FOSTER COURT, UNIVERSITY COLLEGE OF LONDON, LONDON

ACOUSTIC SURVEY AND NOISE CONTROL STRATEGY REPORT

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AUDIT SHEET

REVISION	DESCRIPTION	DATE	ISSUED BY	REVIEWED BY
1	ACOUSTIC SURVEY AND NOISE CONTROL STRATEGY REPORT	17/01/2008	CFC	MMC
2	Updated plant items	4/3/09	JCE	
3	Clarification following comments	5/3/09	MMC	

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Contents

1. INTRODUCTION

Hoare Lea Acoustics have been commissioned to undertake a noise survey at Foster Court, University College of London, London. We understand that the refurbishment of the building comprises installation of new externally located M&E plant on the south-west corner of the ground floor. The building is for office and lecturing use, so the required plant is for heating and cooling purposes.

The noise survey forms the basis of an assessment to determine external and internal noise limits for M&E equipment associated with the refurbishment. This report contains details of both the survey and the determined noise limits for the equipment.

2. SITE DESCRIPTION

The building site is located on Malet Place. The noise environment is mainly dominated by road traffic on Byng Place and Gordon Square and M&E plants already existent in the site. The surrounding buildings are for the majority lecturing/office use, with the closest ones approximately 3m away from the proposed location of the new plant. Some residential dwellings are also situated to the North-East of Foster Court, at a distance of around 50m from the proposed new plant location.

3. BASIS OF ASSESSMENT

3.1 BS4142

BS 4142 provides a method of assessment which is based on the evaluation of a “rating level” for the noise occurring at any surrounding noise sensitive premises as a result of the source in question. The rating level refers to the noise in question, adjusted by the addition of a correction factor of 5dB where appropriate to account for noise features that may increase the likelihood of disturbance.

The likelihood of complaint is subsequently indicated by the difference between the rating level from the development and the existing background noise in the area. The standard states that a difference of around +10 dB or higher indicates that complaints are likely, while a rating level of +5dB is considered to be of marginal significance. As the level of difference decreases below +5dB, complaints are considered less and less likely.

It is proposed that the new plant serving Foster Court should be designed to a rated level totalling no more than the existing background noise level (L_{A90}) minus 5dB as measured at 1 m from the facade of the nearest noise-sensitive properties: the residential dwellings. It is expected that, at this level, noise from plant will not be a cause for complaint.

3.2 UCL Internal Noise Level Criteria

The UCL Noise Level Criteria recommends a noise rating level of NR25 in seminar rooms and NR35 in offices in order to minimise disturbance to concentration and speech intelligibility. It should be noted that a noise level of NR35 can be assumed to be equivalent to a noise level of 40dB $L_{Aeq,\ 1hour}$

In addition to the criterion at residential facades, due to the nature of the area, it is further proposed to set a limit for noise at 1m from office/seminar facades. Assuming a 10dB reduction in noise level due to a partially open window (with reference to BS 8233), the noise criteria as measured at 1m from a seminar façade is recommended to be 40dB $L_{Aeq,\ 1hour}$ during office hours, and 50dB $L_{Aeq,\ 1hour}$ at 1m from an office facade.

4. BACKGROUND NOISE MEASUREMENT SURVEY

Hoare Lea Acoustics undertook a measurement survey to establish the prevailing noise conditions in the vicinity of Foster Court.

This survey comprised automated unattended measurements at a fixed position between 15:00 14th January and 10:00 on 17th January 2008. The weather conditions during the survey period were only favourable for undertaking environmental noise measurements, with clear and dry weather on the 16th of January, thus only that data is analysed in this report.

During this measurement survey the sound level meter was situated on the North-East roof of Foster Court: see Figure 1. This position was chosen to minimise the influence of the existing roof-top plant and to be representative of the noise environment to the North-East of the site.

The automatic sound level meter established values for the A-Weighted L_{90} levels measured for sequential 5-minute sample periods. Details of the equipment used are provided in Appendix B – List of Measurement Equipment. The noise level time history chart for the survey is included in Figure 2 for reference, and the full measurement data is held on file.

