30-32 Grays Inn Road, London,

ENVIRONMENTAL NOISE SURVEY
AND PPG24 ASSESSMENT
REPORT18597/PPG24 01.Rev2

For:

MR Partnership
41 Foley Street
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8 May 2013

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1.0 INTRODUCTION

Planning permission is being submitted for change of use at 30-32 Grays Inn Road.

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.

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

2.0 PPG24 Format

Following consultation with Camden Council, they have informed us that the current NPPF policy does not satisfy their planning requirements on its own and so prefer the previous PPG24 standard to be followed.

3.0 OBJECTIVES

To establish, by means of detailed 24 hour daytime and night-time fully automated environmental noise monitoring, the existing A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} environmental noise levels at 2No. selected secure and accessible positions at the site.

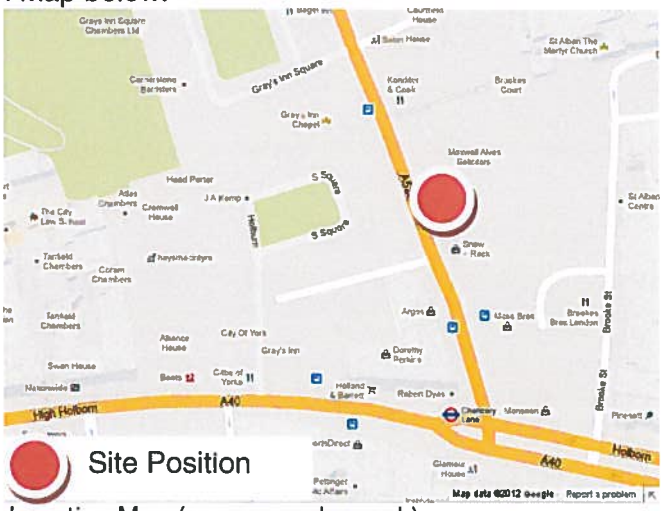
To measure L_{eq}, L_{90}, L_{10} and L_{max} octave band spectra noise levels for typical daytime and night-time periods at the measurement position in order to obtain a more detailed description of the noise climate.

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

4.0 SITE DESCRIPTION

4.1 Location

The site is located on Grays Inn Road and falls within Camden's jurisdiction. See Location Map below.



Location Map (maps.google.co.uk)

4.2 Description

30-32 Grays Inn Road comprises of a large commercial building. The site is bound by Grays Inn Road to the west, and commercial/residential buildings to all other sides.
See Site Plan below.

Site Plan (maps.google.co.uk)

5.0 ACOUSTIC TERMINOLOGY

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

6.0 METHODOLOGY

6.1 Procedure

Fully automated environmental noise monitoring was undertaken from approximately 11:00 hours on 03 October 2012 to 11:00 hours on 04 October 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.

6.2 Measurement Positions

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

Position No	Description
1	The sound level meter was attached to a pole out of a first floor window, towards the western site boundary.
2	The sound level meter was attached to a pole out of a first floor window, towards the eastern site boundary.

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

6.3 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	3542	LD calibration on 24/02/2012
Position 1 Type 1 ½" Condenser Microphone	PCB	377B02	104675	LD calibration on 24/02/2012
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3700	LD calibration on 23/02/2011
Position 2 Type 1 ½" Condenser Microphone	Larson Davis	2541	104981	LD calibration on 23/02/2011
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.

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.

7.0 RESULTS

The results have been plotted on Time History Graphs 18436/TH1 to 18436/TH4 enclosed presenting the 15 minute A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

7.1 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.

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 $L_{Aeq(8\text{-}hour)}$
68 dB	64 dB	52dB	48 dB

N.B. The above levels have been corrected for façade reflections where appropriate, for comparison with the free field levels stated in PPG24.

