Acoustic Design Services Ltd

CONSULTANTS IN ACOUSTICS
NOISE AND VIBRATION

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Acoustic Report
in respect refurbishment
of air conditioning plant
at Commonwealth House
1-19 New Oxford Street WC1A 1NV

SUMMARY

Acoustic Design Services Ltd have visited Commonwealth House and have determined the ambient noise level over a 3 hour period at roof level.

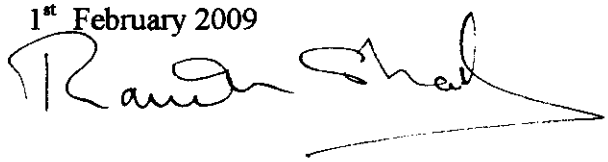
We could ascertain no residential units in the immediate neighbourhood nor are there any in Commonwealth House itself.

We have calculated the likely sound emissions from the listed equipment at four locations at a distance of 20m from the façade of Commonwealth House. The calculated sound level from the air conditioning plant is at least 10dBA lower than the L90 background sound level derived from the traffic noise.

We have analysed the calculated sound levels according to the methodology of BS4142:1997; we find that with calculated sound levels greater than 10dBA *below* the L90 background sound level, there would be a positive indication that a noise nuisance is unlikely .

Ramon Shack MSc, PhD, CPhys, MInstP, FIOA

1st February 2009



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1.0 Introduction

1.1 Commonwealth House, 1-19 New Oxford Street is a 9 storey Building dating from the 1930s with retail units on the ground floor and office levels on the upper floors.

1.2 The building is a triangular building bounded on the south side by High Holborn for west bound traffic and by New Oxford Street on the north side. In practice the New Oxford Street section of road is also a west bound slip road meeting up with the main traffic route along Bloomsbury Way carrying the east bound traffic.

1.3 The relevant section of New Oxford Street with Commonwealth House carries only light traffic and is used as a slip road for buses.

1.4 The western "base " of the triangular block is bounded by an 10 storey office block that is unoccupied.

1.5 A far as one can tell the buildings immediately surrounding Commonwealth House are similar eight or nine storey buildings with only office accommodation and no residential units in the immediate neighbourhood.

1.6 A careful visual survey of the upper levels of the property did not indicate any residential units in the immediate vicinity and there was only a possible residential unit at low level (3rd or 4th storey) at a distance of at least 150m distance.

1.7 Commonwealth House itself has no residential units.

1.8 The 7th and 8th floors of Commonwealth have required an upgrade of the air conditioning units.

1.9 Acoustic Design Services have been requested to prepare an acoustic report in respect of the external roof mounted air conditioning units with particular regard to the acoustic impact of these units on any residential units.

2.0 Sound level Measuremnts

2.1 As a commercial office block it would be expected to serve a "normal" daytime use from around 0800 hours to around 1800 hours. This is generally regarded as within daytime use rather than "night time" which is generally considered from 2300hours to 0700hours.

2.2 It was agreed with Mr Young of Camden BC that a 3 hour noise survey at roof level would suffice to establish the existing noise climate at Commonwealth House.

2.3 Acoustic Design Services visited Commonwealth House on Tuesday 27th January 2009. The weather was fine and dry with a clear blue sky and with little or no wind.

2.4 Two in number Norsonic 116 data logging sound level meters were calibrated and set up on the 9th floor roof level.

2.5 The sound level meters were fitted with GRAS 41-AL outdoor microphones and manufacturers wind shields. The Norsonic 116 units were calibrated using a Norsonic 2531 calibrator and checked at the end of the measurements.

2.6 The sound levels meters were at a height of approximately 1.5m above the roof level at Locations P and Q (Figure 1). Location P was set up on the North side of the building (New Oxford Street) whilst the second init was set up at Location Q to overlook High Holborn. In practice the Units were within about 1m of the parapet of the building because of the safety fencing.

2.7 The Norsonic sound level meters were set to collect sound data in 5 minute tranches between 0930hours and 1230hours. The data collected gave, in particular, the LA90(5min) and the LAeq(5 min) parameters.

