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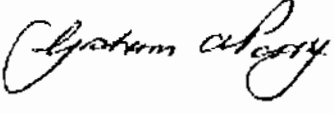
***Harstinder Kang***

***6 Malthouse Lane, Reading***

***Daylight and Sunlight Assessment***

**Status: FINAL**

**Date: 13.01.2021**

|                |                                                                                                                                 |
|----------------|---------------------------------------------------------------------------------------------------------------------------------|
| Author         | <br>Mike Ledbetter<br>Environmental Consultant |
| Approved By    | <br>Graham Parry<br>Managing Director          |
| Report For     | Harstinder Kang<br>By E-mail: hskang1@hotmail.com                                                                               |
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## 1. INTRODUCTION

ACCON UK Ltd has been commissioned by Harstinder Kang to undertake a daylight and sunlight assessment in respect of the proposed development at 6 Malthouse Lane, Reading. The assessment is required in order to determine if the proposed development will receive adequate levels of light.

**Appendix 1** provides a plan of the proposed development site with the location of the proposed change of use development identified and the floor plans.

## 2. THE NATURE AND EFFECT OF DAYLIGHT AND SUNLIGHT

The provision of daylight is as important as ensuring low levels of noise or low levels of odour in maintaining the enjoyment of one's property. Adequate levels of daylight are important not only to light and heat the home, but also for an occupant's emotional well-being. Daylight is widely accepted to have a positive psychological effect on human beings and there is a great deal of evidence to suggest that people who are deprived of daylight are more susceptible to depression and mood swings. This is common in northern countries, such as Norway, Iceland and Canada where daylight is scarce during the winter months.

When assessing the effects of proposed building projects on the potential to cause issues relating to light, it is important to recognise the distinction between daylight and sunlight. Daylight is the combination of all direct and indirect sunlight during the daytime, whereas sunlight (for the purposes of this report) comprises only the direct elements of sunlight. For example on a cloudy or overcast day diffused daylight still shines through windows, even when sunlight is absent.

Any development within a built up area has the potential to alter the amount of daylight and direct sun received by nearby residential properties. Care should be taken when designing new buildings in built-up areas, especially when the proposed development is relatively tall or situated to the south of existing buildings, because in the northern hemisphere the majority of the sunlight comes from the south. In the UK (and other northern hemisphere countries) south-facing facades will, in general, receive most sunlight, while north facing facades will receive sunlight on only a handful of occasions, specifically early-mornings and late evenings during the summer months.

It is therefore important to ensure that buildings to the south of any development do not cause overshadowing to existing dwellings and therefore reduce their capacity to receive sunlight.

### 3. ASSESSMENT CRITERIA

#### 3.1. National Policy

The Department for Communities and Local Government (DCLG) sets national planning policy. The document 'The Planning System: General Principles (2005)', published in conjunction with Planning Policy Statement 1: Delivering Sustainable Development (which has now been replaced by the National Planning Policy Framework), 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 three guidance documents are relevant when considering daylight, sunlight and overshadowing in dwellings:

- **The Building Research Establishment (BRE) report, "Site layout planning for daylight and sunlight – a guide to good practice – Second Edition 2011"** by PJ Littlefair (referred to as the BRE Report). Although not Government guidance, this report is commonly referenced as the main guide in the UK in determining the minimum standards of daylight and sunlight and for determining the impact of a development;
- **British Standard BS EN 17037:2018 Daylight in buildings.** BS EN 17037:2018 supersedes the British Standard BS 8206-2:2008 "Lighting for buildings. Code of practice for daylighting". It contains guidance on the minimum recommended levels of interior daylighting and introduces some of the calculation procedures used in the BRE Report;
- **The Code for Sustainable Homes – Technical Guidance.** The Code's Technical Guidance document determines its target criteria for well-lit homes, building upon the calculation procedures within the BRE Report and BS 8206:2008. It should be noted that the daylighting element of the Code is not mandatory, suggesting that the targets within the Code are desirable, but not an essential planning constraint.
- **Planning Practice Guidance – Effective use of land - How are daylight and sunlight regulated?** – This section of the PPG summarises the considerations in respect to making effective use of land, including planning for higher density development. Paragraph 006 – "How are daylight and sunlight regulated" (Reference ID 66-006-20190722) in particular focuses on the levels of daylight and sunlight levels within proposed developments and how developments affect daylight and sunlight levels on neighbouring occupiers and states:

"Where a planning application is submitted, local planning authorities will need to consider whether the proposed development would have an unreasonable impact on the daylight and sunlight levels enjoyed by neighbouring occupiers, as well as assessing whether daylight and sunlight within the development itself will provide satisfactory living conditions for future occupants.

In some cases, properties benefit from a legal 'right to light', which is an easement that gives a landowner the right to receive light through specified openings, and can be used to prevent this from being obstructed without the owner's consent. Such rights are not part of the planning system, but may affect the scope for development on neighbouring sites."

- **Planning Practice Guidance – Effective use of land - What are the wider planning considerations in assessing appropriate levels of sunlight and daylight?** - Paragraph 007 (Reference ID 66-007-20190722) in particular focuses on the context of the light levels of the development such as in city centre locations and states:

“All developments should maintain acceptable living standards. What this means in practice, in relation to assessing appropriate levels of sunlight and daylight, will depend to some extent on the context for the development as well as its detailed design. For example in areas of high-density historic buildings, or city centre locations where tall modern buildings predominate, lower daylight and daylight and sunlight levels at some windows may be unavoidable if new developments are to be in keeping with the general form of their surroundings.

In such situations good design (such as giving careful consideration to a building’s massing and layout of habitable rooms) will be necessary to help make the best use of the site and maintain acceptable living standards.”

### 3.2. The BRE Report

The BRE report contains guidance on how to design developments, whilst 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 contains criteria to determine the acceptability of a new development. 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 document looks at three separate areas when considering the impacts on lighting:

- **Daylight** – i.e. the impacts of all direct and indirect sunlight during the daytime;
- **Sunlight** – i.e. the impacts of only the direct sunlight; and
- **Overshadowing of Gardens and Open spaces.**

Appendix 2 details the BRE Report, including the methodologies and full details of the criteria.

Table 3.1 summarises the criteria used to assess the impacts from new development on the daylight and sunlight reaching existing properties.

**Table 3.1: Summary criteria contained within the BRE Report**

| Parameter     | BRE Report Ref.   | Criteria                                                                                    | Acceptability Criteria |
|---------------|-------------------|---------------------------------------------------------------------------------------------|------------------------|
| Daylight      | Section 2.2       | Angle to sky from horizontal                                                                | Maximum 25°            |
|               |                   | Vertical Sky Component (VSC)                                                                | Greater than 27%       |
|               | Appendix C        | Average Daylight Factor (ADF)                                                               | Greater than 1%-2%*    |
|               | Appendix D        | Percentage of the Working Plane beyond the No-Sky Line (NSL)                                | “Significant Part”+    |
| Sunlight      | Section 3.1 & 3.2 | Annual Probable Sunlight Hours (APSH) (Full Year)                                           | Greater than 25%†      |
|               |                   | Annual Probable Sunlight Hours (APSH) (Winter Months)                                       | Greater than 5%†       |
| Overshadowing | Section 3.3       | Area of amenity space prevented from receiving any sun at all on the 21 <sup>st</sup> March | Maximum 40%            |

\*= Varies depending on room use. See Appendix 3 for full details.

+ = Whilst the BRE Report describes the methodology for determining the percentage of the Working Plane that is in full sun, it does not give an acceptability criterion, only that supplementary electric lighting will be required if a "significant part" of the working plane lies beyond the no-sky line. However, the Code for Sustainable Homes and BS 8206: 2008 suggests that each room requires a minimum of 80%.

† = Applies only to main living rooms, not to bedrooms, kitchens or other non-habitable rooms.

