HILSON MORAN

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Wellcome Trust

Bentley House, 200 Euston Road, London

Noise Survey Report

Issue	Date
1.0	21 May 2010

HILSON MORAN

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engineering the future
for the built environment

Wellcome Trust

Bentley House, 200 Euston Road, London

Noise Survey Report

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Contents

1 EXECUTIVE SUMMARY

A planning application for a new development, comprising a student Hall of Residence and associated amenity areas, is proposed at Bentley House, 200 Euston Road, London. The proposed development will include external building services plant. In addition, the general area is subject to noise from traffic on surrounding roads which will have the potential to affect internal noise levels within the new development.

Hilson Moran therefore undertook an environmental noise survey at the proposed development site, in order to determine prevailing noise levels affecting the site and its surroundings and inform the planning process.

The results of the noise survey were found to be fairly typical, considering the location of the measurement positions and the dominant nearby noise sources.

External plant noise emission limits have been proposed based on typical Camden Council standards.

Based on the measured external noise levels, typical daytime, evening and night-time noise levels incident upon the proposed development have been determined and compared with Camden Council standards.

It has been determined that satisfactory resting, sleeping and study conditions can be achieved in proposed study-bedrooms, given the sound insulation performance of the various elements of the external façade which shall be incorporated into the design (full acoustic specifications for which, shall be prepared at detail design stage).

2 INTRODUCTION

2.1 Background

A planning application for a new development, comprising a student Hall of Residence and associated amenity areas, is proposed at Bentley House, 200 Euston Road, London. The proposed development will include external building services plant. In addition, the general area is subject to noise from traffic on surrounding roads which will have the potential to affect internal noise levels within the new development.

Hilson Moran has therefore been appointed to undertake an environmental noise survey at the site, in order to determine the prevailing noise levels and help inform the planning application by identifying any necessary mitigation this change of use application may require.

2.2 Purpose

The purposes of this report are therefore:

(a) to determine prevailing environmental noise levels;

(b) based on (a), to determine the lowest background noise levels at any noise sensitive properties near to the site;

(c) based on (b), to present plant noise emission limits in accordance with typical Camden Council standards;

(d) to compare the measured incident noise levels with Camden Council guidance

(e) to comment on the planning implications and, if necessary, propose preliminary noise mitigation measures.

2.3 Scope

This report reviews prevailing environmental noise levels around the site. External noise emission limits have been proposed for new plant items associated with the developments. The incident noise levels for daytime, evening and night-time periods, have been determined and compared with the requirements of Camden Council and preliminary noise mitigation measures are proposed where necessary.

2.4 Structure

Following this introductory section, a description of the site is given in Section 3. Section 4 gives a description of the environmental noise survey methodology with results presented in Section 5 and Appendix B. Section 6 presents external plant noise emission limits. An assessment according to the guidance from the Camden Council is presented in Section 7.

Appendix A presents an explanation of the acoustic terminology used in this report.

