



BUILDING SERVICES AND ENVIRONMENTAL
ENGINEERING CONSULTANTS

ACOUSTIC CONSULTANCY REPORT

Environmental Noise Survey at 61-65 Charlotte Street, London, W1T 4P(F,P,Q)

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1.0 INTRODUCTION

New air conditioning and ventilation plant is to be installed at 61-65 Charlotte Street, London, to serve the refurbished mixed use development. The proposed condensing units and ventilation plant will be installed on the roofs at the rear of the properties as indicated on the relevant Architect's layouts.

An environmental noise survey was undertaken to obtain statistical noise data and to establish the background noise levels at the site. This information will be used in accordance with relevant British Standards and codes of good design practice to set noise rating levels at the closest premises.

It is assumed, for the purpose of this report, that the operational period of the mechanical plant equipment will potentially be 24 hours. There are no restrictions on operating hours for the existing plant serving the building.

The assessment of the survey data will take into consideration the guidance, principles and recommendations contained in the following documents:

- | | |
|---------------------|---|
| BS 4142:1997 | "Method for rating industrial noise affecting mixed industrial and residential areas" |
| BS 8233:1999 | "Sound insulation and noise reduction for buildings" |

2.0 SITE DESCRIPTION

61 – 65 Charlotte Street consists of three separate terraced properties each with a basement, ground floor and three upper floors.

The basement of 65 Charlotte Street is utilised as office and storage space. At ground floor there is a cafe and the upper floors are residential flats.

The basement of 63 Charlotte Street is currently unoccupied. There is a hair dresser shop at ground floor level and the upper floors are residential flats.

61 Charlotte Street is currently unoccupied. It was formally office space for media companies.

The properties front onto Charlotte Street, a busy street with a high density of road traffic, shops and restaurants.

The basement and ground floor of 61 Charlotte Street extend to the rear of the property to fill the lightwell formed by the buildings on the adjacent and parallel streets.

Numerous existing air conditioning condensing units and ventilation plant are located on the roofs to the rear of the property. Similar plant and equipment is located on the roofs of the adjacent and surrounding buildings.

Roof mounted air handling plant, kitchen extract duct and other extract ventilation plant and discharge points are located on adjacent buildings at the rear of the property.

The proposed project is to create a single retail unit across the three properties on basement and ground floor levels and provide additional residential units on upper floors above.

The proposed external plant is to be situated on the low level roofs at the rear of the building in similar location to the existing condensing plant.

Ventilation plant intake points are proposed in the low level roofs at the rear of the building. Extract ventilation discharge is proposed above third floor roof level.

The rear of the site is surrounded by residential and commercial properties with windows facing onto the rear roof areas. The rear boundary of the roofs has commercial and residential properties with windows at 1st, 2nd and 3rd floor levels overlooking the roof plant area. Condensing plant

serving these areas is also hung on the external wall facing onto the roof plant area.

The front boundary of the rear roof plant area is bounded by residential units which form part of this development.

To the north the site is bounded by a roof plant area containing condensing plant and large ventilation plant and a patio.

To the south the site is bounded by commercial offices at 1st floor level. Condensing plant serving these offices is located on the party wall facing onto the roof plant area.

The nearest noise sensitive windows will be

- a) The windows of 1st floor residential flats at 61,63 & 65 Charlotte Street
- b) The windows of the 1st floor level commercial property at on the western boundary of the roof.
- c) The windows of the 1st floor level commercial property on the southern boundary of the roof.
- d) The small window to the property on the northern boundary of the site.

Other noise sensitive residential and commercial facades in the vicinity were considered to be at a greater distance and are not considered further.

3.0 LOCAL NOISE CLIMATE

3.1 ROAD TRAFFIC

At the measuring positions, noise from road traffic was deemed as usual city centre background traffic noise and was observed throughout the survey. The road traffic noise essentially comprised two components, continuous traffic rumble, and discrete event type emissions due mainly to heavy goods traffic, the latter being observed throughout the duration of the survey.

3.2 RAIL TRAFFIC NOISE

There was no perceptible noise from Rail Traffic or noise and vibration from the Underground Rail System, anywhere around the site.

