

Internal Daylight  
Analysis  
Planning application  
Report

26

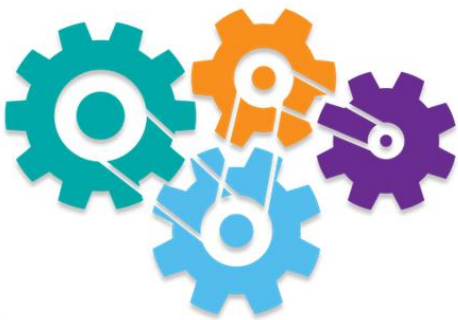
Lyndhurst  
Road,  
London  
NW3

---

March 2015

---

Ref: 15-1396



- 1. EXECUTIVE SUMMARY ..... 5
- 2. INTRODUCTION ..... 5
- 3. PLANNING POLICY ..... 6
- 4. GUIDANCE DOCUMENT..... 6
  - 4.1. Building Research Establishment (BRE) report (BRE 209): "Site layout planning for daylight and sunlight: A guide to good practice" Second Edition (2011) ..... 6
- 5. ASSESSMENT METHODOLOGY..... 7
  - 5.1. General ..... 7
  - 5.2. BRE Digest 209: "Site layout planning for daylight and sunlight" ..... 8
    - 5.2.1. Average Daylight Factor (ADF)..... 8
    - 5.2.2. No-Sky Line (NSL)..... 9
- 6. BRE DIGEST 209 AND BREEAM 2011 NEW CONSTRUCTION: SIGNIFICANT CRITERIA ..... 10
  - 6.1. Average Daylight Factor and No-Sky Line..... 10
  - 6.2. Criteria for Average Daylight Factor and No-Sky Line ..... 10
    - Table 1: Criteria for assessing ADF and NSL ..... 10
- 7. ASSESSMENT ..... 11
  - 7.1. BS 8206-2: 1992 ..... 11
  - 7.2. Average Daylight Factor and No-Sky Line..... 11
- 8. CONCLUSION ..... 12
  - 8.1. Average Daylight Factor ..... 12
  - 8.2. No-Sky Line ..... 12
- 9. APPENDIX..... 13
  - 9.1. Site plan and location ..... 13
    - 9.1.1. Proposed site layout ..... 13
  - 9.2. ADF and No-Sky Line results..... 15



### Quality Standards Control

The signatories below verify that this document has been prepared in accordance with our quality control requirements. These procedures do not affect the content and views expressed by the originator.

This document must only be treated as a draft unless it has been signed by the originators and approved by a director.

DATE	PRODUCED BY	APPROVED BY
27.03.2015	DC	AWK



<i>Revision</i>	
Date	
Prepared by	
Checked by	
Authorised by	

## Limitations

Syntegra Consulting Ltd (“SC”) has prepared this report for the sole use of **John Fitzpatrick (“Client”)** in accordance with the agreement under which our services were performed. No other warranty, expressed or implied, is made as to the professional advice included in this report or any other services provided by SC.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by SC has not been independently verified by SC, unless otherwise stated in the report.

The methodology adopted and the sources of information used by SC in providing its services are outlined in this report. The work described in this report was undertaken in **March 2015** and is based on the conditions encountered and the information available during the said period of time. The scope of this report and the services are accordingly factually limited by these circumstances.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

SC disclaim any undertaking or obligation to advise any person of any change in any matter affecting the report, which may come or be brought to SC’s attention after the date of the report.

Certain statements made in the report that are not historical facts may constitute estimates, projections or other forward-looking statements and even though they are based on reasonable assumptions as of the date of the report, such forward-looking statements by their nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. SC specifically does not guarantee or warrant any estimate or projections contained in this report.

Costs may vary outside the ranges quoted. Whilst cost estimates are provided for individual issues in this report these are based upon information at the time which can be incomplete. Cost estimates for such issues may therefore vary from those provided. Where costs are supplied, these estimates should be considered in aggregate only. No reliance should be made in relation to any division of aggregate costs, including in relation to any issue, site or other subdivision.

No allowance has been made for changes in prices or exchange rates or changes in any other conditions which may result in price fluctuations in the future. Where assessments of works or costs necessary to achieve compliance have been made, these are based upon measures which, in SC’s experience, could normally be negotiated with the relevant authorities under present legislation and enforcement practice, assuming a proactive and reasonable approach by site management.

Forecast cost estimates do not include such costs associated with any negotiations, appeals or other non-technical actions associated with the agreement on measures to meet the requirements of the authorities, nor are potential business loss and interruption costs considered that may be incurred as part of any technical measures.

## Copyright

© This report is the copyright of SC. Any unauthorised reproduction or usage by any person other than the addressee is strictly prohibited.

## 1. Executive summary

This report demonstrates that adequate levels of internal daylight are met on 100% of the habitable rooms.

The No-Sky Line (NSL) criteria is met on 75% of the habitable rooms.

1 out of 4 rooms (Room 04) achieves a NSL below the 80%, but the value is above the 60% and with acceptable level of average daylight factor (ADF), therefore the room can be still be considered well day lit.

↪ **On balance it can be concluded that the proposed design is acceptable.**

## 2. Introduction

This report has been prepared to support the planning application for the proposed refurbishment at 26 Lyndhurst Road, London, NW3.