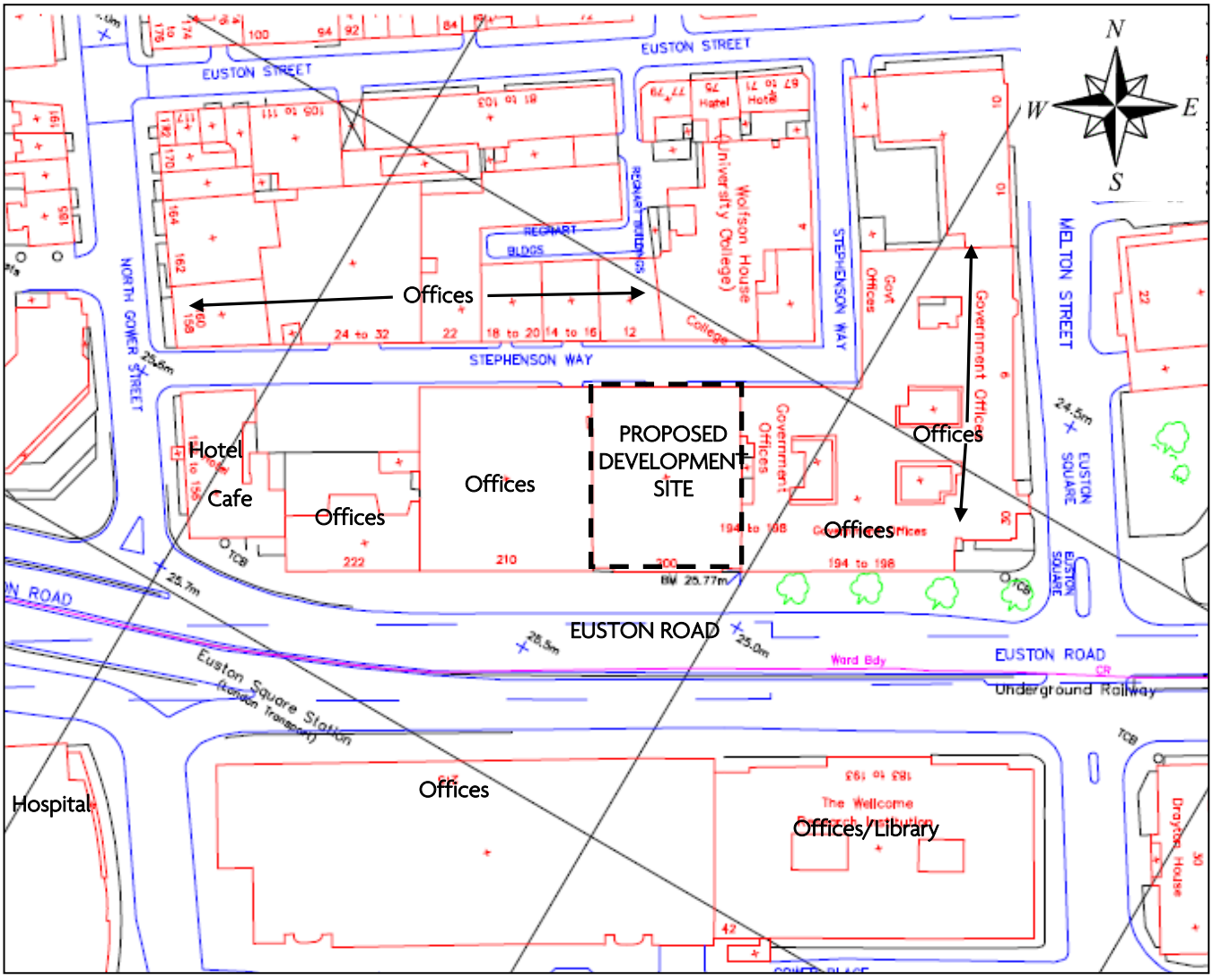
3 SITE DESCRIPTION

The proposed development site is located at 200 Euston Road in London. The site is currently occupied by Bentley House, a vacant 4-storey storage/archive building. Bentley House is bounded by Euston Road to the South, Stephenson Way to the North and office buildings to the East and West.

Whilst on site it was noted that the surrounding properties mainly consist of offices, as well as a hotel and café on the corner of Euston Road and North Gower Street. University College Hospital is located to the South-West of the site.

Figure 3.1 below shows the existing site and its surroundings.

Figure 3.1 Location of Proposed Development Site and Surrounding Land Use



4 SURVEY METHODOLOGY

An unmanned environmental noise survey was undertaken between approximately 14:00 hours on Friday 16 April 2010 and 14:00 hours on Tuesday 20 April 2010.

A-weighted (dBA) L_{max}, L_{eq} and L_{90} noise levels were measured throughout the environmental noise survey over contiguous 100 millisecond intervals. Octave band noise levels (from 63Hz to 8kHz) were also recorded so as to provide a more detailed description of the noise climate throughout the survey period.

The measurement positions are shown on Figure 4.1 and described in Table 4.1.