7.2 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	2	0
01:00-02:00	0	0
02:00-03:00	0	0
03:00-04:00	0	0
04:00-05:00	0	0
05:00-06:00	2	0
06:00-07:00	0	0

N.B. The above levels have been corrected for façade reflections where appropriate, for comparison with the free field levels stated in PPG24.

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 thus 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	50	43
Position 2	42	41

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 30-32 Grays Inn Road:

Plant Description	Location	Qty	Plant Make	Model Number
Outdoor Condenser	Rear Lightwell	2	Daikin	RXYSQ5PV
Outdoor Condenser	Roof/Rear Lightwell	13/2	Daikin	5MXS90E
Extract Fan	Roof	1	Nuaire	ESTCP6

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
	63	125	250	500	1k	2k	4k	8k	
RXYSQ5PV	63	54	54	51	48	43	36	30	53
5MXS90E	56	53	52	50	48	42	38	32	52
ESTCP6	-	81	79	71	70	68	65	61	76

9.2 Location of Plant

The plant on the roof is to be installed in a screened off area. The condensers to the rear of the property will be in the ground floor light well

The nearest noise sensitive residential windows are approximately 5m away from the proposed ground floor plant location and 10m away from the roof plant.

The proposed plant is to serve the residential and commercial property.

9.3 Plant Noise Impact Assessment

The following table presents our calculations relating to the proposed plant installation affecting the nearest residential window of the top floor flat.

The following calculation is for the roof based plant.

	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
ESTCP6	-	81	79	71	70	68	65	61	76
5MXS90E (13 units)	67	64	63	61	59	53	49	43	63
From All Plant	67	81	79	71	70	68	65	61	77
Distance Loss (10m)	-20	-20	-20	-20	-20	-20	-20	-20	-
Calculated Noise Level at Window	47	61	59	51	50	48	45	41	57

Our calculations indicate that the proposed plant will exceed the requirements of the Local Authority at the nearest residential windows.

The following calculation is for the rear Lightwell based plant.

	Sound Pressure Level (dB re $2x10^{-5}$ Pa) at Octave Band Centre Frequency (Hz)								dBA
	63	125	250	500	1k	2k	4k	8k	
RXYSQ5PV (2 units)	66	57	57	54	51	46	39	33	56
5MXS90E (2 units)	59	56	55	53	51	45	41	35	55
From All Plant	67	60	59	57	54	49	43	37	59
Distance Loss (2m)	-3	-3	-3	-3	-3	-3	-3	-3	-
Calculated Noise Level at Window	64	57	56	54	51	46	40	34	56

Our calculations indicate that the proposed plant will exceed the requirements of the Local Authority at the nearest residential windows.

10.0 MITIGATION METHODS

The mitigation advice provided is concerned with atmospheric noise emission only. We have assessed the mitigation required to achieve the Local Authority criteria as follows:

10.1 Roof Plant

We would advise that the plant has a 1m high acoustic barrier enclosing the plant on all 4 sides. Attached is the specification for the barrier.

10.2 Rear Lightwell

We would advise that the enclosure containing the 4No. condensers be louvered to achieve 41dB(A) at the nearest residential window 2m away.

This could be achieved by using 600mm back to back louvers, please see the attached specification.

11.0 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 noted to be road traffic from Grays Inn Road.

12.0 PPG24 ASSESSMENT

12.1 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)."*

12.2 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.

12.3 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.

Noise Exposure Category		
Position	**Daytime**	**Night-time**
1	C	C
2	A	B

12.4 Discussion

With reference to the noise exposure categories for dwellings, as detailed in Section 8.1, when assessing planning applications for sites which fall into NEC C, PPG24 advises 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 an adequate level of protection against noise.

It should be recognised that PPG24 does not reflect the situation that in London noise levels and the demand for housing are both high, relative to the country in general. In our experience the majority of proposed residential sites in London fall into NEC C along at least one boundary. PPG24 unfortunately does not reflect the situation that higher noise levels are expected, and so the guidance is rather conservative.

