Daylight Sunlight Assessment

Including internal daylight calculations

128-130 Grafton Road, Kentish Town, NW5 4BA

10 September 2018

Report Details

Report Title	Daylight/Sunlight Assessment
Project Address	128-130 Grafton Road, Kentish Town, NW5 4BA
Client	ETA BRIDGING LTD
Agent	M Andreeva
Agent's Address	Royal Arsenal Riverside, London, SE18 6PG
Client's Address	c/o
Description of the Proposal	Demolition of existing 2-storey industrial building (B8) at 128-130 Grafton Road; and erection of a 6-storey mixed-use building to comprise commercial office space (B1) in basement, and 5 x residential floors (C3) to comprise 8 x 2-bed and 1 x 3-bed self-contained apartments.

This report has been prepared in support of a full planning application at the above-detailed site for the proposed works described, with all reasonable skill, care and diligence, and taking account of the workforce and resources. Information reported herein is based on the interpretation of data collected and analysed to the best of our knowledge.

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1. INTRODUCTION

This statement is to be read in conjunction with the drawings and supporting documents submitted with the Application Ref. **2018/3059/P**.

M Andreeva has been instructed by ETA BRIDGING LTD to undertake a daylight/sunlight assessment for the redevelopment at 128-130 Grafton Road, situated within the London Borough of Camden.

This Daylight/Sunlight Assessment in support of a full planning application. The proposed works are for the demolition of existing two-storey industrial building, (B8 use) that is comprised of storage on the ground floor and office on the raised ground floor, at 128-130 Grafton Road, and the erection of a 5-storey (plus basement) mixed-use property comprised of office (B1) and residential (C3) of 8 x 2-bed and 1 x 3-bed (penthouse) self-contained flats.

A daylight/sunlight assessment has been carried out in accordance with The Building Research Establishment (BRE) report, “Site layout planning for daylight and sunlight” by PJ Littlefair. This report summarises an assessment of the impacts of the proposed development on the surrounding properties potential to receive daylight and sunlight. This report fully incorporates the changes in methodology as a consequence of the publication of the Second Edition of the BRE Report in 2011.

It should be noted that this assessment does not take into account Rights to Light. A Right to Light is a legal right which one property may acquire over another. If a building is erected which reduces the light available to the adjoining property below sufficient levels, Rights to Light may be infringed, which may attract compensation and/or an injunction to stop the development. However, Rights to Light should not be a material planning consideration, and therefore, this issue has not been assessed as part of this report. However, in most circumstances, if the development passes the tests contained within the BRE Report, Rights to Light should not be infringed.

2.1 National Policy

The Department for Communities and Local Government (DCLG) sets national planning policy. Their document 'The Planning System: General Principles (2005), published in conjunction with Planning Policy Statement 1: Delivering Sustainable Development, discusses the need to protect amenities in the public's interest, of which the need for daylight/sunlight could be considered one such amenity. However, the government does not have an adopted policy on daylight, sunlight and the effects of overshadowing, and does not have targets, criteria or relevant planning guidance, in the way it has for other environmental impacts such as noise, landscape or air quality.

However, the Building Research Establishment (BRE) report, *"Site layout planning for Daylight and Sunlight"* Second Edition 2011 by PJ Littlefair (referred to as the BRE Report) is almost universally used as the official method in the UK and Ireland for determining the minimum standards of daylight and sunlight and for assessing the impact of development on daylight and sunlight availability. Also, the *British Standard BS 8206:2008 Lighting for buildings – Part 2: Code of practice for daylighting* contains guidance on the minimum recommended levels of interior daylighting and introduces some of the calculation procedures used in the BRE Report.

2.2 The BRE Report

As this report is assessing the impact of new development on an existing site, the BRE Report is an appropriate guidance to use to evaluate daylight and sunlight. The BRE Report contains guidance on how to design developments while minimising the impacts on existing buildings from overshadowing and reduced levels of daylight and sunlight. As well as advice, the report contains a methodology to assess levels of daylight, sunlight and overshadowing and includes criteria to determine the potential impacts of new development on surrounding buildings. However, the report does state that the guidelines are not mandatory, but should be considered a guide to help rather than constrain the designer.

The BRE Report looks at three separate areas when considering the impacts on lighting:

- **Daylight** – i.e. the combined effects of all direct sunlight and indirect skylight during the daytime;
- **Sunlight** – i.e. the results of only the direct sunlight; and
- **Overshadowing of Gardens and Open Spaces.**

2.3 Daylight Assessment

The assessment of daylight is required for windows serving rooms in adjoining dwellings where daylight is required, including living rooms, kitchens and bedrooms. Windows to bathrooms, toilets, store rooms, circulation areas and garages need not be assessed. The guidelines also apply to any room that may have a reasonable expectation of daylight, including schools, hospitals, hotels and some offices. When assessing daylight, the numerical criteria must be viewed flexibly and should be considered against other site layout constraints. In addition, it is important to consider whether the existing building is itself a good neighbour, standing a reasonable distance from the boundary and not taking more than its fair share of light. The assessment takes on several specific stages:

1) The Distance Test: loss of light to windows need not be analysed if the distance from the existing window to the development is three of more times its height above the centre of the existing window;
2) The 25-degree Rule: loss of light to windows need not be analysed if the angle to the horizontal subtended by the new development from the centre of the existing window is less than 25 degrees;
3) Daylight Assessment: diffuse daylight of an existing may be adversely affected by a proposed development if either:

A. the Vertical Sky Component (VSC) measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value; or

B. the area of the working plane which can receive direct skylight is reduced to less than 0.8 times its former value.

It should be noted at determining the area of the working plane with can receive direct light from the sky (which is often referred to as the No-Sky Line or NSL) is seen as an additional assessment, rather than as an alternative to VSC. However, since plotting the NSL requires knowledge of the room geometry, which is not usually available during an impact assessment, it is not always possible to calculate the NSL accurately since the use of too many assumptions would make the results meaningless and unreliable.

Vertical Sky Component

Vertical sky component (VSC) is a 'spot' measure of the skylight reaching the mid-point of a window from an overcast sky. It represents the amount of visible sky that can be seen from that reference point, from over and around an obstruction in front of the window. That area of visible sky is expressed as a percentage of an unobstructed hemisphere of sky, and, therefore, represents the amount of daylight available for that particular window. As it is a 'spot' measurement taken on the outside face of the window, its shortcoming is that it takes no account of the size or number of the windows serving a room, or the size and layout of the room itself.

Determining a material impact

- For existing buildings, the Building Research Establishment (BRE) guideline is based on the loss of VSC at a point at the centre of a window, on the outer plane of the wall. The BRE guidelines state that if the VSC at the centre of a window is more than 27% (or if not, then it is more than 80% of its former value), then the diffuse daylighting of the existing building will not be adversely affected.
- It should, nevertheless, be noted that the 27% VSC target value is derived from a low density suburban housing model. The independent daylight and sunlight review states that in an inner city urban environment, VSC values in excess of 20% should be considered as reasonably good, and that VSC in the mid-teens should be acceptable. However, where the VSC value falls below 10% (so as to be in single figures), the availability of direct light from the sky will be poor.
- With respect to the reduction factor, it should also be noted that whilst BRE guidelines state that a 20% reduction is the threshold for a materially noticeable change, the independent daylight and sunlight review sets out that given the underdeveloped nature of the site relative to its context, this percentage reduction should be increased to 30%, with and upper threshold of 40%.

2.4 Sunlight Assessment

The assessment of sunlight is required for rooms in adjoining dwellings where sunlight is required. Generally, all main living rooms and conservatories should have access to direct sunlight. Kitchens and bedrooms are less important, although care should be taken not to block too much sun.
As with daylight, the numerical criteria for sunlight should be viewed flexibly and should be considered against other site layout constraints. It is important to understand that people like and appreciate sunlight and may resent the loss of sunlight, although is not an essential requirement of a dwelling, unlike daylight availability or access to a quiet noise environment. Therefore, larger reductions in sunlight may be acceptable, for example if new development is to match the height and proportion of existing buildings nearby.

The assessment of sunlight takes on several specific stages:

1. Facing South: loss of sunlight to windows only needs to be assessed if the window faces within 90° of due south;

2. The Distance Test: loss of sunlight to windows need not be analysed if the distance from the existing window to the development is three or more times its height above the centre of the existing window;

3. The 25-degree Rule: loss of sunlight to windows need not be analysed if the angle to the horizontal subtended by the new development from the centre of the existing window is less than 25 degrees;

4. Sunlight Assessment: direct sunlight of an existing windows may be adversely effected by a proposed development if at the centre of a window:

A. receives less than 25% of Annual Probable Sunlight Hours (APSH), or less than 5% APSH between 21st September and 21st March; and

B. receives less lean 0.8 times its former APSH during either period; and

C. has a reduction in sunlight over the whole year of greater than 4% APSH.

Annual Probable Sunlight Hours

Annual probable sunlight hours (APSH) is a measure of sunlight that a given window may expect over a year period. The BRE guidance recognises that sunlight is less important than daylight in the amenity of a room and is heavily influenced by orientation. North facing windows may receive sunlight on only a handful of occasions in a year, and windows facing eastwards or westwards will only receive sunlight for some of the day. Therefore, BRE guidance states that only windows with an orientation within 90 degrees of south need be assessed.

