BUILDING SURVEYING SOLUTIONS

Daylight and Sunlight Study (Within Development)
24 to 28 Warner Street, London EC1R 5EX

18th September 2012

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1 EXECUTIVE SUMMARY

1.1 Overview

1.1.1 Building Surveying Solutions produced a daylight and sunlight study dated 7th April 2011 in connection with approved application 2011/5129/P. We have now been instructed to re-assess the lower ground and ground floor plans based on an amended design that will form the basis of a Section 73 application.

1.1.2 A new version of the Building Research Establishment (BRE) guide 'Site Layout Planning for Daylight and Sunlight: a good practice guide' by P J Littlefair was published in October 2011 i.e. after our report of 7th April 2011. We have also therefore been instructed to update our assessment to take into account the 2011 BRE guide. The 2011 guidelines are more stringent than the previous 1991 guidelines upon which our 7th April 2011 report was based.

1.1.3 Appendix 1 identifies the windows analysed in this study. The numerical test results (including all calculation workings) are provided in Appendix 2. No sky line contours are presented in Appendix 3.

1.1.4 Building Surveying Solutions confirms that the proposed design satisfies all of the requirements set out in the BRE guide 'Site Layout Planning for Daylight and Sunlight' 2011.

2 INFORMATION SOURCES

2.1 Documents Considered

2.1.1 This report is based on the following drawings:

ARC Design Partnership LLP

3001(P)011	Lower Ground Floor Plan	Rev C
3001(P)012	Ground Floor Plan	Rev G

3 METHODOLOGY OF THE STUDY

3.1 BRE Guide : Site Layout Planning for Daylight and Sunlight

3.1.1 The study is based on the numerical tests laid down in the Building Research Establishment (BRE) guide 'Site Layout Planning for Daylight and Sunlight: a good practice guide' by P J Littlefair 2011.

3.1.2 The standards set out in the BRE guide are intended to be used flexibly. In instances where there is a special requirement for daylight or sunlight, higher levels may be deemed necessary. In other situations, such as with urban developments, lower daylight and sunlight levels may be unavoidable. The following statement is quoted directly from the BRE guide:

3.1.3 "The guide is intended for building designers and their clients, consultants and planning officials. The advice given is not mandatory and this document should not be considered as an instrument of planning policy. Its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly because natural lighting is only one of the many factors in site layout design."

3.2 Interior Daylighting

3.2.1 The interior daylighting recommendations set out in BRE guide are based on British Standard BS 8206 Part 2 and the Chartered Institute of Building Services Engineers Applications Manual on window design. Collectively, the guides set out three main criteria for interior daylighting. These are summarised as follows:

3.2.2 Test 1 Average Daylight Factor *(df)*

The Average Daylight Factor can be calculated using the following formula:

$$df = \frac{T\ Aw\ \theta}{A\ (1-R^2)}\ \%$$

Where

T is the diffuse visible transmittance of the glazing (we have assumed double glazing of a transmittance value of 0.68)
Aw is the net glazed area of the window (m^2)(in this case assumed to be 90% of structural opening size)
A is the total area of the room surfaces (m^2)

R is their average reflectance
Θ is the angle of visible sky in degrees

The Average Daylight factor test is applied to habitable rooms within domestic properties. A kitchen is generally deemed to be a habitable room if it is large enough to accommodate a dining area. If the kitchen is small or if the property has a separate dining area then the accepted practice is to treat the kitchen as a non habitable room.

For the purpose of this study we have assumed BRE internal reflectance values pertaining to medium wooden floors, light painted walls and white painted ceilings. Windows 2, 13 and 14 are sited below glass balconies/balustrades. Since light has to pass through additional layers of glazing, we have accounted for this in the calculations by adjusting the glazing transmittance value. We have assumed an overall transmittance value of 0.37 for the window, balcony and balustrade glazing.

The guide recommends an Average Daylight Factor of 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary lighting is provided. There are additional minimum recommendations for dwellings of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms.