It is also important to note that PPG24 considers external noise levels. However, given the intensely urban nature of the application site, the internal noise levels should be the overriding consideration in determining suitability for use.

Furthermore purchasers buying a property in London are able to exercise choice and accept a higher degree of noise, especially if acceptable internal noise levels can be achieved, as discussed in the following sections.

For these reasons it is common for planning permission to be granted for sites which partially fall into Noise Exposure Category C.

Paragraph 8 of PPG24 states:

"Categories B and C deal with situations where noise mitigation measures may make development acceptable."

13.0 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.

13.1 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: 1999: "Sound insulation and noise reduction for buildings". Section 7.6.1 of BS 8233: 1999 states that reasonable resting and sleeping conditions in living rooms and bedrooms can be achieved by the following target $L_{Aeq,T}$ internal noise levels:

Room Type	$L_{Aeq,T}$	
	Good	Reasonable
Living Room	30dB	40dB
Bedrooms	30dB	35dB

The Standard also states *"For a reasonable standard in bedrooms at night, individual noise events (measure with F time-weighting) should not normally exceed 45dB L_{Amax}."*

13.2 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.

13.3 Local Unitary Development Plan

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

13.4 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.

Room Type	Period	Criterion
Living Areas	Daytime (07:00-23:00 hours)	40dB $L_{Aeq, 16hr}$
Bedrooms	Night-time (23:00-07:00 hours)	35dB $L_{Aeq, 8hr}$

The above levels correspond to "reasonable", as defined in BS 8233. If these criteria are adopted as minimum standards for worst affected dwellings, the typical levels in typical flats will approach, and in many cases exceed, "good" as defined in BS 8233.

Note: The criteria termed "reasonable" in BS8233: 1999 would generally be considered to be pretty stringent and acceptable. It would in fact be fair to substitute the word "reasonable" for "acceptable". To expect "good" in the worst case dwellings would thus be consistent with BS 8233: 1999. If the worst case was designed to "good" this would lead to "over design" for other dwellings – which could be undesirable for various reasons (including cost and acoustic privacy between dwellings).

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.

14.0 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 Thermal Double Glazing.

Daytime $L_{Aeq(16\text{-}hour)}$ dBA	Night-time $L_{Aeq(8\text{-}hour)}$
35 dBA	31 dBA

These predicted worst case internal noise levels meet the proposed criteria.

It is thus demonstrated that acceptable internal noise levels are achievable.

15.0 CONCLUSIONS

A detailed 24 hour environmental noise survey has been undertaken 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.

The worst case position falls into Noise Exposure Category C. The remainder of the façades fall into Noise Exposure Category B. 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 constructions.

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 façade.

The assessment indicates that the proposed plant could exceed the requirements of the Local Authority at the nearest noise sensitive window. Recommendations have been made such that the Local Authority's criteria should be achieved.

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Checked by
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Appendix A

The acoustic terms used in this report are explained below:

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.

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30-32 Grays Inn Road

ACOUSTIC SPECIFICATION FOR

ACOUSTIC SCREEN (ACOUSTICALLY ABSORBENT)

Acoustic screening shall extend:

- continuously around 4 sides of the plant area.
- from the roof up to a minimum height of 1000 mm above roof level, or equal to the highest part of the plant, whichever is the higher.

Performance

The acoustic screen shall provide in its as-installed condition the following minimum combined sound reduction indices (SRI's)/Transmission Losses when tested in accordance with BS EN ISO 10140-2:2010:

Minimum Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
20	21	27	37	44	46	51	49

The internal surface of the acoustic screen shall provide in its as-installed condition the following minimum absorption coefficients:

Minimum Absorption Coefficients (∝) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
-	0.85	0.95	0.95	0.95	0.95	0.9	0.8

Construction

The acoustic panels shall comprise 100mm thick mineral wool slabs retained between galvanised mild steel sheet – perforated on the plant side with a free area of at least 25%. The outer casing shall be constructed from galvanised sheet steel having a minimum thickness of 1.2mm (16 swg) and fixed at 300mm (max) centres. The slabs shall be retained behind a suitable protective facing such as perforated steel sheet (minimum free area of 23%). Flattened-expanded ("Expamet") sheet shall not be used, unless all edges of the sheet are mechanically fixed to the casing and galvanised steel cover strips are used to prevent rivet heads pulling through the perforated sheet (trapping the Expamet between two solid steel layers).