Figure 4.1 Site Plan Indicating Approximate Measurement Positions

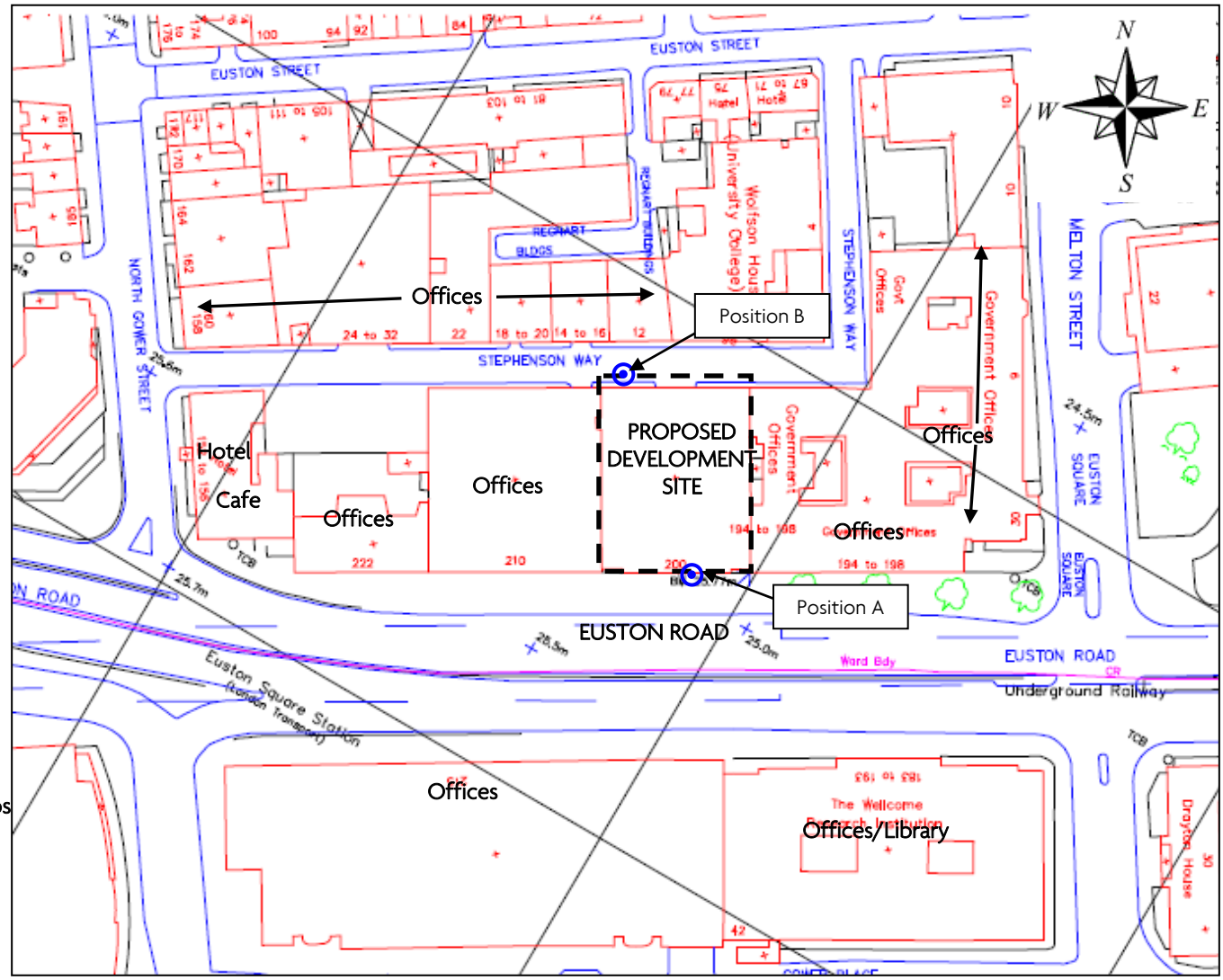


Table 4.1 Description of Noise Measurement Positions

Measurement Position	Description
A	At the Southern boundary of the proposed development site, protruding by approximately 0.5m from a first floor window of the existing building (200 Euston Road), at a height of approximately 5m above ground level, overlooking Euston Road
B	At the Northern boundary of the proposed development site, protruding by approximately 1m from a first floor window of the existing building (200 Euston Road) at a height of approximately 5m above ground level, overlooking Stephenson Way

Measurement position A was considered representative of typical noise levels at the noisiest façade of the site, in order to allow an assessment of the acoustic requirements of the proposed development façades to be undertaken.

Measurement position B was considered representative of typical noise levels at the quietest area of the site, to be used to determine suitable plant noise emission limits. Position B was also selected so that noise levels incident on the rear of proposed development site, due to road traffic along Stephenson Way, could be assessed.

The equipment used for the noise survey is summarised in Table 4.2.