A special procedure is required for floor to ceiling windows such as patio doors. If part of a window is below the height of the working plane (a horizontal plane 0.85m above the floor in housing), this portion should be treated as a separate window. The ADF for this window has an extra factor applied to it, to take account of the reduced effectiveness of low level glazing in lighting the room. A value equal to the floor reflectance may be taken for this factor. The ADF for the portion of the window above the working plane is calculated in the normal way without this additional factor, and the ADFs for the two portions are added together.

3.2.3 Test 2 Room Depth

If a daylit room is lit by windows in one wall only, the depth of the room L should not exceed the limiting value given by:

$$\frac{L}{W} + \frac{L}{H} \leq \frac{2}{1-R_b}$$

Where

W is the room width
H is the window-head height above floor level
R_b is the average reflectance of the surfaces in the rear half of the room

3.2.4 Test 3 Position of the no sky line

If a significant area of the working plane lies beyond the no sky line (i.e. it receives no direct skylight), then the distribution of daylight in the room will look poor and supplementary electric lighting will be required.

The no sky line assessment is not applicable where a room derives its daylight solely from a light well or atrium. In these situations the room relies on borrowed light instead of direct skylight.

3.3 Sunlight to Windows

3.3.1 The BRE guide recommends that where possible each dwelling should have at least one main living room window that faces within 90 degrees of due south. However, the guide acknowledges that this is not always possible when it comes to flats.

3.3.2 The BRE sunlight tests should be applied to all main living rooms and conservatories which have a window which faces within 90 degrees of due south. The guide states that sunlight is viewed as less important in kitchens and bedrooms. In non-domestic buildings, any spaces which are deemed to have a specific requirement for sunlight should be checked.

3.3.3 The BRE guide recommends that where possible, main living room windows should receive 25% of the total annual probable sunlight hours, including 5% of the annual probable sunlight hours during the winter months between 21st September and 21st March.

4 RESULTS OF THE STUDY

4.1 Window Reference Points

4.1.1 Refer to Appendix 1 for a drawing which identifies the positions of the windows analysed in this study. We have tested the windows at the lower ground and ground floor levels on the basis that, if these satisfy the BRE requirements, the windows at the upper levels will surpass the BRE minimum requirements by an even greater margin.

4.2 Numerical Results and No Sky Line Contours

4.2.1 The numerical test results including all calculation workings are provided in Appendix 2. No sky line contours for the habitable rooms are presented in Appendix 3.

4.3 Interior Daylighting

4.3.1 All rooms meet or surpass the BRE Average Daylight Factor targets.

4.3.2 All rooms pass the room depth test.

4.3.3 The BRE guide does not give numerical pass/fail criteria for the No Sky Line test when applied to new dwellings (guidance is given for when this test is applied to existing neighbouring buildings). However, for completeness, we have illustrated the no sky line contours in Appendix 3.

4.4 Sunlight to Windows

4.4.1 Living rooms which face within 90 degrees of due south have been tested for direct sunlight. The results are presented in Appendix 2. Not all windows receive ideal levels of direct sunlight. However, the BRE guide acknowledges that it is not always possible for every dwelling to be well situated to receive direct sunlight.

4.5 Conclusion

4.5.1 Building Surveying Solutions confirms that the proposed design satisfies all of the requirements set out in the BRE guide ‘Site Layout Planning for Daylight and Sunlight’ 2011.

5 CLARIFICATIONS

5.1 General

5.1.1 The report provided is solely for the use of the client and no liability to anyone else is accepted.

5.1.2 We have undertaken the survey following the guidelines of the RICS publication "Surveying Safely".

5.1.3 Where limited access is available, reasonable assumptions will have been made.

5.1.4 Building Surveying Solutions have endeavoured to include in the report those matters, which they have knowledge of or of which they have been made aware, that might adversely affect the validity of the opinion given.

5.1.5 Building Surveying Solutions will notify those instructing them immediately and confirm in writing if for any reason the report requires any correction or qualification.