The proposed refurbishment seeks to extend the building on the lower ground floor by way of two flats.

The report assesses the internal daylight within the habitable rooms of the proposed development focusing only on the kitchen/dining/living rooms and on the bedrooms located on the lower ground floor.

The assessment is undertaken in accordance with "**BRE 209 Digest: Site Layout Planning For Daylight and Sunlight – A Guide to Good Practice**". This document states that it is also intended to be used in conjunction with the interior daylight recommendations found within the British Standard BS8206-2:2008 and The Application Manual on Window Design of the Chartered Institution of Building Services Engineers (CIBSE).

The study has been undertaken by constructing a 3D IES model of the proposed site and surrounding buildings in order to analyse the internal daylight in the rooms. The assessment is based on the 2D AutoCAD drawings (site plan, floor plans, sections and elevations) available at the time.

### 3. Planning policy

Where the proposed development has the potential to negatively impact the existing levels of daylight or sunlight on neighbouring properties, a daylight and sunlight assessment has to accompany the planning application.

The daylight and sunlight assessment includes the necessary information to meet the criteria outlined in the Site layout planning for daylight and sunlight: a guide to good practice published by the Building Research Establishment (BRE).

### 4. Guidance document

#### 4.1. Building Research Establishment (BRE) report (BRE 209): "Site layout planning for daylight and sunlight: A guide to good practice" Second Edition (2011)

The Second Edition of the report replaces the 1991 document of the same name and came into effect from October 2011.

It is important to note that the introduction to the report stresses that the document is provided for guidance purposes only and it is not intended to be interpreted as a strict and rigid set of rules. It also recommends that it may be appropriate to adopt a flexible approach and alternative target values in dealing with "special circumstances" for example "in a historic city centre, or in an area with modern high-rise buildings, a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings". This is amplified by the following extracts from the introduction (p1, para. 6) and Section 2.2:

*"The advice given here is not mandatory and this document should not be seen 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 many factors in site layout design". (p1, para. 1.6)*

*"In special circumstances the Developer or Planning Authority may wish to use different target values". (p1, para. 1.6)*

*"Note that numerical values given here are purely advisory. Different criteria may be used, based upon the requirements for daylight in an area viewed against other site layout constraints. Another important issue is whether the existing building is itself a good neighbour, standing a reasonable distance from the boundary and taking no more than its fair share of light". (p7 para. 2.2.3)*

The examples given in the report can be applied to any part of the country: suburban, urban and rural areas. The inflexible application of the target values given in the report may make reaching the BRE criteria difficult in a tight, urban environment where there is unlikely to be the same expectation of daylight and sunlight amenity as in a suburban or rural environment.

## 5. Assessment methodology

### 5.1. General

This report analyses the levels of internal daylight within each following rooms:

- **Lower Ground floor:**
  - R01 - KDL - Lower Ground Floor - Flat 1
  - R02 - Bedroom - Lower Ground Floor - Flat 1
  - R03 - KDL - Lower Ground Floor - Flat 2
  - R04 - Bedroom - Lower Ground Floor - Flat 2

Specifically, it takes into consideration the Average Daylight Factor (ADF) in kitchens, dining/living rooms considered as open plans and in the bedrooms.

4 target rooms (R1 and R4) as shown in section 9.1 in Appendix, have been identified on the proposed drawing following guidance within the BRE guidelines "*Site layout planning for daylight and sunlight*" and *BREEAM Domestic Refurbishment*.

The IES Virtual Environment modelling software utilised for the compilation of this report has been accredited by CIBSE and acknowledged by the BRE as a suitable software tool for undertaking internal daylight assessments in accordance with the BRE Good Practice guidelines. The specific IES software modules utilised for this assessment are the following:

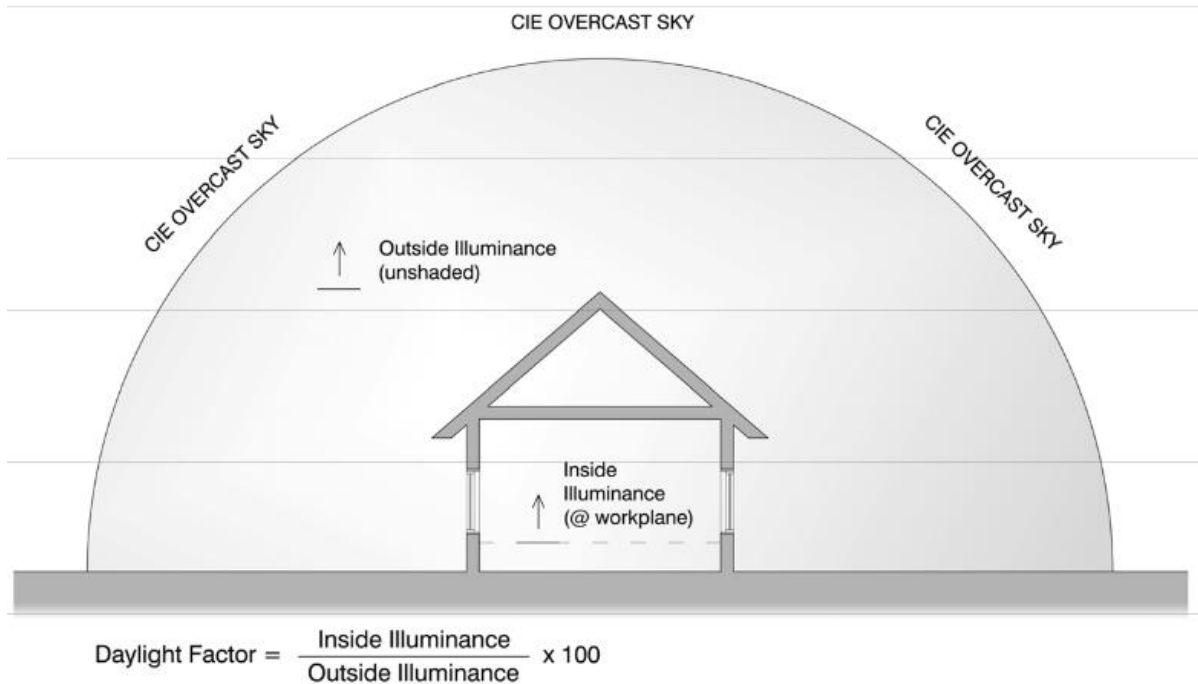
- ModellIT: enables you to create a 3D "Virtual Environment" model without CAD data, or alternatively allows you to create a 3D model from 2D CAD data. Interfaces with AutoCAD and Google Sketchup.
- FlucDL: allows to calculate point by point illuminance and daylight factors on any surfaces in the model or on specified workplanes (e.g. the height of a desk).