2.8 The measurements are shown in Tables 1 and 2 and graphically on Charts 1 and 2. As far as this report is concerned the relevant acoustic parameter is the L90 parameter which is the baseline against which the acoustic impact is judged, whilst the LAeq parameter indicates a measure of extraneous activity that is occurring, ie traffic noise, aircraft noise , road repairs etc.

2.9 Measurements at Location P (Chart 1) represent ambient noise levels on the New Oxford Street side of the building. The L90 levels are relatively constant at 56-57dBA and will be representative of lower traffic flows in that section of New Oxford Street.

2.10 Measurements at Location Q represent ambient noise levels in High Holborn. The latter part of the measurements from about 1145 hours increased as a result of road repairs occurring in that section of High Holborn opposite Commonwealth House. However the earlier section of measurements indicate that the L90 values for the High Holborn are typically 58-59dBA.

2.11 As far as could be determined, the roof mounted air conditioning units were not operating or were not operating at sound emission levels that could be detected within the measurement scheme.

3.0 Air conditioning Units

3.1 Acoustic Design Services Ltd have not been involved in the scheme from the outset. It is our understanding that the scheme is a partial refurbishment of the air conditioning units on the 7th Floor of Commonwealth House. Drawings by ITD Consultants of Portsmouth (ITD drawings 1636/ 7HL and 1636/Roof) show the internal units on the 7th floor offices with reference to the existing roof mounted plant and in particular the distribution of the individual units groups at 8th floor roof level.

3.2 The air conditioning units are by Mitsubishi Electric Co and are in three main groups with two isolated units at the western end of the roof. It is convenient to group the units together and derive a total sound emission level for each group at a specific distance.

3.3 Some of the units are wall mounted units. The manufacturers data for these units are for free standing at a distance of 1m. An additional correction of +3dBA is used for the wall mounted units.

3.4 Other units are housed in a plant compound at C (Figure 1). The manufacturer's data is given at a distance of 1m for the free standing unit. In practice there will be some screening by the walls of the plant compound whilst there may be some reflection effects. For these units we have applied a 0dB correction.

3.5 The ITD Consultants drawings show that there are 4 in number existing units in the Plant compound (PUHY-P400YHM) . These units have been included in the calculations. We summarise the units and the combined sound emission levels in Table 3 as follows :-

Table 3 Summary of Roof Level Air Conditioning Plant

Plant Group	Units	wall mounted / free standing +3dB / 0dB	Unit SPL @1m	Total SPL @1m
A	5 x PUHZ-RP35VHA3	+3dB	46dBA	55dBA
B	5 x PUHZ-RP35VHA3	+3dB	46dBA	55dBA
C	2 x PUHY-P350YHM-A plus 4 x PUHY-P400YHM	0dB 0dB	60dBA 61dBA	68dBA
D	1 x PUHZ-RP35VHA3	+3dB	46dBA	49dBA
E	1 x PUHZ-RP35VHA3	+3dB	46dBA	49dBA

4.0 Assessment of Acoustic Impact

4.1 The usual acoustic assessment of fixed pant is consideration according to BS 4142 :1997 " A method of Rating industrial noise affecting mixed residential and industrial areas".

4.2 The noise emission from the plant is determined as an LAeq(t) where t is a reference time. This measured or calculated level is corrected by 0dBA or +5dBA according to whether or not it is considered that the noise will have distinguishable characteristics (whistles, whines hisses or bumps) or is intermittent. The corrected sound level is termed the Rating Level

4.3 The method of assessment is based on a measurement of the LA90 background sound level. and comparing the excess of the measured or calculated Rating Level of the process above that of the L90 level to give the Assessment level.

4.4 An Assessment Level of about 5dBA is considered of marginal significance. An Assessment Level in excess of 10dBA is regarded as a likelihood that complaints may occur. A Rating Level of 10dBA or more ***below*** the L90 may be taken as positive indication that complaints are unlikely.