Determining a material impact

BRE guidance recommends that the APSH received at a given window in the proposed case should be at least 25% of the total available, including at least 5% in winter. Where the proposed values fall short of these, and the loss is greater than 4%, then the proposed values should not be less than 0.8 times their previous value in each period.

2.5 Internal Daylight Assessment

The BRE report contains guidance on how to design developments, whilst retaining good levels of daylight. As well as advice, the report contains a methodology to assess levels of daylight and contains criteria to determine whether a development is well day lit. However, the report does state that the guidelines are not mandatory, but should be considered a guide to help rather than constrain the designer.

The Average Daylight Factor (ADF) is a very common and easy to understand measure for expressing the daylight availability in a room. It describes the ratio of outside illuminance over inside illuminance, expressed as a percentage. The higher the ADF the more natural light is available in the room.

Rooms with an average DF of 2% give us a feeling of being day lit. However, it is only when the ADF rises above 5% that we perceive it as well day lit. Different types of rooms have different minimum requirements for daylighting.

Average Daylight Factor

Average daylight factor (ADF) is a measure of the adequacy of diffuse daylight within a room, and accounts for factors such as the size of a window in relation to the size of the room; the reflectance of the walls; and, the nature of the glazing and number of windows. Clearly a small room with a large window will be better illuminated by daylight than a large room with a small window, and the ADF measure accounts for this.
Determining a material impact

BRE guidelines confirm that the acceptable minimum ADF target value depends on the room use. That is 1% for a bedroom, 1.5% for a living room and 2% for a family kitchen. In cases where one room serves more than one purpose, the minimum ADF should be that for the room type with the higher value. Notwithstanding this, the independent daylight and sunlight review states that, in practice, the principal use of rooms designed as a 'living room/kitchen/dining room' is as a living room. Accordingly, it would be reasonable to apply a target of 1.5% to such rooms.

No-Sky Line

No-sky line (NSL) is a measure of the distribution of diffuse daylight within a room. The NSL simply follows the division between those parts of a room that can receive some direct skylight from those that cannot. If from a point in a room on the working plane (a plane 850mm above the floor) it is possible to see some sky then that point will lie inside the NSL contour. Conversely, if no sky is visible from that point then it would lie outside the contour.

Where large parts of the working plane lie beyond the NSL, the internal natural lighting conditions will be poor regardless of the VSC value, and where there is significant movement in the position of the NSL contour following a development, the impact on internal amenity can be significant.

3.1 Methodology

We have suggested the following methodology to assess the layouts proposed:

- Carry out a diffuse daylight calculation;
- Prepare a 3D computer model to understand and visualise sunlight for the neighbours;
- Carry out daylight sunlight assessment using the methodologies set out in by BRE and British Standard Guidelines for diffuse daylight and sunlight conditions.

For the daylight and sunlight assessment, a full-size 3D model of the existing area and proposed development, including existing buildings and neighbouring properties were constructed in Google SketchUp Pro 2017, geographically located at coordinates *528495 (Easting, x)* and *185040 (Northing, y)* via Google Earth using algorithms. Analysis of VSC was carried out using a DL-Light Daylight and Sunlight Modelling software plugin in SketchUp.

3.2 Daylight Assessment - Vertical Sky Component (VSC)

When undertaking a daylight assessment, the BRE Report suggests a VSC of 27% or more should be achieved if a room is to be adequately day-lit. It also suggests that when existing levels of daylight are below 27% VSC, a reduction of more than 20% from the existing level will be noticeable to the inhabitants, i.e. an impact will occur. The independent daylight and sunlight review states that in an **inner city urban environment, VSC values in excess of 20% should be considered as reasonably good, and that VSC in the mid-teens should be acceptable.**

Based on the plans of the site and the positions of the closest buildings, it is possible to calculate the vertical sky component for the proposed development (see *Figure 3.1* and *Figure 3.2*).

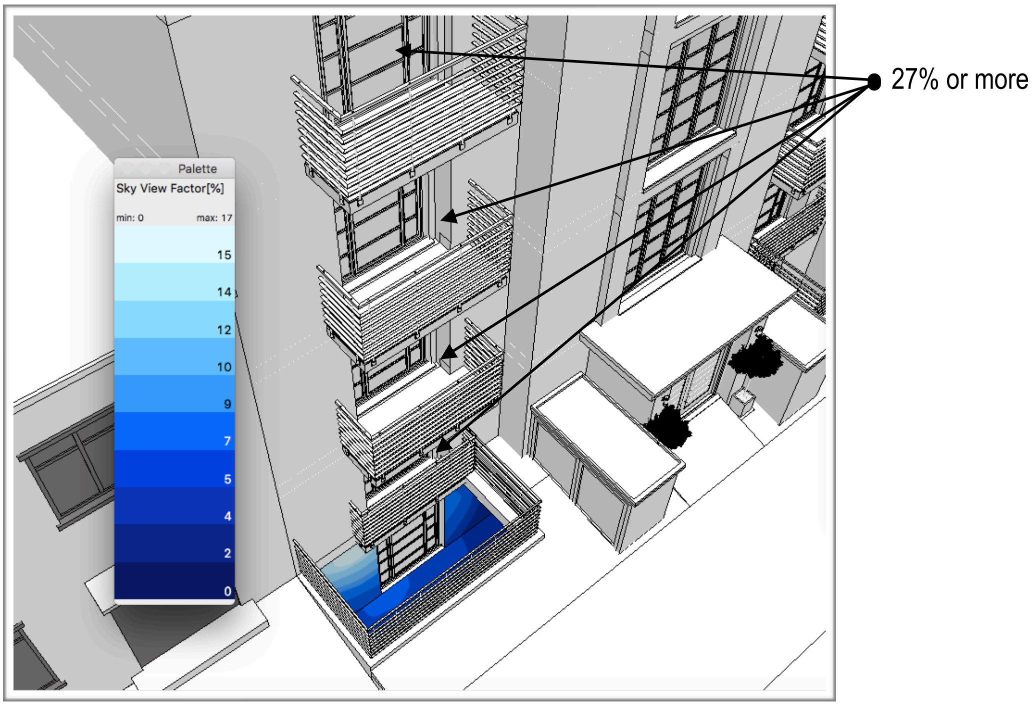


Figure 3.1 VSC, Front of proposed building facing south; assessed basement (Office, B1).

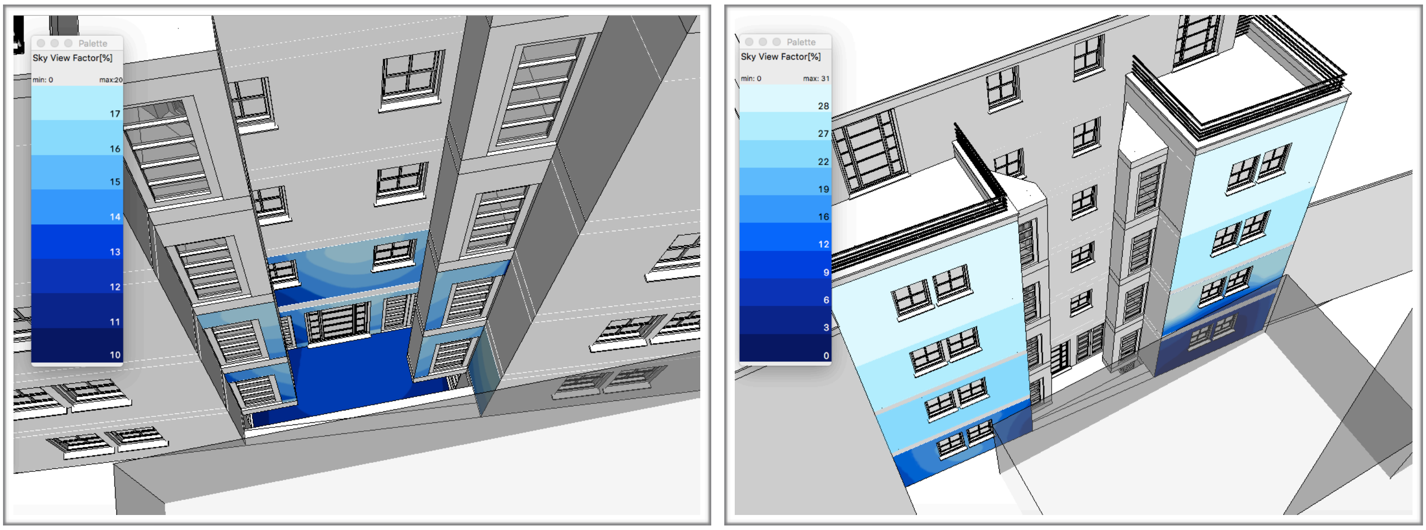


Figure 3.2 VSC, Rear of proposed building facing north.

