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Daylight and Sunlight Study (Within Development)  
Merlin House, 122 to 126 Kilburn High Road,  
London NW6 4HY

14 November 2014



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DAYLIGHT AND SUNLIGHT STUDY  
Merlin House, 122 to 126 Kilburn High Road, London NW6 4HY

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# 1 EXECUTIVE SUMMARY

## 1.1 Overview

- 1.1.1 Right of Light Consulting has been commissioned to undertake a daylight and sunlight study in connection with the development at Merlin House, 122 to 126 Kilburn High Road, London NW6 4HY. The aim of the study is to check whether or not the proposed first and top floors receive satisfactory levels of daylight and sunlight.
- 1.1.2 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.
- 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 Right of Light Consulting confirms that the proposed design satisfies all of the requirements set out in the BRE guide 'Site Layout Planning for Daylight and Sunlight'.

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## 2 INFORMATION SOURCES

### 2.1 Documents Considered

2.1.1 This report is based on the following drawings:

Stephen Davy Peter Smith Architects

1416(PL) 001	Location Plan	Rev –
1416(PL) 002	Site Plan	Rev –
1416(PL) 010	Proposed Basement floor Plan	Rev –
1416(PL) 011	Proposed Ground floor	Rev –
1416(PL) 012	Proposed first floor Side Extension	Rev –
1416(PL) 013	Proposed Top floor Extension	Rev –
1416(PL) 201	Quex Road Elevation	Rev –
1416(PL) 202	Kilburn High Road Elevation	Rev –
1416(PL) 203	Rear Elevation	Rev –

KND Surveys Ltd

K 07 07 G	Site Survey & Ground floor Plan	Rev –
K 07 07 1	First Floor Plan	Rev –
K 07 07 2	Second Floor Plan	Rev –
K 07 07 3	Floor Plan	Rev –
K 07 07 E1	Elevation 1	Rev –
K 07 07 E2	Elevation 2	Rev –
K 07 07 E3	Elevation 3	Rev –
K 07 07 E4	Elevation 4	Rev –
K 07 07 R	Roof Plan	Rev –

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### 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:

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

Where

- T is the diffuse visible transmittance of the glazing (BRE standard of 0.68)  
A<sub>w</sub> is the net glazed area of the window (m<sup>2</sup>)  
A is the total area of the room surfaces (m<sup>2</sup>)  
R is their average reflectance  
θ is the angle of visible sky in degrees

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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 matte white painted ceilings.

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<sub>b</sub> 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 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 21<sup>st</sup> September and 21<sup>st</sup> March.

## 3.4 Overshadowing to Gardens and Open Spaces

3.4.1 The availability of sunlight should be checked for all open spaces where sunlight is required. This would normally include:

- Gardens, usually the main back garden of a house
- Parks and playing fields
- Children's playgrounds
- Outdoor swimming pools and paddling pools
- Sitting out areas, such as those between non-domestic buildings and in public squares
- Focal points for views such as a group of monuments or fountains.



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3.4.2 The BRE guide recommends that for an open space to appear adequately lit throughout the year, at least 50% of its area should receive two hours of sunlight on 21st March.

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## **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.

### **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 fixed 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. The contours illustrate good access to daylight over a significant part of the working plane.

### **4.4 Sunlight to Windows**

4.4.1 All main living room windows which face within 90 degrees of due south have been tested for direct sunlight. All tested windows pass both the total annual sunlight hours test and the winter sunlight hours test. The proposed development therefore satisfies the BRE direct sunlight to windows requirements.

### **4.5 Conclusion**

4.5.1 Right of Light Consulting confirms that the proposed design satisfies all of the requirements set out in the BRE guide 'Site Layout Planning for Daylight and Sunlight'.

