



RIGHT OF LIGHT
CONSULTING
Chartered Surveyors

Right of Light Consulting

Burley House
15-17 High Street
Rayleigh
Essex
SS6 7EW

TEL 0800 197 4836

E-MAIL enquiries@right-of-light.co.uk

WEBSITE www.right-of-light.co.uk

Daylight and Sunlight Study (Within Development) Green Lane, Northwood HA6 2UY

7 July 2017



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Tel: 0800 197 4836

DAYLIGHT AND SUNLIGHT STUDY
Green Lane, Northwood HA6 2UY

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1 EXECUTIVE SUMMARY

1.1 Overview

- 1.1.1 Right of Light Consulting has been commissioned by Westcombe Homes Ltd to undertake a daylight and sunlight study in connection with the development at Green Lane, Northwood HA6 2UY. The aim of the study is to check whether or not the proposed development receives 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'.

2 INFORMATION SOURCES

2.1 Documents Considered

2.1.1 This report is based on the following drawings:

Mk Surveys

21350	Topographical Survey	Rev –
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Fluent Architectural Design Services

FLU.249.FP.01	Block 1 Existing Floor Plans	Rev –
FLU.249.3A.01	Location Plan	Rev –
FLU.249.3A.02	Proposed Site Layout	Rev –
FLU.249.3A.03	Basement Floor Plan	Rev –
FLU.249.3A.04	Ground Floor Plan	Rev –
FLU.249.3A.05	First Floor Plan	Rev –
FLU.249.3A.06	Second Floor Plan	Rev –
FLU.249.3A.07	Front & Side Elevations	Rev –
FLU.249.3A.08	Rear & Side Elevations	Rev –

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 _w | is the net glazed area of the window (m ²) |
| 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.

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 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.

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.

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.

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 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 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'.

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, 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 This report is based upon and subject to the scope of work set out in Right of Light Consulting's quotation and standard terms and conditions.
- 5.1.7 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.

APPENDICES

APPENDIX 1

WINDOW KEY

Key:

Window 1 ● Window reference



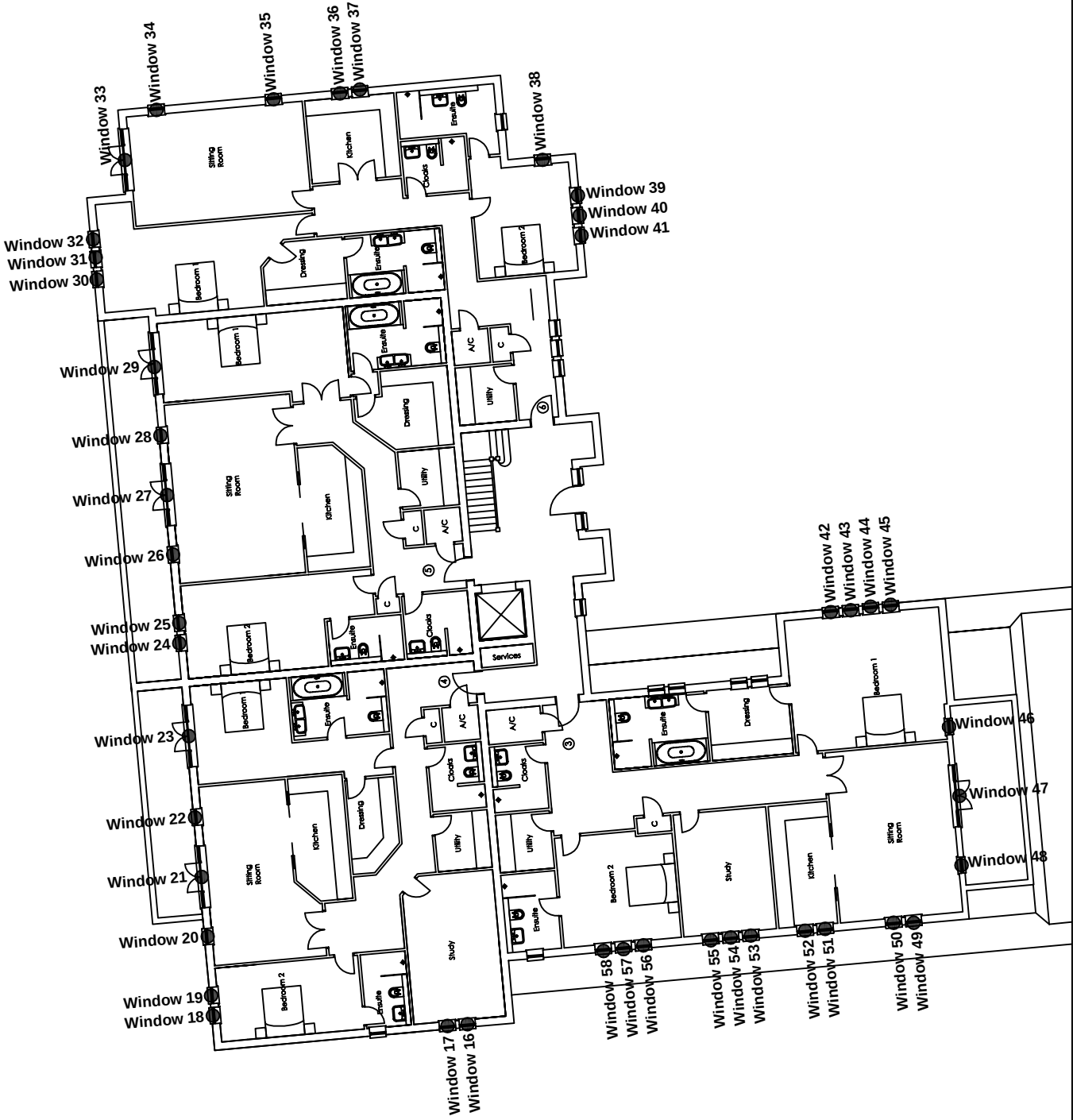
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Drawing Title: Window Key	
Scale: Do not scale	
Drawing No: 1 of 4	Rev. -
Rev	Date
Details of revision	



Burley House
15 - 17 High Street
Rayleigh
Essex SS6 7EW
Tel. 0800 197 4836
enquiries@right-of-light.co.uk
www.right-of-light-consulting.com

Key:

Window 1 ● Window reference



Project Name: Green Lane, Northwood HA6 2UY

Drawing Title: Window Key

Scale: Do not scale

Drawing No: 2 of 4

Rev. -

Rev

Date

Details of revision



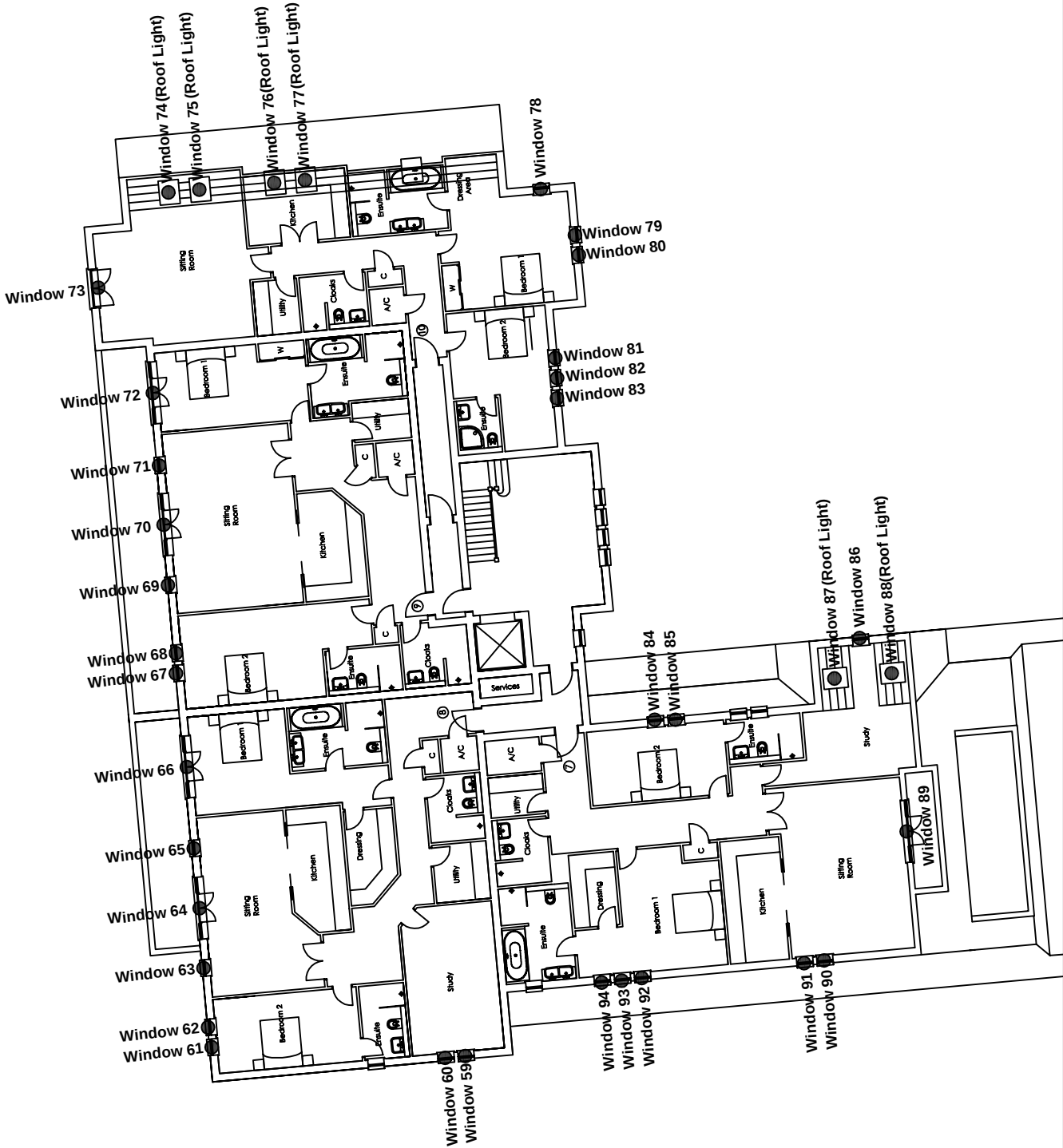
Burley House
15 - 17 High Street
Rayleigh
Essex SS6 7EW

Tel. 0800 197 4836

enquiries@right-of-light.co.uk
www.right-of-light-consulting.com

Key:

Window 1 ● Window reference



Project Name: Green Lane, Northwood HA6 2UY

Drawing Title: Window Key

Scale: Do not scale

Drawing No: 3 of 4

Rev. Details of revision

Date

Rev. -

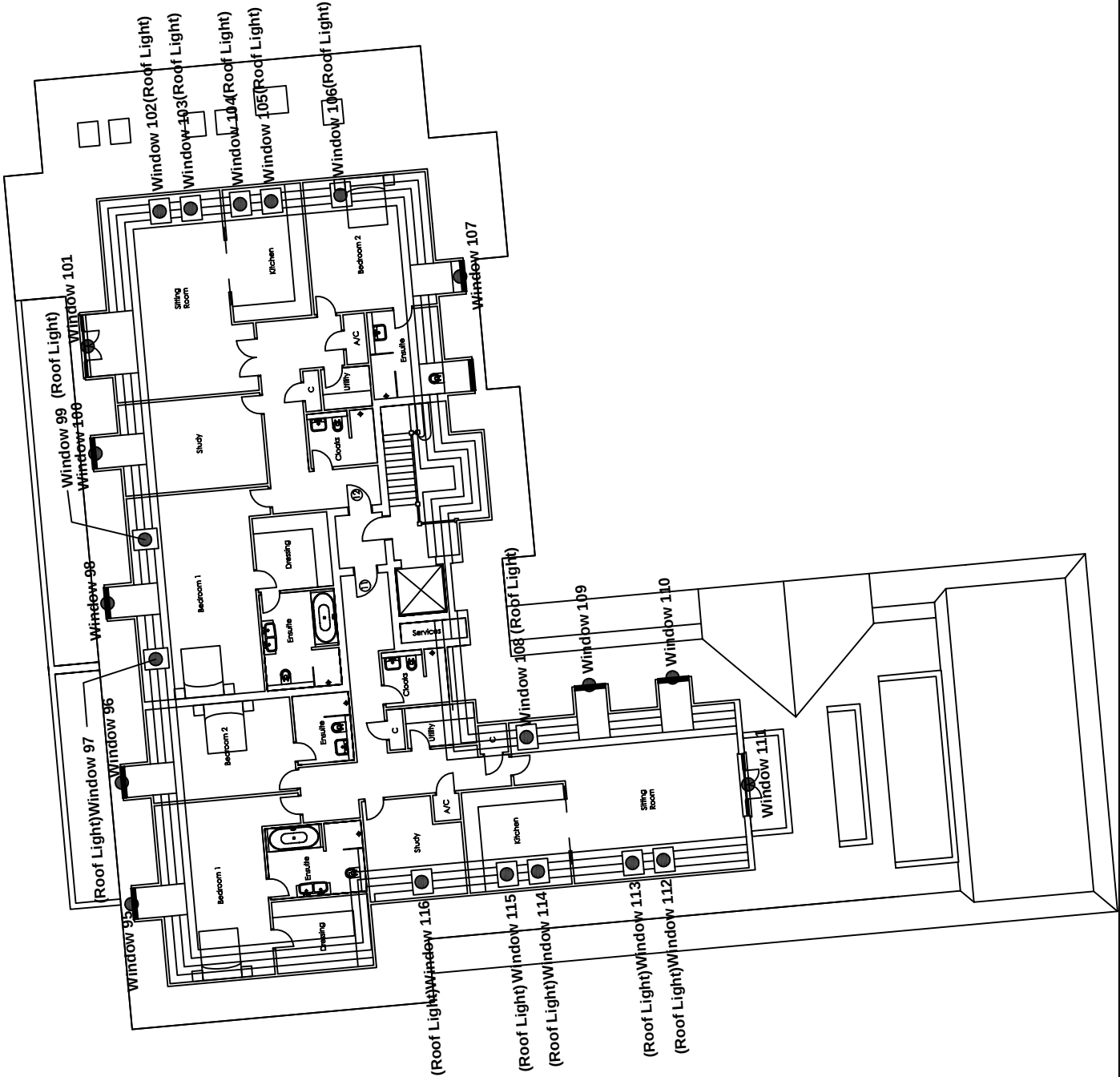


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Key:

Window 1 ● Window reference



Project Name: Green Lane, Northwood HA6 2UY

Drawing Title: Window Key

Scale: Do not scale

Drawing No: 4 of 4

Rev. -

Date

Details of revision



Burley House
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www.right-of-light-consulting.com

APPENDIX 2

DAYLIGHT AND SUNLIGHT CALCULATIONS

Appendix 2 - Average Daylight Factor (ADF)
Green Lane, Northwood HA6 2UY

Reference	Target ADF based on room use	Average Daylight Factor Coefficients					Actual ADF	Result
	Primary room use	ADF	T	Aw	A	R	Theta	
Proposed Basement Floor								
Window 1	Study	1.5%	0.68	0.86	80.75	0.7	59.1	0.8%
Window 2			0.68	0.86	80.75	0.7	59.9	0.8%
Window 3			0.68	0.86	80.75	0.7	60.6	0.8%
Total ADF for room								2.4% Pass
Window 4			0.68	0.86	70.27	0.71	75.7	1.3%
Window 5	Bedroom	1.0%	0.68	0.86	70.27	0.71	75.9	1.3%
Total ADF for room								2.6% Pass
Window 6			0.68	0.86	100.92	0.67	76.4	0.8%
Window 7 (lower)			0.68	1.39	100.92	0.67	73.6	0.5%
Window 7 (upper)			0.68	3.37	100.92	0.67	77.3	3.2%
Window 8	Sitting Room	1.5%	0.68	0.86	100.92	0.67	76.8	0.8%
Total ADF for room								5.3% Pass
Window 9 (lower)			0.68	1.39	93.0	0.69	73.9	0.6%
Window 9 (upper)			0.68	3.37	93.0	0.69	77.5	3.7%
Total ADF for room								4.3% Pass
Window 10 (lower)	Bedroom	1.0%	0.68	1.39	93.0	0.69	73.8	0.6%
Window 10 (upper)			0.68	3.37	93.0	0.69	77.5	3.7%
Total ADF for room								4.3% Pass
Window 11			0.68	0.86	100.92	0.67	76.8	0.8%
Window 12 (lower)			0.68	1.39	100.92	0.67	73.4	0.5%
Window 12 (upper)	Sitting Room	1.5%	0.68	3.37	100.92	0.67	77.2	3.2%
Window 13			0.68	0.86	100.92	0.67	76.4	0.8%
Total ADF for room								5.3% Pass
Window 14			0.68	0.86	70.28	0.71	76.2	1.3%
Window 15			0.68	0.86	70.28	0.71	76.1	1.3%
Total ADF for room	Bedroom	1.0%						2.6% Pass
Proposed Ground Floor								
Window 16 (lower)			0.68	0.01	83.85	0.7	74.7	0.0%
Window 16 (upper)			0.68	0.85	83.85	0.7	76.6	1.0%
Window 17 (lower)			0.68	0.01	83.85	0.7	74.8	0.0%

Appendix 2 - Average Daylight Factor (ADF)
Green Lane, Northwood HA6 2UY

Reference	Target ADF based on room use Primary room use	ADF	Average Daylight Factor Coefficients				Actual ADF ADF Result
		T	Aw	A	R	Theta	
Window 17 (upper)		0.68	0.85	83.85	0.7	76.6	1.0%
Total ADF for room	Study	1.5%					2.0% Pass
Window 18 (lower)		0.68	0.01	72.38	0.71	82.8	0.0%
Window 18 (upper)		0.68	0.85	72.38	0.71	83.8	1.3%
Window 19 (lower)		0.68	0.01	72.38	0.71	82.6	0.0%
Window 19 (upper)		0.68	0.85	72.38	0.71	83.6	1.3%
Total ADF for room	Bedroom	1.0%					2.6% Pass
Window 20 (lower)		0.68	0.01	104.66	0.67	82.4	0.0%
Window 20 (upper)		0.68	0.85	104.66	0.67	83.4	0.8%
Window 21 (lower)		0.68	1.63	104.66	0.67	81.8	0.6%
Window 21 (upper)		0.68	3.23	104.66	0.67	83.8	3.2%
Window 22 (lower)		0.68	0.01	104.66	0.67	82.4	0.0%
Window 22 (upper)		0.68	0.85	104.66	0.67	83.4	0.8%
Total ADF for room	Sitting Room	1.5%					5.4% Pass
Window 23 (lower)		0.68	1.63	95.49	0.69	81.9	0.7%
Window 23 (upper)		0.68	3.23	95.49	0.69	83.8	3.7%
Total ADF for room	Bedroom	1.0%					4.4% Pass
Window 24 (lower)		0.68	0.01	99.2	0.71	82.4	0.0%
Window 24 (upper)		0.68	0.85	99.2	0.71	83.6	1.0%
Window 25 (lower)		0.68	0.01	99.2	0.71	82.4	0.0%
Window 25 (upper)		0.68	0.85	99.2	0.71	83.5	1.0%
Total ADF for room	Bedroom	1.0%					2.0% Pass
Window 26 (lower)		0.68	0.01	124.8	0.67	82.3	0.0%
Window 26 (upper)		0.68	0.85	124.8	0.67	83.5	0.7%
Window 27 (lower)		0.68	1.63	124.8	0.67	81.2	0.5%
Window 27 (upper)		0.68	3.23	124.8	0.67	83.3	2.6%
Window 28 (lower)		0.68	0.01	124.8	0.67	80.3	0.0%
Window 28 (upper)		0.68	0.85	124.8	0.67	81.7	0.7%
Total ADF for room	Sitting Room	1.5%					4.5% Pass
Window 29 (lower)		0.68	1.63	98.27	0.68	70.9	0.6%
Window 29 (upper)		0.68	3.23	98.27	0.68	72.6	3.0%
Total ADF for room	Bedroom	1.0%					3.6% Pass