Table 4.2 Description of Equipment used for Noise Survey

Measurement Position	Equipment	Description	Quantity	Serial Number
A	01 dB Solo	Type 1 automated logging sound level meter	1	60461
	01 dB PRE 21	Type 1 ½" microphone and pre-amplifier	1	13429
	01 dB BAP 21	Outdoor microphone casing	1	10936
B	01 dB Solo	Type 1 automated logging sound level meter	1	60447
	01 dB PRE 21	Type 1 ½" microphone and pre-amplifier	1	13259
	01 dB BAP 21	Outdoor microphone casing	1	10935
All	01 dB CAL 21	Calibrator	1	50441990

The weather conditions at the start and end of the survey periods were considered appropriate for undertaking environmental noise measurements i.e. there was little or no rainfall, the sky was fairly clear of cloud and there was only light wind. Hilson Moran understands these weather conditions were representative of the full survey period.

The noise monitoring equipment used was calibrated before and after the noise survey periods. No significant change was found.

5 SURVEY RESULTS & OBSERVATIONS

5.1 Results

Appendix B presents time history graphs showing the A-weighted (dBA) L_{max}, L_{eq} and L_{90} noise levels measured throughout the noise survey at each position (note that levels measured at position A have been corrected for nearby surface reflections in accordance with advice from BS8233: 1999[1]). We would consider the noise levels measured to be representative of the typical noise climate at the site, considering the location of the measurement positions and the dominant nearby noise sources.

The lowest measured 10-minute background L_{A90} noise levels during weekday/weekend daytime, evening and night-time periods at each position are summarised in Table 5.1 below.

Table 5.1 Lowest Measured Daytime, Evening and Night-time Background L_{90} Noise Levels

Measurement Position	Lowest Measured L_{90} Background Noise Level (dBA)					
	Daytime/Typical Office Hours (07:00 – 19:00 hours)		Evening (19:00 – 23:00 hours)		Night-time (23:00 – 07:00 hours)	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
A	66	63	64	63	56	57
B	55	52	52	52	51	51

From the measured noise levels, we have derived the logarithmically-averaged daytime, *evening* and night-time free-field ambient noise levels at each measurement position shown in Table 5.2.

Table 5.2 Overall Measured Daytime, Evening and Night-time Ambient Noise Levels

	Period, T	$L_{Aeq,T}$ (dB)	
		Position A	Position B
Daytime Logarithmic Average (12 hour)	07:00 – 19:00	72	61
Evening Logarithmic Average (4 hour)	19:00 – 23:00	73	58
Night-time logarithmic Average (8 hour)	23:00 – 07:00	72	56

5.2 Observations

Due to the nature of the survey (unmanned) we are unable to comment on the exact noise climate throughout the entire survey period. However, at the beginning and end of the survey the daytime noise climate at position A was noted to be dominated by noise from traffic movements along Euston Road. Night-time noise levels at position A were assumed to be affected by general ambient background noise (road traffic, etc.)

At position B, the daytime noise climate was noted to be dominated by noise from road traffic and occasional loading activities on Stephenson Way. Noise from traffic movements on Euston Road was clearly audible and noise from building services plant on surrounding buildings was also audible at this position. Night-time noise levels at position B were assumed to be affected by general ambient background noise (road traffic, etc.) as well as noise from building services plant.

6 EXTERNAL PLANT NOISE LIMITS

6.1 Local Authority Guidance

The proposed development site lies within the jurisdiction of London Borough of Camden (Camden Council). We understand Camden Council's typical standards relating to plant noise are as follows[2]

"The Council will only grant planning permission for plant or machinery, including ventilation or air handling equipment, if it can be operated without causing a loss to local amenity and does not exceed the thresholds..."

Thresholds for noise levels from plant and machinery at which planning permission will not be granted by Camden Council are shown in Table 6.1 below

Table 6.1 Noise Levels from Plant and Machinery at Which Planning Permission will not be Granted

Noise Description and location of measurement	Period	Time	Noise Level
Noise at 1 metre external to a sensitive façade	Day, Evening and Night	00:00 – 24:00	5dB(A) less than L_{A90}
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade	Day, Evening and Night	00:00 – 24:00	10dB(A) less than L_{A90}
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade	Day, Evening and Night	00:00 – 24:00	10dB(A) less than L_{A90}
Noise at 1 metre external to a sensitive façade where L_{A90} > 60dB	Day, Evening and Night	00:00 – 24:00	55dB L_{Aeq}

Based on typical Camden Council standards and the lowest measured 10-minute background L_{A90} noise levels during daytime, evening and night-time periods at each position during the environmental noise survey, we would propose the plant noise limits shown in Table 6.2. The plant noise limits are to be achieved during the relevant plant operating period, when measured 1m external to the nearest noise sensitive façade to the site.