3.3 AIRCRAFT NOISE

Aircraft over flights were not observed during the attended period of the survey. Their possible contribution to the background and ambient noise climate is considered minimal.

3.4 CONSTRUCTION NOISE

There was a large construction site two streets away from the rear of the building on Cleveland Street. Intermittent noise was perceptible from the tower cranes during the survey.

3.5 EXISTING MECHANICAL AND BUILDING SERVICES PLANT NOISE SOURCES

The roofs to the rear of the building are heavily populated with air conditioning condensing units. The adjacent walls and roofs of adjacent properties are also covered in air conditioning condensing units. Most of the condensing units were not running during the survey period. The survey was carried out in October when there was little or no demand for cooling. Some of the condensing units were heat pump units and were running intermittently to provide heating.

It is likely that the background noise levels would be greater during the summer period when more of the existing condensing units were running.

The large air handling unit located on the adjacent property roof to the northern boundary of the site was not running during the survey period.



Some ventilation systems were operating periodically; the toilet ventilation serving 61 basement, the kitchen extract serving 65 ground floor, various roof fans serving 61 basement; extract ventilation from the adjacent property to the rear of the site.

It is unknown whether any of the kitchen extract systems serving adjacent properties were running during the survey.

Spot daytime measurements were taken at 8 locations across the roof at the rear of the site to map the variation in levels across the roof plant area. These measurements were affected by whether the local plant was running or not.

The location for the 24 hr measurement was selected to be 1 metre from the rear facade of 61 Charlotte Street at a point where a safe measurement could be taken. The measurement location was 1500mm distant from a condensing unit that was running intermittently during the survey. Other condensing units near the measurement point were not running during the measurement period. Because of the profusion of condensing plant on the roof and adjacent to the property it is not possible to find a measurement point that is further than 1500mm away from the nearest item of plant. For this reason the measurement point can be assumed to be representative of the entire roof plant area and boundaries.

Access to the third floor roof was not possible during the survey.

4.0 MEASURING EQUIPMENT

Sound pressure level measurements were obtained using the following instrumentation complying with the Type 1 specification of IEC 651:1979 Amend.1 and IEC 804:1985 Amend.2:

CASELLA CEL Type 633 Sound Level Meter, – Manufacturer's Serial No. 471156

Date of Last Full Calibration: 22/10/2012.

The sound level meter was complete with full weatherproof outdoor kit comprising weatherproof case and battery pack, remote long lead microphone and microphone rain screen.

Calibration checks prior to and after completion of each measurement run were made with a CEL-120 Acoustic Calibrator Compliant with IEC 60942: 2003 and ANSI S1.40:2006. Calibration level 114 dB \pm 0.3 dB @ 1kHz.

All instrumentation carried current BSRIA conformity certification traceable to National Standards.

5.0 MEASUREMENTS

The selected measuring position, Position A, was 1 metre from the facade of the nearest noise sensitive dwelling at 1st floor 61 Charlotte Street.

The background noise measured at this position is considered to be representative of the background noise across the whole of the rear of the site at 1st floor level and it is applicable to other dwellings and occupied buildings adjacent to the property.

Statistical broadband measurements were made from 16:20 on the 1st November 2012 to 16:09 on 2nd November 2012.

Measurements of the percentile level $L_{A90,T}$ were made with a measurement time interval $T_m = 5$ minutes.

These results are shown in Appendix B.

The weather conditions during the survey dry and mild. Wind speeds were judged to be within the acoustical limits of the microphones' windshield.

The statistical data shown in Appendix B are defined as follows:

$L_{Aeq,T}$ The A-weighted equivalent continuous noise level for the duration of the measurement time interval, T.

$L_{A90,T}$ The A-weighted sound pressure level exceeded for 90% of the measurement time interval, T.

Spot Measurements

Spot measurements were taken at a series of points around the roof as indicated on the plan layout. These measurements were taken to give an indication of the variation in sound pressure levels across the site.

At each location the microphone was mounted 1 metre above the ground on a tripod and, following calibration each time, the rain screen was fitted.

Spot measurements were taken for sample periods of 1 to 5 minutes. Measurements were taken between 15:30 and 16:30 on 1st November 2012 and further measurements were taken on 16:10 and 17:30 on 2nd November 2012.

