Hawkins environmental

# Internal Daylight Assessment: 1a Perren Street, Kentish Town

Andrew Sabin

4th September 2018

## Report Details:

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| **Client** | Andrew Sabin |
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| V1 | 23rd July 2018 | Original Issue | Nick Hawkins MSc MIOA MIAQM | Nick Hawkins MSc MIOA MIAQM |
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# Table of Contents



# List of Tables



# List of Figures

# 1. INTRODUCTION

Hawkins Environmental Limited has been instructed by Andrew Sabin to undertake an internal daylight assessment for the redevelopment of 1a Perren Street, situated in the London Borough of Camden.

The proposed development will see a partial remodelling of the building, with a small extension, to convert a single family home on the first floor to three apartments, plus an additional duplex on the ground and first floor, retaining commercial uses on the ground floor. During the planning process, concern has been noted as to whether the basement bedroom would be considered to be adequately daylit. Consequently, this daylight assessment assesses the level of daylight within the habitable rooms and determines whether the rooms will be adequately daylit.

The 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 fully incorporates the changes in methodology as a consequence of the publication of the Second Edition of the BRE Report in 2011.

# 2. POLICY & ASSESSMENT CRITERIA

## 2.1. National Planning Policy Framework (2018)

The National Planning Policy Framework (NPPF) was first published on the 27th March 2012 and revised on the 24th July 2018 and outlines the Government's environmental, economic and social policies for England. The NPPF sets out a presumption in favour of sustainable development which should be delivered with three main dimensions: economic; social and environmental (Paragraphs 7, 8 10 and 11). The NPPF aims to enable local people and their councils to produce their own distinctive local and neighbourhood plans, which should be interpreted and applied in order to meet the needs and priorities of their communities.

The NPPF states that the planning system *"Planning policies and decisions should contribute to and enhance the natural and local environment by… e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans"* (Paragraph 120).

The revised 2018 version of the NPPF talks specifically about daylight for the first time. Paragraph 123 states that:

*"Where there is an existing or anticipated shortage of land for meeting identified housing needs, it is especially important that planning policies and decisions avoid homes being built at low densities, and ensure that developments make optimal use of the potential of each site. In these circumstances…local planning authorities should refuse applications which they consider fail to make efficient use of land, taking into account the policies in this Framework. In this context, when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site (as long as the resulting scheme would provide acceptable living standards)".*

## 2.2. Planning Practice Guidance (2015)

The Planning Practice Guidance (PPG) was launched on 6th March 2014 and provides additional guidance and interpretation to the Government's strategic policies, outlined within the NPPF, in a web-based resource. This is updated regularly.

The PPG discusses the importance of good design and references daylight and sunlight on a number of occasions, specifically the need to ensure that daylight and sunlight patterns are considered when considering the form and scale of a new building, especially in relation to tall buildings.

## 2.3. The London Plan (2016)

The London Plan – Spatial Development Strategy for London Consolidated with Alterations since 2011 (2016) provides an overall strategic plan for

London, and it sets out a fully integrated economic, environmental, transport and social framework for the development of the capital to 2031. The London Plan brings together the Mayor's strategies, including policy on a range of environmental issues, such as climate change, air quality, noise and waste. London Boroughs' local

plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

Policy 3.5 relates to the quality and design of housing developments and states that:

> *"Housing developments should be of the highest quality internally, externally and in relation to their context and to the wider environment, taking account of strategic policies in this Plan to protect and enhance London's residential environment and attractiveness as a place to live."*

## 2.4. The Draft London Plan (2017)

The revised December 2017 draft version of The London Plan, which has yet to be adopted, provides substantial revisions in relation to daylighting. Policy D4 - Housing quality and standards states:

> *"F. The design of development should provide sufficient daylight and sunlight to new housing that is appropriate for its context, whilst avoiding overheating, minimising overshadowing and maximising the usability of outside amenity space".*

Policy D8 - Tall buildings states in relation to the environmental impact of tall structures that:

> *"Wind, daylight, sunlight penetration and temperature conditions around the building(s) and neighbourhood must be carefully considered and not compromise comfort and the enjoyment of open spaces, including water spaces, around the building".*

Specifically, in relation to smaller developments, the draft Plan notes:

> *"Environmental and architectural innovation should be supported and schemes should achieve good design and ensure that existing and proposed homes benefit from satisfactory levels of daylight and sunlight".*

## 2.5. Housing Supplementary Planning Guidance (2016)

Published in March 2016, the Housing Supplementary Planning Guidance highlights the elements of the London Plan that are relevant to housing development, and where applicable, provides more detail.