5.1.6 Building Surveying Solutions confirm that they have used their best endeavours to ensure that the facts stated in this report are correct and that the opinions expressed represent a true and complete professional opinion.

5.2 Project Specific

5.2.1 None

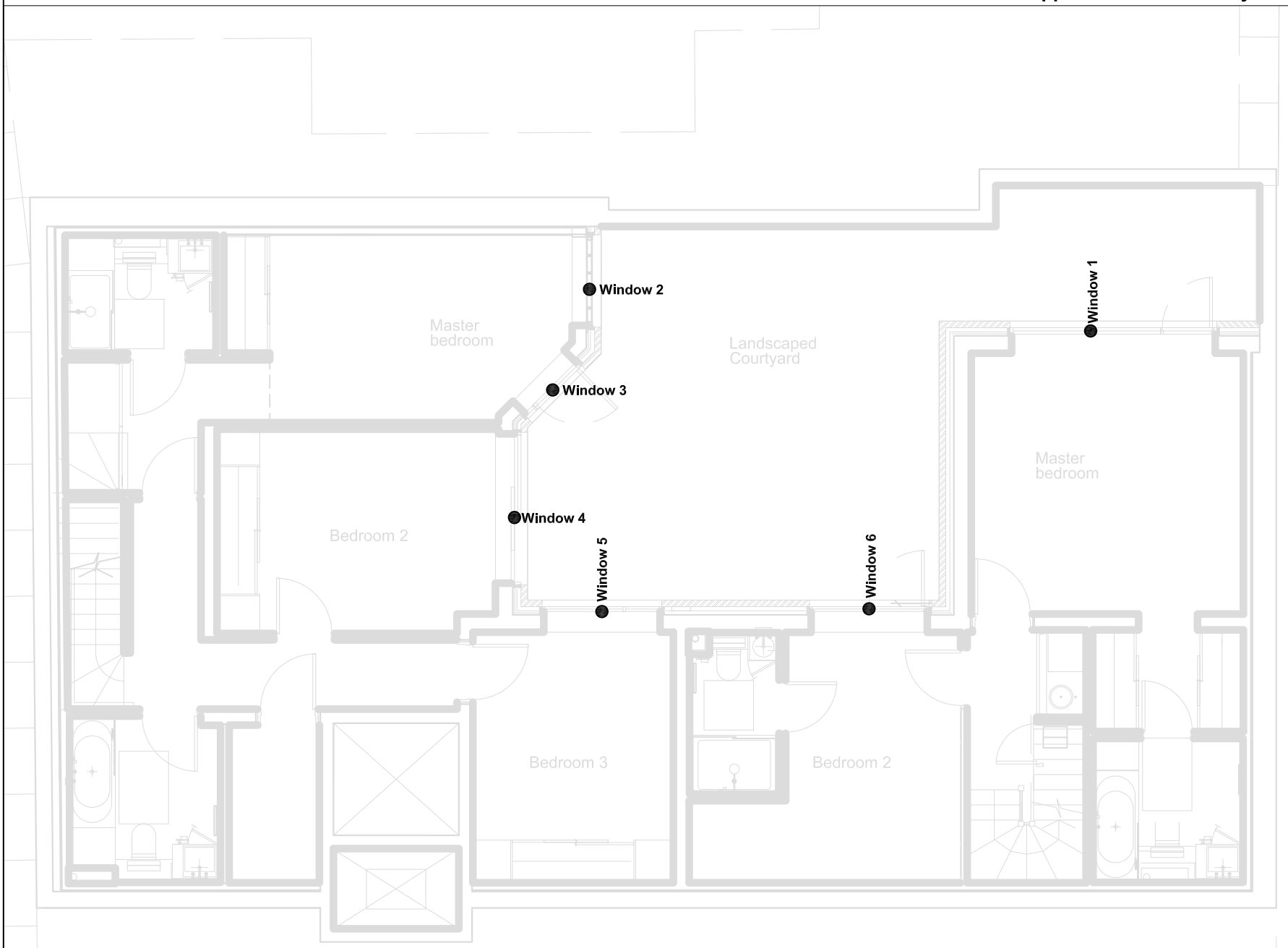
APPENDICES

APPENDIX 1

WINDOW KEY

Proposed Lower Ground Floor

Appendix 1 Window Key



Key:

Window 1 ● Window reference

Project Name: 24-28 Warner Street, Camden, London EC1R 5EX.