The results drawn from the daylight/sunlight software analyses show that the VSC values should be acceptable on the basis that they either meet or exceed the recommended 27% or more. The VSC in areas of the building that are more concealed than others fall in the mid-teens, which should be acceptable in inner city urban environments. The assessed basement (Office B1) shows good levels of VSC. Whereas the upper floors can gain up to +-31% VSC, which is considered adequately day-lit.
The specific percentage of VSC for each habitable room is shown in **Table 4.2:** Daylight Factor Calculations further in the document.

Appendix A demonstrates the BREEAM Average Daylight Factor (ADF) assessed for the building using DL-Light Daylight and Sunlight Modelling software plugin in SketchUp.

3.3 Sunlight Assessment - Average Probable Sunlight Hours (APSH)

BRE guidance recommends that the APSH received at a given window in the proposed case should be at least 25% of the total available, including at least 5% in winter. Where the proposed values fall short of these, and the loss is greater than 4%, then the proposed values should not be less than 0.8 times their previous value in each period.

Note:

- North facing windows may receive sunlight on only a handful of occasions in a year, and windows facing eastwards or westwards will only receive sunlight for some of the day. Therefore, BRE guidance states that only windows with an orientation within 90 degrees of south need be assessed.

Since none of the windows under consideration at the rear of the proposed property face within 90° of due south, an assessment of sunlight is not necessary.

- The BRE Report states that sunlight is not an essential requirement of a dwelling, unlike daylight availability. Therefore, larger reductions in sunlight may be acceptable, for example if new development is to match the height and proportion of existing buildings nearby.

Figure 3.3 shows the amount of sun exposure (h/day) assessed for Summer and Winter for both south-facing and north-facing aspects of the building. Please note that all self-contained flats are dual-aspect.

FRONT OF BUILDING FACING SOUTH

REAR OF BUILDING FACING NORTH

SUN EXPOSURE (H/DAY) IN **SUMMER** MONTHS

SUN EXPOSURE (H/DAY) IN **WINTER** MONTHS

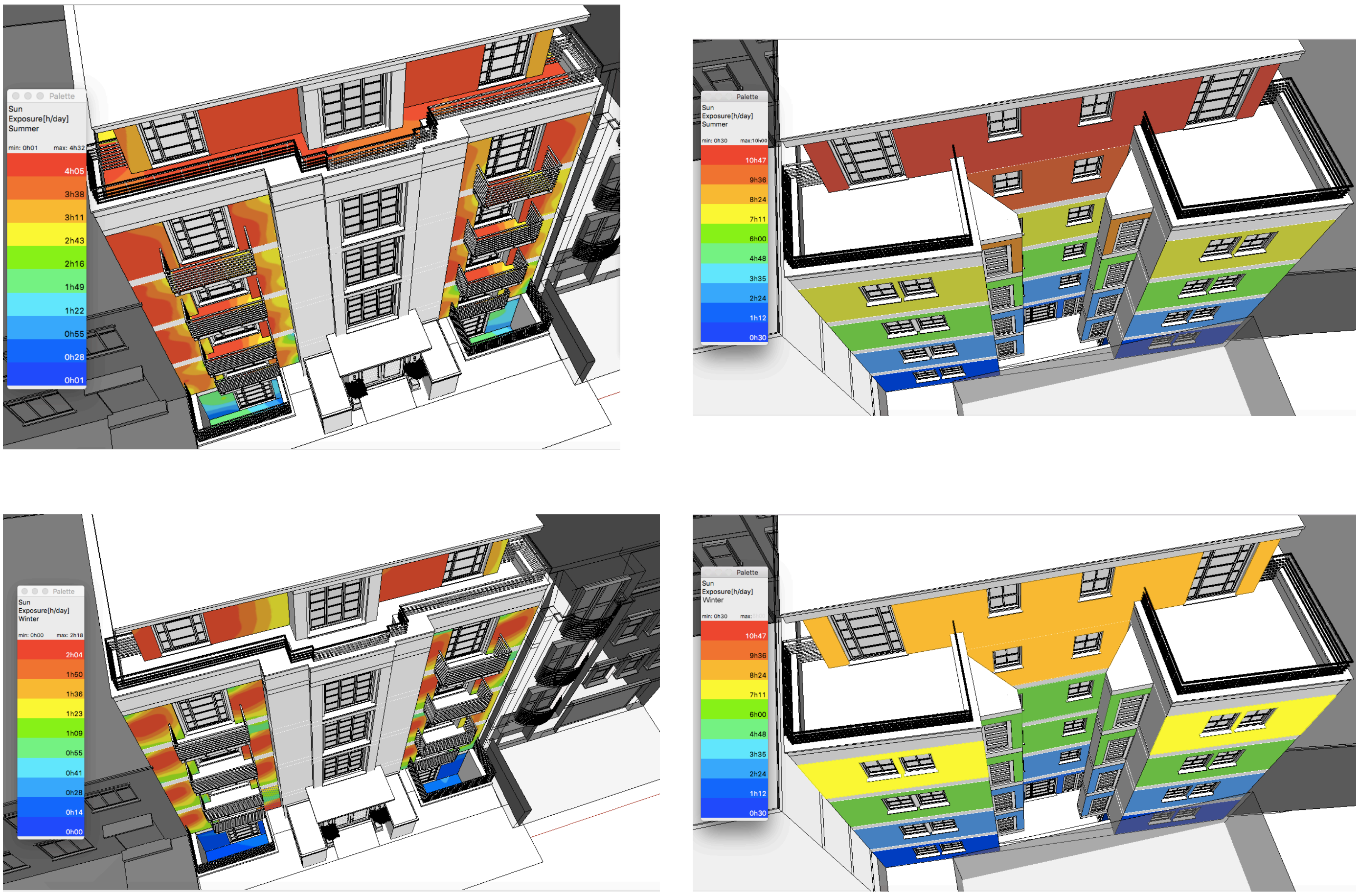


Figure 3.3 BREEAM compatible assessment for APSH in Summer and Winter, using DL-Light software

Since the proposed building is an infill to replace existing property and all windows face the same direction as the windows and balconies of the adjacent properties, and the height and size/scale of the proposed is almost identical to the surrounding buildings, due to its position and orientation, the proposed will not cause detrimental impact on the reduction of sunlight receipt. All windows of the surrounding properties will continue to receive the recommended percentage of annual sunlight hours, including a minimum of 5% of hours during the winter months, even with the construction of the proposed development and the proposed level of sunlight would be greater than 0.8 times the existing level of sunlight (see *Figure 3.4*: Site Plan).