The L_{Aeq} and $L_{A90,5}$ spot measurements for each location are scheduled in Section 6.0.

6.0 RESULTS

The full set of measurement results is given in Appendix B.

The lowest daytime and night time background levels L_{A90} are summarised below:

Table 1: Lowest measured background levels

Reference	Measurement Location	Daytime L_{A90} (07.00-23.00)	Night L_{A90} (23.00-07.00)
1	Rear of 61 Charlotte Street	54.5 dB	54.5 dB

The minimum daytime and night time L_{A90} measurements are the same. The minimum L_{A90} measurements appear to be limited by the existing condensing plant and ventilation plant.

Table 2: Spot background level measurements

Reference	L_{eq}	Minimum L_{A90}
1	57.6	55.0
2	52.7	51.0
3	54.8	53.5
4	53.5	53.0
5	53.4	52.1
6	52.6	51.2
7	51.6	51.4
8	59.9	58.5
9	60.6	51.0
10	56.8	52.0
11	64.5	57.2

The variation in the background noise levels across the site was very much dependant on whether the local plant was running whilst the measurements were taken.

The arrangement and type of plant is similar across the entire site so the reference monitoring point which was local to operational condensing plant can be considered as representative of the whole area.

7.0 EVALUATION OF CRITERIA

Although the area within which the site is set contains residential and commercial developments, it is considered that the adjacent residential dwellings will constitute the most sensitive premises.

7.1 RESIDENTIAL DESIGN CRITERIA

7.1.1 BS 4142 : 1997

BS 4142: 1997 "Method for rating industrial noise affecting mixed residential and industrial areas" describes a method for determining the level of noise of an industrial nature, together with procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. In general, the likelihood of complaint in response to a noise depends upon factors including the margin by which it exceeds the background noise level. The standard states that "*a difference of around 5dB is of marginal significance*".

7.1.2 CAMDEN DEVELOPMENT POLICIES

Camden Development Policy DP28 Table E provides guidance for the noise from plant and machinery. Table E is reproduced below.

Table E: 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	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBL _{Aeq}

Since plant noise may be expected to be intermittent and could contain distinguishable tones the rating level of noise caused by fixed plant needs to be 10dB below the broadband L_{A90,T} background level

Therefore the rating level shall be:

Rating Level = L_{A90,T} - 10 dB

8.0 TARGET DESIGN NOISE LIMITS

In order to limit the increase in the background noise level due to the new external plant to no more than 10 dBA below the existing background levels, a rating level ($L_{Ar,T}$) is applied at 1.0 metre external to the windows of the nearest affected buildings.

The actual design rating levels to be adopted for this project are set out in Table 3.

Table 3 Recommended design rating levels, $L_{Ar,T}$

Reference	Receiver Premises	Distance from Plant Area	$L_{Ar,T}$ (07.00-23.00)	$L_{Ar,T}$ (23.00-07.00)
R1	61 Charlotte Street 1 st Floor Flat	0 m	44.5 dB	44.5 dB
R2	63 Charlotte Street 1 st Floor Flat	0 m	44.5 dB	44.5 dB
R3	65 Charlotte Street 1 st Floor Flat	0 m	44.5 dB	44.5 dB
R4	Northern Boundary with 67 Charlotte Street	0 m	44.5 dB	44.5 dB
R5	59 Charlotte Street 1 st Floor Offices	1 m	44.5 dB	44.5 dB
R6	Goodge Place 1 st Floor Offices at rear boundary of site	0 m	44.5 dB	44.5 dB
R7	Residential Properties in Goodge Place at rear of the site	5 m	30.5 dB	30.5 dB



Note:

The design rating level $L_{A,T}$ includes a 5dB acoustic feature allowance for noise that contains a distinguishable, discrete, continuous tone, distinct impulses or is irregular enough to attract attention at the assessment location.

Predictions for plant noise transmission shall be corrected for multiple source addition, distance, reflections, directivity, and barrier effects where applicable, and must include contributions from all appropriate sources.