Drawing Title: Window Key

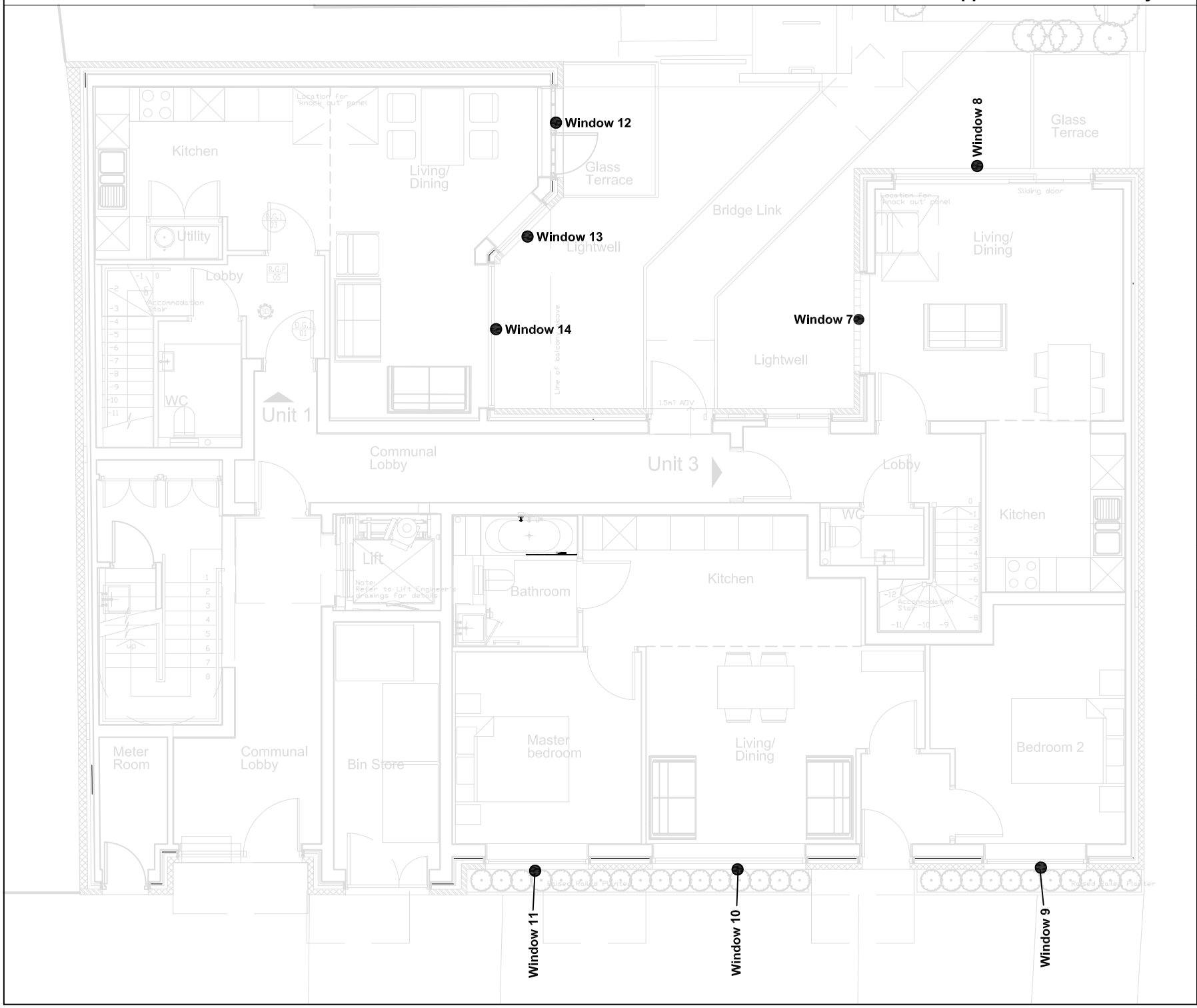
Scale: Do not scale

Drawing No: 1 of 2 | Rev. –

Rev	Date	Details of revision

Proposed Ground Floor

Appendix 1 Window Key



Key:

Window 1 ● Window reference

Project Name:	24-28 Warner Street, Camden, London EC1R 5EX.
Drawing Title:	Window Key
Scale:	Do not scale
Drawing No:	2 of 2
Rev.	-

Rev	Date	Details of revision

APPENDIX 2

DAYLIGHT AND SUNLIGHT CALCULATIONS

Appendix 2 - Average Daylight Factor (ADF)

24-28 Warner Street, Camden, London EC1R 5EX

Reference	Target ADF based on room use		Average Daylight Factor Coefficients					Actual ADF	
	Primary room use	ADF	T	Aw	A	R	Theta	ADF	Result
<u>Proposed Lower Ground Floor</u>									
Window 1 (lower)			0.68	2.4	78.32	0.67	21.6	0.1%	
Window 1 (upper)			0.68	3.95	78.32	0.67	26.6	1.7%	