## 5.2. BRE Digest 209: "Site layout planning for daylight and sunlight"

This section provides a brief description of the calculating methods for the daylight, sunlight and overshadowing to gardens and open spaces criteria presented in BRE Digest 209.

### 5.2.1. Average Daylight Factor (ADF)

The Average Daylight Factor (ADF) is the average indoor illuminance (from daylight) on the working plane within a room, expressed as a percentage of the simultaneous outdoor illuminance on a horizontal plane under an unobstructed CIE "standard overcast sky".



The BRE guidelines "Site layout planning for daylight and sunlight" incorporate two main methods of calculating daylight: the Vertical Sky Component (VSC) method and the Average Daylight Factor (ADF) method.

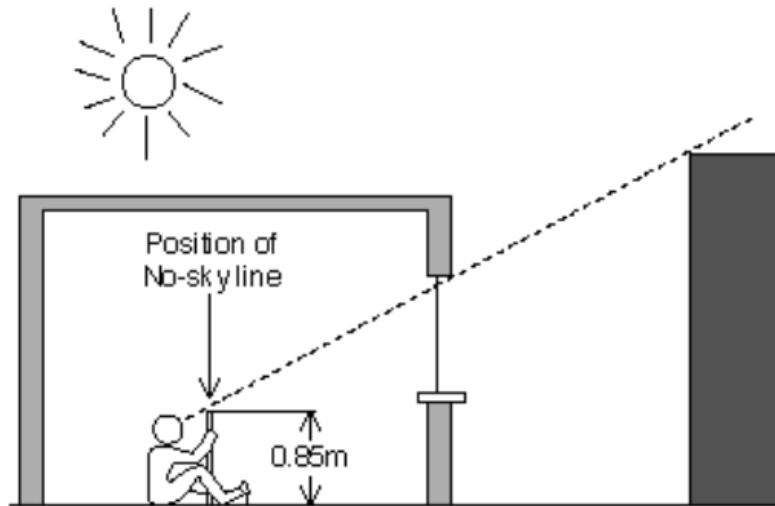
The ADF method of assessment takes into account the total glazed area to the room, the transmittance quality of the glazing proposed, the total area of the room surfaces including ceilings and floors, and the internal average reflectance for the room being assessed. The method also takes into account the Vertical Sky Component and the quantum of reflected light off external surfaces.

In this assessment, the ADF method is selected and more details on the numerical criteria for the VSC method are presented in section 9.6.



### 5.2.2. No-Sky Line (NSL)

This method of assessment is a simple test to establish where within the proposed room the sky will be visible through the windows, taking into account external obstructions. The assessment is undertaken at working plane height (850mm above floor level) and the method of calculation is set out in Appendix D of the BRE handbook.



Appendix C of the BRE handbook states “if a significant area of the working plane lies beyond the no skyline (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.” To guarantee a satisfactory daylight uniformity, this area is more precisely quantified in the BS 8206 Part2 2008 as 20%.

More details on the numerical criteria for the NSL method are presented in section 9.6.

## 6. BRE Digest 209 and BREEAM 2011 New Construction: Significant criteria

### 6.1. Average Daylight Factor and No-Sky Line

The daylight criteria given within the BRE guidelines have been used as a basis to assess the internal daylight:

"If a predominantly day lit appearance is required, then ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. There are additional recommendations for dwellings, of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms. These last are minimum values of Average Daylight Factor, and should be obtained even if a predominantly day lit appearance is not required".

The Code for Sustainable Homes: technical guide (Nov 2010) recommends that kitchens must achieve a minimum Average Daylight Factor (ADF) of at least 2%, all living rooms, dining rooms and studies (including any room designated as a home office under Ene 9 – Home Office) must achieve a minimum Average Daylight Factor of at least 1.5% and 80% of the working plane in each kitchen, living room, dining room, and study (including any room designated as a home office under Ene 9 – Home Office) must receive direct light from the sky.