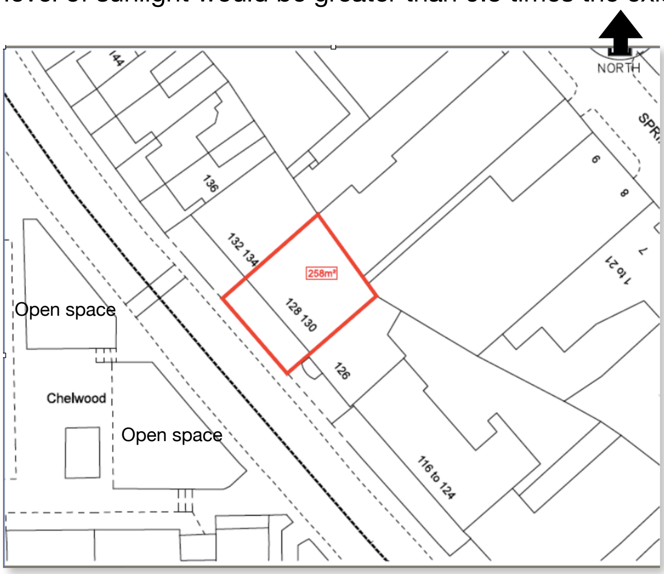


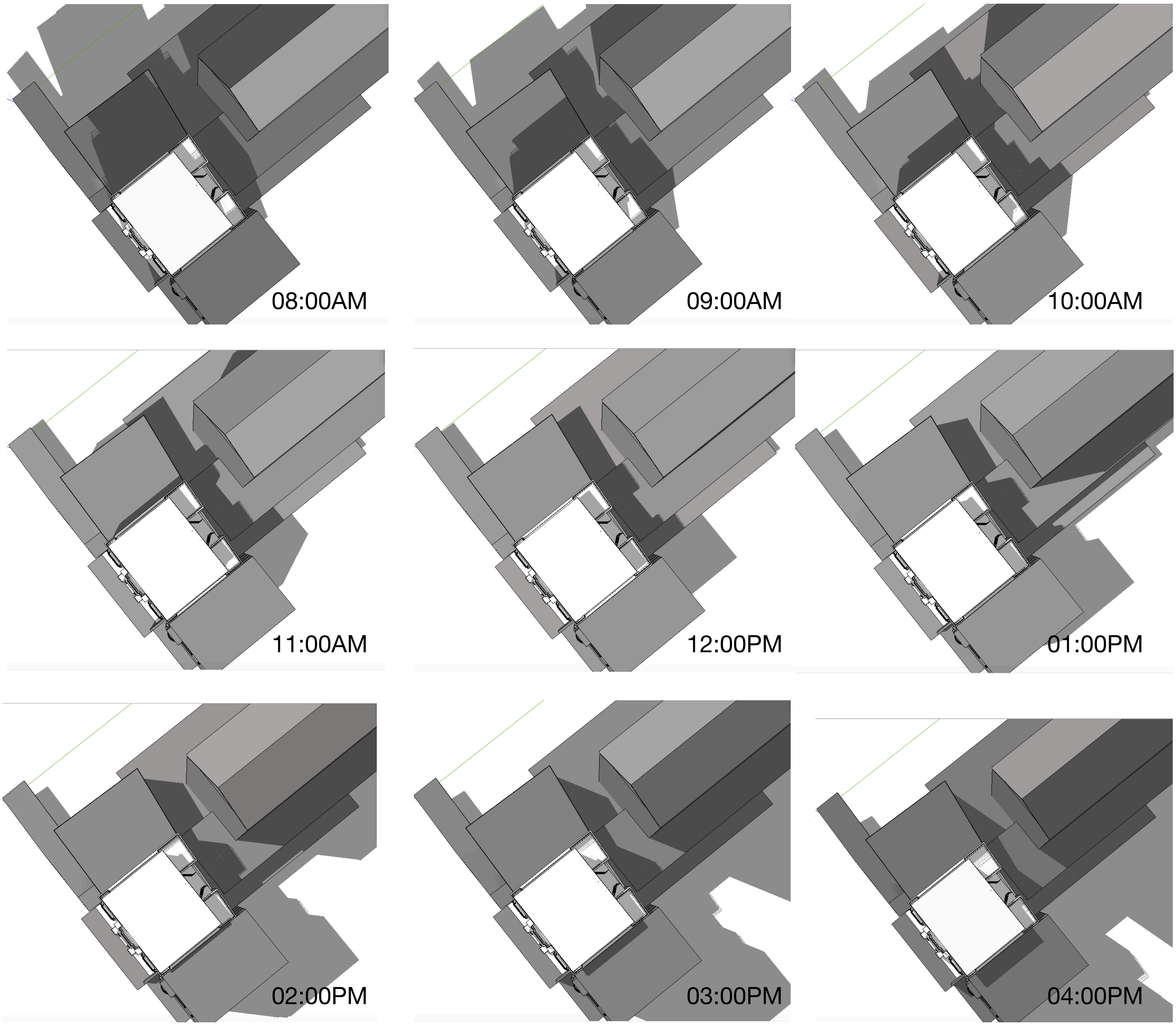
Figure 3.4 Site Plan

3.4 Overshadowing impact. Sun-path

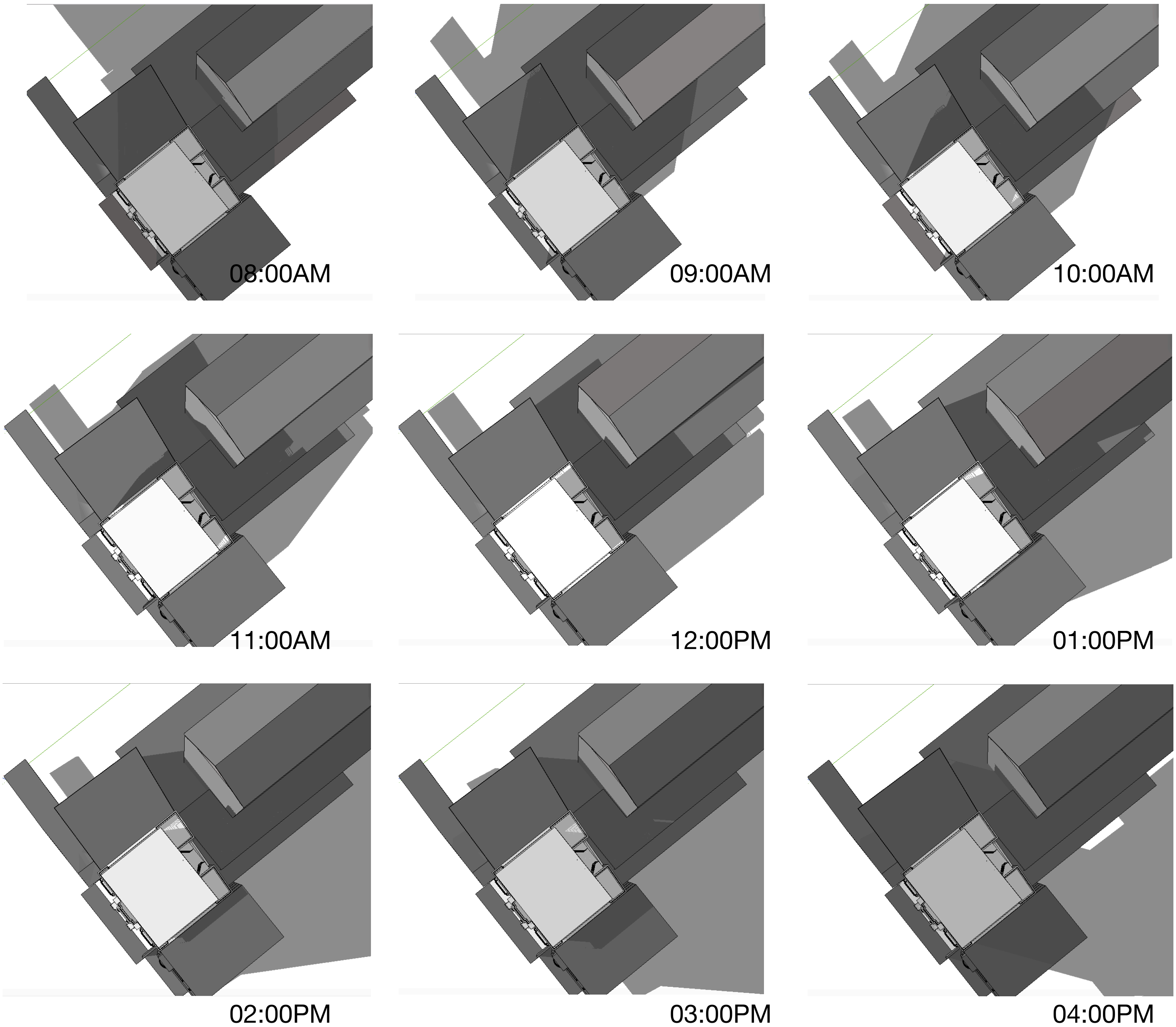
To be thorough, attached are Sun-path Studies, showing the sun at different hours on 21st March, 21st June, 21st September, and 21st December. The similar model was used the Sun-path Diagrams as the Daylight Study.

The diagrams show that the adjoining windows will receive a minimum of 25% of the Annual Probable Sunlight Hours (APSH) with 5% in the winter between the 21st September and the 21st March.