5.0 Sound levels Calculations

5.1 Acoustic Design Services have been asked to consider the acoustic impact of the roof mounted plant at Commonwealth House on potential residential units.

5.2 Commonwealth House has no residential units in the building and as far as we can tell there are no residential units in the immediate neighbourhood. However if such units are present then these must be in adjacent buildings that are at a distance from the Commonwealth House and on the opposite sides of the adjacent roads.

5.3 We consider in the following analysis that the sound emission levels from the air conditioning plant can be grouped into specific locations as indicated on ITD drawing 1636/ roof ie Wall A. These groups are shown in Table 3

5.4 We have considered the sound emission at a distance of 20m from Commonwealth House and relative a plant group e.g. Location A has 5 units mounted on Wall A and if the a point is selected 20m from the edge of the building it would correspond to a point on the building on the opposite side of New Oxford Street. Other plant groups at Locations B,C,D or E would therefore be at greater distances from the assumed receiver point.

5.5 We have calculated the sound emission levels derived from the plant groups for four receiver points nominally north , east, south and west of Commonwealth House and summarise the these in Table 4 as follows :-

Table 4

Receiver Location	Total SPL
North (New Oxford Street)	37.3dBA
East	34.0dBA
South (High Holborn)	41.7dBA
West	36.1dBA

5.6 We summarise the calculation methodology and detailed results in Annexes 1 and 2.

6.0 Acoustic Assessment (BS4142 :1997)

6.1 Section 2 above indicates that reasonable assessments for the L90 sound levels are represented by 56-57dBA for Location P Overlooking to New Oxford Street and 58-59dBA at Location Q overlooking High Holborn.

6.2 We have calculated the total sound emission levels at 20m from the Commonwealth House Facades at 4 locations around the building. These are shown in Table 4.

6.3 It will be seen that the calculated sound level from the air conditioning plant at all Four locations is greater than *10dBA less* than the relevant L90 level.

6.4 The greatest sound level is represented on High Holborn at 41 7dBA compared to he relevant L90 level of 58-59dBA derived from the road traffic noise.

6.5 If this is consider this formally under the methodology of BS4142 :1997 this is as follows :-

BS4142 :1997 Assessment for High Holborn

	Level LAeq(1hr)	BS 4142:1997 clause
Maximum Specific Level	41.7dBA	Para 3.1
Tonal Correction	0dBA	Para 6.0
Rating Level	41.7dBA	Para 8.0
L90 Background level	58dBA	Para 7.0
Assessment level	**-16.3dBA**	**Para 9.0**

Comment:- Positive indication Nuisance is unlikely

7.0 Conclusions

7.1 Acoustic Design Services Ltd have visited Commonwealth House and have determined the ambient noise level over a 3hour period at roof level.

7.2 We could ascertain no residential units in the immediate neighbourhood nor are there any in Commonwealth House itself.

7.3 We have calculated the likely sound emissions from the listed equipment at four locations at a distance of 20m from the façade of Commonwealth House. The calculated sound level from the air conditioning plant is at least 10dBA lower than the L90 background sound level derived from the traffic noise.

7.4 We have analysed the calculated sound levels according to the methodology of BS4142:1997; we find that with calculated sound levels greater than 10dBA *below* the L90 background sound level, there would be a positive indication that a noise nuisance is unlikely .