## 4. DAYLIGHT AND SUNLIGHT ASSESSMENT

For the proposed change of use development, a self-test has been undertaken to determine whether all of the habitable rooms in the building would receive sufficient levels of daylight and sunlight for the future inhabitants. The one window on the southern façade of the proposed development lets into a bathroom and has therefore not been assessed.

**Table 4.1** identifies the daylight and sunlight level results of the self-test for each window within the proposed change of use development.

Windows 3 and 6 do not face within 90° of due south and therefore the sunlight assessment is not required, however; **Table 4.1** has identified the results of the modelling for information purposes. Window 3, which receives the least sunlight, lets into the sleeping area of the proposed downstairs studio flat. As this is the sleeping area of the flat sunlight is typically less important than other areas of the dwelling. It should also be noted that sunlight from Windows 1 and 2 will partially let into the sleeping area increasing the level of sunlight received by this area.

All other windows receive adequate levels of daylight and sunlight for the purposes of residential development.

**Table 4.1: Self-Test - Vertical Sky Component and Annual Probable Sunlight Hours**

| Floor | Window | Aspect | VSC  | APSH   |        |
|-------|--------|--------|------|--------|--------|
|       |        |        |      | Annual | Winter |
| G     | 1      | W      | 33.9 | 48     | 14     |
| G     | 2      | W      | 33.5 | 45     | 11     |
| G     | 3      | E      | 29.5 | 22     | 0      |
| 1     | 4      | W      | 37.3 | 50     | 15     |
| 1     | 5      | W      | 36.9 | 49     | 14     |
| 1     | 6      | E      | 35.7 | 40     | 6      |

## 5. CONCLUSIONS

Calculations were conducted in accordance with the BRE guidelines to determine if the proposed redevelopment of 6 Malthouse Lane, Reading, would receive acceptable levels of daylight and sunlight.

The currently proposed building envelope will receive an adequate level of daylight and sunlight. Therefore there is no reason in terms of daylight or sunlight that the development should be refused planning permission.

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## Appendix 1 Development Site Plan