Appendix 2 - Average Daylight Factor (ADF)
Green Lane, Northwood HA6 2UY

Reference	Target ADF based on room use		Average Daylight Factor Coefficients				Actual ADF	
	Primary room use	ADF	T	Aw	A	R	Theta	Result
Window 30 (lower)	Bedroom	1.0%	0.68	0.01	109.56	0.71	83.5	0.0%
Window 30 (upper)			0.68	0.85	109.56	0.71	86.2	0.9%
Window 31 (lower)			0.68	0.01	109.56	0.71	83.4	0.0%
Window 31 (upper)			0.68	0.85	109.56	0.71	86.2	0.9%
Window 32 (lower)			0.68	0.01	109.56	0.71	83.2	0.0%
Window 32 (upper)			0.68	0.85	109.56	0.71	86.1	0.9%
Total ADF for room								2.7% Pass
Window 33 (lower)	Sitting Room	1.5%	0.68	1.63	111.75	0.67	66.6	0.5%
Window 33 (upper)			0.68	3.23	111.75	0.67	64.6	2.3%
Window 34 (lower)			0.68	0.01	111.75	0.67	68.0	0.0%
Window 34 (upper)			0.68	0.85	111.75	0.67	71.6	0.7%
Window 35 (lower)			0.68	0.01	111.75	0.67	71.0	0.0%
Window 35 (upper)			0.68	0.85	111.75	0.67	73.4	0.7%
Total ADF for room								4.2% Pass
Window 36 (lower)	Kitchen	2.0%	0.68	0.01	54.51	0.71	71.3	0.0%
Window 36 (upper)			0.68	0.85	54.51	0.71	73.6	1.6%
Window 37 (lower)			0.68	0.01	54.51	0.71	71.2	0.0%
Window 37 (upper)			0.68	0.85	54.51	0.71	73.5	1.6%
Total ADF for room								3.2% Pass
Window 38 (lower)	Bedroom	1.0%	0.68	0.01	74.29	0.69	56.0	0.0%
Window 38 (upper)			0.68	0.85	74.29	0.69	57.8	0.9%
Window 39			0.68	0.86	74.29	0.69	81.6	1.2%
Window 40			0.68	0.86	74.29	0.69	81.5	1.2%
Window 41			0.68	0.86	74.29	0.69	81.3	1.2%
Total ADF for room								4.5% Pass
Window 42 (lower)	Bedroom	1.0%	0.68	0.01	115.12	0.68	71.2	0.0%
Window 42 (upper)			0.68	0.85	115.12	0.68	73.2	0.7%
Window 43 (lower)			0.68	0.01	115.12	0.68	72.1	0.0%
Window 43 (upper)			0.68	0.85	115.12	0.68	74.0	0.7%
Window 44 (lower)			0.68	0.01	115.12	0.68	72.9	0.0%
Window 44 (upper)			0.68	0.85	115.12	0.68	74.7	0.7%
Window 45 (lower)			0.68	0.01	115.12	0.68	73.5	0.0%

Appendix 2 - Average Daylight Factor (ADF)
Green Lane, Northwood HA6 2UY

Reference	Target ADF based on room use		Average Daylight Factor Coefficients					Actual ADF		
	Primary room use	ADF	T	A _w	A	R	Theta	ADF	Result	
Window 45 (upper)	Bedroom	1.0%	0.68	0.85	115.12	0.68	75.3	0.7%	3.5% Pass	
Window 46 (lower)			0.68	0.01	115.12	0.68	65.2	0.0%		
Window 46 (upper)			0.68	0.85	115.12	0.68	71.9	0.7%		
Total ADF for room										
Window 47 (lower)			0.68	1.63	117.89	0.66	71.3	0.5%		
Window 47 (upper)			0.68	3.23	117.89	0.66	82.3	2.7%		
Window 48 (lower)			0.68	0.01	117.89	0.66	63.4	0.0%		
Window 48 (upper)			0.68	0.85	117.89	0.66	70.2	0.6%		
Window 49 (lower)			0.68	0.01	117.89	0.66	77.5	0.0%		
Window 49 (upper)			0.68	0.85	117.89	0.66	78.5	0.7%		
Window 50 (lower)	Sitting Room	1.5%	0.68	0.01	117.89	0.66	77.5	0.0%		
Window 50 (upper)			0.68	0.85	117.89	0.66	78.7	0.7%		
Total ADF for room								5.2% Pass		
Window 51 (lower)			0.68	0.01	55.55	0.71	77.1	0.0%		
Window 51 (upper)			0.68	0.85	55.55	0.71	78.4	1.6%		
Window 52 (lower)			0.68	0.01	55.55	0.71	77.0	0.0%		
Window 52 (upper)			0.68	0.85	55.55	0.71	78.3	1.6%		
Total ADF for room								3.2% Pass		
Window 53 (lower)			Kitchen	2.0%	0.68	0.01	74.39	0.7	76.5	0.0%
Window 53 (upper)					0.68	0.85	74.39	0.7	77.9	1.2%
Window 54 (lower)	0.68	0.01			74.39	0.7	76.3	0.0%		
Window 54 (upper)	0.68	0.85			74.39	0.7	77.7	1.2%		
Window 55 (lower)	0.68	0.01			74.39	0.7	76.0	0.0%		
Window 55 (upper)	0.68	0.85			74.39	0.7	77.4	1.2%		
Total ADF for room								3.6% Pass		
Window 56 (lower)	Study	1.5%			0.68	0.01	80.83	0.69	74.1	0.0%
Window 56 (upper)					0.68	0.85	80.83	0.69	75.8	1.0%
Window 57 (lower)					0.68	0.01	80.83	0.69	73.0	0.0%
Window 57 (upper)			0.68	0.85	80.83	0.69	74.8	1.0%		
Window 58 (lower)			0.68	0.01	80.83	0.69	71.4	0.0%		
Window 58 (upper)			0.68	0.85	80.83	0.69	73.2	1.0%		
Total ADF for room								3.0% Pass		

