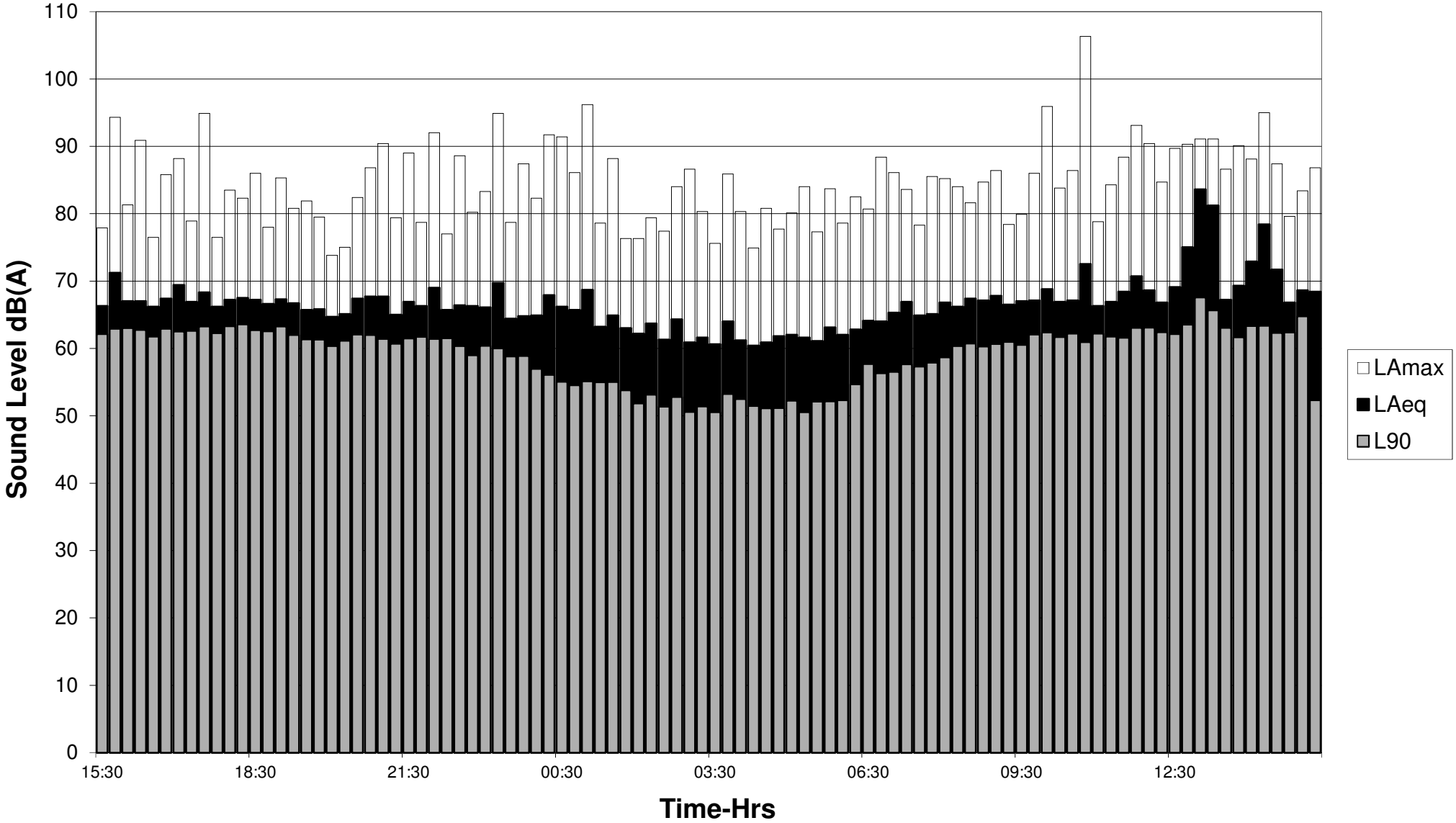
Doors, access panels and service penetrations shall be treated so as to maintain the acoustic performance of the assembled screen.

All junctions between the screen and adjacent structures shall be made good and sealed with a heavy grout and/or dense non-hardening mastic.

The complete structure shall be wind and weather resistant to standards agreed with the Client.