The inert, rot and vermin proof, non-hygroscopic and non-combustible mineral wool or glass fibre acoustic medium shall be packed to a density of not less than 45kg/m^3. This shall be faced with a glass fibre cloth, or other approved infill protection membrane. Panels shall be

constructed and assembled so that no egress of the acoustic medium will occur.

The acoustic media shall not comprise materials which are generally composed of mineral fibres, either man made or naturally occurring, which have a diameter of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to ensure fibre migration is prevented.

Provision shall be made to prevent settling of the acoustic medium. The panels shall be suitably weather protected. In particular panels shall have drain holes as required to avoid soaking of the acoustic medium.

The complete structure shall be inert, rot and vermin proof, wind and weather resistant to standards agreed with the Client.

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

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

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

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30-32 Grays Inn Road

ACOUSTIC SPECIFICATION FOR

ACOUSTIC LOUVRE

The louvre blades shall face in the direction opposite to that which would be conventional for weather louvers, such that the plant is not visible between the louvre blades when viewed from below.

Performance

The acoustic louvres shall be at least 600mm deep and provide, in their as-installed condition, the following minimum combined sound reduction indices (SRI's)/Transmission Losses when tested in accordance with BS EN ISO 10140-2:2010:

Minimum Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
9	10	14	18	26	26	25	24

Construction

The louvre frame shall be constructed from a suitable gauge of galvanised mild steel, or aluminium, supporting louvre blades of like material. The acoustic material in the blades shall be packed to a density of not less than 45kg/m^3 and be inert, rot and vermin proof, non-hygroscopic incombustible mineral fibre. This shall be faced with glass fibre cloth, or other approved infill protection membrane, and retained on the lower blade face by perforated galvanised mild steel or aluminium (not "expamet" or similar derivative) having a minimum thickness of 0.5mm fixed at 200mm (max) centres.