## Appendix 1: Development Site Plan

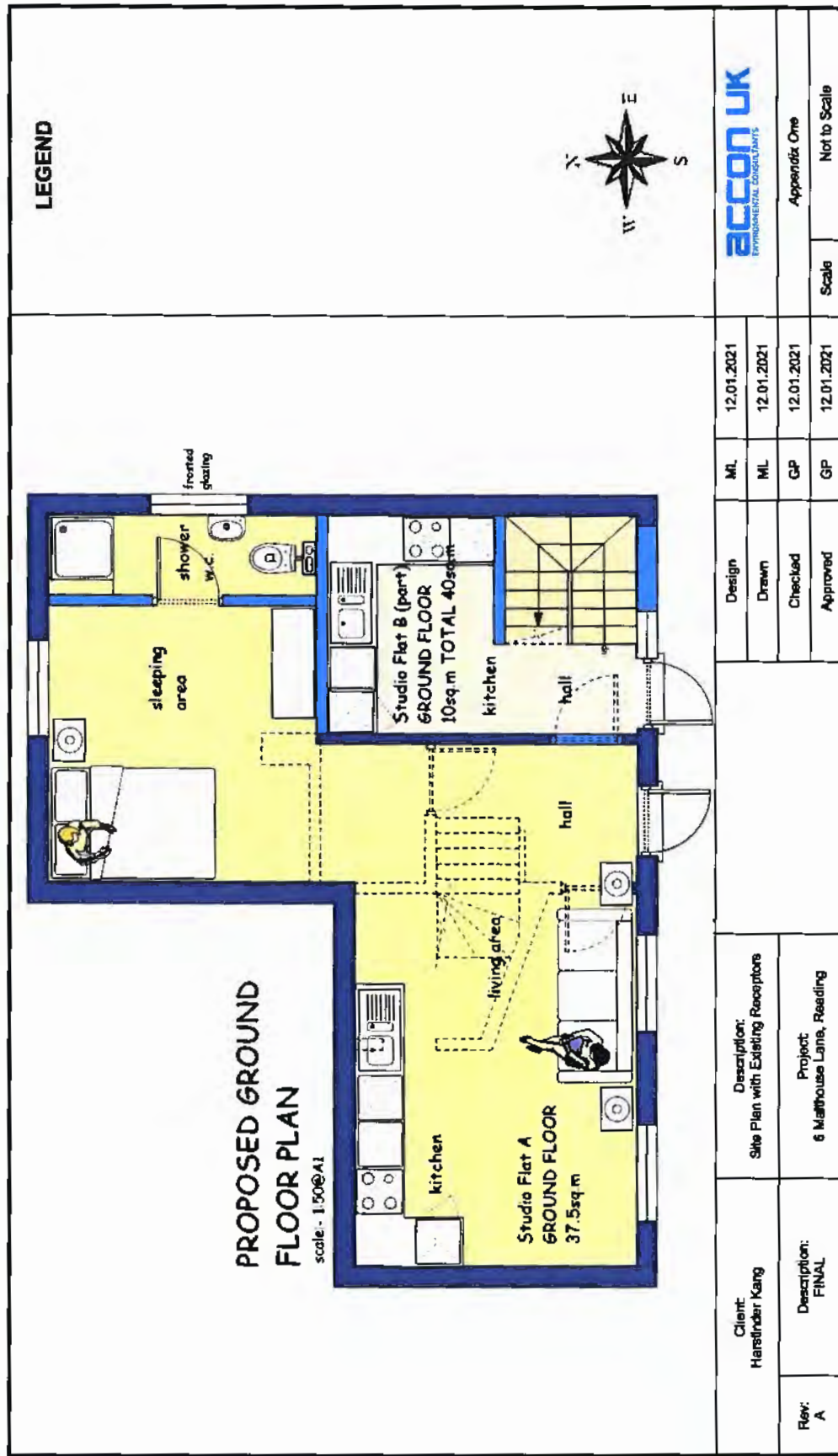


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Email: enquiry@accon-uk.com • www.accon-uk.com  
Unit B, Fronds Park, Aldermaston, Reading, RG7 4LH  
Reading Office Tel: 0118 971 0000 Fax: 0118 971 2272  
Brighton Office Tel: 01273 573 814