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## **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 Right of Light Consulting 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 Right of Light Consulting will notify those instructing them immediately and confirm in writing if for any reason the report requires any correction or qualification.
- 5.1.6 Right of Light Consulting 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

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## APPENDICES

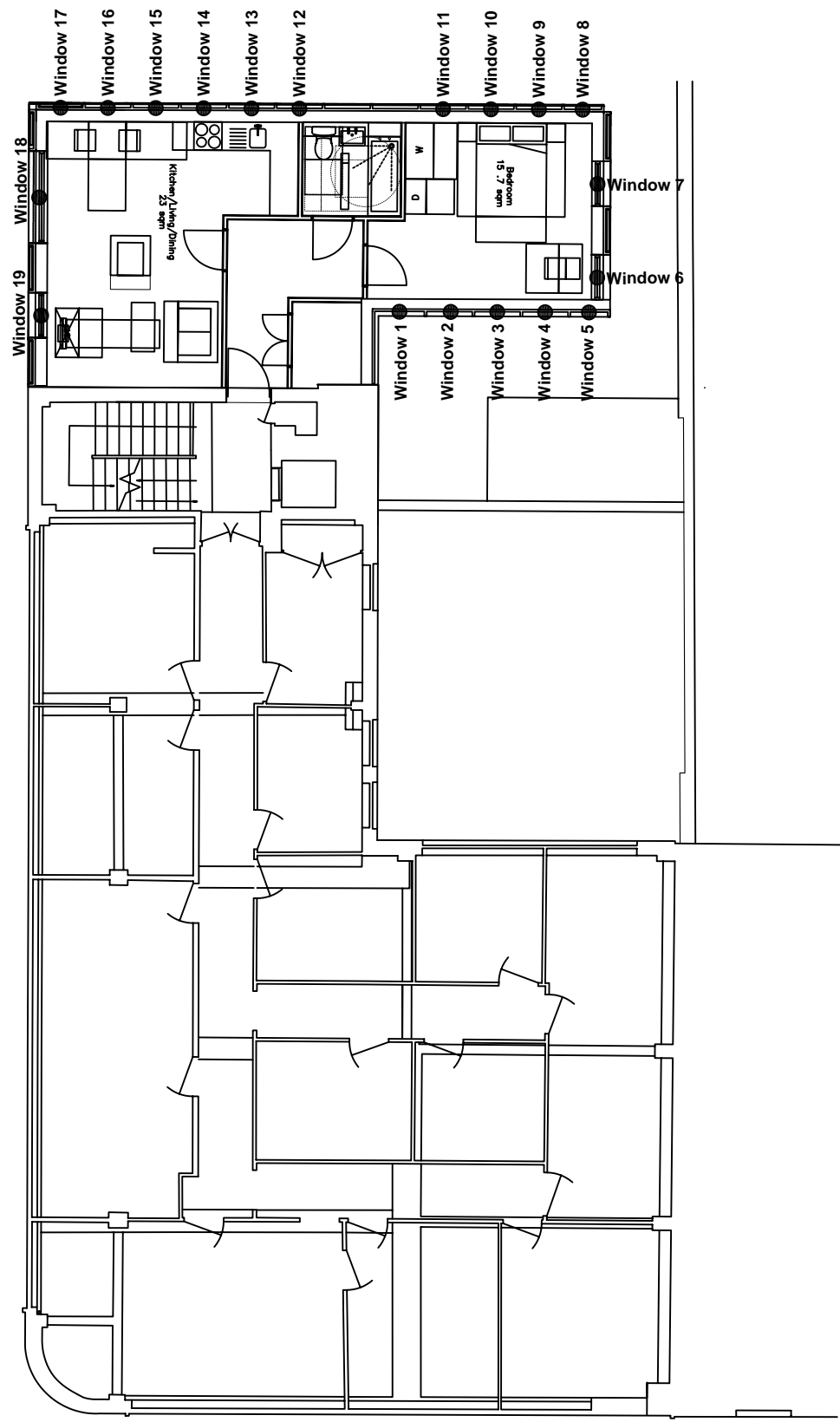
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## **APPENDIX 1**

### WINDOW KEY

Key:

Window 1 ● Window reference



Project Name: Merlin House, 122-126 Kilburn High Road, London NW6 4HY

Drawing Title: Window Key

Scale: Do not scale

Drawing No: 1 of 2

Rev. -

Rev. Date Details of revision



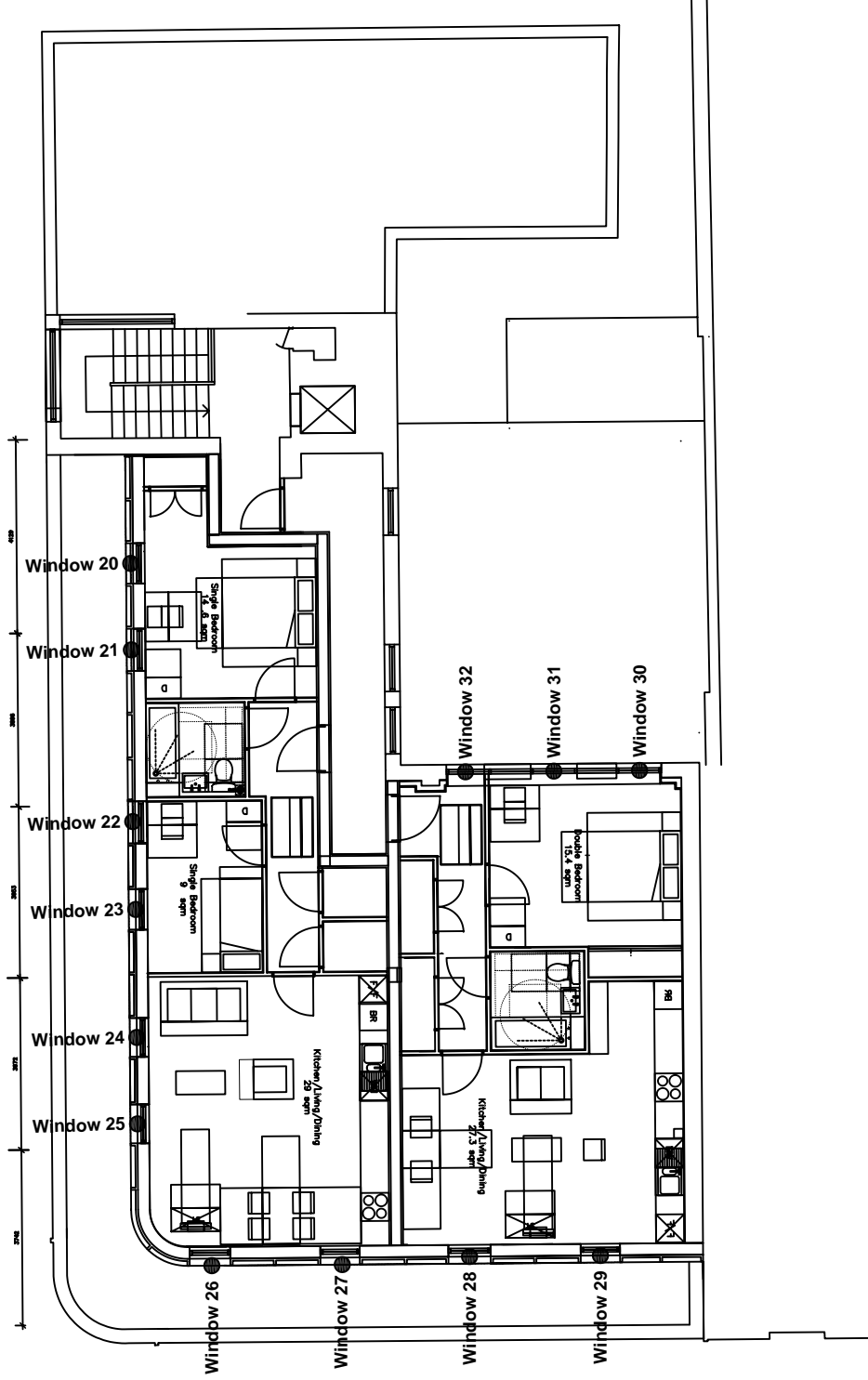
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Key:

Window 1 ● Window reference



Project Name: **Merlin House, 122-126 Kilburn High Road, London NW6 4HY**

Drawing Title: **Window Key**

Scale: **Do not scale**

Drawing No: **2 of 2**

Rev. -

Rev	Date	Details of revision



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## **APPENDIX 2**

### **DAYLIGHT AND SUNLIGHT CALCULATIONS**



**Appendix 2 - Average Daylight Factor (ADF)  
Merlin House, 122-126 Kilburn High Road, London NW6 4HY**

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>First Floor</u>									
Window 1			0.68	1.92	79.88	0.58	34.8	0.9%	
Window 2			0.68	1.92	79.88	0.58	37.1	0.9%	
Window 3			0.68	1.92	79.88	0.58	39.1	1.0%	
Window 4			0.68	1.92	79.88	0.58	41.0	1.0%	
Window 5			0.68	0.88	79.88	0.58	41.4	0.5%	
Window 6			0.68	1.89	79.88	0.58	72.3	1.7%	
Window 7			0.68	1.89	79.88	0.58	72.9	1.8%	
Window 8			0.68	1.18	79.88	0.58	64.3	1.0%	
Window 9			0.68	1.92	79.88	0.58	65.1	1.6%	
Window 10			0.68	1.92	79.88	0.58	65.6	1.6%	
Window 11			0.68	1.92	79.88	0.58	66.0	1.6%	
<b>Total ADF for room</b>	Bedroom	1.0%						<b>13.6%</b>	<b>Pass</b>
Window 12			0.68	1.92	109.77	0.63	67.1	1.3%	
Window 13			0.68	1.92	109.77	0.63	67.9	1.4%	
Window 14			0.68	1.92	109.77	0.63	69.0	1.4%	
Window 15			0.68	1.92	109.77	0.63	70.2	1.4%	
Window 16			0.68	1.92	109.77	0.63	71.5	1.4%	
Window 17			0.68	1.48	109.77	0.63	72.9	1.1%	
Window 18			0.68	3.88	109.77	0.63	73.9	3.0%	
Window 19			0.68	1.89	109.77	0.63	72.7	1.4%	
<b>Total ADF for room</b>	Kitchen/Living/Dining	2.0%						<b>12.4%</b>	<b>Pass</b>
<u>Top Floor</u>									
Window 20 (lower)			0.68	0.59	70.75	0.73	82.1	0.2%	
Window 20 (upper)			0.68	1.13	70.75	0.73	84.2	1.9%	
Window 21 (lower)			0.68	0.62	70.75	0.73	87.1	0.2%	
Window 21 (upper)			0.68	1.18	70.75	0.73	87.8	2.1%	
<b>Total ADF for room</b>	Bedroom	1.0%						<b>4.3%</b>	<b>Pass</b>
Window 22 (lower)			0.68	0.62	51.0	0.72	88.7	0.2%	
Window 22 (upper)			0.68	1.18	51.0	0.72	88.7	2.9%	
Window 23 (lower)			0.68	0.59	51.0	0.72	88.8	0.2%	
Window 23 (upper)			0.68	1.14	51.0	0.72	88.8	2.8%	
<b>Total ADF for room</b>	Bedroom	1.0%						<b>6.2%</b>	<b>Pass</b>

**Appendix 2 - Average Daylight Factor (ADF)  
Merlin House, 122-126 Kilburn High Road, London NW6 4HY**

Reference	Target ADF based on room use		Average Daylight Factor Coefficients					Actual ADF	
	Primary room use	ADF	T	Aw	A	R	Theta	ADF	Result
Window 24 (lower)			0.68	0.57	116.33	0.69	88.9	0.1%	
Window 24 (upper)			0.68	1.09	116.33	0.69	88.9	1.1%	
Window 25 (lower)			0.68	0.57	116.33	0.69	88.9	0.1%	
Window 25 (upper)			0.68	1.09	116.33	0.69	88.9	1.1%	
Window 26 (lower)			0.68	0.59	116.33	0.69	88.3	0.1%	
Window 26 (upper)			0.68	1.14	116.33	0.69	88.5	1.1%	
Window 27 (lower)			0.68	0.57	116.33	0.69	88.2	0.1%	
Window 27 (upper)			0.68	1.1	116.33	0.69	88.5	1.1%	
<b>Total ADF for room</b>	Kitchen/Living/Dining	2.0%						<b>4.8%</b>	<b>Pass</b>
Window 28 (lower)			0.68	0.62	117.14	0.72	87.9	0.1%	
Window 28 (upper)			0.68	1.18	117.14	0.72	88.4	1.3%	
Window 29 (lower)			0.68	0.57	117.14	0.72	85.4	0.1%	
Window 29 (upper)			0.68	1.1	117.14	0.72	87.8	1.2%	
<b>Total ADF for room</b>	Kitchen/Living/Dining	2.0%						<b>2.7%</b>	<b>Pass</b>
Window 30 (lower)			0.68	0.58	71.02	0.72	80.1	0.1%	
Window 30 (upper)			0.68	1.12	71.02	0.72	84.2	1.9%	
Window 31 (lower)			0.68	0.61	71.02	0.72	74.8	0.1%	
Window 31 (upper)			0.68	1.17	71.02	0.72	80.6	1.9%	
<b>Total ADF for room</b>	Bedroom	1.0%						<b>4.1%</b>	<b>Pass</b>