Appendix 2 - Average Daylight Factor (ADF)
Green Lane, Northwood HA6 2UY

Reference	Target ADF based on room use	Average Daylight Factor Coefficients				Actual ADF	Result
	Primary room use	ADF	T	Aw	A	R	Theta
<u>Proposed First Floor</u>							
Window 59 (lower)			0.68	0.05	83.85	0.7	79.4
Window 59 (upper)			0.68	0.81	83.85	0.7	76.2
Window 60 (lower)			0.68	0.05	83.85	0.7	79.4
Window 60 (upper)			0.68	0.81	83.85	0.7	76.3
Total ADF for room	Study	1.5%					2.1% Pass
Window 61 (lower)			0.68	0.05	72.38	0.71	76.9
Window 61 (upper)			0.68	0.81	72.38	0.71	64.4
Window 62 (lower)			0.68	0.05	72.38	0.71	76.4
Window 62 (upper)			0.68	0.81	72.38	0.71	64.0
Total ADF for room	Bedroom	1.0%					2.1% Pass
Window 63 (lower)			0.68	0.05	104.66	0.67	76.1
Window 63 (upper)			0.68	0.81	104.66	0.67	63.8
Window 64 (lower)			0.68	1.63	104.66	0.67	79.0
Window 64 (upper)			0.68	3.08	104.66	0.67	63.9
Window 65 (lower)			0.68	0.05	104.66	0.67	76.1
Window 65 (upper)			0.68	0.81	104.66	0.67	63.8
Total ADF for room	Sitting Room	1.5%					4.1% Pass
Window 66 (lower)			0.68	1.63	95.49	0.69	79.0
Window 66 (upper)			0.68	3.08	95.49	0.69	63.9
Total ADF for room	Bedroom	1.0%					3.4% Pass
Window 67 (lower)			0.68	0.05	99.2	0.71	76.2
Window 67 (upper)			0.68	0.81	99.2	0.71	63.9
Window 68 (lower)			0.68	0.05	99.2	0.71	76.2
Window 68 (upper)			0.68	0.81	99.2	0.71	63.9
Total ADF for room	Bedroom	1.0%					1.5% Pass
Window 69 (lower)			0.68	0.05	124.8	0.67	76.1
Window 69 (upper)			0.68	0.81	124.8	0.67	63.8
Window 70 (lower)			0.68	1.57	124.8	0.67	78.6
Window 70 (upper)			0.68	2.97	124.8	0.67	63.7
Window 71 (lower)			0.68	0.05	124.8	0.67	75.0
Window 71 (upper)			0.68	0.81	124.8	0.67	63.2
Total ADF for room	Sitting Room	1.5%					3.4% Pass

Appendix 2 - Average Daylight Factor (ADF)
Green Lane, Northwood HA6 2UY

Reference	Target ADF based on room use Primary room use	ADF	Average Daylight Factor Coefficients				Theta	Actual ADF ADF	Result
		T	Aw	A	R				
Window 72 (lower)		0.68	1.63	75.4	0.68		70.0	0.8%	
Window 72 (upper)		0.68	3.08	75.4	0.68		58.8	3.0%	
Total ADF for room	Bedroom							3.8%	Pass
Window 73 (lower)		0.68	0.12	134.52	0.69		88.8	0.0%	
Window 73 (upper)		0.68	1.92	134.52	0.69		89.0	1.6%	
Window 74		0.68	0.83	134.52	0.69		113.5	0.9%	
Window 75		0.68	0.83	134.52	0.69		112.4	0.9%	
Total ADF for room	Sitting Room							3.4%	Pass
Window 76		0.68	0.7	52.81	0.71		102.7	1.9%	
Window 77		0.68	0.7	52.81	0.71		91.3	1.7%	
Total ADF for room	Kitchen							3.6%	Pass
Window 78 (lower)		0.68	0.05	98.75	0.7		68.3	0.0%	
Window 78 (upper)		0.68	0.81	98.75	0.7		74.6	0.8%	
Window 79 (lower)		0.68	0.05	98.75	0.7		84.3	0.0%	
Window 79 (upper)		0.68	0.81	98.75	0.7		85.2	0.9%	
Window 80 (lower)		0.68	0.05	98.75	0.7		84.2	0.0%	
Window 80 (upper)		0.68	0.81	98.75	0.7		85.1	0.9%	
Total ADF for room	Bedroom							2.7%	Pass
Window 81 (lower)		0.68	0.05	79.22	0.7		74.7	0.0%	
Window 81 (upper)		0.68	0.81	79.22	0.7		72.4	1.0%	
Window 82 (lower)		0.68	0.05	79.22	0.7		76.5	0.0%	
Window 82 (upper)		0.68	0.81	79.22	0.7		73.8	1.0%	
Window 83 (lower)		0.68	0.05	79.22	0.7		75.2	0.0%	
Window 83 (upper)		0.68	0.81	79.22	0.7		72.8	1.0%	
Total ADF for room	Bedroom							3.1%	Pass
Window 84 (lower)		0.68	0.05	69.62	0.71		63.1	0.0%	
Window 84 (upper)		0.68	0.81	69.62	0.71		61.8	1.0%	
Window 85 (lower)		0.68	0.05	69.62	0.71		65.2	0.0%	
Window 85 (upper)		0.68	0.81	69.62	0.71		63.9	1.0%	
Total ADF for room	Bedroom							2.1%	Pass
Window 86		0.68	0.35	94.91	0.71		79.4	0.4%	
Window 87		0.68	0.83	94.91	0.71		79.5	0.9%	

Appendix 2 - Average Daylight Factor (ADF)
Green Lane, Northwood HA6 2UY

Reference	Target ADF based on room use Primary room use	ADF	Average Daylight Factor Coefficients				Actual ADF ADF Result
		T	Aw	A	R	Theta	
Window 88		0.68	0.83	94.91	0.71	114.3	1.4%
Total ADF for room	Study	1.5%					2.7% Pass
Window 89 (lower)		0.68	1.63	121.64	0.68	63.2	0.4%
Window 89 (upper)		0.68	1.91	121.64	0.68	85.6	1.7%
Window 90 (lower)		0.68	0.05	121.64	0.68	80.3	0.0%
Window 90 (upper)		0.68	0.81	121.64	0.68	76.7	0.6%
Window 91 (lower)		0.68	0.05	121.64	0.68	80.2	0.0%
Window 91 (upper)		0.68	0.81	121.64	0.68	76.7	0.6%
Total ADF for room	Sitting Room	1.5%					3.3% Pass
Window 92 (lower)		0.68	0.05	92.6	0.7	78.8	0.0%
Window 92 (upper)		0.68	0.81	92.6	0.7	75.7	0.9%
Window 93 (lower)		0.68	0.05	92.6	0.7	78.0	0.0%
Window 93 (upper)		0.68	0.81	92.6	0.7	75.2	0.9%
Window 94 (lower)		0.68	0.05	92.6	0.7	76.8	0.0%
Window 94 (upper)		0.68	0.81	92.6	0.7	74.3	0.9%
Total ADF for room	Bedroom	1.0%					2.8% Pass
Proposed Second Floor							
Window 95	Bedroom	1.0%	0.68	1.3	126.06	0.71	89.1
Window 96	Bedroom	1.0%	0.68	1.3	91.42	0.71	89.1
Window 97			0.68	0.76	145.97	0.69	119.7
Window 98			0.68	1.3	145.97	0.69	89.1
Window 99			0.68	0.76	145.97	0.69	119.6
Total ADF for room	Bedroom	1.0%					2.6% Pass
Window 100	Study	1.5%	0.68	1.3	88.73	0.71	89.0
Window 101 (lower)			0.68	0.4	149.36	0.68	85.3
Window 101 (upper)			0.68	3.55	149.36	0.68	88.2
Window 102			0.68	0.82	149.36	0.68	113.8
Window 103			0.68	0.82	149.36	0.68	113.4
Total ADF for room	Sitting Room	1.5%					4.3% Pass
Window 104			0.68	0.82	69.66	0.71	112.6
Window 105			0.68	0.82	69.66	0.71	112.3