### 6.2. Criteria for Average Daylight Factor and No-Sky Line

The table 1 is a summary of the criteria to assess the ADF and NSL.

Room function	Criteria
Kitchen	ADF > 2.0%
Living/Dining room	ADF > 1.5%
Bedroom	ADF > 1.0%
No-Sky Line: % of working plane in each rooms	≥ 80%

*Table 1: Criteria for assessing ADF and NSL*

## 7. Assessment

### 7.1. BS 8206-2: 1992

The foreword to BS 8206-2: 1992 states that:

*“The aim of the standard is to give guidance to architects, builders and others who carry out lighting design. It is recognised that lighting is only one of many matters that influence fenestration. These include other aspects of environmental performance (such as noise, thermal equilibrium and the control of energy use), fire hazards, constructional requirements, the external appearance and the surroundings of the site. The best design for a building does not necessarily incorporate the ideal solution for any individual function. For this reason, careful judgement should be exercised when using the criteria given in the standards for other purposes, particularly town planning control.”*

### 7.2. Average Daylight Factor and No-Sky Line

The daylight results are presented in section 9.6 in Appendix.  
(K = kitchen, L = Living, D = Dining, B = Bedroom)

**A summary of results is displayed in the table 1 below:**

(K=Kitchen, D=Dining, L=Living, BST=Bedroom/study room)

Internal daylight assessment					
Room	Room function	ADF (criteria)	ADF (result)	NSL	Result
R01 - KDL - Lower Ground Floor - Flat 1	R1 - KDL	2.0%	2.5%	84%	PASS
R02 - Bedroom - Lower Ground Floor - Flat 1	R2 - BST	1.0%	3.0%	99%	PASS
R03 - KDL - Lower Ground Floor - Flat 2	R3 - KDL	2.0%	3.4%	100%	PASS
R04 - Bedroom - Lower Ground Floor - Flat 2	R4 - BST	1.0%	1.0%	71%	PASS

*Table 1: Internal daylight results*

As it can be seen in the table above, all the habitable rooms achieve the relevant ADF criteria.

✓ However 1 out of 4 rooms failed to meet the NSL criteria.

→ As the kitchens/living/dining rooms are "open plan" they are considered as one room therefore the minimum criteria of 2.0% (kitchen) would need to be achieved.

It should be noted that the values provided in the BRE 209 are for guidance purposes only.

## 8. Conclusion

### 8.1. Average Daylight Factor

This report demonstrates that adequate levels of internal daylight are met on 100% of the habitable rooms.

### 8.2. No-Sky Line

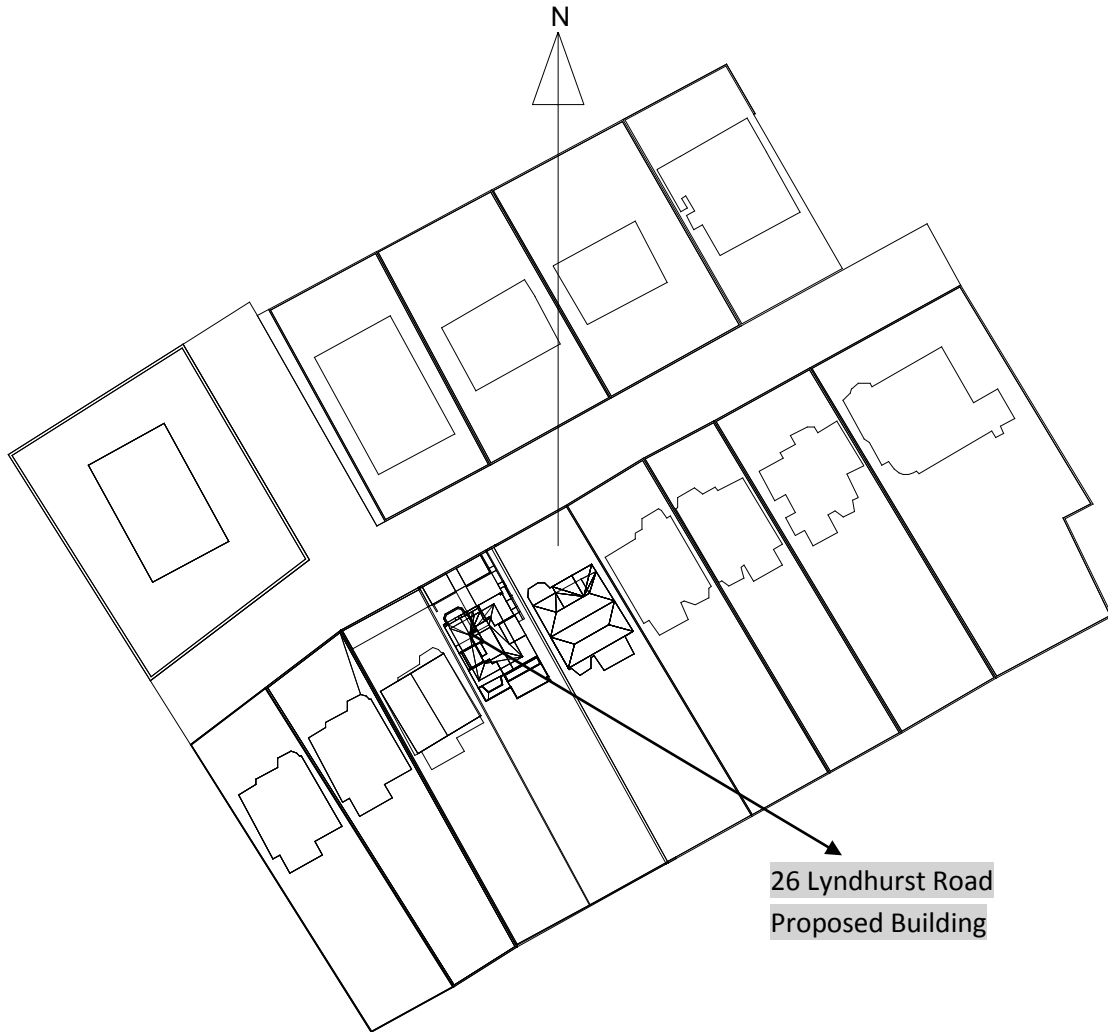
This report demonstrates that the No-Sky Line (NSL) criteria is met on 75% of the habitable rooms. The room 04 achieves a NSL below the 80%, but the value is above the 60% and with acceptable level of average daylight factor (ADF), therefore the room can be still be considered well day lit.