**Appendix 2 - Room Depth Calculation**  
**Merlin House, 122-126 Kilburn High Road, London NW6 4HY**

Room	Room Depth Coefficients				Room Depth Calculation		Result
	L	W	H	Rb	L/W + L/H	2/H-Rb	
<u>First Floor</u>							
Window 1	3.8	4.8	3.6	0.76	1.85 <=	8.24	Pass
Window 2	3.8	4.8	3.6	0.76	1.85 <=	8.24	Pass
Window 3	3.8	4.8	3.6	0.76	1.85 <=	8.24	Pass
Window 4	3.8	4.8	3.6	0.76	1.85 <=	8.24	Pass
Window 5	3.8	4.8	3.6	0.76	1.85 <=	8.24	Pass
Window 6	4.8	3.8	3.6	0.76	2.6 <=	8.24	Pass
Window 7	4.8	3.8	3.6	0.76	2.6 <=	8.24	Pass
Window 8	3.8	4.8	3.6	0.76	1.85 <=	8.24	Pass
Window 9	3.8	4.8	3.6	0.76	1.85 <=	8.24	Pass
Window 10	3.8	4.8	3.6	0.76	1.85 <=	8.24	Pass
Window 11	3.8	4.8	3.6	0.76	1.85 <=	8.24	Pass
Window 12	5.7	5.4	3.6	0.75	2.64 <=	7.97	Pass
Window 13	5.7	5.4	3.6	0.75	2.64 <=	7.97	Pass
Window 14	5.7	5.4	3.6	0.75	2.64 <=	7.97	Pass
Window 15	5.7	5.4	3.6	0.75	2.64 <=	7.97	Pass
Window 16	5.7	5.4	3.6	0.75	2.64 <=	7.97	Pass
Window 17	5.7	5.4	3.6	0.75	2.64 <=	7.97	Pass
Window 18	5.4	5.7	3.6	0.75	2.45 <=	7.97	Pass
Window 19	5.4	5.7	3.6	0.75	2.45 <=	7.97	Pass
<u>Top Floor</u>							
Window 20	3.7	4.4	2.5	0.76	2.32 <=	8.44	Pass
Window 21	3.7	4.4	2.5	0.76	2.32 <=	8.44	Pass
Window 22	2.5	3.7	2.5	0.77	1.68 <=	8.7	Pass
Window 23	2.5	3.7	2.5	0.77	1.68 <=	8.7	Pass
Window 24	5.1	5.8	2.5	0.74	2.92 <=	7.57	Pass
Window 25	5.1	5.8	2.5	0.74	2.92 <=	7.57	Pass
Window 26	5.8	5.1	2.5	0.74	3.46 <=	7.57	Pass
Window 27	5.8	5.1	2.5	0.74	3.46 <=	7.57	Pass
Window 28	5.6	6.0	2.5	0.74	3.17 <=	7.82	Pass
Window 29	5.6	6.0	2.5	0.74	3.17 <=	7.82	Pass
Window 30	3.6	4.1	2.5	0.76	2.32 <=	8.19	Pass
Window 31	3.6	4.1	2.5	0.76	2.32 <=	8.19	Pass

**Appendix 2 - Sunlight to Windows**  
**Merlin House, 122-126 Kilburn High Road, London NW6 4HY**

Reference	Use Class	Annual Probable Sunlight Hours	
		Total	Winter
<u>Top Floor</u>			
Window 26	Kitchen/Living/Dining	66%	24%
Window 27	Kitchen/Living/Dining	66%	24%
Window 28	Kitchen/Living/Dining	66%	24%
Window 29	Kitchen/Living/Dining	64%	22%