Ramon Shack MSc, PhD, CPhys, MInstP, FIOA

1st February 2009

DWG. No. 1636/ROOF | REV. No. A

VIEW B

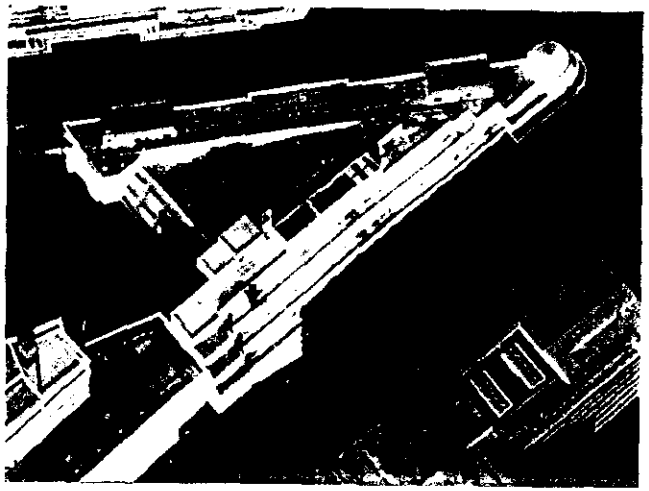

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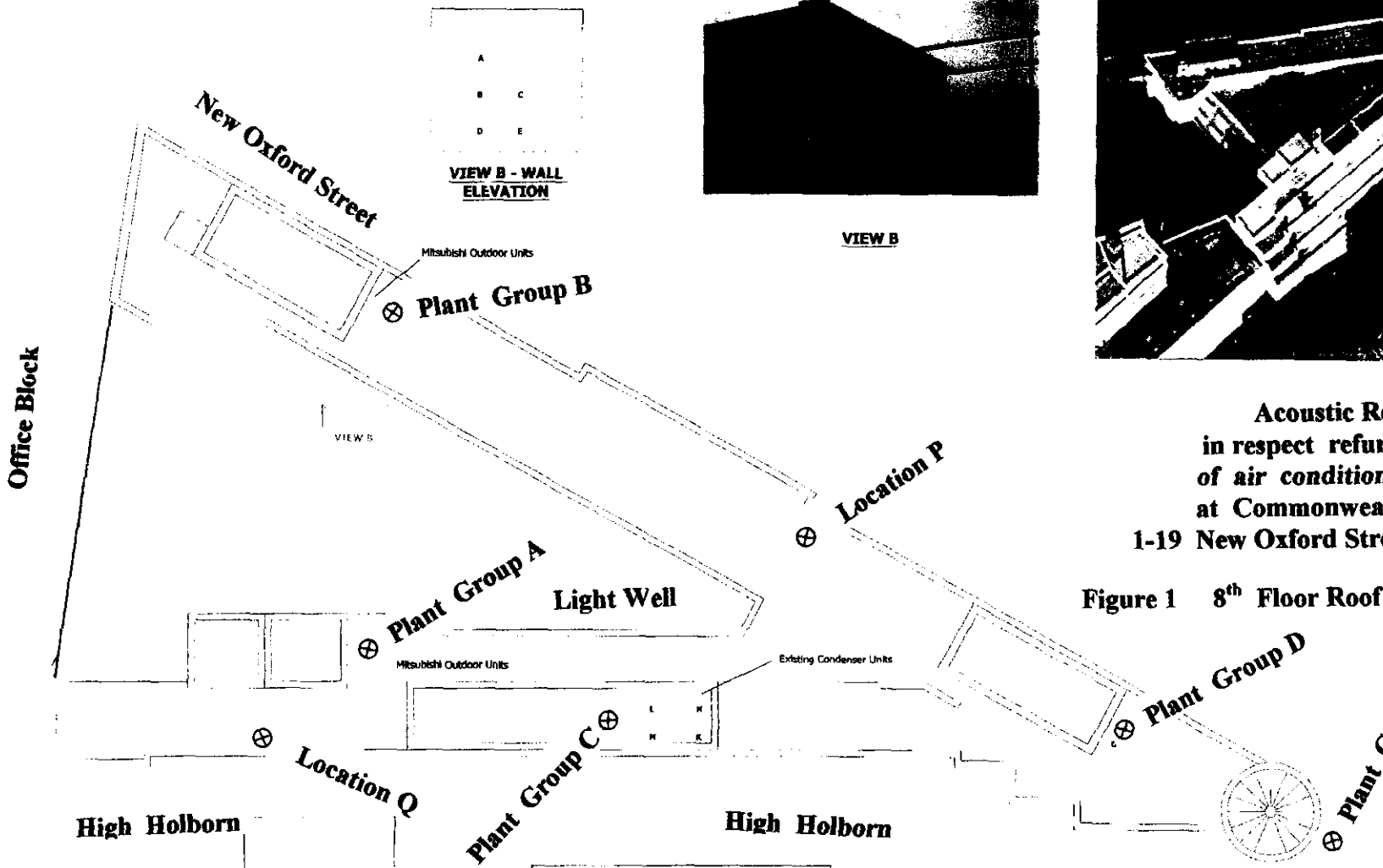
Figure 1 8th Floor Roof Plan and plant Groups