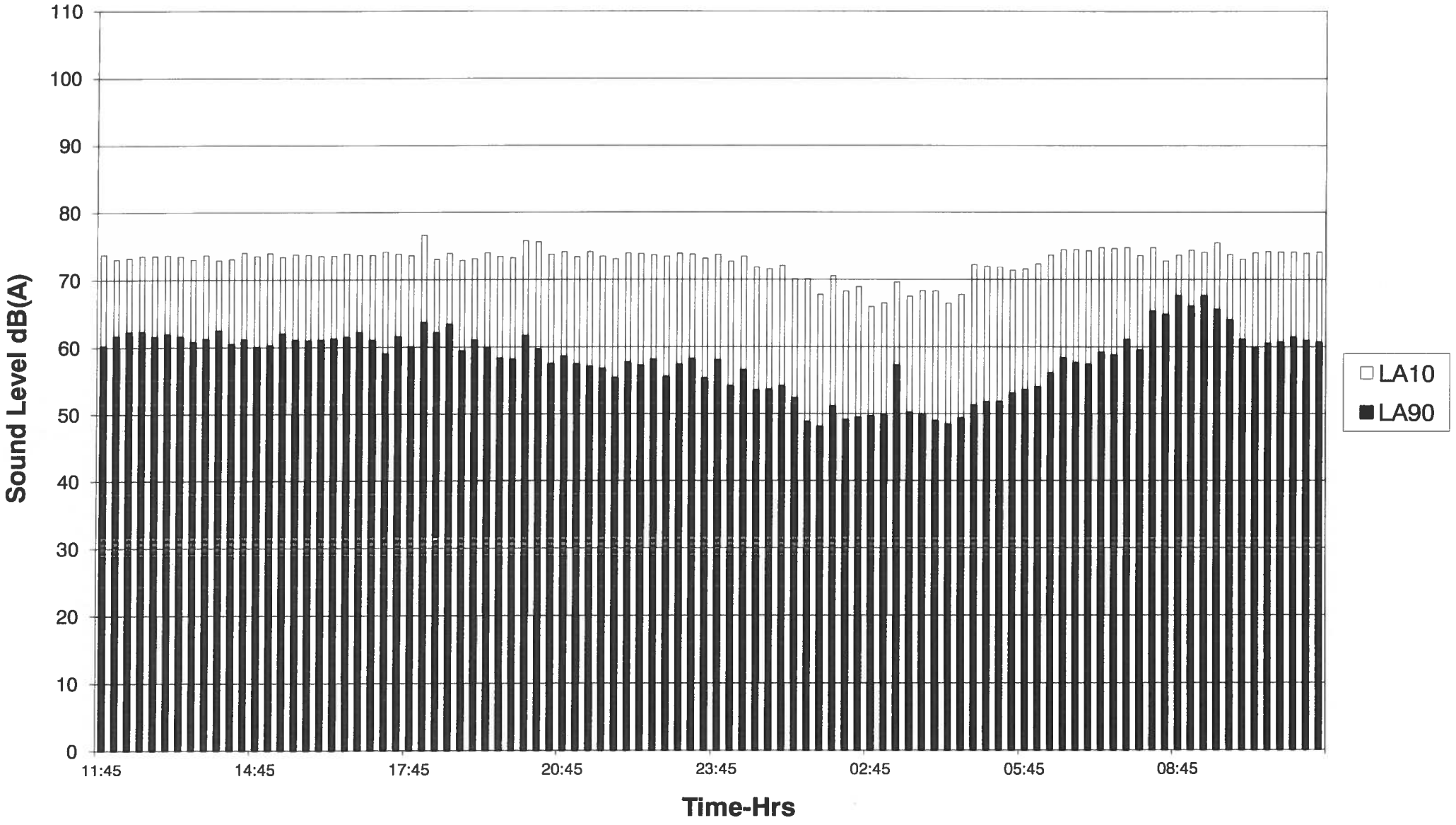
All junctions between the acoustic screen and adjacent structures shall be made good and sealed with a heavy grout and/or non-hardening dense mastic.

The supplier shall ensure that the assembled enclosure is designed and constructed to withstand site operating conditions such as wind and snow loads, etc., as appropriate, and is suitably weatherproofed.

The acoustic media shall not comprise materials which are generally composed of mineral fibres, either man made or naturally occurring, which have a diameter of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to ensure that fibre migration is prevented.