## Appendix 1: Ground Floor Plan



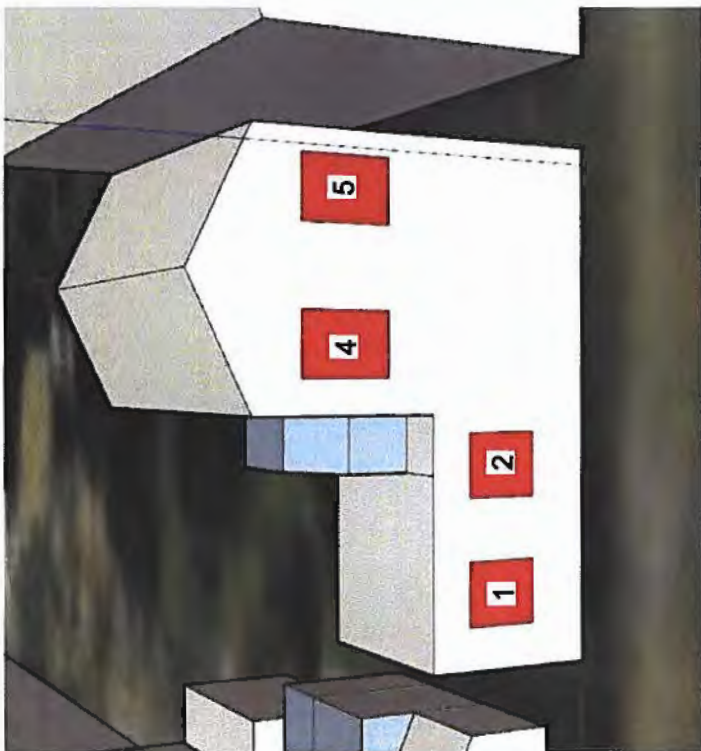
## Appendix 1: First Floor Plan

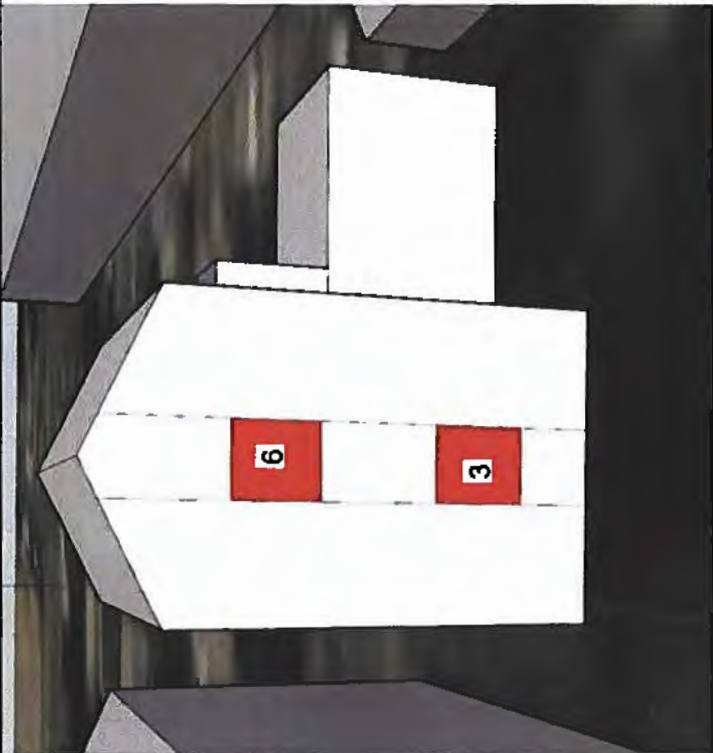


## **Appendix 2 Window Locations**

## Appendix 2: Window Locations

| Western Facade |                            | Eastern Facade                                                                |          |    |            |                                       |                       |
|----------------|----------------------------|-------------------------------------------------------------------------------|----------|----|------------|---------------------------------------|-----------------------|
| Rev: A         | Client:<br>Harstinder Kang | Description:<br>Window Locations<br><br>Project:<br>6 Malthouse Lane, Reading | Design   | ML | 12.01.2021 | accon UK<br>ENVIRONMENTAL CONSULTANTS |                       |
|                | Description:<br>FINAL      |                                                                               | Drawn    | ML | 12.01.2021 |                                       |                       |
|                |                            |                                                                               | Checked  | GP | 12.01.2021 |                                       | Appendix Two          |
|                |                            |                                                                               | Approved | GP | 12.01.2021 |                                       | Scale<br>Not to Scale |





## **Appendix 3 The BRE Report**

## Appendix 3: The BRE Report

When considering daylight and sunlight assessments, reference is often made to the Building Research Establishment (BRE) report, "Site layout planning for daylight and sunlight – a guide to good practice" by PJ Littlefair.

The BRE Report contains guidance on how to design developments, whilst 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 contains criteria to determine the potential impact of a 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.

### A2.1 Daylight

Contained within the three relevant documents, there are three criteria and calculation procedures to determine levels of daylight. Each one has its limitations and is used in different circumstances. The criteria are:

- **The 25° Rule and the Vertical Sky Component**
- **Average Daylight Factor**
- **No-Sky Line and the Working Plane**