One important aspect of the Housing SPG is that it acknowledges that the BRE Guidelines should be applied flexibly. The SPG states:

> *"Policy 7.6Bd requires new development to avoid causing 'unacceptable harm' to the amenity of surrounding land and buildings, particularly in relation to privacy and overshadowing and where tall buildings are proposed. An appropriate degree of flexibility needs to be applied when using BRE guidelines to assess the daylight and sunlight impacts of new development on surrounding properties, as well as within new developments themselves. Guidelines should be applied sensitively to higher density development, especially in opportunity areas, town centres, large sites and accessible locations, where BRE advice suggests considering the use of alternative targets. This should take into account local circumstances; the need to optimise housing capacity; and scope for the character and form of an area to change over time.*
>
> *The degree of harm on adjacent properties and the daylight targets within a proposed scheme should be assessed drawing on broadly comparable residential typologies within the area and of a similar*

*nature across London. Decision makers should recognise that fully optimising housing potential on large sites may necessitate standards which depart from those presently experienced but which still achieve satisfactory levels of residential amenity and avoid unacceptable harm".*

The accompanying notes to Standard 32 reinforce this view and states that:

*"BRE guidelines on assessing daylight and sunlight should be applied sensitively to higher density development in London, particularly in central and urban settings, recognising the London Plan's strategic approach to optimise housing output (Policy 3.4) and the need to accommodate additional housing supply in locations with good accessibility suitable for higher density development (Policy 3.3). Quantitative standards on daylight and sunlight should not be applied rigidly, without carefully considering the location and context and standards experienced in broadly comparable housing typologies in London".*

Standard 32 talks directly about the need for direct sunlight. The standard states:

*"All homes should provide for direct sunlight to enter at least one habitable room for part of the day. Living areas and kitchen dining spaces should preferably receive direct sunlight".*

The accompanying notes go on to state that:

*"Daylight enhances residents' enjoyment of an interior and reduces the energy needed to provide light for everyday activities, while controlled sunlight can help to meet part of the winter heating requirement. Sunlight is particularly desirable in living areas and kitchen dining spaces… (The) BRE good practice guidelines and methodology can be used to assess the levels of daylight and sunlight achieved within new developments…"*

The guidance goes on to state that where Standard 32 cannot be achieved when it is not possible to provide direct sunlight to at least one habitable room:

*"… developers should demonstrate how the daylight standards proposed within a scheme and individual units will achieve good amenity for residents. They should also demonstrate how the design has sought to optimise the amount of daylight and amenity available to residents, for example, through the design, colour and landscaping of surrounding buildings and spaces within a development".*

## 2.6. Site Layout Planning for Daylight and Sunlight (2011)

The Building Research Establishment (BRE) report, "Site layout planning for daylight and sunlight" Second Edition 2011 by PJ Littlefair (referred to as the BRE Guidance) is almost universally used as the official method in the UK and Ireland for determining whether a development meets good practice standards of daylight and sunlight and for determining the impact of a development on daylight and sunlight availability.

The BRE Guidance 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 solar dazzle from sloping buildings. In addition, the BRE Report provides advice on how to design buildings to ensure that they retain good practice 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 potential impacts of a new development on surrounding buildings and to determine whether new developments are well lit internally.

However, the report does state that the good practice guidelines are not mandatory, but should be considered as a guide to help rather than constrain the designer.

The Average Daylight Factor (ADF) is the accepted methodology for measuring 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 daylit. Different types of rooms have different minimum requirements for daylighting. **Table 2.1** details the acceptable criteria for average daylight factor for habitable rooms.