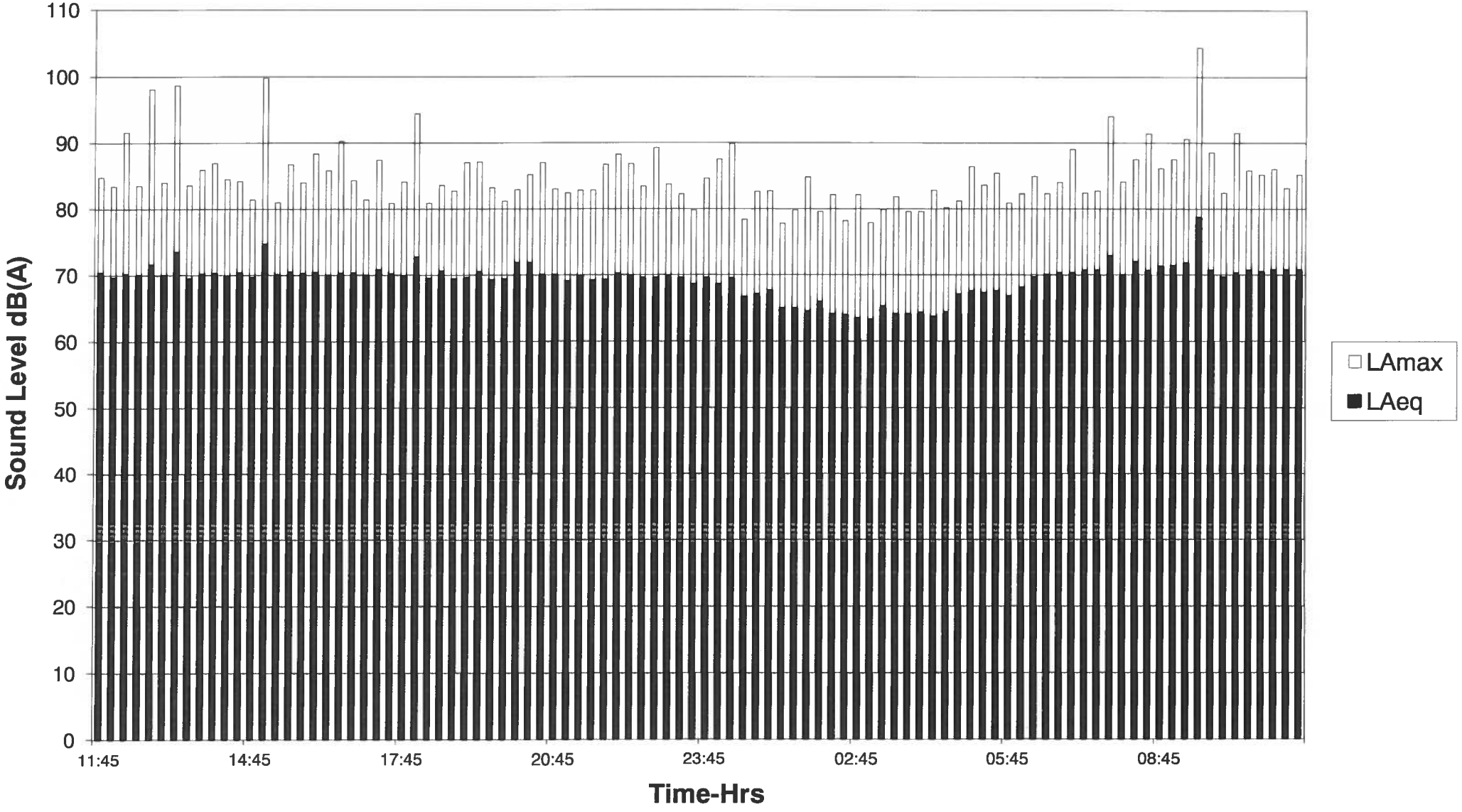
Any deviations from the above specification must be agreed by, and confirmed in writing to, Hann Tucker Associates.

30-32 Grays Inn Road
Position 1
L_{A10} and L_{A90} Noise Levels
Wednesday 03/10/2012 - Thursday 04/10/2012