Total ADF for room	Bedroom	1.0%						**1.8%**	**Pass**
Window 2 (lower)			0.46	1.07	62.28	0.68	18.8	0.0%	
Window 2 (upper)			0.46	1.94	62.28	0.68	21.4	0.6%	
Window 3 (lower)			0.68	0.87	62.28	0.68	14.1	0.0%	
Window 3 (upper)			0.68	1.58	62.28	0.68	15.1	0.5%	
Total ADF for room	Bedroom	1.0%						**1.2%**	**Pass**
Window 4 (lower)			0.68	1.77	64.46	0.68	19.3	0.1%	
Window 4 (upper)			0.68	3.2	64.46	0.68	20.4	1.3%	
Total ADF for room	Bedroom	1.0%						**1.4%**	**Pass**
Window 5 (lower)			0.68	1.38	59.68	0.69	20.5	0.1%	
Window 5 (upper)			0.68	2.28	59.68	0.69	21.8	1.1%	
Total ADF for room	Bedroom	1.0%						**1.2%**	**Pass**
Window 6 (lower)			0.68	1.38	65.81	0.7	24.9	0.1%	
Window 6 (upper)			0.68	2.28	65.81	0.7	26.4	1.2%	
Total ADF for room	Bedroom	1.0%						**1.3%**	**Pass**

Appendix 2 - Average Daylight Factor (ADF)