Appendix 2 - Average Daylight Factor (ADF)
Green Lane, Northwood HA6 2UY

Reference	Target ADF based on room use		Average Daylight Factor Coefficients					Actual ADF
	Primary room use	ADF	T	Aw	A	R	Theta	Result
Total ADF for room	Kitchen	2.0%						3.6% Pass
Window 106			0.68	0.82	102.71	0.7	113.0	1.2%
Window 107			0.68	1.3	102.71	0.7	86.1	1.4%
Total ADF for room	Bedroom	1.0%						2.6% Pass
Window 108			0.68	0.81	182.46	0.67	112.0	0.6%
Window 109			0.68	1.3	182.46	0.67	81.4	0.7%
Window 110			0.68	1.3	182.46	0.67	84.7	0.7%
Window 111 (lower)			0.68	1.63	182.46	0.67	57.3	0.2%
Window 111 (upper)			0.68	3.19	182.46	0.67	87.3	1.9%
Window 112			0.68	0.81	182.46	0.67	116.7	0.6%
Window 113			0.68	0.81	182.46	0.67	116.7	0.6%
Total ADF for room	Sitting Room	1.5%						5.3% Pass
Window 114			0.68	0.81	67.88	0.71	116.5	1.9%
Window 115			0.68	0.81	67.88	0.71	116.3	1.9%
Total ADF for room	Kitchen	2.0%						3.8% Pass
Window 116	Study	1.5%	0.68	0.81	63.16	0.72	113.8	2.0% Pass

Appendix 2 - Room Depth Calculation
Green Lane, Northwood HA6 2UY

Room	Room Depth Coefficients			Room Depth Calculation			Result
	L	W	H	Rb	L/W + L/H	2/L-Rb	
<u>Proposed Basement Floor</u>							
Window 1	5.7	3.4	2.6	0.7	3.87 <=	6.57	Pass
Window 2	5.7	3.4	2.6	0.7	3.87 <=	6.57	Pass
Window 3	5.7	3.4	2.6	0.7	3.87 <=	6.57	Pass
Window 4	5.4	2.9	2.6	0.71	3.94 <=	6.82	Pass
Window 5	5.4	2.9	2.6	0.71	3.94 <=	6.82	Pass
Window 6	4.2	6.9	2.6	0.67	2.22 <=	6.08	Pass
Window 7	4.2	6.9	2.6	0.67	2.22 <=	6.08	Pass
Window 8	4.2	6.9	2.6	0.67	2.22 <=	6.08	Pass
Window 9	7.4	3.8	2.6	0.69	4.79 <=	6.52	Pass
Window 10	7.4	3.8	2.6	0.69	4.79 <=	6.52	Pass
Window 11	4.2	6.9	2.6	0.67	2.22 <=	6.08	Pass
Window 12	4.2	6.9	2.6	0.67	2.22 <=	6.08	Pass
Window 13	4.2	6.9	2.6	0.67	2.22 <=	6.08	Pass
Window 14	5.4	2.9	2.6	0.71	3.94 <=	6.82	Pass
Window 15	5.4	2.9	2.6	0.71	3.94 <=	6.82	Pass
<u>Proposed Ground Floor</u>							
Window 16	5.7	3.6	2.5	0.7	3.86 <=	6.71	Pass
Window 17	5.7	3.6	2.5	0.7	3.86 <=	6.71	Pass
Window 18	5.6	2.9	2.5	0.71	4.17 <=	6.82	Pass
Window 19	5.6	2.9	2.5	0.71	4.17 <=	6.82	Pass
Window 20	4.4	6.9	2.5	0.67	2.4 <=	6.07	Pass
Window 21	4.4	6.9	2.5	0.67	2.4 <=	6.07	Pass
Window 22	4.4	6.9	2.5	0.67	2.4 <=	6.07	Pass
Window 23	7.6	3.8	2.5	0.69	5.04 <=	6.51	Pass
Window 24	7.4	3.6	2.5	0.71	5.02 <=	6.81	Pass
Window 25	7.4	3.6	2.5	0.71	5.02 <=	6.81	Pass
Window 26	4.9	6.9	2.5	0.67	2.67 <=	6.03	Pass
Window 27	4.9	6.9	2.5	0.67	2.67 <=	6.03	Pass
Window 28	4.9	6.9	2.5	0.67	2.67 <=	6.03	Pass
Window 29	7.2	3.5	2.5	0.68	4.94 <=	6.31	Pass
Window 30	8.4	4.2	2.5	0.71	5.36 <=	6.79	Pass
Window 31	8.4	4.2	2.5	0.71	5.36 <=	6.79	Pass
Window 32	8.4	4.2	2.5	0.71	5.36 <=	6.79	Pass