#### A2.1.1 The 25° Rule and Vertical Sky Component

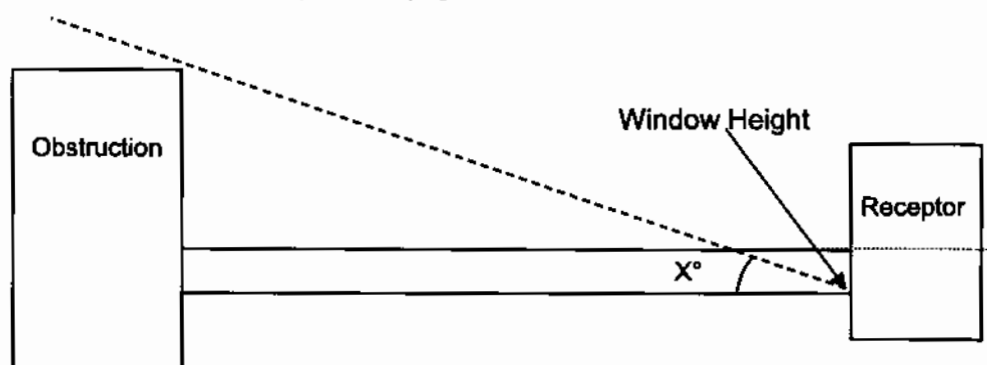
The BRE Report contains guidance on how to design developments, whilst minimising the impacts of existing buildings from overshadowing and reduced levels of daylight and sunlight, as well as ensuring developments are adequately daylighted. The report suggests that in general, a building will have the potential for good interior diffuse daylighting providing that:

- a) no obstruction, measured in a vertical section perpendicular to the main face, from a point 2m from the ground level, subtends an angle of more than 25° to the horizontal;
- or
- b) if a) is not satisfied, then all points on the main face on a line 2m above ground level are within 4m (measured sideways) of a point which has a Vertical Sky Component (VSC) of 27% or more.

The report contains a methodology for calculating the VSC, but also indicates that the methodology for calculating the levels of interior daylighting in BS 8206-2 should also be used where appropriate.

The report highlights a simplified procedure that can be used to screen new developments to determine whether a more detailed assessment is required. This screening method considers the extent to which the angle of view of the sky from the centre of the lowest window of the existing properties will be constrained by the proposed new buildings. If the new development subtends an angle of less than 25° to the horizontal from the lowest window of the existing property, then it is unlikely that the development will cause any substantive effects of the lighting of existing buildings; greater than 25° and further analysis will be required to determine the extent to which there will be a loss of daylight to the existing building. A schematic example of this calculation can be seen in **Figure A2.1**.

**Figure A2.1: Schematic Example of Daylight Calculations**



If the screening method determines that there may be an obstruction, the exact level of light can be calculated by determining the Vertical Sky Component (VSC). The BRE Report highlights a number of ways to calculate the VSC, including the skylight indicator method and the Waldram Diagrams.

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.

With regard to the surrounding properties, greater protection should be afforded to windows that serve habitable dwellings and, in particular, those serving living rooms and family kitchens. The tests can also be applied to non-domestic uses such as offices and workplaces where such uses will ordinarily have a reasonable expectation of daylight or sunlight. However, retail outlets such as shops and high street banks are not generally considered to have a reasonable expectation of daylight or sunlight. It is considered that retail outlets and point-of-sale displays do not rely on daylight or sunlight but on electric lighting. Assessment for daylight and sunlight is not therefore considered necessary in those instances.

The use of the VSC does have a number of limitations. For example, the calculation procedure only calculates the amount of light falling on the wall in question, it does not take into account the size of the windows or the size of the room that it is intending to light. Consequently, it is possible to design a room that would be adequately daylit through sensible room and window design (e.g. shallow rooms and large windows, or the use of roof lights), but the VSC will still show a low level of light falling on the wall. The VSC calculations do not take into account how designers may maximise the available light within a dwelling.

#### **A2.2.2 Average Daylight Factor**

The VSC only determines whether a room has the potential for good interior daylighting. The actual interior daylighting of the building can be checked by using the Average Daylight Factor (ADF) introduced in BS 8206: 2008.

The 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 DF then the more that natural light is available in a room.

Rooms with an average DF of 2% give us a feeling of daylight. 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 A2.1** details the acceptable criteria for average daylight factor for habitable rooms.