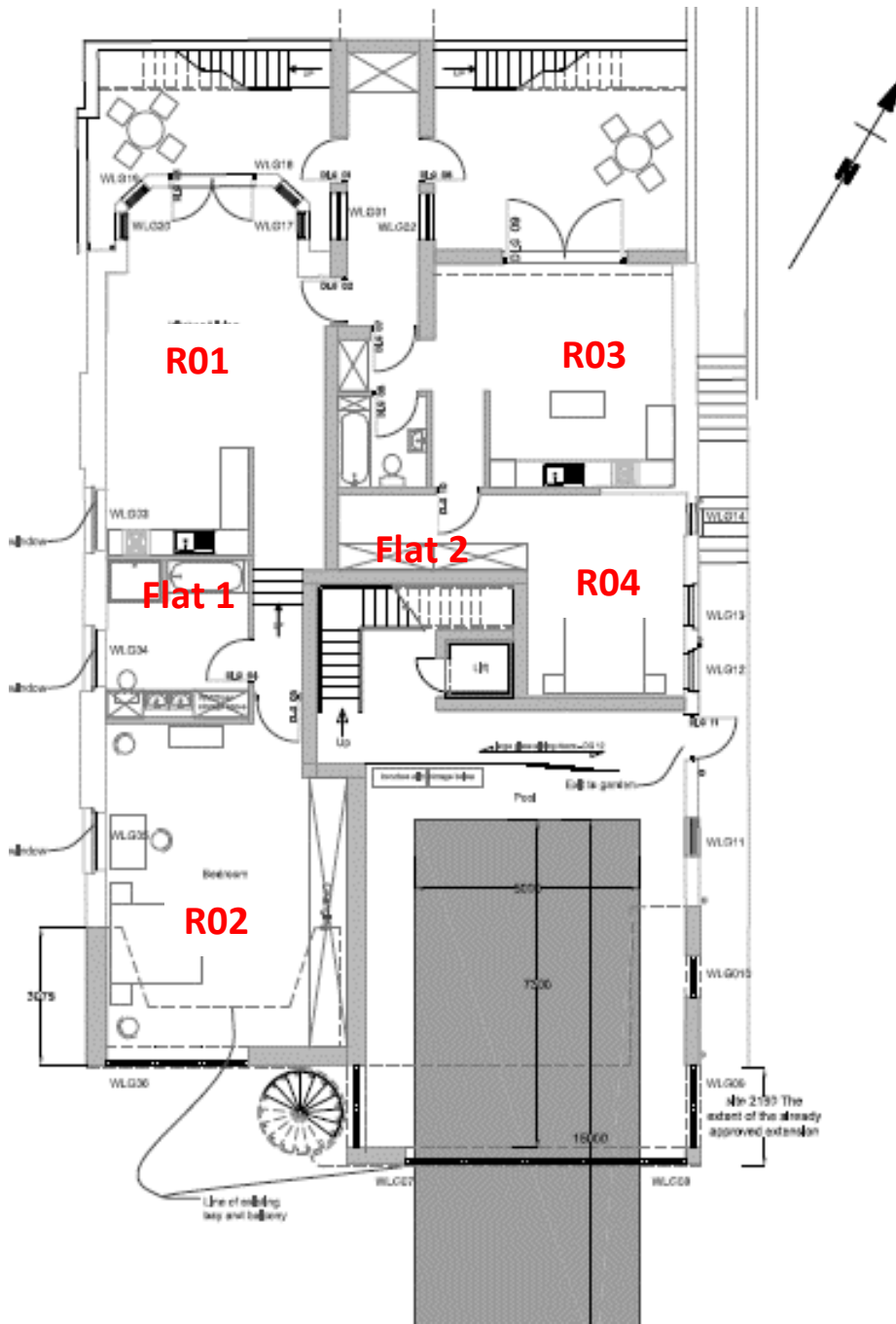
⇒ **On balance it can be concluded that the proposed design is acceptable.**