MITSUBISHI UNIT REFERENCES:

A- MUZ-GA35VA-E1	K - PUHY-P400YHM-A
B- MUZ-GA35VA-E1	L - PUHY-P400YHM-A
C- MUZ-GA35VA-E1	M - PUHY-P400YHM-A
D- MUZ-GA35VA-E1	N - PUHY-P400YHM-A
E- MUZ-GA35VA-E1	O - MUZ-GA35VA-E1
F- MUZ-GA35VA-E1	P - MUZ-GA35VA-E1
G- MUZ-GA35VA-E1	
H- MUZ-GA35VA-E1	
I- MUZ-GA35VA-E1	
J- MUZ-GA35VA-E1	

NOTE:
TO CROSS-REFERANCE WHICH OUTDOOR UNIT IS SERVING WHICH INDOOR UNIT ON THE 8TH FLOOR SEE DRAWING 08/1636/8HLA

FOR BUILDING CONTROL

A LE 21.07.08 ISSUED FOR BUILDING REGS APPROVAL
REV. DRG. DATE DESCRIPTION

CLIENT
K1 CONSTRUCTION
566 CHISWICK HIGH ROAD
LONDON W4 5YA

BUILDING
COMMONWEALTH HOUSE
1 - 19 NEW OXFORD STREET
LONDON WC2

TITLE
V&F SERVICES
ROOF PLAN

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CONSULTANTS

SCALE 1 : 100 @ A1 | DATE JUNE 2008
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DRG. NO. 1636/ROOF | REVISION A