Table 6.2 Proposed External Plant Noise Limits – Noise Sensitive Properties

Measurement Position	External Plant Noise Limit during plant operating period (dBA)					
	Daytime/Typical Office Hours (07:00 – 19:00 hours)		Evening (19:00 – 23:00 hours)		Night-time (23:00 – 07:00 hours)	
	Weekday	Weekend	Weekday	Weekend	Weekday	Weekend
A	55*	55*	55*	55*	49	52
B	50	47	47	47	46	46

The above external plant noise limits are subject to approval by Camden Council. In accordance with the requirements of Camden Council, if noise from the proposed plant has a distinguishable discrete continuous note or distinct impulses then the above plant noise limits should be reduced by 5 dBA (except those marked *, where the lowest measured L_{A90} exceeds 60 dB so the plant noise limit remains at 55 dBA).

6.2 Plant Noise Mitigation

Measures that will be employed as standard practice to ensure the external plant noise level limits are not exceeded include:

- Selection of low-noise plant
- Location of plant to maximise separation (in terms of both screening and distance) from noise sensitive properties
- Use of appropriate external screens and attenuating enclosures around plant areas where necessary
- Use of appropriate atmospheric duct-mounted attenuators, where necessary, on air moving plant

7 INTERNAL NOISE LEVELS

7.1 Local Authority Guidance

Camden Council planning guidance states the following[2]:

"The Council will only grant planning permission for development sensitive to noise/vibration in locations that experience noise/vibration pollution if appropriate attenuation measures are taken."

Table 7.1 shows noise levels from roads or railways at and above which Camden Council's guidance states that attenuation measures will be required before planning permission is granted.

Table 7.1 Noise Levels on Residential Sites Adjoining Railways and Roads at and above which Attenuation Measures will be Required

Noise Description and location of measurement	Period	Time	Sites adjoining railways	Sites adjoining roads
Noise at 1 metre external to a sensitive façade	Day	07:00 – 19:00	65 dB L_{Aeq},12h	62 dB L_{Aeq},12h
Noise at 1 metre external to a sensitive façade	Evening	19:00 – 23:00	60 dB L_{Aeq},4h	57 dB L_{Aeq},4h
Noise at 1 metre external to a sensitive façade	Night	23:00 – 07:00	55 dB L_{Aeq},8h	52 dB L_{Aeq},8h
Individual noise events several times an hour	Night	23:00 – 07:00	> 82 dB L_{Amax} (S time weighting)	> 82 dB L_{Amax} (S time weighting)

Based on the measured noise levels shown in Table 5.2 and the Camden Council guidance in Table 7.1, attenuation measures would be required in the proposed residential façades facing both Euston Road and Stephenson Way in order for planning permission to be granted.

We understand that Camden Council's guidance regarding external noise levels are in place to ensure that suitable internal noise levels can be achieved within a proposed residential development. We would advise that acceptable internal noise levels could be achieved within the proposed development with appropriate design and construction of external building façades, as demonstrated in the following Section.

7.2 Preliminary Façade Sound Reduction Assessment

The external façades of the residential development will need to be designed and constructed so as to provide adequate/effective protection against noise and to achieve acceptable internal noise levels in the new development.

7.2.1 Acceptable Internal Noise Levels

In lieu of any specific requirements regarding acceptable internal noise levels within Camden Council's UDP, we would recommend that the "reasonable" standard within BS 8233: 1999[1] "*Sound insulation and noise reduction for buildings – Code of practice*" should be considered acceptable, as presented in Table 7.3 below.

Table 7.3 BS 8233 Internal Noise Level Guidelines for Residential Rooms

Criterion	Typical Situation	Maximum $L_{Aeq, T*}$ (dB)
Reasonable resting / sleeping conditions	Living Rooms	40
	Bedrooms	35

**T = 16 hours for daytime periods (07:00 – 23:00 hours) and 8 hours for night-time periods (23:00 – 07:00 hours)*

In addition, the WHO document "*Guidelines for Community Noise*"[3] also advises that "*for bedrooms the critical effect is sleep disturbance"* and suggests a limiting L_{Amax} noise level of 45dB for single sound events.

Please note that the BS 8233 "*Reasonable*" standard is commonly used and Hilson Moran has successfully applied this standard on many comparable residential developments in urban locations across the United Kingdom.