5. DISCUSSION

Based upon the survey of existing noise levels, the typical lowest measured background noise level (L_{A90}) during the daytime was 51dB, and during the night-time 50dB. This is considered to be a reasonable representation of background noise levels in the area to the North-East of the site; these relatively high levels of background noise are consistent with the sustained traffic on the nearby roads and existent M&E plants on the site.

The proposed criteria for new M&E plant noise limits are therefore as follows:

Time period	1m from window of nearest affected residential façade	1m from office window	1m from seminar room window
07:00 – 23:00	$L_{Aeq,1\ hour}$ 46 dB	50dB $L_{Aeq,\ 1hour}$	40dB $L_{Aeq,\ 1hour}$
23:00 – 07:00	$L_{Aeq,5\ mins}$ 45 dB	Not applicable	Not applicable

Table 1 – Proposed external M&E noise limits

If noise emitted from the equipment contains tones, features, or is intermittent enough to attract attention, a 5 dB penalty should be applied to the above criteria by reducing them by the corresponding amount.

6. ANALYSIS / ASSESSMENT OF PROPOSED UNITS

An analysis of the noise emitted by plant items to be installed in the light-well has been undertaken. Current proposals comprise the following:

- 2 no. PURY-P800YSHMA condenser units, Lp 64 dB(A) at 1m
- 2 no. PURY-P500YSHMA condense units, Lp 60 dB(A) at 1m
- 3 no. Stultz dry air coolers (only 2 units will operate simultaneously) L_w 64 dB(A)

Standard distance and barrier effect calculations indicate that the noise level due to operation of these plant items will not exceed 30 dB(A) at 1m from the nearest residential facade. This is well below the proposed environmental noise criteria and therefore a positive indication that complaints regarding noise emissions are unlikely.

Calculations indicate that a noise level of approximately 65 dB(A) will be produced at the office windows overlooking the plant area (at all levels due to the reverberant nature of the space). This exceeds the office facade noise criterion, which assumed the use of openable windows for ventilation. It is understood that there are no seminar rooms overlooking the plant.

In order to achieve the noise intrusion criterion proposed by the college, windows with a sound reduction performance of R_w 30 dB could be installed. This would be achieved with closed, well sealed double glazing e.g. 4/12/6, or alternatively using a secondary system installed in addition to the existing glazing. In both cases, a mechanical alternative to the use of open windows for ventilation purposes would be required.

Please note that this assessment includes only the currently proposed plant items. Any additional items associated with future refurbishment work should be assessed separately.

7. SUMMARY

- A noise survey has been undertaken around Foster Court, University College of London, London, to determine the prevailing noise climate.

- Suitable noise level limits for M&E plant associated with the new works have been proposed based upon the measured existing noise levels. These are applied both at the surrounding UCL facades and the nearest neighbouring residential facades.

- The new plant associated with the development has been demonstrated to achieve the environmental noise criteria at the nearest residential facades.

- Mitigation measures are proposed to allow compliance with the UCL internal noise criteria for the office facades surrounding the plant area. When deciding on the implementation of these measures, UCL could consider the noise sensitivity of the affected rooms as well as the existing situation which includes condenser plant operating in the courtyard area.