ROOF PLAN

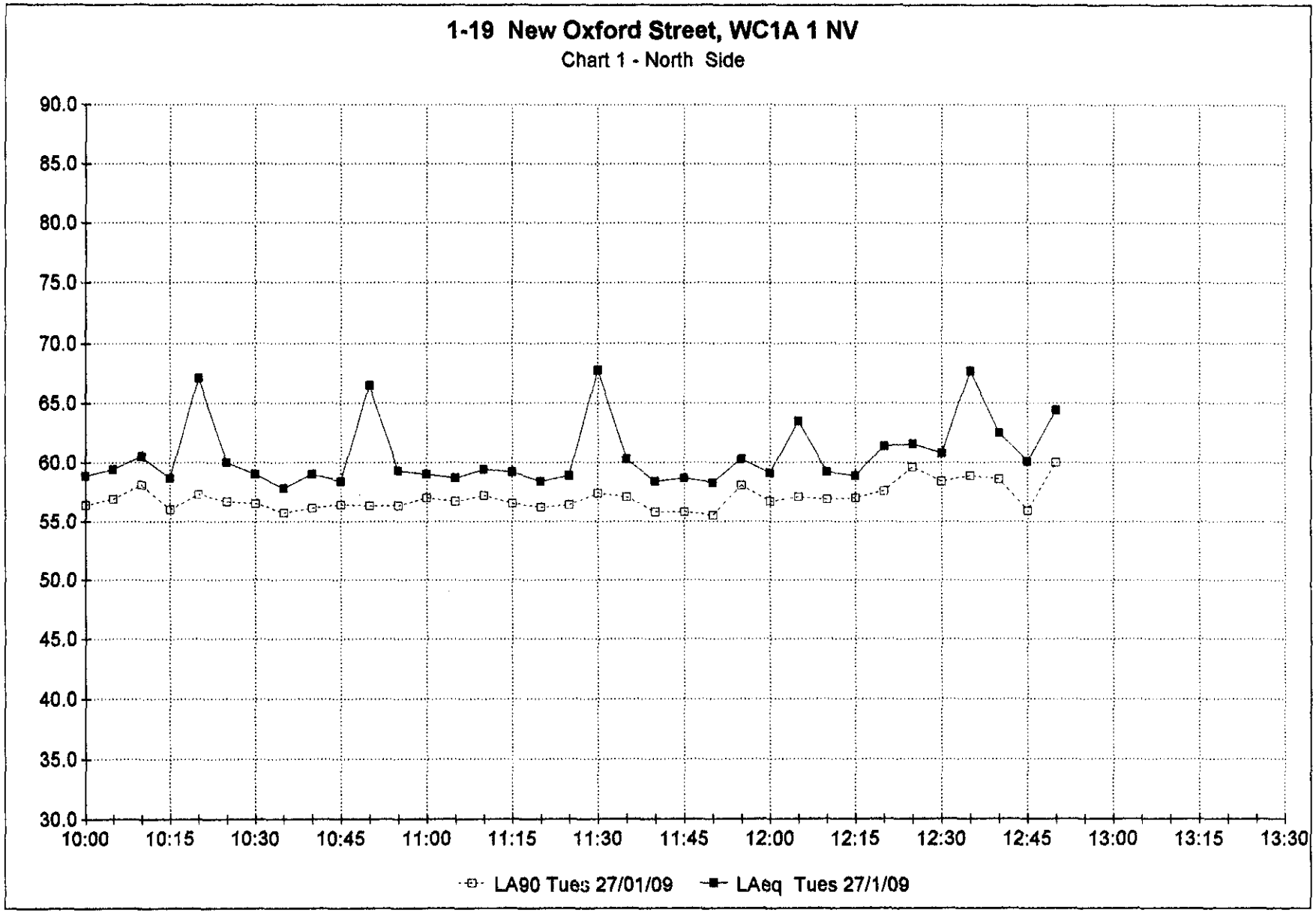
Table 2

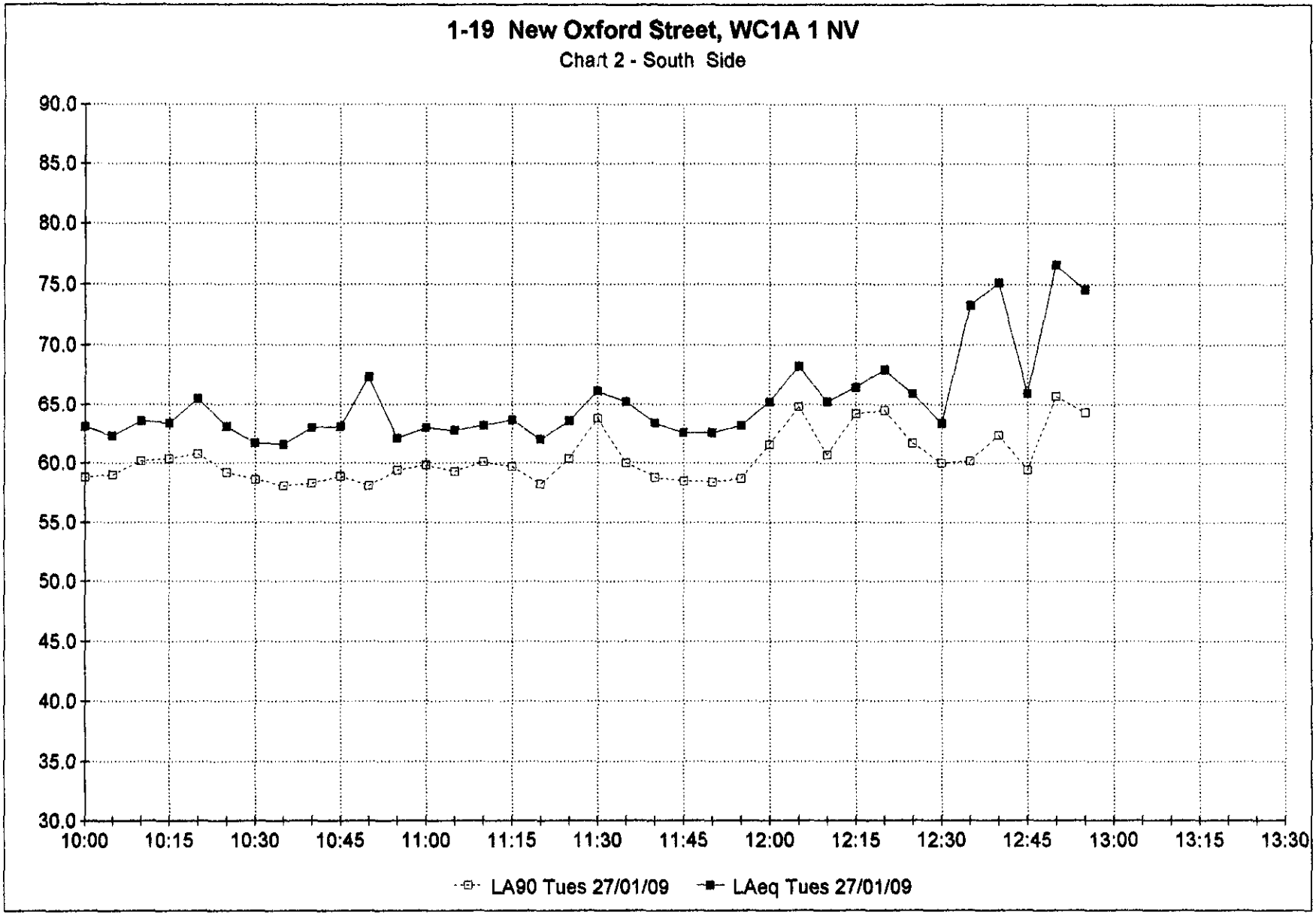
Noise Survey at 1- 19 New Oxford Street, London, WC1A 1N