**Table A2.1: Daylight Factor Criteria**

| Criteria                                                                    | Minimum Daylight Factor |
|-----------------------------------------------------------------------------|-------------------------|
| Predominantly daylight without the need for supplementary electric lighting | 5%                      |
| With supplementary electric lighting:                                       |                         |
| Suitable for kitchens                                                       | 2%                      |
| Suitable for living rooms                                                   | 1.5%                    |
| Suitable for bedrooms                                                       | 1%                      |

### **A2.2.3 No-Sky Line and the Working Plane**

Whilst the ADF and VSC determine the amount of daylight in a room, the no-sky line determines how well the daylight is distributed in the room. Areas beyond the no-sky line will generally look gloomy.

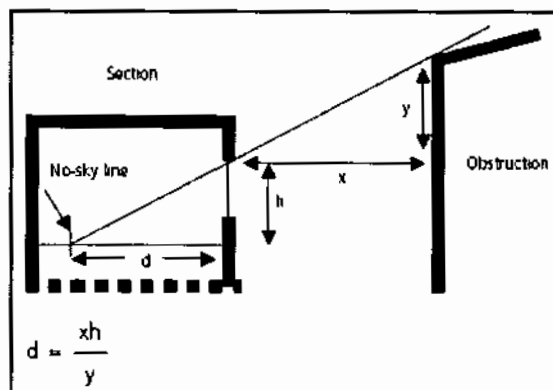
The working plane is a notional surface, typically at about desk or table height, at which the daylight factor or the 'no-sky line' is calculated or plotted. For calculations in dwellings, it is taken to be at a position 0.85 m above the floor.

The no-sky line divides those areas of the working plane which can receive direct skylight, from those which cannot. If the external obstructions already exist, it is possible to measure directly the position of the no-sky line in a room.

The assessment criteria for the working plane is detailed in the Communities & Local Government published report *Code for Sustainable Homes-Technical Guidance (2008)*. The minimum requirement stated by the guidance is 80% of the working plane in each kitchen, living room, dining room and study must receive direct light from the sky.

As an approximation, obstructions that are parallel to the window can be considered infinite. The no sky-line will then be parallel to the window at a distance 'd' from the window wall. **Figure A2.2** 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*.

**Figure A2.2: Pictorial calculation of the No-Sky Line**



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

## A2.2 Sunlight

Whilst daylight is an essential element of all dwellings, sunlight is considered to be desirable rather than essential. The BRE Report suggests that not all windows need to have access to direct sunlight and that direct sunlight is most desirable in living rooms and kitchens and less important in bedrooms.

When designing a new development or an extension to an existing building, the impact on the amount of sunlight received in the living areas of residential properties must be assessed, as residents are particularly likely to notice a loss of sunlight entering their homes.

Sunlight availability can be measured in Annual Probable Sunlit Hours (APSH). The APSH assessment determines the amount of probable sunlight that will shine on the window in a typical year.

The BRE Report suggests that to ensure that a dwelling will appear reasonably sunlit, at least one main window wall should face within 90 ° of due south and that the window receives at least 25% of the total APSH available during a given year, and at least 5% of the total APSH during the winter months. Consequently, not every window in a dwelling needs to achieve the minimum levels of sunlight, nor does every room in a dwelling.

When assessing the impact on sunlight from a new development on an existing development, if the levels with the development proposals include an APSH less than 0.8 times their former value, then the existing occupants will notice the loss in sunlight.



Email: [enquiry@accon-uk.com](mailto:enquiry@accon-uk.com)

**Reading Office:**

Tel: 0118 971 0000  
Fax: 0118 971 2272  
Unit B, Fronds Park,  
Frouds Lane, Aldermaston,  
Reading, RG7 4LH

**Brighton Office:**

Tel: 01273 573 814  
Citibase, 95 Ditchling Road,  
Brighton, East Sussex, BN1 4ST

[www.accon-uk.com](http://www.accon-uk.com)