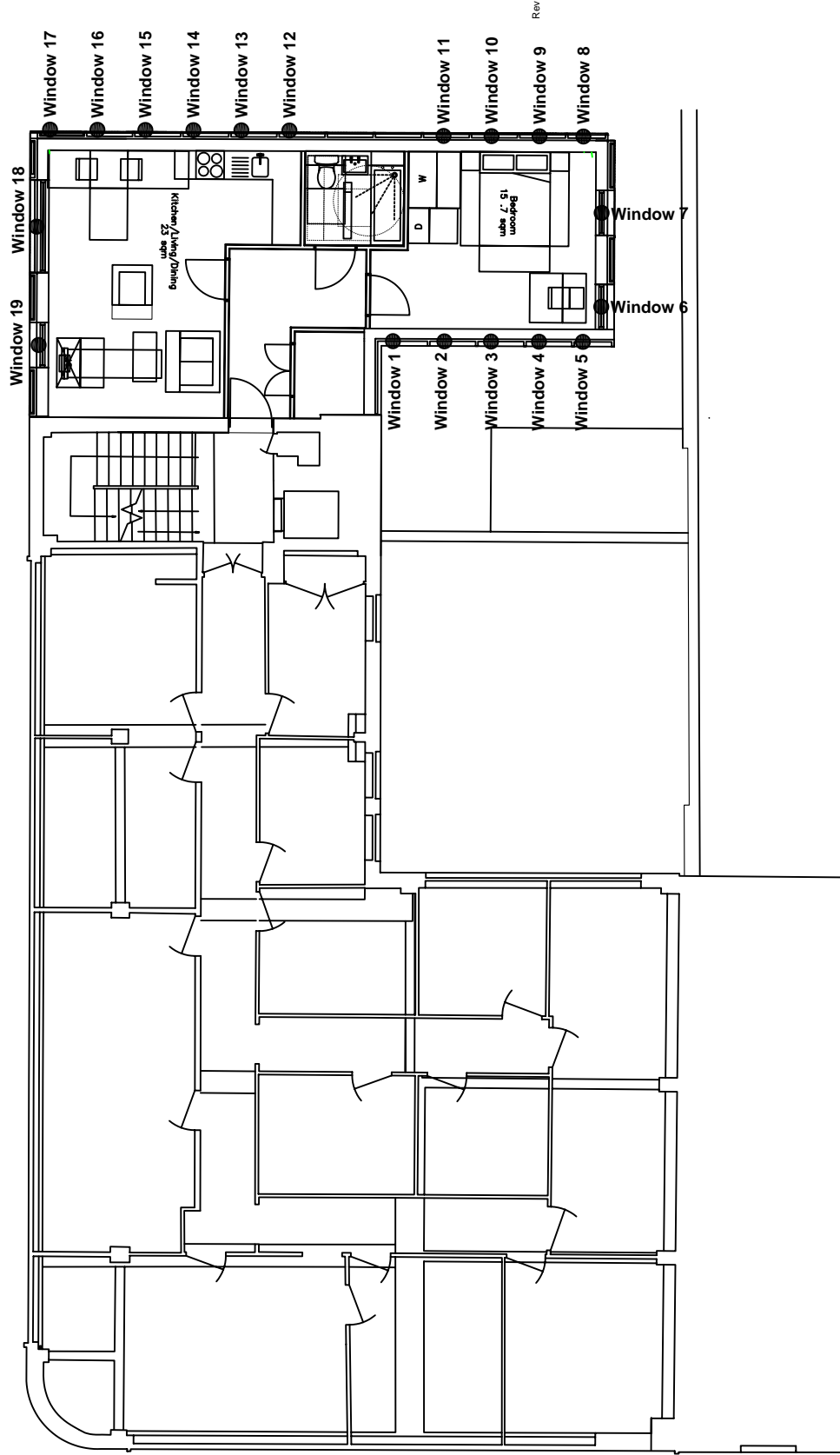
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## **APPENDIX 3**

### **NO SKY LINE CONTOURS**

### Appendix 3 No Sky Line Contours

Proposed First floor at Kilburn High Road (122 to 126)



Key:

● 1

Window reference

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

□ Area does receive direct sky light.

▭ Light aperture.