Since the design rating level will be below the background noise level at the reference position, it will not be possible to obtain measurements that can be directly compared to the specification. To obtain the necessary evidence of compliance for commissioning purposes, measurements shall be obtained at locations where the specific noise level exceeds the ambient level by at least 10 dB(A). Calculations shall then be applied to the specific noise level measurement to predict the rating level at the exact reference position, for direct comparison with the specification.

9.0 CONCLUSION AND RECOMMENDATIONS

An environmental noise survey was undertaken in order to establish the existing noise climate in the vicinity of the site. The data obtained has subsequently been used to derive noise design criteria in accordance with appropriate forms of guidance, including the relevant Local Authority Policy. The achievement of the design limits stated in Table 3 will therefore be sufficient in principle to ensure compliance with the relevant codes of good design practice referred to earlier within this report, thereby minimising the risk of justifiable noise complaints from the occupants of neighbouring properties.

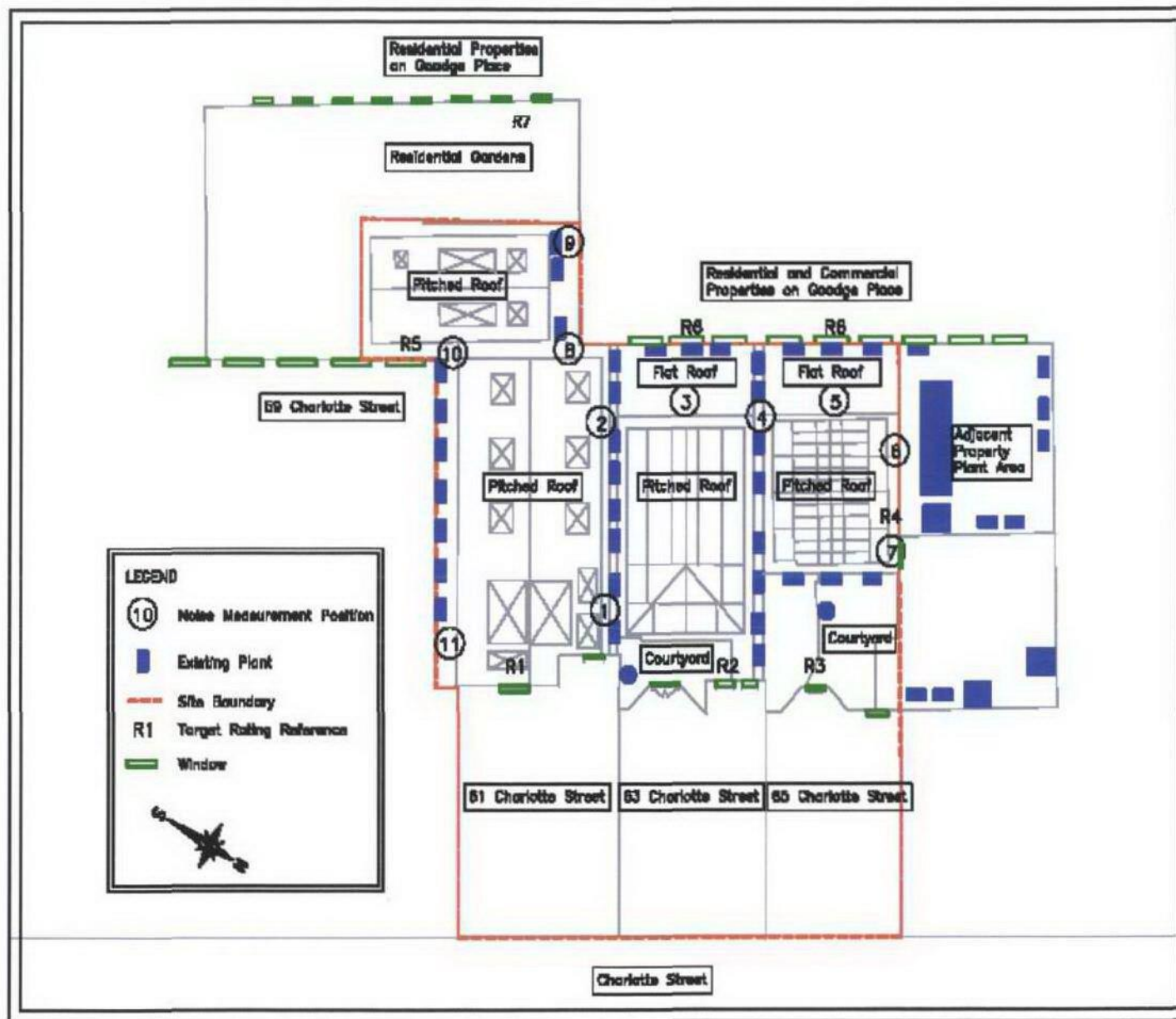
The new equipment proposed will be acoustically treated in order to achieve the recommended design rating levels stated in Table 3.