Appendix 2 - Room Depth Calculation
Green Lane, Northwood HA6 2UY

Room	Room Depth Coefficients				Room Depth Calculation		Result
	L	W	H	Rb	LW + L/H	2/L-Rb	
Window 33	6.9	4.3	2.5	0.67	4.36 <=	6.03	Pass
Window 34	4.3	6.9	2.5	0.67	2.34 <=	6.03	Pass
Window 35	4.3	6.9	2.5	0.67	2.34 <=	6.03	Pass
Window 36	3.2	3.5	2.5	0.71	2.19 <=	6.82	Pass
Window 37	3.2	3.5	2.5	0.71	2.19 <=	6.82	Pass
Window 38	4.2	3.8	2.5	0.69	2.79 <=	6.44	Pass
Window 39	3.8	4.7	2.7	0.69	2.22 <=	6.44	Pass
Window 40	3.8	4.7	2.7	0.69	2.22 <=	6.44	Pass
Window 41	3.8	4.7	2.7	0.69	2.22 <=	6.44	Pass
Window 42	5.1	6.0	2.5	0.68	2.89 <=	6.27	Pass
Window 43	5.1	6.0	2.5	0.68	2.89 <=	6.27	Pass
Window 44	5.1	6.0	2.5	0.68	2.89 <=	6.27	Pass
Window 45	5.1	6.0	2.5	0.68	2.89 <=	6.27	Pass
Window 46	5.9	5.1	2.5	0.68	3.52 <=	6.27	Pass
Window 47	4.8	6.6	2.5	0.66	2.65 <=	5.93	Pass
Window 48	4.8	6.6	2.5	0.66	2.65 <=	5.93	Pass
Window 49	6.6	4.8	2.5	0.66	4.02 <=	5.93	Pass
Window 50	6.6	4.8	2.5	0.66	4.02 <=	5.93	Pass
Window 51	4.8	2.3	2.5	0.71	4.01 <=	6.9	Pass
Window 52	4.8	2.3	2.5	0.71	4.01 <=	6.9	Pass
Window 53	4.8	3.6	2.5	0.7	3.25 <=	6.57	Pass
Window 54	4.8	3.6	2.5	0.7	3.25 <=	6.57	Pass
Window 55	4.8	3.6	2.5	0.7	3.25 <=	6.57	Pass
Window 56	4.3	4.6	2.5	0.69	2.65 <=	6.56	Pass
Window 57	4.3	4.6	2.5	0.69	2.65 <=	6.56	Pass
Window 58	4.3	4.6	2.5	0.69	2.65 <=	6.56	Pass
Proposed First Floor							
Window 59	5.7	3.6	2.5	0.7	3.86 <=	6.71	Pass
Window 60	5.7	3.6	2.5	0.7	3.86 <=	6.71	Pass
Window 61	5.6	2.9	2.5	0.71	4.17 <=	6.82	Pass
Window 62	5.6	2.9	2.5	0.71	4.17 <=	6.82	Pass
Window 63	4.4	6.9	2.5	0.67	2.4 <=	6.09	Pass
Window 64	4.4	6.9	2.5	0.67	2.4 <=	6.09	Pass
Window 65	4.4	6.9	2.5	0.67	2.4 <=	6.09	Pass

Appendix 2 - Room Depth Calculation
Green Lane, Northwood HA6 2UY

Room	Room Depth Coefficients				Room Depth Calculation		Result
	L	W	H	Rb	LW + LH	2/L-Rb	
Window 66	7.6	3.8	2.5	0.69	5.04 <=	6.53	Pass
Window 67	7.4	3.6	2.5	0.71	5.02 <=	6.81	Pass
Window 68	7.4	3.6	2.5	0.71	5.02 <=	6.81	Pass
Window 69	4.9	6.9	2.5	0.67	2.67 <=	6.06	Pass
Window 70	4.9	6.9	2.5	0.67	2.67 <=	6.06	Pass
Window 71	4.9	6.9	2.5	0.67	2.67 <=	6.06	Pass
Window 72	5.8	3.1	2.5	0.68	4.19 <=	6.26	Pass
Window 73	6.7	6.5	2.5	0.69	3.71 <=	6.42	Pass
Window 78	4.2	5.1	2.5	0.7	2.5 <=	6.68	Pass
Window 79	5.1	5.9	2.5	0.7	2.9 <=	6.68	Pass
Window 80	5.1	5.9	2.5	0.7	2.9 <=	6.68	Pass
Window 81	3.8	5.5	2.5	0.7	2.21 <=	6.71	Pass
Window 82	3.8	5.5	2.5	0.7	2.21 <=	6.71	Pass
Window 83	3.8	5.5	2.5	0.7	2.21 <=	6.71	Pass
Window 84	2.9	5.3	2.5	0.71	1.71 <=	6.82	Pass
Window 85	2.9	5.3	2.5	0.71	1.71 <=	6.82	Pass
Window 86	5.1	5.9	2.0	0.71	3.41 <=	6.86	Pass
Window 89	5.2	6.6	1.8	0.68	3.68 <=	6.19	Pass
Window 90	6.6	5.2	2.5	0.68	3.91 <=	6.19	Pass
Window 91	6.6	5.2	2.5	0.68	3.91 <=	6.19	Pass
Window 92	4.8	5.8	2.5	0.7	2.75 <=	6.7	Pass
Window 93	4.8	5.8	2.5	0.7	2.75 <=	6.7	Pass
Window 94	4.8	5.8	2.5	0.7	2.75 <=	6.7	Pass
Proposed Second Floor							
Window 95	5.6	6.9	2.7	0.71	2.89 <=	6.84	Pass
Window 96	6.6	3.6	2.7	0.71	4.28 <=	6.87	Pass
Window 98	5.7	7.9	2.7	0.69	2.83 <=	6.54	Pass
Window 100	6.5	3.5	2.7	0.71	4.26 <=	6.88	Pass
Window 101	6.4	7.8	2.7	0.68	3.19 <=	6.23	Pass
Window 107	5.7	5.1	2.7	0.7	3.23 <=	6.66	Pass
Window 109	7.4	8.7	2.7	0.67	3.59 <=	6.0	Pass
Window 110	7.4	8.7	2.7	0.67	3.59 <=	6.0	Pass
Window 111	8.7	7.4	2.5	0.67	4.66 <=	6.0	Pass

Appendix 2 - Sunlight to Windows
Green Lane, Northwood HA6 2UY

Reference	Use Class	Annual Probable Sunlight Hours	
		Total	Winter
<u>Proposed Basement Floor</u>			
Window 6	Sitting Room	0%	0%
Window 7	Sitting Room	3%	0%
Window 8	Sitting Room	0%	0%
Window 11	Sitting Room	0%	0%
Window 12	Sitting Room	3%	0%
Window 13	Sitting Room	0%	0%
<u>Proposed Ground Floor</u>			
Window 20	Sitting Room	0%	0%
Window 21	Sitting Room	4%	0%
Window 22	Sitting Room	0%	0%
Window 26	Sitting Room	0%	0%
Window 27	Sitting Room	4%	0%
Window 28	Sitting Room	0%	0%
Window 33	Sitting Room	0%	0%
Window 34	Sitting Room	24%	2%
Window 35	Sitting Room	24%	2%
Window 47	Sitting Room	79%	27%
Window 48	Sitting Room	50%	20%
Window 49	Sitting Room	28%	6%
<u>Proposed First Floor</u>			
Window 63	Sitting Room	0%	0%
Window 64	Sitting Room	3%	0%
Window 65	Sitting Room	0%	0%
Window 69	Sitting Room	0%	0%
Window 70	Sitting Room	3%	0%
Window 71	Sitting Room	0%	0%
Window 73	Sitting Room	3%	0%
Window 74	Sitting Room	57%	11%
Window 75	Sitting Room	56%	10%
<u>Proposed Second Floor</u>			
Window 101	Sitting Room	5%	0%