Project Name: Merlin House, 122-126 Kilburn High Road, London NW6 4HY

Drawing Title: No Sky Line Contours

Scale: Do not scale

Drawing No: 1 of 2

Rev. -

Date

Details of revision

Rev



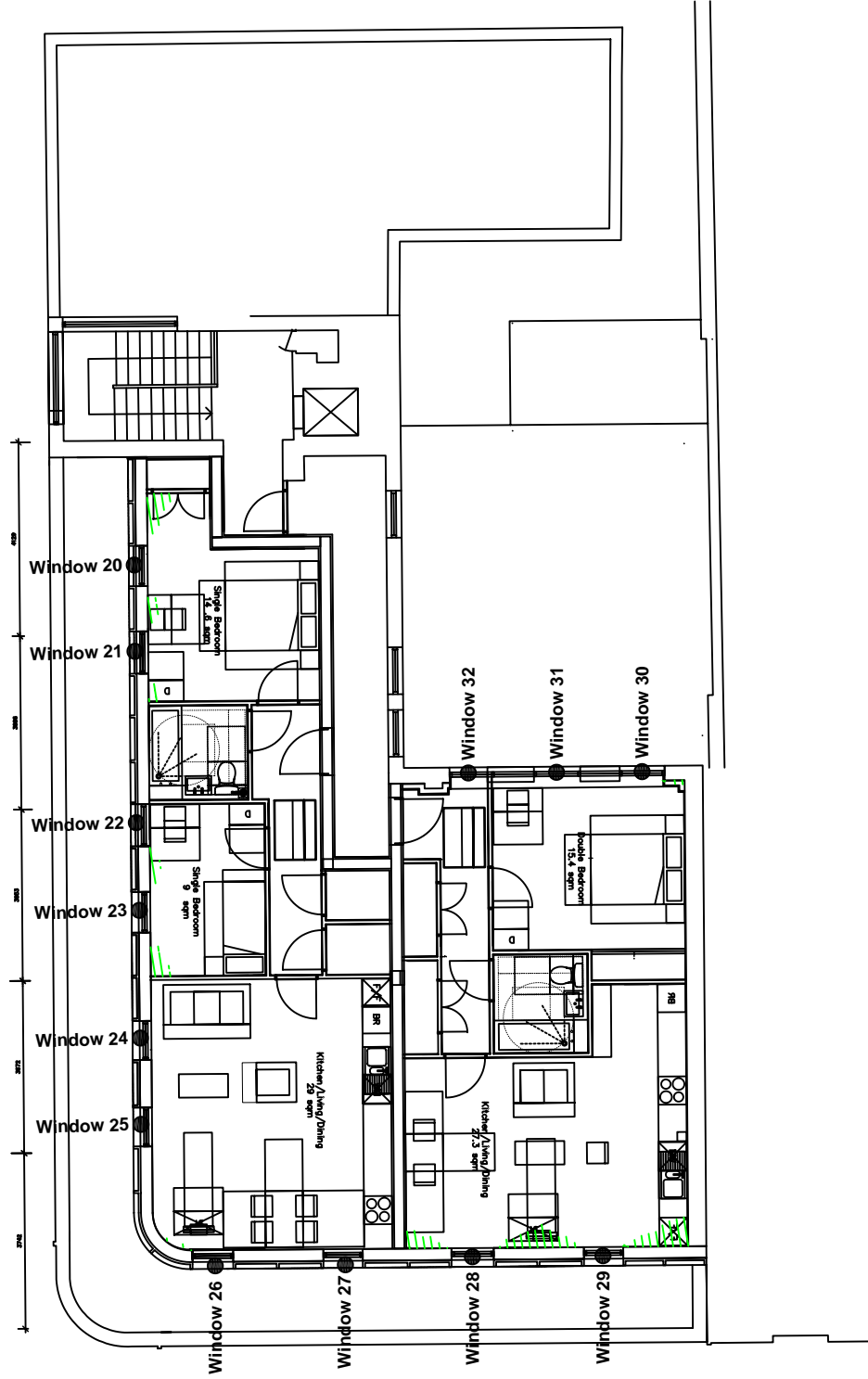
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### Appendix 3 No Sky Line Contours

Proposed Top floor at Kilburn High Road (122 to 126)



Key:

● 1

Window reference



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



Area does receive direct sky light.



Light aperture.

Project Name: **Merlin House, 122-126 Kilburn High Road, London NW6 4HY**

Drawing Title: **No Sky Line Contours**

Scale: **Do not scale**

Drawing No: **2 of 2**

Rev	Date	Details of revision

Rev. -



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