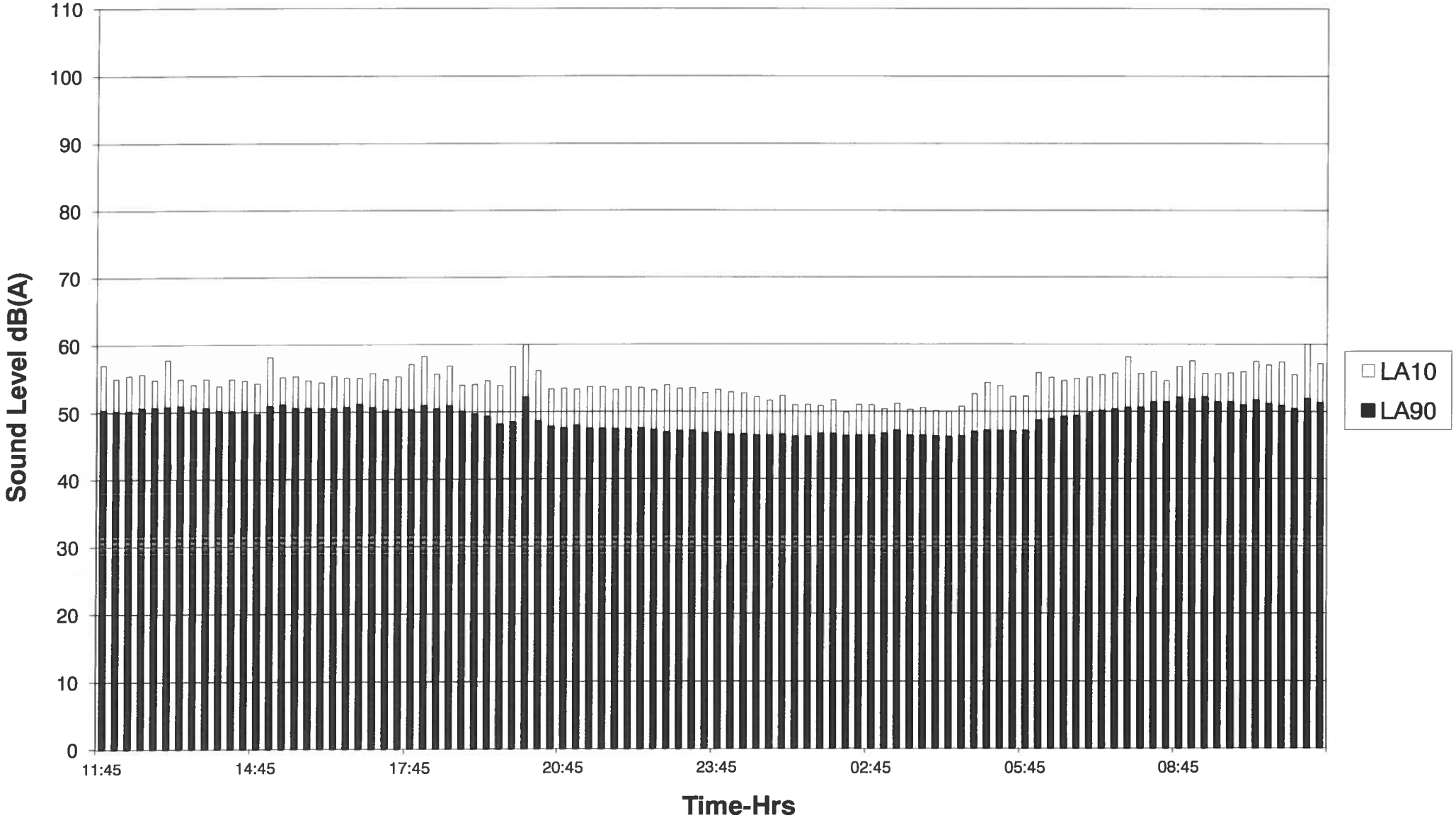
Time History Graph 18597/TH1

30-32 Grays Inn Road
Position 1
L_{Aeq} and L_{Amax} Noise Levels
Wednesday 03/10/2012 - Thursday 04/10/2012