Appendix 2 - Sunlight to Windows
Green Lane, Northwood HA6 2UY

Reference	Use Class	Annual Probable Sunlight Hours	
		Total	Winter
Window 102	Sitting Room	60%	14%
Window 103	Sitting Room	59%	13%
Window 108	Sitting Room	60%	14%
Window 109	Sitting Room	35%	8%
Window 110	Sitting Room	36%	8%
Window 111	Sitting Room	78%	28%
Window 112	Sitting Room	66%	18%
Window 113	Sitting Room	66%	18%

APPENDIX 3

NO SKY LINE CONTOURS

Appendix 3 No Sky Line Contours

Proposed Basement floor at Green Lane Northwood



Key:

1

Window reference

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

Area does receive direct sky light.

Light aperture.

Project Name: Green Lane, Northwood HA6 2UY

Drawing Title: No Sky Line Contours

Scale: Do not scale

Drawing No: 1 of 4

Rev

Date

Details of revision

Rev

Date

Details of revision

Rev

Date

Details of revision



Burley House
15 - 17 High Street
Rayleigh
Essex SS6 7EW

Tel. 0800 197 4836

enquiries@right-of-light.co.uk
www.right-of-light-consulting.com

Appendix 3 No Sky Line Contours

Proposed Ground floor at Green Lane Northwood

Key:

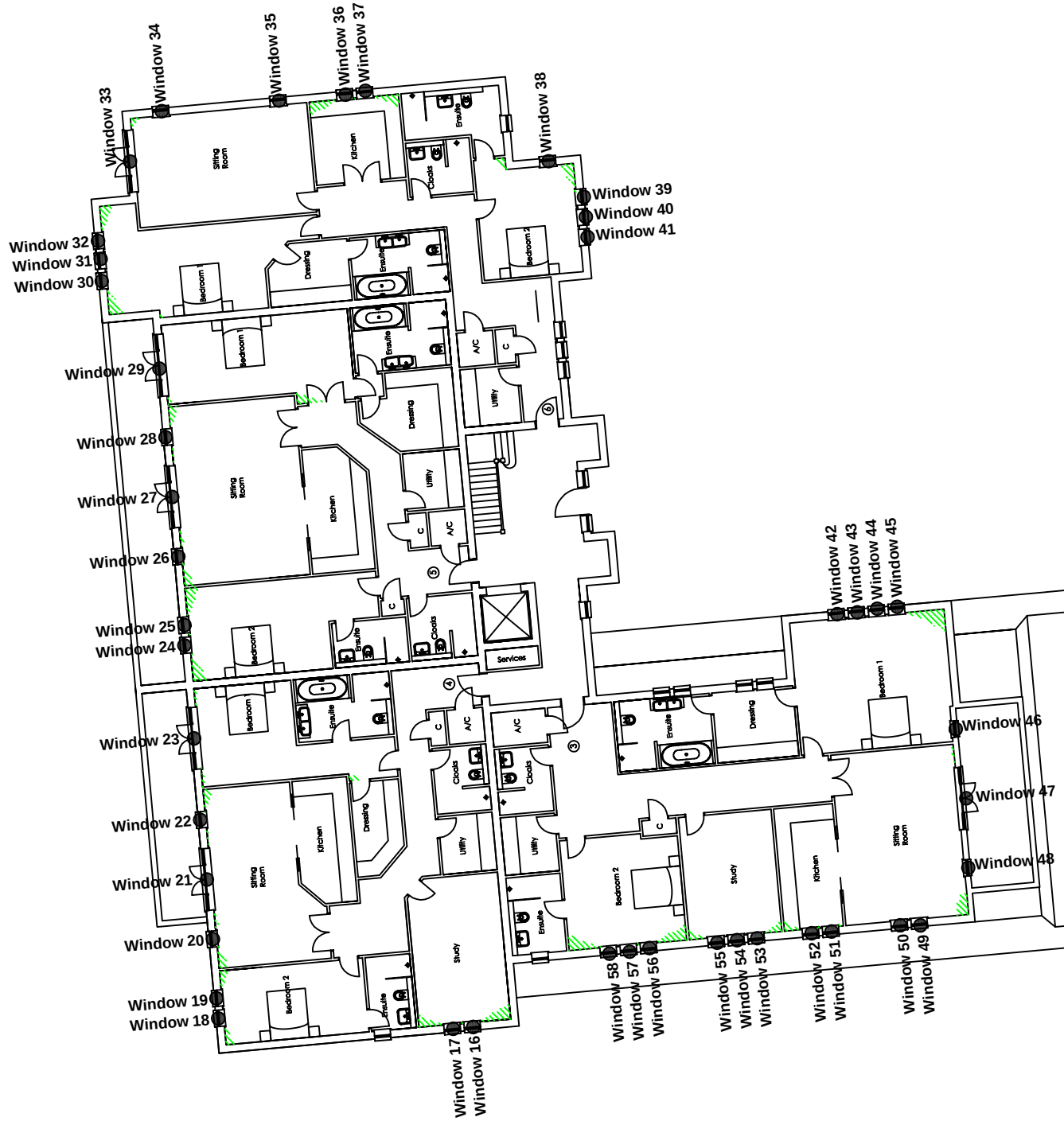
1

Window reference

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

Area does receive direct sky light.

Light aperture.



Project Name: Green Lane, Northwood HA6 2UY

Drawing Title: No Sky Line Contours

Scale: Do not scale

Drawing No: 2 of 4

Rev: Date

Details of revision

Rev. -



Burley House
15 - 17 High Street
Rayleigh
Essex SS6 7EW
Tel. 0800 197 4836

enquiries@right-of-light.co.uk
www.right-of-light-consulting.com

Appendix 3 No Sky Line Contours

Proposed First floor at Green Lane Northwood

Key:

1

Window reference

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

Area does receive direct sky light.

Light aperture.

Project Name: Green Lane, Northwood HA6 2UY

Drawing Title: No Sky Line Contours

Scale: Do not scale

Drawing No: 3 of 4

Rev

Date

Details of revision

Rev

Date

Details of revision

Rev

Date

Details of revision



Burley House
15 - 17 High Street
Rayleigh
Essex SS6 7EW

Tel. 0800 197 4836

enquiries@right-of-light.co.uk
www.right-of-light-consulting.com



Proposed Second floor at Green Lane Northwood

Light aperture.

enquiries@right-of-light.co.uk
www.right-of-light-consulting.com