## 9. Appendix

### 9.1. Site plan and location

#### 9.1.1. Proposed site layout



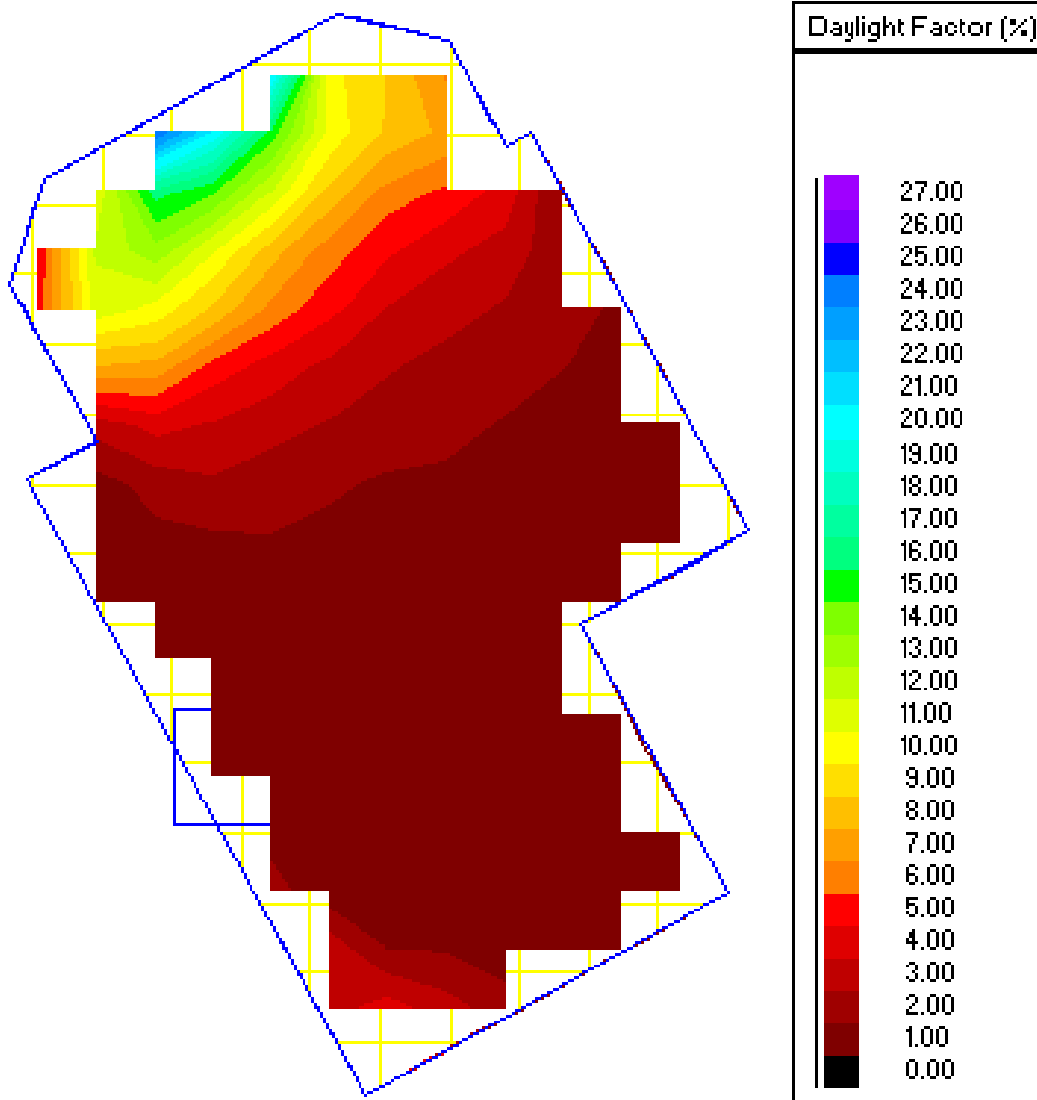


**Proposed Lower Ground Floor**

<b>Location</b>	<b>26 Lyndhurst Road, London, NW3</b>
<b>Latitude (°)</b>	51.55N
<b>Longitude (°)</b>	0.17 W