7.2.2 Proposed Facades overlooking Euston Road

The predicted daytime and night-time ambient noise levels incident upon the proposed residential façades facing Euston Road are shown in Table 5.2 and Appendix B.

According to our preliminary calculations, in order to achieve the internal noise levels proposed in Section 7.2.1, the required level of attenuation could be provided by the retained glazing and façade , provided the existing glazing is refurbished to achieve good acoustic and thermal seals and fitted with a new secondary internal pane with 100mm air space and acoustically lined reveals. We understand bedrooms are to be ventilated mechanically, which will remove the necessity for natural ventilation openings.

Please note that these recommendations are for planning guidance only. Full calculations will be undertaken at the design stage in order to prepare detailed acoustic specifications for each of the external façade elements.

7.2.3 Proposed Facades overlooking Stephenson Way

The predicted daytime and night-time ambient noise levels incident upon the proposed residential façades facing Stephenson Way shown in Table 5.2 and Appendix B.

According to our preliminary calculations, in order to achieve the internal noise levels proposed in Section 7.2.1, the required level of attenuation could be provided by a façade typically consisting of:

(a) Double glazing, capable of achieving a minimum laboratory sound reduction performance of R_w 31 dB (typically 4mm glass / 12-16mm airspace / 4mm glass i.e. standard thermal double glazing)

and

(b) Standard (non-acoustic) trickle ventilators, capable of achieving a minimum sound reduction performance of $D_{n,ew}$ 35 dB for each ventilator in the open position (no greater than 8,000mm^2 per habitable room)

and

(c) Non-glazed areas of external façades typically consisting of a brick/block cavity wall.

Please note that these recommendations are for planning guidance only. Full calculations will be undertaken at the design stage in order to prepare detailed acoustic specifications for each of the external façade elements.

7.2.4 Proposed Facades within courtyards

Our calculations indicate that the predicted daytime and night-time ambient noise levels incident upon the proposed residential façades within the courtyards are likely to be approximately:

Daytime/Evening 60dB $L_{Aeq\ (16\ hour)}$

Night-time 55dB $L_{Aeq\ (8\ hour)}$

In addition, it has been estimated that a value of approximately 75dB L_{Amax} represents a typical worst-case night time maximum external noise level incident upon these residential facades.

According to our preliminary calculations, in order to achieve the internal noise levels proposed in Section 7.2.1, the required level of attenuation could be provided by a façade typically consisting of:

(a) Double glazing, capable of achieving a minimum laboratory sound reduction performance of R_w 31 dB (typically 4mm glass / 12-16mm airspace / 4mm glass i.e. standard thermal double glazing)

and

(b) Standard (non-acoustic) trickle ventilators, capable of achieving a minimum sound reduction performance of $D_{n,ew}$ 35 dB for each ventilator in the open position (no greater than 8,000mm^2 per habitable room)

and

(c) Non-glazed areas of external façades typically consisting of a brick/block cavity wall.