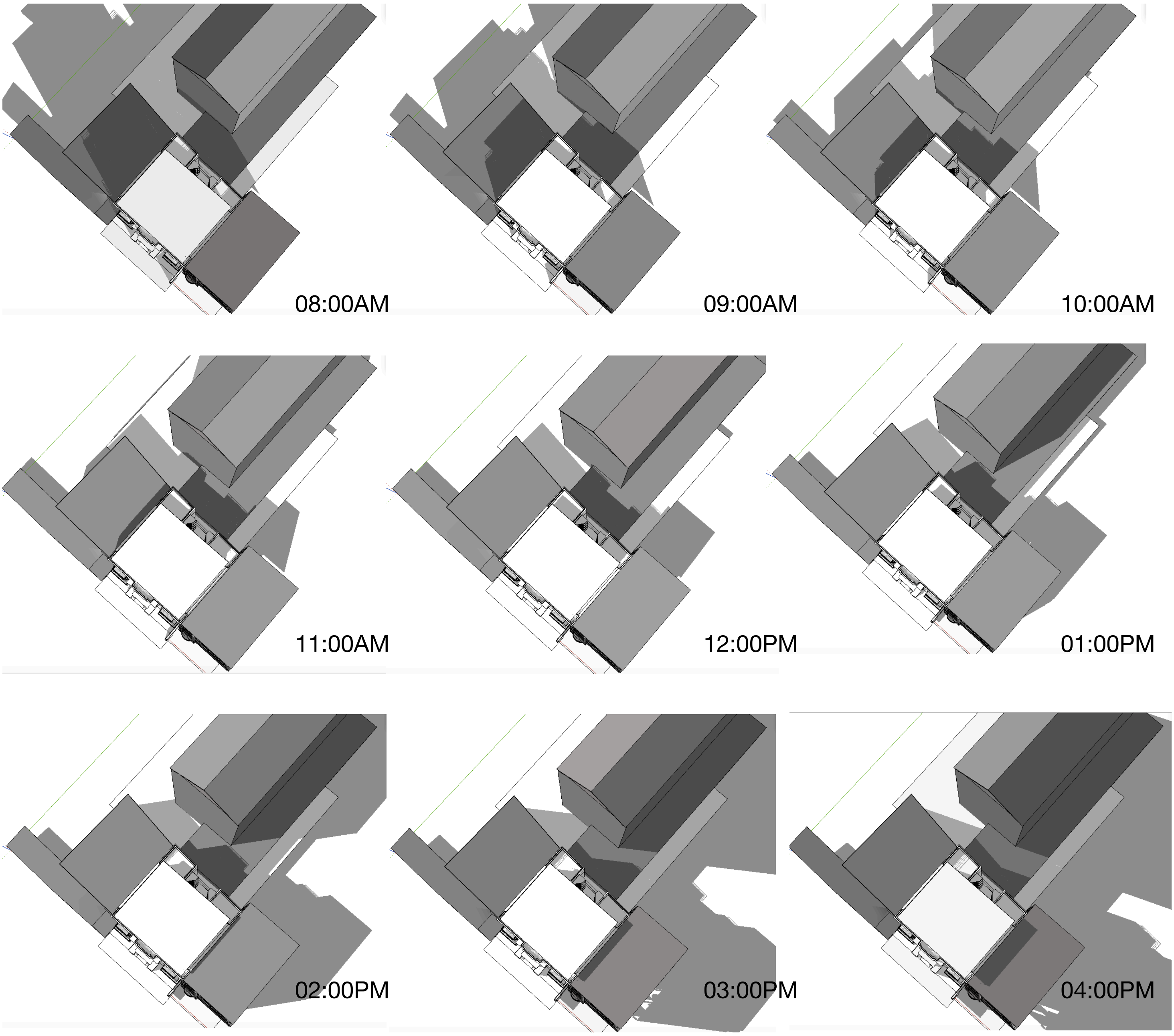
Sun-path Model 21st September



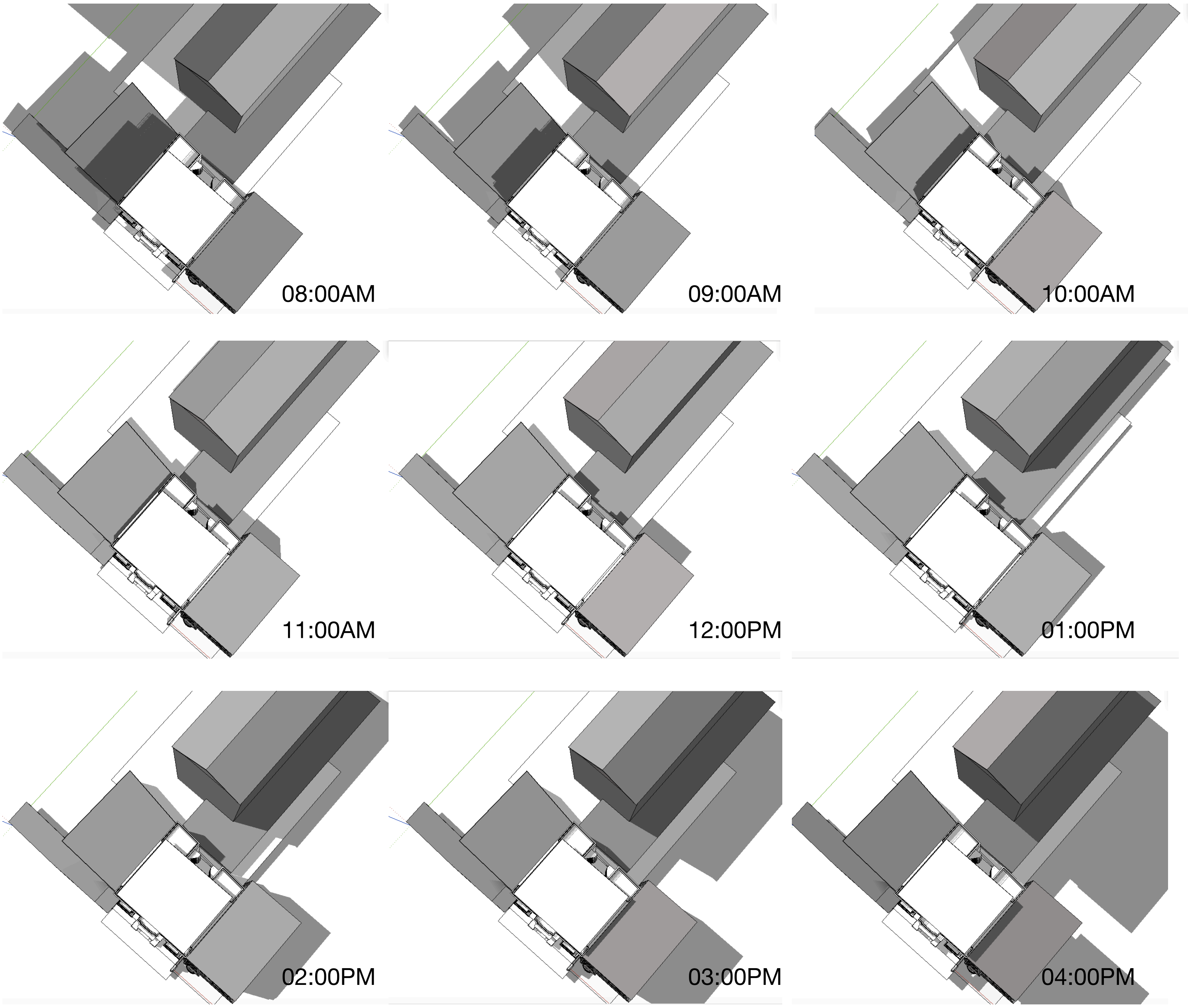
Sun-path Model 21st December



Sun-path Model 21st March



Sun-path Model 21st June



4.1 Average Daylight Factor

The average daylight factor assessment has been calculated for all of the proposed development. Under the BRE guidelines, the minimum ADF recommended for bedrooms is 1%, living rooms is 1.5% and for kitchens is 2%.

Rooms with an average DF of 2% give us a feeling of being day lit. However, it is only when the ADF rises above 5% that we perceive it as well day lit. Different types of rooms have different minimum requirements for daylighting. *Table 4.1* details the acceptable criteria for average daylight factor for habitable rooms.

Table 4.1

CRITERIA	MINIMUN DAYLIGHT FACTOR
Predominantly daylight without the need for supplementary electric lighting	5%
With supplementary electric lighting: Suitable for kitchens Suitable for living rooms Suitable for bedrooms	 2% 1.5% 1%

Formula

The ADF is calculated by the following formula provided within the Building Research Establishment (BRE) report, “Site layout planning for daylight and sunlight – Second Edition 2011” by PJ Littlefair:

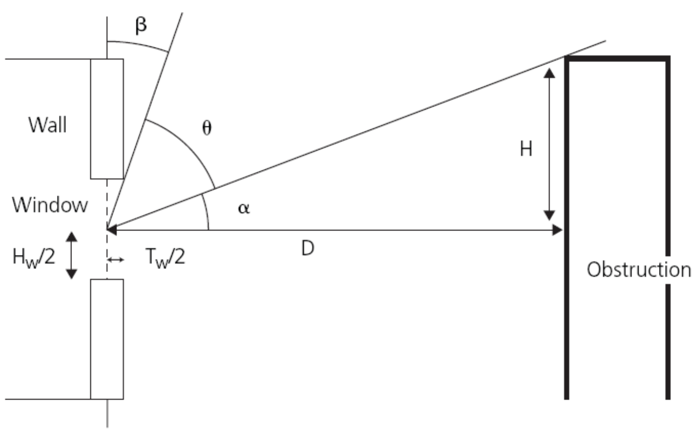
$$ADF = \frac{T A_w \theta}{A (1 - R^2)}$$

Where:

T is the diffuse visible transmittance of the glazing (normally 0.68 for double glazing, or lower for roof lights that may be susceptible to soiling);
Aw is the net glazed area of the windows (in m2);
θ is the angle of visible sky in degrees;
A is the total area of room surfaces (in m2), which includes walls, ceilings and floors; and
R is the average room reflectance (normally 0.5).