27th January 2009, Location Q South

LAeq(5min) and L90(5min) Measurements

Date	Tuesday 27th January 2009							
Time	L90	LAeq	LAmax					
0930-0935	60.7	63.9	74.7					
0935-0940	60.4	71.4	88.7					
0940-9950	59.5	62.8	70.6					
09:45-09:50	58.8	63.1	70.8					
09:50-09:55	59.0	62.3	69.6					
09:55-10:00	60.2	63.6	74.4					
10:00-10:05	60.4	63.4	71.5					
10:05-10:10	60.8	65.5	78.2					
10:10-10:15	59.2	63.1	71.8					
10:15-10:20	58.6	61.7	68.8					
10:20-10:25	58.1	61.6	71.6					
10:25-10:30	58.3	63.0	72.8					
10:30-10:35	58.9	63.1	70.6					
10:35-10:40	58.1	67.3	83.7					
10:40-10:45	59.4	62.1	70.5					
10:45-10:50	59.8	63.0	76.3					
10:50-10:55	59.3	62.8	70.3					
10:55-11:00	60.1	63.2	72.3					
11:00-11:05	59.7	63.7	85.1					
11:05-11:10	58.2	62.0	71.2					
11:10-11:15	60.4	63.6	72.3					
11:15-11:20	63.8	66.1	80.7					
11:20-11:25	60.0	65.2	81.2					
11:25-11:30	58.8	63.4	79.2					
11:30-11:35	58.5	62.6	72.1					
11:35-11:40	58.4	62.6	71.8					
11:40-11:45	58.7	63.2	72.1					
11:45-11:50	61.6	65.2	75.5					
11:50-11:55	64.8	68.2	86.5					
11:55-12:00	60.7	65.2	78.4					
12:00-12:05	64.2	66.4	82.1					
12:05-12:10	64.5	67.9	83.4					
12:10-12:15	61.7	65.9	82.2					
12:15-12:20	60.0	63.4	76.8					
12:20-12:25	60.2	73.2	81.4					
12:25-12:30	62.4	75.1	87.2					
12:30-12:35	59.4	65.9	82.2					
12:35-12:40	65.7	76.6	92.8					
12:40-12:45	64.3	74.5	80.2					