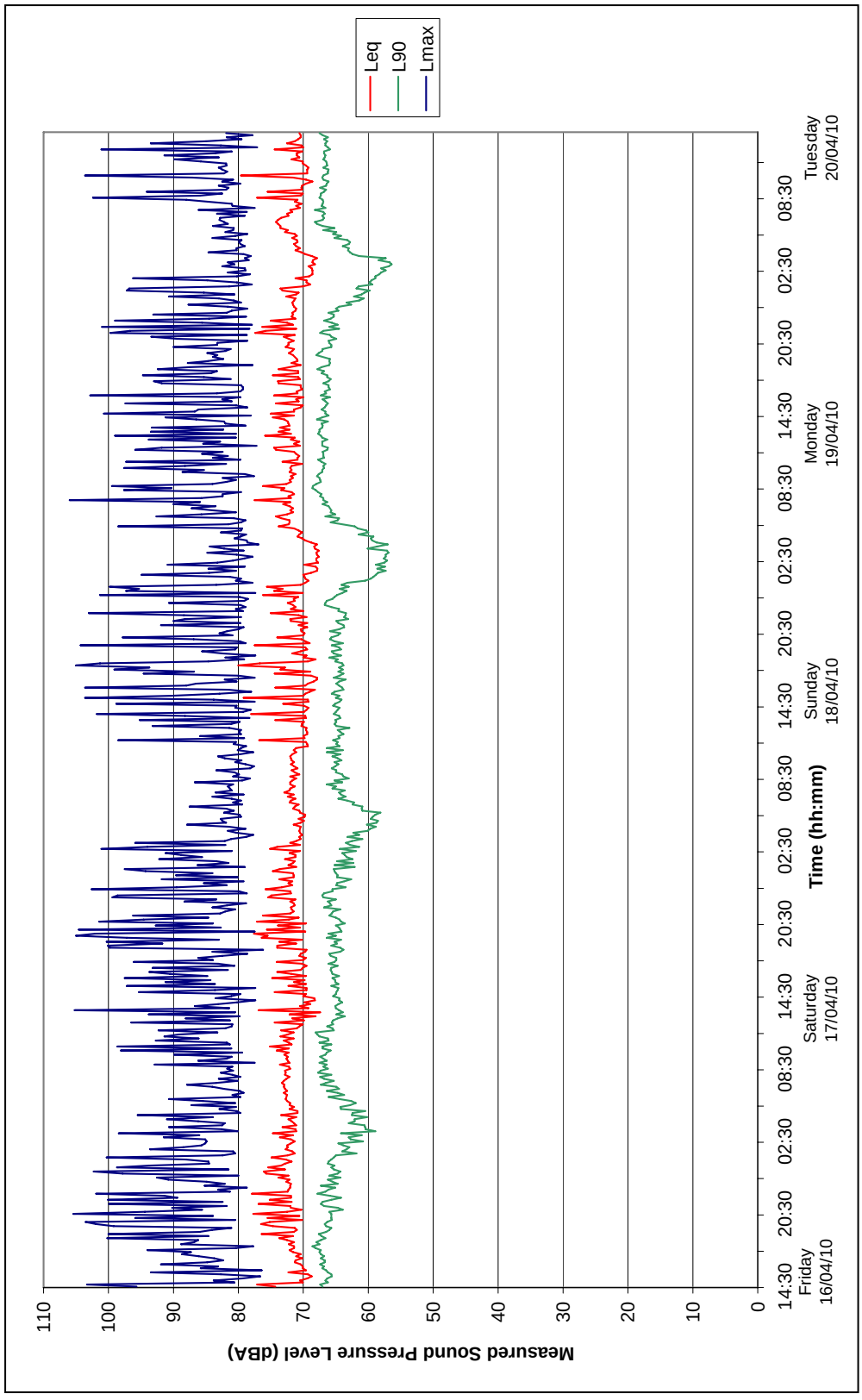
Please note that these recommendations are for planning guidance only. Full calculations will be undertaken at the design stage in order to prepare detailed acoustic specifications for each of the external façade elements.