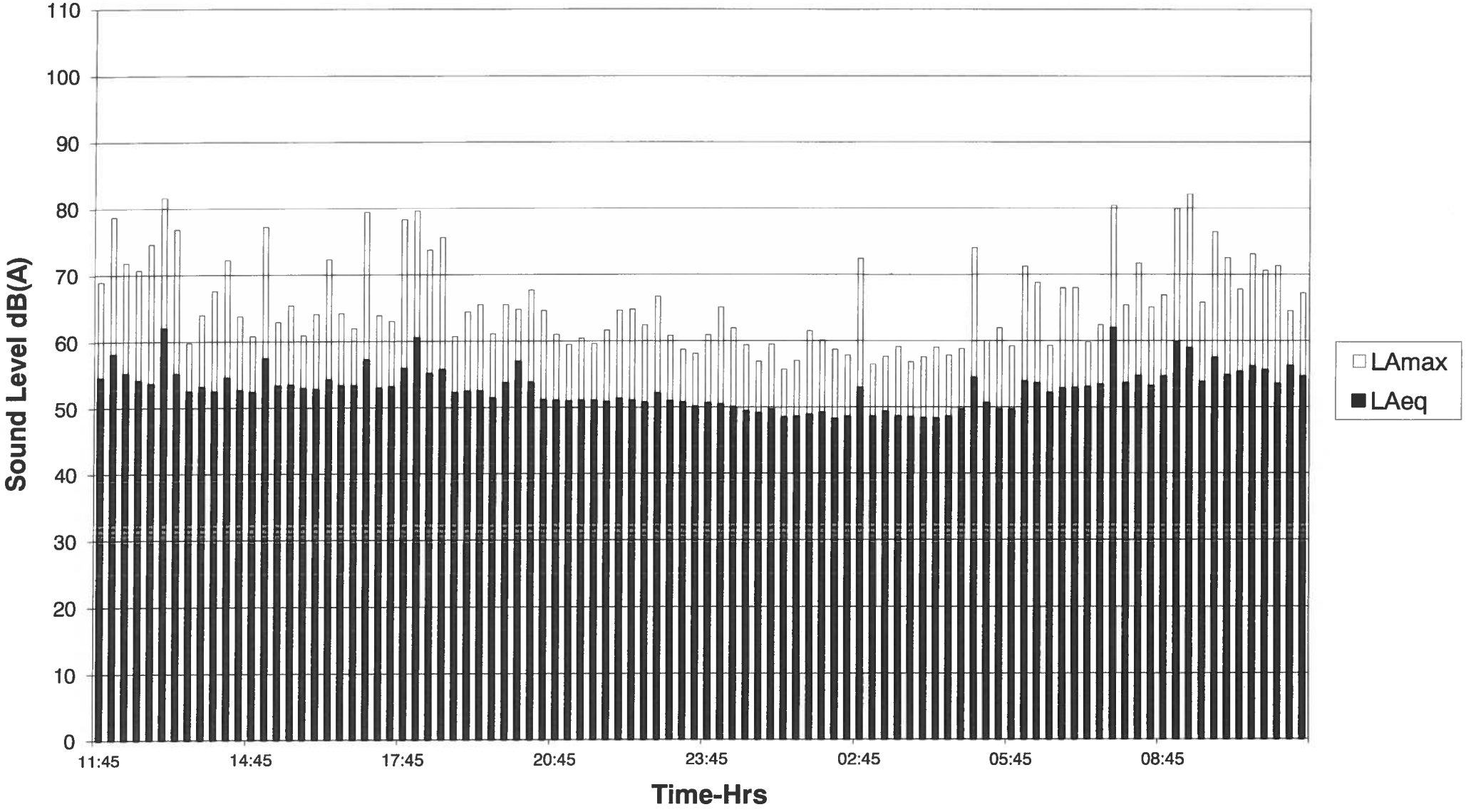
Time History Graph 18597/TH2

30-32 Grays Inn Road
Position 2
L_{A10} and L_{A90} Noise Levels
Wednesday 03/10/2012 - Thursday 04/10/2012



Time History Graph 18597/TH3

30-32 Grays Inn Road
Position 2
L_{Aeq} and L_{Amax} Noise Levels
Wednesday 03/10/2012 - Thursday 04/10/2012



Time History Graph 18597/TH4