Whilst most of the values in the calculation are self explanatory, the angle of visible sky (θ) is more complicated to calculate. *Figure 4.1* graphically shows the angle of concern. θ (the angle of visible sky), can be calculated by subtracting β (the angle of sky obscured by the thickness of the wall) and α (the angle to the sky from the horizontal) from 90Æ. The angle to the sky from the horizontal is the most important angle, and this is a function of the height of the main obstruction to the window, as well as the distance to this obstruction.

Figure 4.1: Calculating the Angle of Visible Sky



In more complex situations, where there are multiple obstructions, at different heights and distances from the windows of concern, it is possible to model the Vertical Sky Component (VSC) of each window. The VSC is the amount of light falling on the window and is a function of the angle of sky visible from the window. Once the VSC is calculated, it is possible to convert this figure into θ, based on factors provided within the BRE Report, in order to calculate the ADF.

To calculate the VSC, the IES Virtual Environment software (VE-Pro Suite) has been utilised. The VE-Pro software has been accredited by CIBSE and acknowledged by the BRE as a suitable software tool for undertaking daylight, sunlight and overshadowing assessments in accordance with the Building Research Establishment (BRE) report, “Site layout planning for daylight and sunlight” Second Edition 2011 by PJ Littlefair. A module of the VE-Pro suite have been utilised for this assessment.

Each room under consideration on each floor has been designated a letter. A plan showing the rooms and letters can be seen in *Figure 4.2, Figure 4.3, Figure 4.4, Figure 4.5, Figure 4.6* and *Figure 4.7.*
Table 4.2 shows the daylight factor calculations for each window, and *Table 4.3* showing the aggregated results of these calculations for each room.

Figure 4.2: Basement Floor Plan (under construction)

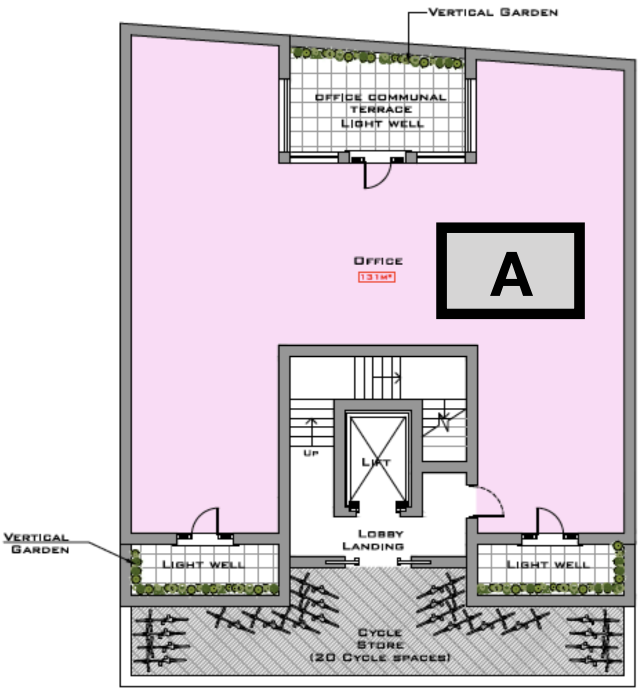


Figure 4.3: Ground Floor Plan (under construction)

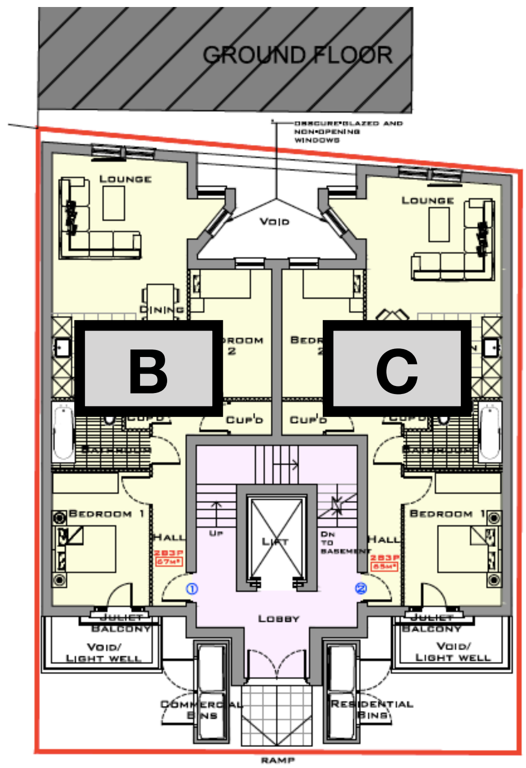


Figure 4.4: First Floor Plan (under construction)

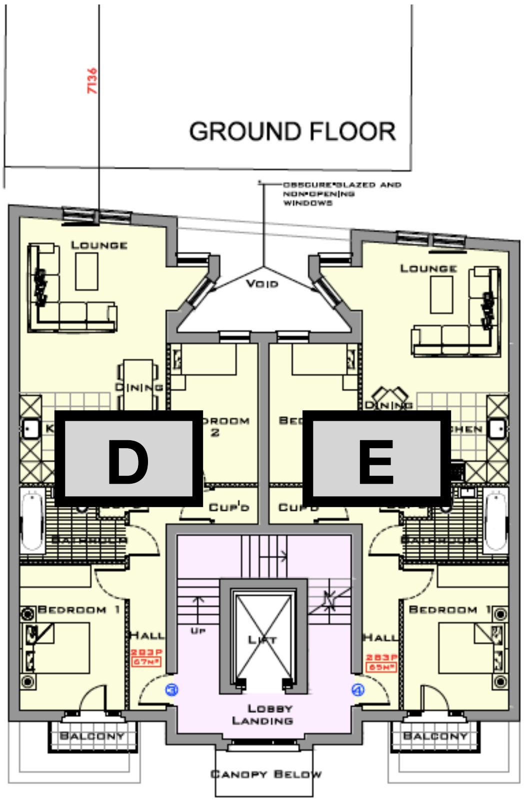


Figure 4.6: Third Floor Plan (under construction)

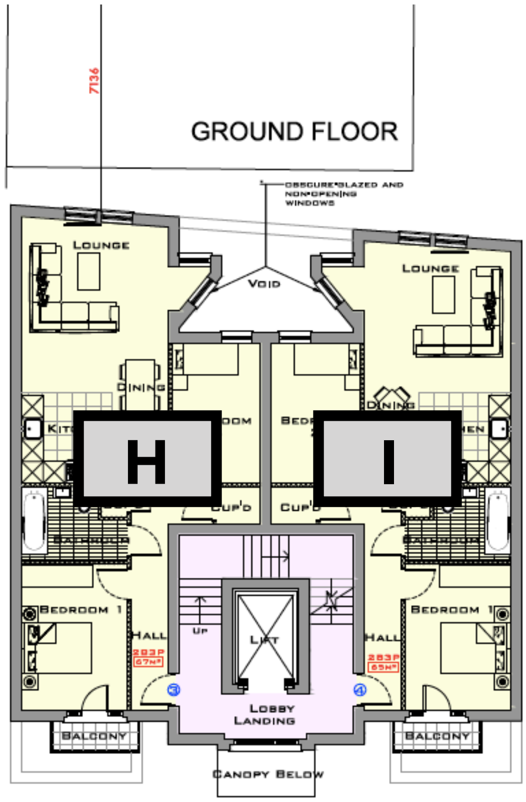


Figure 4.5: Second Floor Plan (under construction)