APPENDIX A: ACOUSTIC TERMINOLOGY

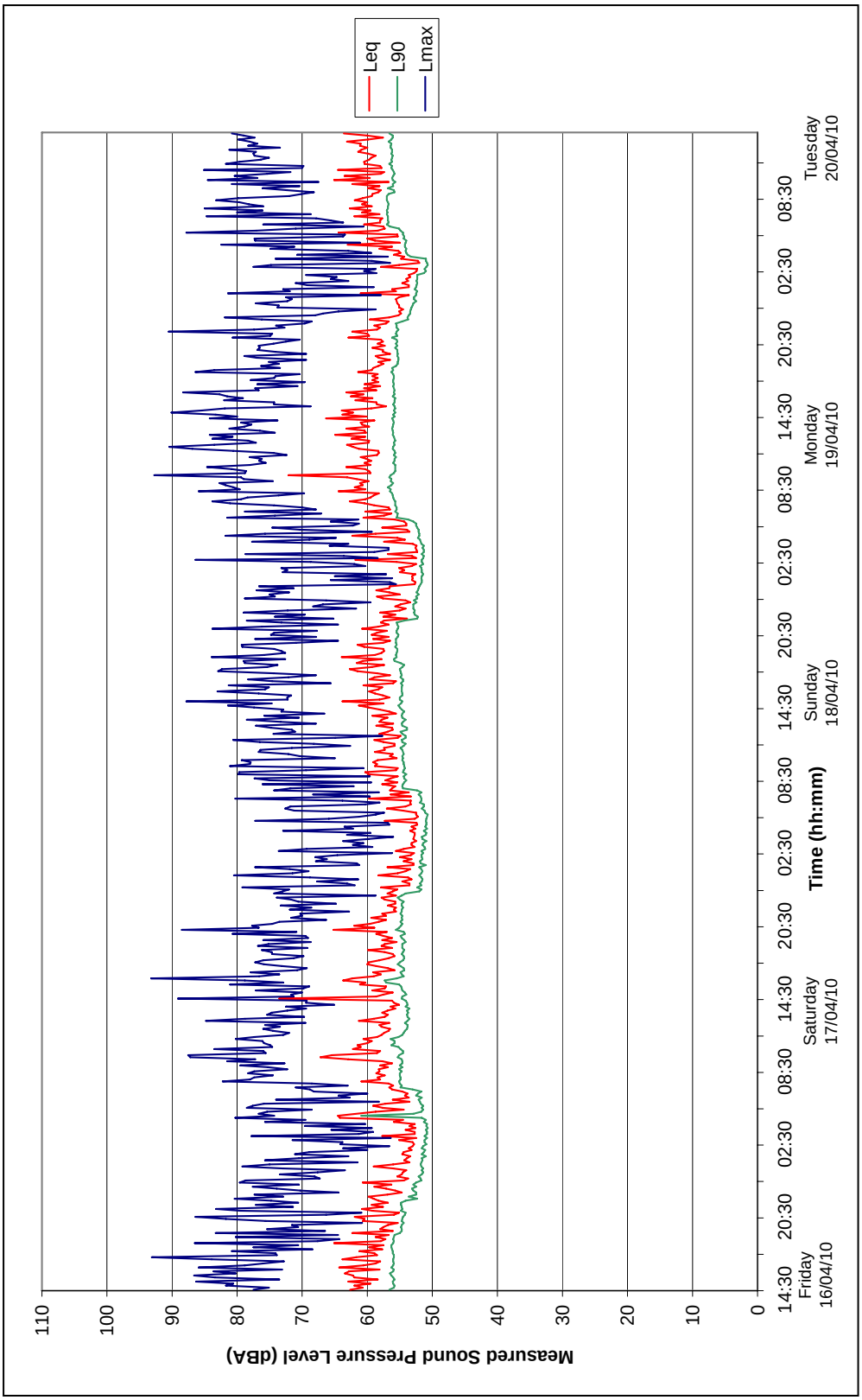
Parameter	Description
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing ($20x10^{-6}$ Pascals).
Sound Pressure Level (L_p)	The sound pressure level is the sound pressure fluctuation caused by vibrating objects relative to the threshold of hearing.
A-weighting (L_A or dBA)	The sound level in dB with a filter applied to increase certain frequencies and decrease others to correspond with the average human response to sound.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T (typically T= 16 hours for daytime periods, T = 8 hours for night-time periods). This is the sound level that is equivalent to the average energy of noise recorded over a given period.
$L_{n,T}$	The noise level exceeded for n% of the time over a given period T. e.g. L_{90}, the noise level exceeded for 90% of the time (background noise level).
L_{max}	The maximum noise level measured.
R_W (dB)	The Weighted Sound Reduction Index – a single number indicator of the sound reduction/insulation performance of a structure e.g. wall, floor, door, glazing etc. The higher the value, the better the sound insulation.
$D_{n,ew}$ (dB)	The Weighted Element Normalised Sound Level Difference – a single number indicator of the sound reduction/insulation performance of a small element e.g. a trickle ventilator

APPENDIX B: NOISE MONITORING RESULTS

B1. Time History Graph of Noise Levels at Measurement Position A (Facing Euston Road)



B2. Time History Graph of Noise Levels at Measurement Position B (Facing Stephenson Way)



DOCUMENT CONTROL & REFERENCES

Change History

Issue 0.1	23 April 2010	Document produced by Mark Brightwell and forwarded to Nicholas Jones for review.
Issue 0.2	26 April 2010	Document reviewed by Nicholas Jones and returned to Mark Brightwell for production and issue of final document.
Issue 0.3	26 April 2010	Draft document issued to design team for comment
Issue 0.4	10 May 2010	Draft document reissued following comments from the design team
Issue 1.0	21 May 2010	Final document issued.

Changes Forecast

None.

Document References

1. BS 8233 British Standard (BS) 8233: 1999 "Sound insulation and noise reduction for buildings – Code of practice"
2. London Borough of Camden Replacement Unitary Development Plan, Adopted June 2006
3. World Health Organisation (WHO) *"Guidelines for Community Noise"*