24-28 Warner Street, Camden, London EC1R 5EX

Reference	Target ADF based on room use		Average Daylight Factor Coefficients					Actual ADF	
	Primary room use	ADF	T	Aw	A	R	Theta	ADF	Result
Proposed Ground Floor									
Window 7 (lower)			0.68	1.32	81.11	0.58	18.4	0.0%	
Window 7 (upper)			0.68	2.44	81.11	0.58	21.0	0.6%	
Window 8 (lower)			0.68	2.68	81.11	0.58	23.7	0.1%	
Window 8 (upper)			0.68	4.96	81.11	0.58	12.3	0.8%	
Total ADF for room	Living/Dining	1.5%						**1.6%**	**Pass**
Window 9 (lower)			0.68	0.19	64.05	0.71	48.9	0.0%	
Window 9 (upper)			0.68	1.84	64.05	0.71	46.6	1.8%	
Total ADF for room	Bedroom	1.0%						**1.8%**	**Pass**
Window 10 (lower)			0.68	0.27	72.26	0.62	48.7	0.0%	
Window 10 (upper)			0.68	2.76	72.26	0.62	46.2	2.0%	
Total ADF for room	Living/Dining	1.5%						**2.0%**	**Pass**
Window 11 (lower)			0.68	0.19	55.52	0.71	43.9	0.0%	
Window 11 (upper)			0.68	1.84	55.52	0.71	39.2	1.8%	
Total ADF for room	Bedroom	1.0%						**1.8%**	**Pass**
Window 12 (lower)			0.68	1.21	81.51	0.58	24.3	0.1%	
Window 12 (upper)			0.68	2.23	81.51	0.58	26.8	0.8%	
Window 13 (lower)			0.37	0.87	81.51	0.58	17.6	0.0%	
Window 13 (upper)			0.37	1.62	81.51	0.58	18.9	0.2%	
Window 14 (lower)			0.37	1.95	81.51	0.58	22.4	0.0%	
Window 14 (upper)			0.37	3.6	81.51	0.58	24.2	0.6%	
Total ADF for room	Living/Dining	1.5%						**1.7%**	**Pass**

Appendix 2 - Room Depth Calculation

24-28 Warner Street, Camden, London EC1R 5EX

Room	Room Depth Coefficients				Room Depth Calculation			Result
	L	W	H	Rb	L/W + L/H	<=	2/1-Rb	
Proposed Lower Ground Floor								
Window 1	4.1	4.3	2.3	0.67	2.74	<=	6.1	Pass
Window 2	4.7	2.9	2.4	0.68	3.58	<=	6.17	Pass
Window 3	4.1	4.1	2.4	0.68	2.71	<=	6.17	Pass
Window 4	4.4	3.1	2.4	0.68	3.25	<=	6.28	Pass
Window 5	4.0	3.1	2.3	0.69	3.03	<=	6.51	Pass
Window 6	4.0	4.1	2.3	0.7	2.71	<=	6.68	Pass
Proposed Ground Floor								
Window 7	4.5	4.2	2.4	0.58	2.95	<=	4.74	Pass
Window 8	4.2	4.5	2.4	0.58	2.68	<=	4.74	Pass
Window 9	4.2	3.4	2.0	0.71	3.34	<=	6.92	Pass
Window 10	3.5	4.9	2.0	0.62	2.46	<=	5.29	Pass
Window 11	3.4	3.3	2.0	0.71	2.73	<=	6.87	Pass
Window 12	3.7	5.8	2.4	0.58	2.18	<=	4.75	Pass
Window 13	3.8	5.2	2.4	0.58	2.31	<=	4.75	Pass
Window 14	2.6	5.8	2.4	0.58	1.53	<=	4.75	Pass

Appendix 2 - Sunlight to Windows

24-28 Warner Street, Camden, London EC1R 5EX

Reference	Use Class	Annual Probable Sunlight Hours	
		Total	Winter
Proposed Ground Floor			
Window 7	Living/Dining	3%	0%
Window 8	Living/Dining	3%	3%

APPENDIX 3

NO SKY LINE CONTOURS

Proposed Lower Ground Floor

Appendix 3 No Sky Line Contours

Key:

1
Window reference

Area receives no direct sky light (applied to habitable rooms)

Area does receive direct sky light.

Light aperture.

Project Name: 24-28 Warner Street, Camden, London EC1R 5EX.

Drawing Title: No Sky Line Contours

Scale: Do not scale

Drawing No: 1 of 2 | Rev. -

Rev	Date	Details of revision

Proposed Ground Floor

Appendix 3 No Sky Line Contours

Key:

1 Window reference

Area receives no direct sky light (applied to habitable rooms)

Area does receive direct sky light.

Light aperture.

Project Name: 24-28 Warner Street, Camden, London EC1R 5EX.

Drawing Title: No Sky Line Contours

Scale: Do not scale

Drawing No: 2 of 2 Rev. -

Rev	Date	Details of revision