1-19 New Oxford Street, WC1A 1 NV
Chart 1 - North Side
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
10:00
10:15
10:30
10:45
11:00
11:15
11:30
11:45
12:00
12:15
12:30
12:45
13:00
13:15
13:30
LA90 Tues 27/01/09
LAeq Tues 27/1/09


1-19 New Oxford Street, WC1A 1 NV
Chart 2 - South Side
90.0
85.0
80.0
75.0
70.0
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
10:00
10:15
10:30
10:45
11:00
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11:45
12:00
12:15
12:30
12:45
13:00
13:15
13:30
LA90 Tues 27/01/09
LAeq Tues 27/01/09

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ANNEX 1

A1.1 In the case of a number of identical plant items, each with a sound emission of LdB at a given distance , then the combined sound emission is

$$L + 10\log_{10} N \text{ where N is the number of units}$$

A1.2 Where the units(or groups) have different sound emission levels (L1, L2 L3, etc) the total sound pressure level is given by

$$L_{total} = 10\log_{10} [\ 10^{\wedge (L1/10)} + 10^{\wedge (L2/10)} + 10^{\wedge (L3/10)} \ ....]$$

A1.3 It is necessary that the sound pressure level (SPL) are specified with respect to a distance. At distances which are large by comparison to source dimensions, the SPL generally decreases with increasing distance according to

$$L_2 = L_1 + 10\log_{10} [\ d_1^2 / d_2^2\ ]$$

where d_1 and d_2 are the respective distances

A1.4 We have checked the manufacturers data and find that the SPL for the units are quoted at a distance of 1m on a hard reflecting ground plane for free standing units. Where the units are attached to a hard surface such as a wall, an additional 3dB has been assumed.

A1.5 In the case of the units at group Location C effectively in a plant compound , no reflection has been assumed but neither has any screening factor.

A1.6 At certain reception locations, some of the wall mounted units will be self screened by the building elements. In these cases a modest screening factor has been assumed.

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ANNEX 2

In this Annex we summarise the calculation details as follows :-

Table 5A - 20m from North facade (New Oxford Street)

Group	Group SPL @1m	Dist in m	Distance correction	Screening	Nett SPL
A	55dBA	36	-31.2dBA	0	23.8dBA
B	55dBA	23	-27.2dBA	0	27.8dBA
C	68dBA	37	-31.5dBA	0	36.5dBA
D	49dBA	46	-33.2dBA	-10dBA	5.8dBA
E	49dBA	56	-34.9dBA	-10dBA	4.1dBA

Total 37.3dBA

Table 5B - 20m from East Façade

Group	Group SPL @1m	Dist in m	Distance correction	Screening	Nett SPL
A	55dBA	66	-36.4dBA	0	18.6dBA
B	55dBA	69	-36.8dBA	0	18.2dBA
C	68dBA	55	-34.8dBA	0	33.2dBA
D	49dBA	30	-29.7dBA	0	19.3dBA
E	49dBA	20	-26.0dBA	0	23.0dBA

Total 34.0dBA

Table 5A -20m from south Façade (High Holborn)

Group	Group SPL @1m	Dist in m	Distance correction	Screening	Nett SPL
A	55dBA	20	-26.2dBA	0	28.8dBA
B	55dBA	40	-32.0dBA	-5dBA	18.0dBA
C	68dBA	21	-26.6dBA	0	41.4dBA
D	49dBA	30	-29.6dBA	0	19.4dBA
E	49dBA	35	-30.9dBA	0	18.1dBA

Total 41.7dBA

Table 5A -20m from west Facade

Group	Group SPL @1m	Dist in m	Distance correction	Screening	Nett SPL
A	55dBA	34	-30.7dBA	-10dBA	14.3dBA
B	55dBA	34	-30.6dBA	-10dBA	14.4dBA
C	68dBA	40	-32.0dBA	0	36.0dBA
D	49dBA	69	-36.7dBA	-10dBA	2.3dBA
E	49dBA	80	-38.0dBA	-10dBA	1.0dBA

Total 36.1dBA