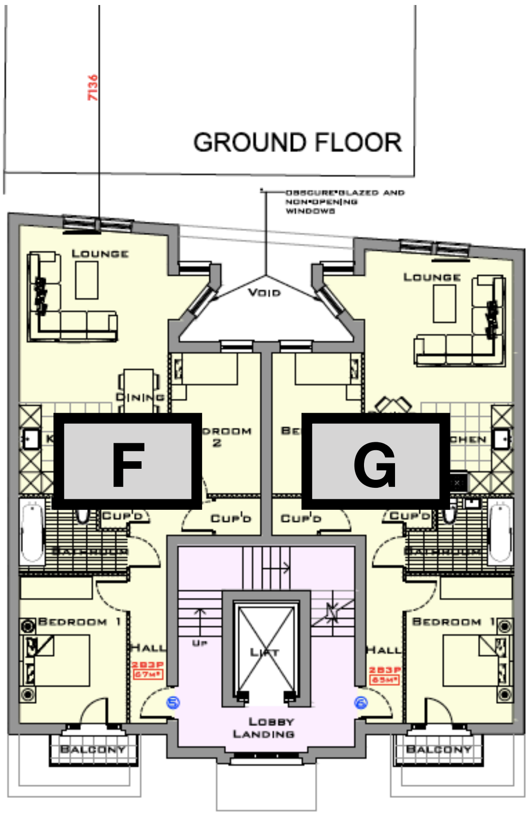


Figure 4.7: Fourth Floor Plan (under construction)

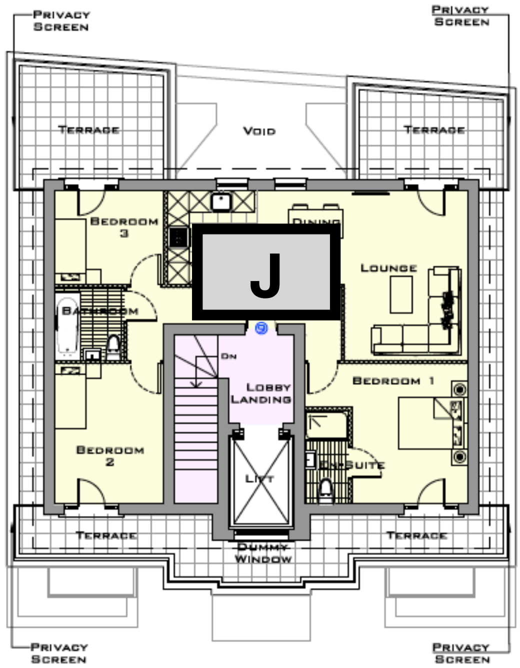


Table 4.2: Daylight Factor Calculations

Floor	Unit Ref.	Use	T	Aw m²	VSC %	Θ Degrees	A m³	R	Number windows
Basement	A	Office B1	0.68	23	16.4	46	314	0.5	10
Ground	B	Living Rooms	0.68	5	14.8	44	72	0.5	4
Ground	B	Bed1	0.68	3	24.6	61	29	0.5	1
Ground	B	Bed2	0.68	1	15.4	45	22	0.5	1
Ground	C	Living Rooms	0.68	5	23.7	59	65	0.5	4
Ground	C	Bed1	0.68	3	26.6	64	29	0.5	1
Ground	C	Bed2	0.68	1	14.3	43	22	0.5	1
First	D	Living Rooms	0.68	5	25.8	63	72	0.5	4
First	D	Bed1	0.68	3	26.8	64	29	0.5	1
First	D	Bed2	0.68	1	23.7	59	22	0.5	1
First	E	Living Rooms	0.68	5	26.8	64	65	0.5	4
First	E	Bed1	0.68	3	26.6	64	29	0.5	1
First	E	Bed2	0.68	1	24.6	61	22	0.5	1
Second	F	Living Rooms	0.68	5	26.8	64	72	0.5	4
Second	F	Bed1	0.68	3	28.5	67	29	0.5	1
Second	F	Bed2	0.68	1	26.6	64	22	0.5	1
Second	G	Living Rooms	0.68	5	28.5	67	65	0.5	4
Second	G	Bed1	0.68	3	28.5	67	29	0.5	1
Second	G	Bed2	0.68	1	26.6	64	22	0.5	1
Third	H	Living Rooms	0.68	5	26.8	64	72	0.5	4
Third	H	Bed1	0.68	3	29.8	70	29	0.5	1
Third	H	Bed2	0.68	1	28.5	67	22	0.5	1
Third	I	Living Rooms	0.68	5	29.9	70	65	0.5	4
Third	I	Bed1	0.68	3	29.8	70	29	0.5	1
Third	I	Bed2	0.68	1	28.5	67	22	0.5	1

Fourth	J	Living Rooms	0.68	5	29.9	70	70	0.5	3
Fourth	J	Bed1	0.68	3	29.8	70	41	0.5	1
Fourth	J	Bed2	0.68	3	29.8	70	29	0.5	1
Fourth	K	Bed3	0.68	3	29.7	69	19	0.5	1

Table 4.3: ADF Results

Floor	Unit Ref.	Use	Average Daylight Factor (ADF)
Basement	A	Office B1	N/A
Ground	B	Living Rooms	2.7%
Ground	B	Bed1	5.7%
Ground	B	Bed2	1.8%
Ground	C	Living Rooms	4.2%
Ground	C	Bed1	6.0%
Ground	C	Bed2	1.8%
First	D	Living Rooms	3.9%
First	D	Bed1	7.0%
First	D	Bed2	2.4%
First	E	Living Rooms	4.5%
First	E	Bed1	6.0%
First	E	Bed2	2.5%
Second	F	Living Rooms	4.0%
Second	F	Bed1	6.3%
Second	F	Bed2	2.7%
Second	G	Living Rooms	4.7%
Second	G	Bed1	6.3%
Second	G	Bed2	2.6%
Third	H	Living Rooms	4.0%
Third	H	Bed1	10.9%
Third	H	Bed2	2.8%

Third	I	Living Rooms	4.9%
Third	I	Bed1	6.6%
Third	I	Bed2	2.8%
Fourth	J	Living Rooms	4.5%
Fourth	J	Bed1	4.6%
Fourth	J	Bed2	6.6%
Fourth	K	Bed3	9.9%

Summary of the results

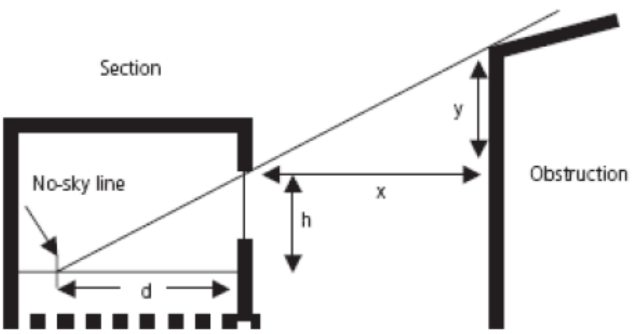
The BRE Report suggests that kitchens should have a minimum ADF of 2%, living rooms 1.5% and bedrooms 1%. *Table 4.3* demonstrated that all 28 rooms assessed, 9 living rooms and 19 bedrooms, **meet the minimum ADF recommended for its room use.**

4.2 No-Sky Line Calculations

Whilst the ADF is used to determine whether a room is adequately day lit, the position of the No-Sky Line (NSL) calculations is used to determine how well distributed the light is within the room. The NSL divides those areas of the working plane which can receive direct skylight, from those which cannot. The working plane is a notional surface, typically at about desk or table height, at which the daylight factor or the 'no-sky line' is calculated or plotted. For the calculations required here, it is set at 0.85 m above the floor.

Figure 4.8 illustrates how the no-sky line can be calculated. If 'd' is greater than the room depth, then no part of the room lies beyond this no-sky line. BS 8206: Part 2 suggests that at least 80% of a room has a direct view of the sky. It is important for kitchens, living rooms and dining rooms to receive direct skylight, but the BRE Report suggests that it is less important for bedrooms to receive direct skylight.

Figure 4.8: Pictorial calculation of the No-Sky Line



$$d = \frac{xh}{y}$$

Where:

h = height of the window head above the working plane
y = height of the obstruction above the window head
x = distance from the window to the obstruction

Table 4.4 shows the no-sky line and working plane percentage for the same rooms which were assessed for the daylight factor assessment.

Table 4.4: NSL Results

Floor	**Unit Ref.**	**Use**	**Amount of the working plane that receives direct light from the sky (%)**
Basement	A	Office B1	N/A
Ground	B	Living Rooms	30
Ground	B	Bed1	100
Ground	B	Bed2	100
Ground	C	Living Rooms	100
Ground	C	Bed1	100
Ground	C	Bed2	100
First	D	Living Rooms	100
First	D	Bed1	100
First	D	Bed2	100
First	E	Living Rooms	100
First	E	Bed1	100
First	E	Bed2	100
Second	F	Living Rooms	100
Second	F	Bed1	100
Second	F	Bed2	100
Second	G	Living Rooms	100
Second	G	Bed1	100
Second	G	Bed2	100
Third	H	Living Rooms	100
Third	H	Bed1	100
Third	H	Bed2	100
Third	I	Living Rooms	100

Third	I	Bed1	100
Third	I	Bed2	100
Fourth	J	Living Rooms	100
Fourth	J	Bed1	100
Fourth	J	Bed2	100
Fourth	K	Bed3	100

The BRE Report suggests that all habitable rooms should have at least 80% of the working plane receiving direct light from the sky, i.e. no greater than 20% of the working plane should site beyond the no-sky line. *Table 4.4* shows that 1 of the 28 rooms assessed fails to a minimum of 80% of the working plane receiving direct light from the sky. However, this is a ground floor living room that has 4 (four) windows, and based on the ADF calculations, it should receive an adequate amount of daylight of 2.7%, which is well above the BRE recommended 1.5% for living spaces.