**9.2. ADF and No-Sky Line results**

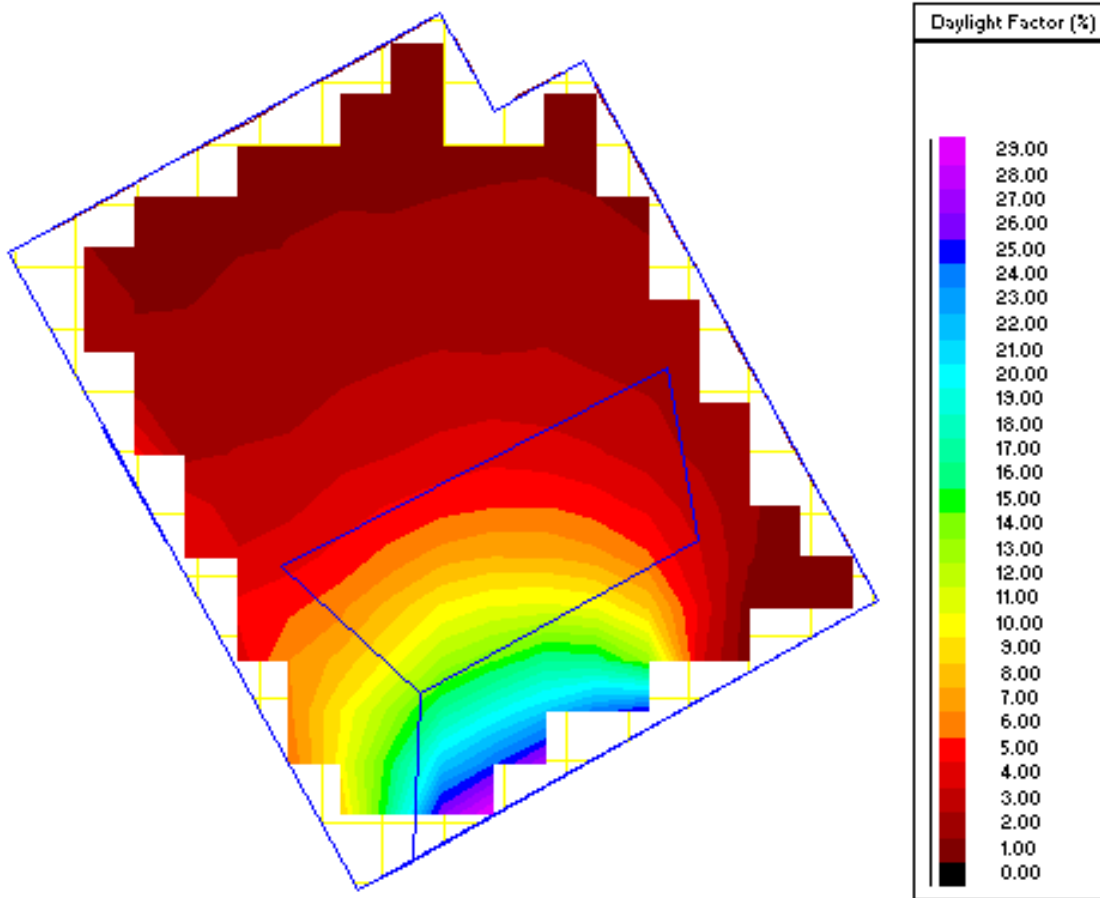
R01 - KDL - Lower Ground Floor - Flat 1



Summary results for working planes and floor

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=36.361m <sup>2</sup> Margin=0.00 m	Daylight factor	0.0 %	2.5 %	27.1 %	0.00	0.00
	Daylight illuminance	0.43 lux	306.87 lux	3313.36 lux	0.00	0.00
	Sky view	0.00	0.84	1.00	0.00	0.00

R02 - Bedroom - Lower Ground Floor - Flat 1

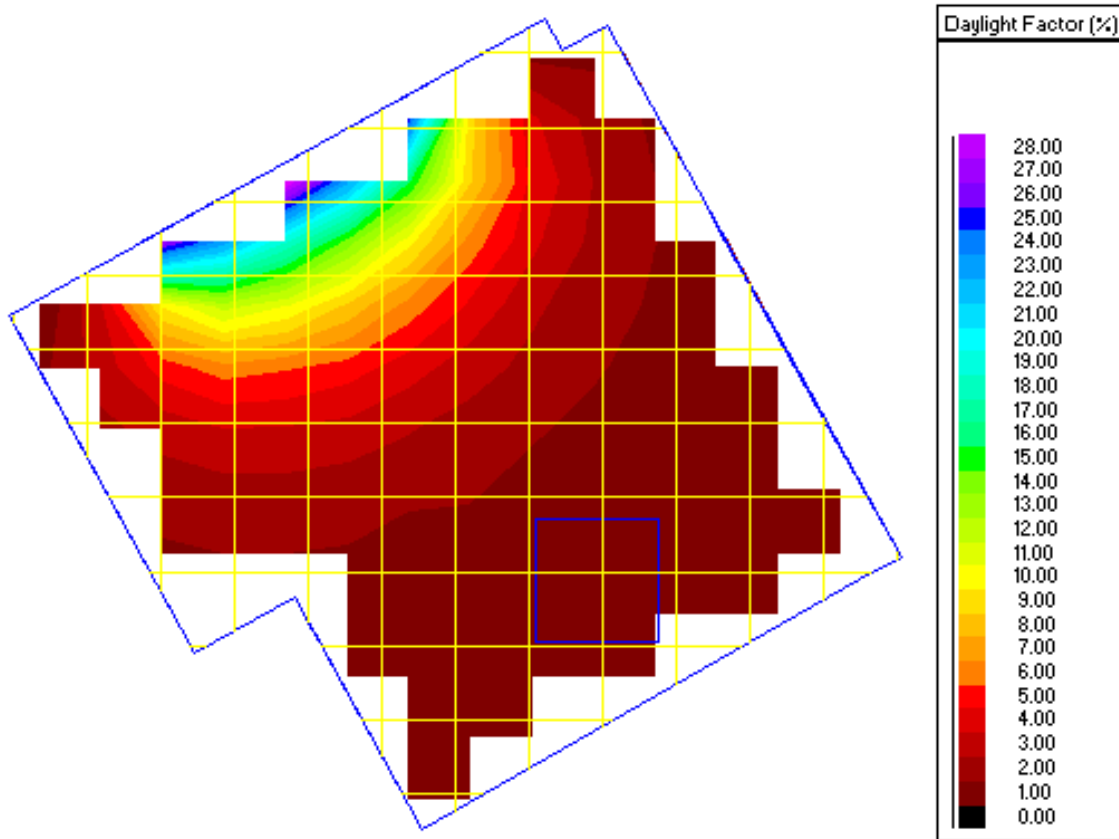


Summary results for working planes and floor

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=28.278m <sup>2</sup> Margin=0.50 m	Daylight factor	0.2 %	3.0 %	21.5 %	0.07	0.01
	Daylight illuminance	25.67 lux	370.24 lux	2629.44 lux	0.07	0.01
	Sky view	0.00	0.99	1.00	0.00	0.00