Figure 1 – Area aerial picture

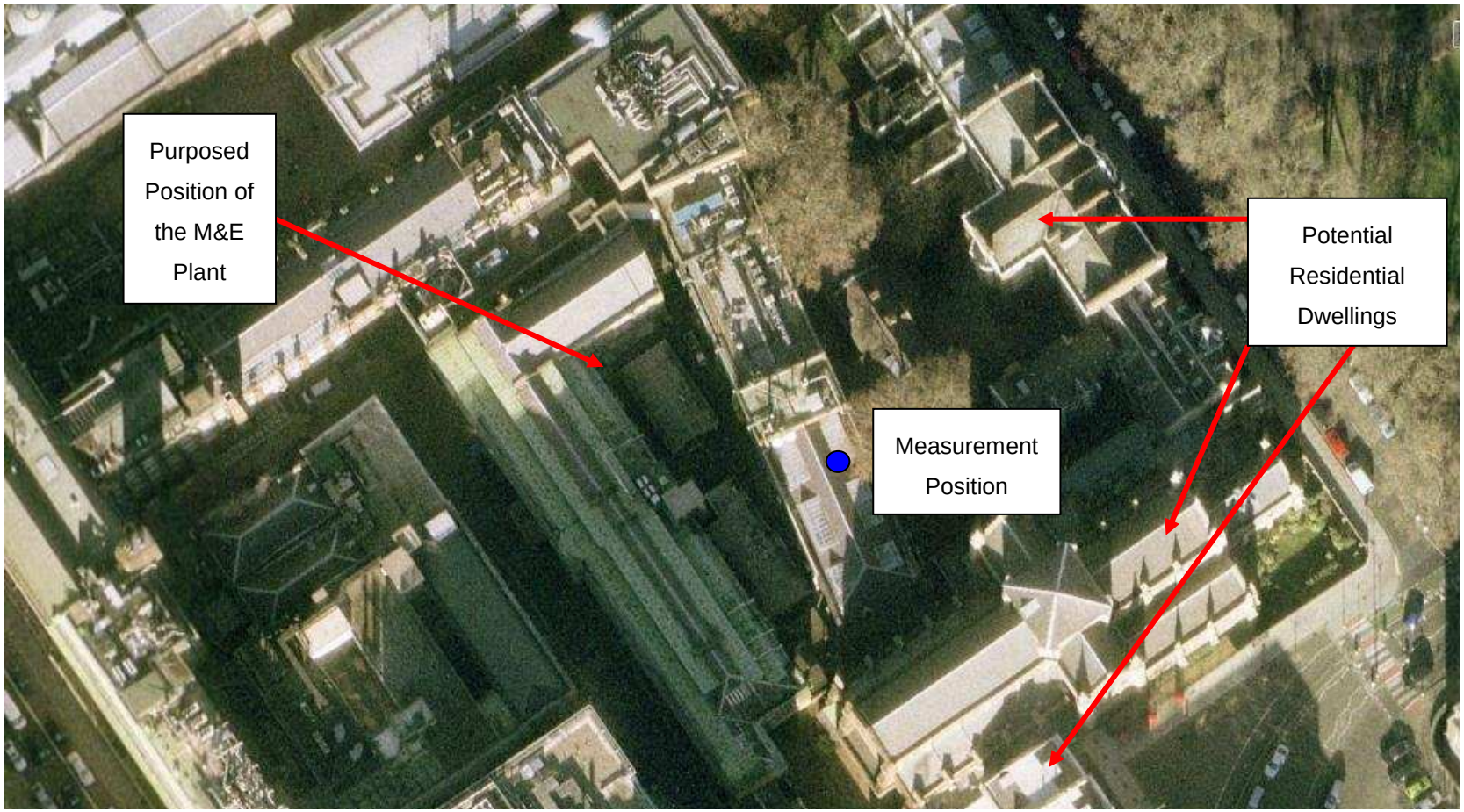
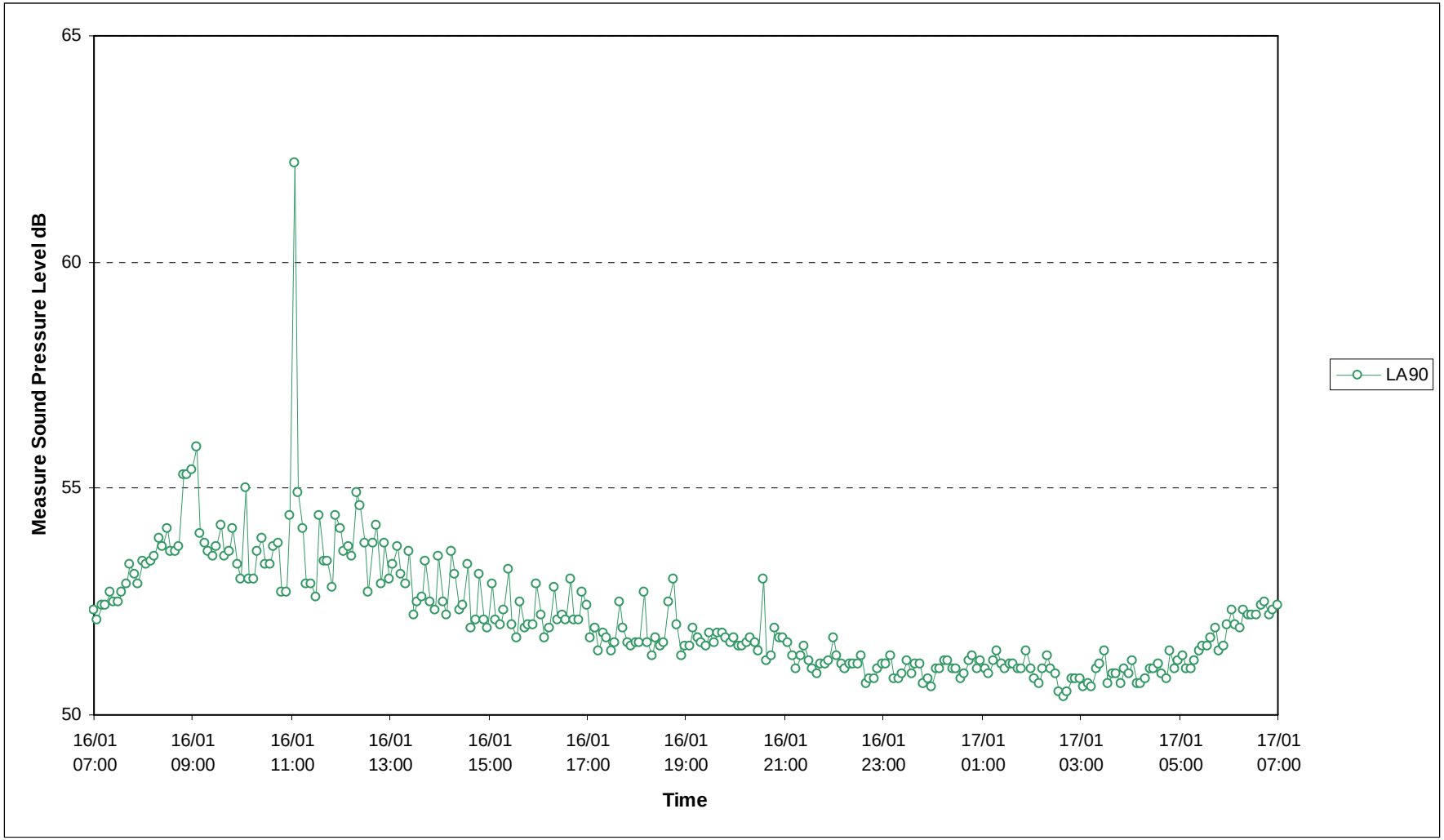


Figure 2 – Noise level time history chart. Levels corresponding to consecutive 5-minutes measurement periods.



APPENDIX A – GLOSSARY OF TERMS

Decibel (dB)

The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithm's are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to mimic the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies. An 'A' weighted value would be written as dB(A).

$L_{Aeq,T}$

The A-Weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter.

$L_{A90,T}$

The A-Weighted noise level exceeded for 90% of the specified measurement period (T).

APPENDIX B – LIST OF MEASUREMENT EQUIPMENT

Automated Measurements

Rion - Microphone: UC-53A	sn: 307209
Rion - Pre-amplifier: NH-21	sn: 12962
Rion - Sound Level Meter: NL-31	sn: 00841830

Additional Equipment

Brüel and Kjær - Sound Calibrator: 4231	sn: 2445715

The above equipment fulfils IEC 61672 Class 1 and is traceable to calibration under BS7580:Part 1:1997.