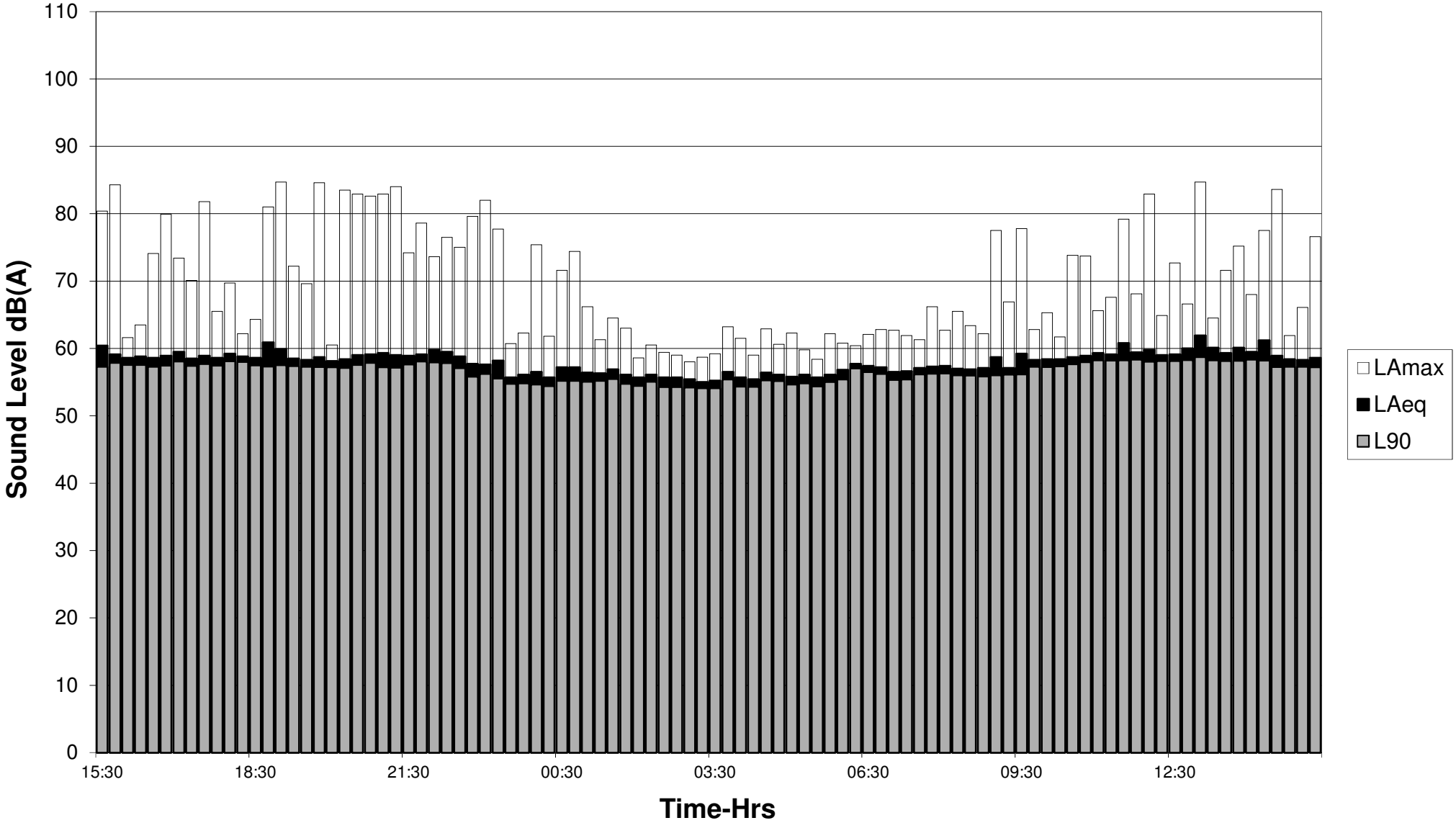
The exact design of the screen will be agreed with and approved by Hann Tucker Associates.

11-13 Goodge Street
Position 1
L_{Aeq} and L_{Amax} Noise Levels
Monday 04/02/2013 - Tuesday 05/02/2013



Time History Graph 18919/TH1

11-13 Goodge Street
Position 2
L_{Aeq} and L_{Amax} Noise Levels
Monday 04/02/2013 - Tuesday 05/02/2013



Time History Graph 18919/TH2