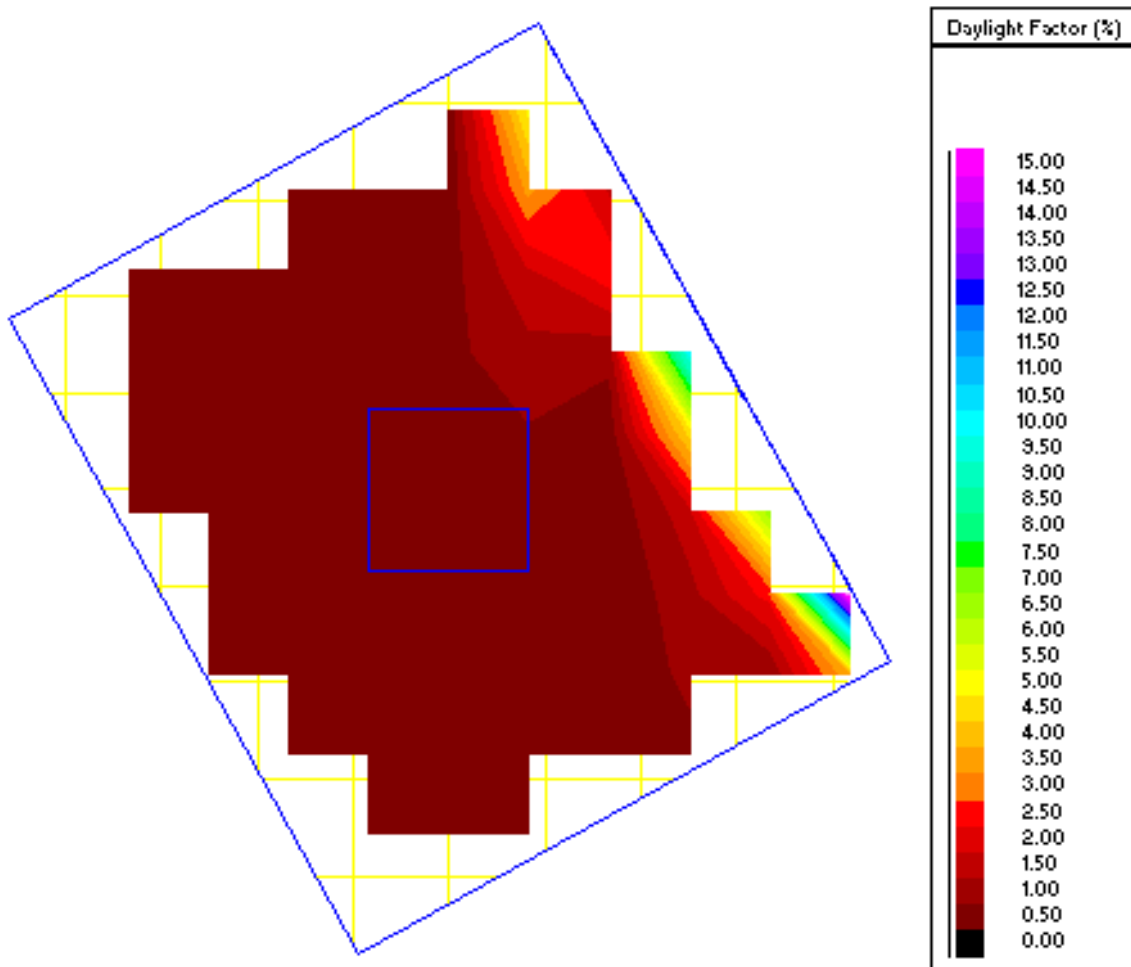
R03 - KDL - Lower Ground Floor - Flat 2



Summary results for working planes and floor

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=26.245m <sup>2</sup> Margin=0.00 m	Daylight factor	0.1 %	3.4 %	28.8 %	0.02	0.00
	Daylight illuminance	8.39 lux	411.71 lux	3518.45 lux	0.02	0.00
	Sky view	1.00	1.00	1.00	1.00	1.00

R04 - Bedroom - Lower Ground Floor - Flat 2



Summary results for working planes and floor

Surface	Quantity	Values			Uniformity (Min./Ave.)	Diversity (Min./Max.)
		Min.	Ave.	Max.		
Working plane 1 Reflectance=0% Transmittance=100% Grid size=0.50 m Area=17.108m <sup>2</sup> Margin=0.00 m	Daylight factor	0.0 %	1.0 %	15.3 %	0.00	0.00
	Daylight illuminance	0.19 lux	117.46 lux	1868.19 lux	0.00	0.00
	Sky view	0.00	0.71	1.00	0.00	0.00