Additionally, it should be noted at determining the area of the working plane with can receive direct light from the sky (which is often referred to as the No-Sky Line or NSL) is seen as an additional assessment, rather than as an alternative to VSC. However, since plotting the NSL requires knowledge of the room geometry, which is not usually available during an impact assessment, it is not always possible to calculate the NSL accurately since the use of too many assumptions would make the results meaningless and unreliable.

Note: All balconies will be of a metal grill to allow for better daylight access, and all internal surfaces - wall finishes and ceiling finishes, will be painted in pale cream and white colours of a high reflectance value to reflect and increase the amount of sunlight coming in (see **Appendix C** for further information).

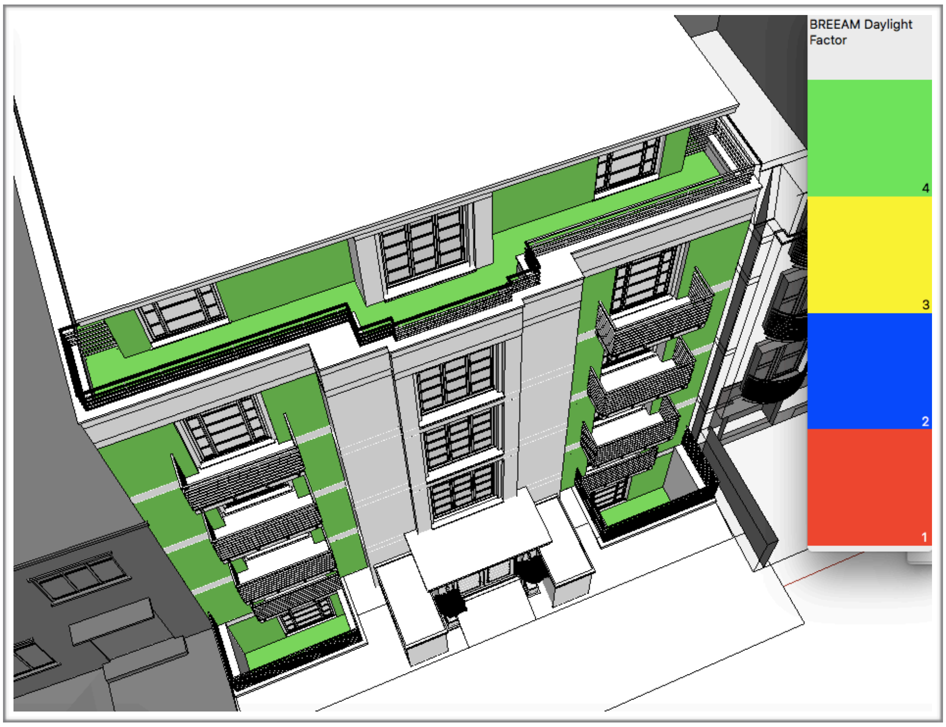
5. CONCLUSIONS

Calculations were conducted in accordance with the BRE Report in order to determine the extent to which the proposed development at 128-130 Grafton Road will affect the levels of daylight and sunlight at adjacent properties. The assessment has shown that there are only "negligible" impacts on levels of sunlight and overshadowing.

Calculations have also shown that the levels of daylight within the proposed development will generally be in excess of the levels normally considered to constitute a well lit room for habitable purposes. Given the daylight (ADF and VSC) and sunlight levels (APSH) of all rooms assessed are meeting or exceeding the recommended minimum, it is considered that the proposed development performs acceptably.

It is important to note that failure to meet the guideline criteria is not an indicator as to whether a development is acceptable. The BRE report states that: "*The advice given (in the report) is not mandatory and the guide 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 since natural lighting is only one of many factors in layout design.*"

Appendix A: BREEAM Average Daylight Factor (ADF)



Appendix B: Sunrise and Sunset times fro Kentish Town, Camden

Sunrise and Sunset times for Kentish Town, Camden

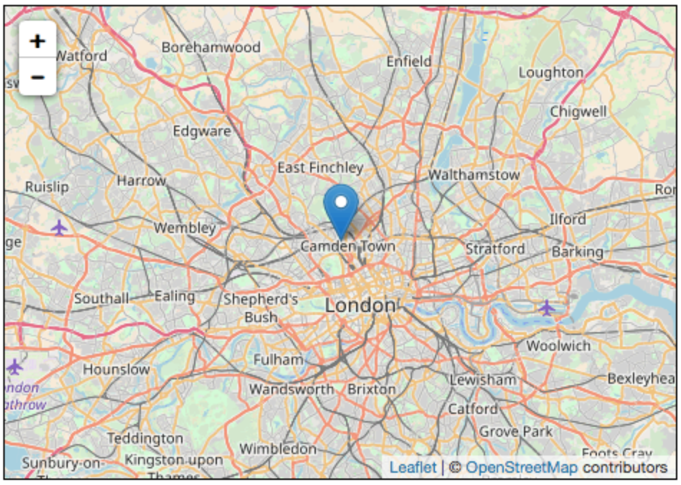
Monday 10 September 2018

« Previous Day | Next Day » | Select Date

Astromomical twilight begins (full darkness ends)	04:29
Nautical twilight begins (First light)	05:13
Civil twilight begins (Dawn)	05:54
Sunrise	**06:28**
Transit (sun is at its highest)	12:57
Sunset	**19:26**
Civil twilight ends (Dusk)	20:00
Nautical twilight ends (Nightfall)	20:41
Astromomical twilight ends (full darkness starts)	21:25

Moon phase ●	New Moon
Moon rises	06:00
Moon sets	19:11

Hours of Daylight today	05:58 to 19:56
Hours of Darkness tonight (lighting-up time)	19:56 to 06:29



Appendix C: Reflectances of Common Materials

APPENDIX REFLECTANCES OF COMMON MATERIALS - SOURCE BS 8206 PT 2

Table A.1. Approximate values of the reflectance of light ***(continued)***

Material	Reflectance
Paint Colours (with BS 4800 colour Code)	
White 00E55	0.85
Pale cream 10C31	0.81
Light grey 00A01	0.68
Strong yellow 10E53	0.64
Mid-grey 00A05	0.45
Strong green 14E53	0.22
Strong red 04E53	0.18
Strong blue 18E53	0.15
Dark grey 10a11	0.14
Dark brown 08C89	0.10
Dark red-purple 02C39	0.10

References given are values for gloss paint. BS 4800 lists approximate Munsell references for paint colours for building purposes, and gives a useful method for deriving reflectances from Munsell references.

APPENDIX REFLECTANCES OF COMMON MATERIALS - SOURCE BS 8206 PT 2

A.1.1 REFLECTANCES

The reflectance of a building material in use is affected by weathering, dirt and moisture. The overall reflectance of a surface is also affected by its shape: a deeply corrugated surface reflects less light than a smooth surface of the same material. Glossy surfaces have a slightly higher reflectance than matt materials of the same body colour, but the distribution of reflected light and the appearance of the surface is more significant than the change in total reflectance. Approximate reflectance values are given in Table A.1.

Table A.1. Approximate values of the reflectance of light

Material	**Reflectance**
Other external materials	
Brickwork (white glazed)	0.7
Portland stone	0.6
Medium limestone	0.4
Concrete	0.4
Brickwork (London stock)	0.3
Brickwork (red)	0.2
Granite	0.2
Window glass	0.1
Tree foliage	0.1

APPENDIX REFLECTANCES OF COMMON MATERIALS - SOURCE BS 8206 PT 2

A.1.1 REFLECTANCES

The reflectance of a building material in use is affected by weathering, dirt and moisture. The overall reflectance of a surface is also affected by its shape: a deeply corrugated surface reflects less light than a smooth surface of the same material. Glossy surfaces have a slightly higher reflectance than matt materials of the same body colour, but the distribution of reflected light and the appearance of the surface is more significant than the change in total reflectance. Approximate reflectance values are given in Table A.1.

Material	Reflectance
Materials used internally	0.8
White paper	0.4
Stainless steel	0.4
Cement screed	0.4
Carpet (cream)	0.4
Wood (light veneers)	0.2
Wood (medium colours)	0.1
Wood (dark oak)	0.1
Quarry tiles	0.1
Window glass	