The site and the adjacent properties are heavily populated with roof top air conditioning and ventilation plant. Due to the time of year, much of the plant on the site and adjacent sites was not running during the acoustic survey. The recommended target rating figures can therefore be considered to be conservative.



10.0 APPENDICES

10.1 APPENDIX A – DRAWINGS





10.2 APPENDIX B MEASUREMENTS



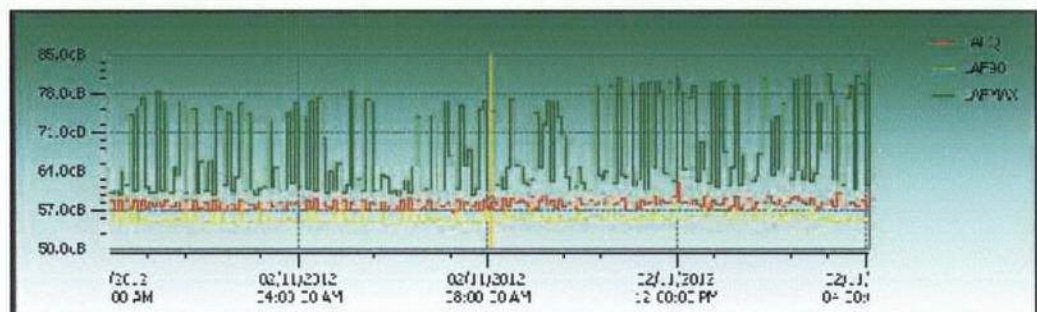
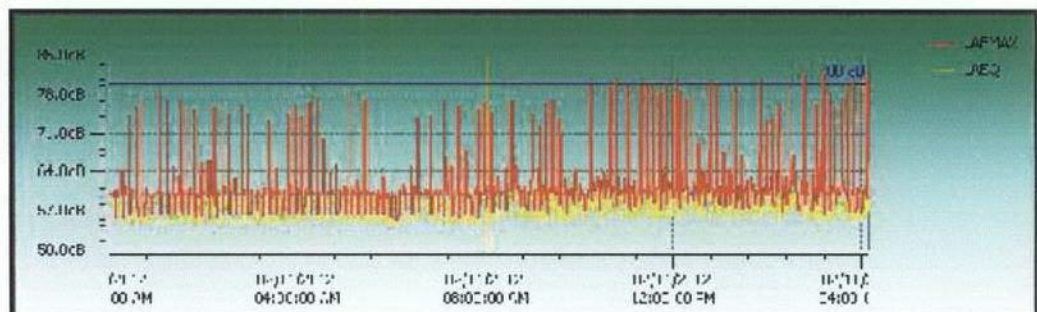
61-63 CHARLOTTE STREET
ENVIRONMENTAL NOISE SURVEY 12078.7

Casella CEL Ltd.

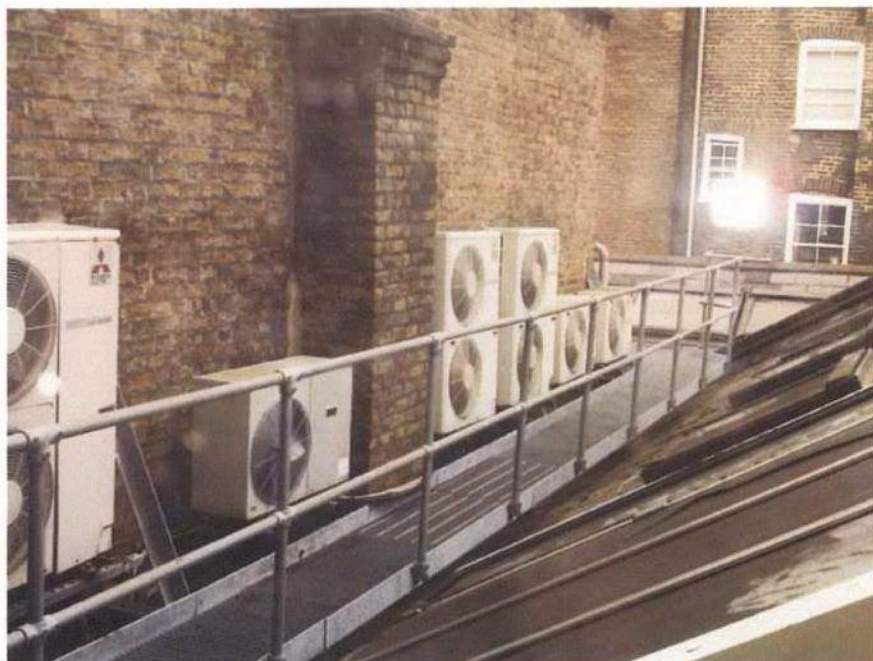
Report On 61-65 Charlotte Street, London



Instrument Model	CEL-633C		
Duration	16:09:23 HH:MM:SS	Criterion Time	00:05:00 HH:MM:SS
Calibration (After) Date	02/11/2012 16:11:26	End Date & Time	02/11/2012 16:09:23
Calibration (Before) Date	01/11/2012 16:25:22	Serial Number	4711556
Calibration Drift	0.00000000 dB	Start Date & Time	02/11/2012 00:00:00
Calibration (Before) SPL	114 dB	Site	61-65 Charlotte Street, London
LAFmax with Time	82.1 dB (02/11/2012 16:09:03)	Person	John Phillips
LAEq	58.1663 dB	Result	Period



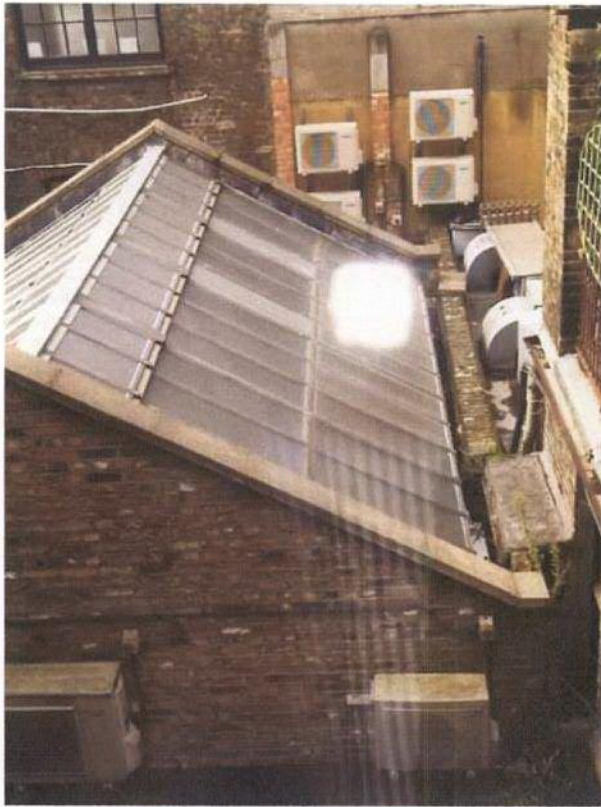
10.3 APPENDIX C – PHOTOGRAPHS



View from 1st floor rear window of 61 Charlotte Street



View of rear of 61 and 63 Charlotte Street from 2nd floor window of 61 Charlotte Street



View from 2nd floor window 65 Charlotte Street



View from 1st floor window 61 Charlotte Street



View across to adjacent properties to the north showing ventilation ductwork



Ventilation plant on adjacent property roof (67 Charlotte Street). (Not running during survey)



View to rear of residential properties on Goodge Place



Rear of commercial properties on Goodge Place