**Table 2.1: Daylight Factor Criteria**

| Room Use | Minimum Daylight Factor |
|---|---|
| Kitchens | 2.0% |
| Living Rooms & Studies | 1.5% |
| Bedrooms | 1.0% |

# 3. INTERIOR DAYLIGHTING CALCULATIONS

It has been determined during the process of the planning application that the proposed habitable rooms will require an internal daylight assessment to determine whether they meet the best practice guidelines on internal daylighting.

## 3.1. 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%.

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);

$A_w$ is the net glazed area of the windows (in $m^2$);

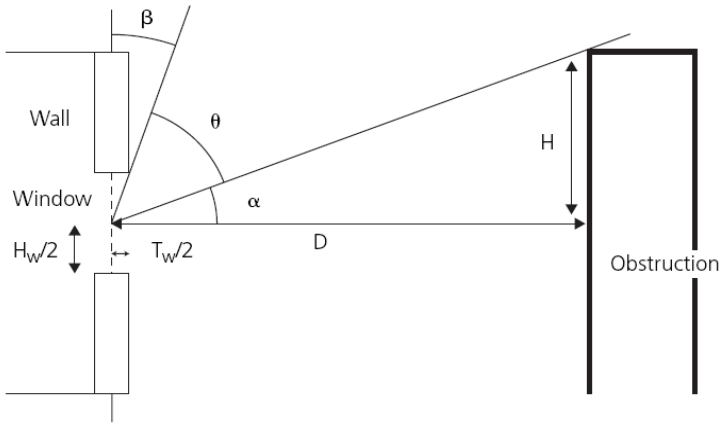
θ is the angle of visible sky in degrees;

A is the total area of room surfaces (in $m^2$), 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 3.1** 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 90°. 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 3.1: 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 in the BRE Report, in order to calculate the ADF.

To calculate the VSC, the software packages created by MBS Survey Software Limited have been utilised to create Waldram Diagrams which plot VSC. The tools created by MBS are one of the only tools in the Daylight/Sunlight sector that fully incorporate the methodologies introduced in the Building Research Establishment (BRE) report, *"Site layout planning for daylight and sunlight"* Second Edition 2011 by PJ Littlefair and is widely acknowledged to be a suitable tool for undertaking daylight, sunlight and overshadowing assessments in accordance with the BRE Guidance. For the purposes of the assessment, a three-dimensional computer model was constructed both with and without the proposed development in place.

At this site, Hawkins Environmental were provided with a site survey of the existing site layout and plans and elevations of the proposed development. This information has been used to construct the three-dimensional computer model. Wherever possible, survey information provided by the client and their agents has been utilised to add information to the model; however, where details were not present in the survey information, professional judgement has been used to estimate information where necessary. **Figures 3.2 to 3.4** show views of the three-dimensional model of the development.

The methodology for calculating the VSC using the Waldram Diagrams is detailed within Appendix B of the Building Research Establishment (BRE) report, "*Site layout planning for daylight and sunlight – a guide to good practice"* by PJ Littlefair.

The Waldram Diagram dates back to 1923 and consists of a grid of squares, each representing an equal portion of available daylight. Upon the grid, it is possible to draw projections of obstructions as seen from a reference point, plotted with reference to the azimuth angles and altitude angles measured from a reference point. The area of the diagram un-obscured equates to the VSC. If the Waldram Diagram is totally un-obscured by obstructions, this represents the maximum possible VSC of 39.6%. The diagram has been designed in such a way that vertical edges remain vertical in projection, but horizontal edges follow the so-called "droop" lines in order to take the cosine law of illumination and the non-uniform luminance of the sky into account. The

Waldram Diagram method is a more complex method than the skylight indicator method also described in the BRE report. However, it tends to be more accurate and less open to interpretation and error.

**Figure 3.5** shows an example Waldram Diagram from this project. It should be noted that the Waldram Diagrams provided here are for information only. The Waldram Diagrams should only be interpreted by professionals with appropriate experience.

**Figure 3.2: 3D model of the Proposed Development – View 1**

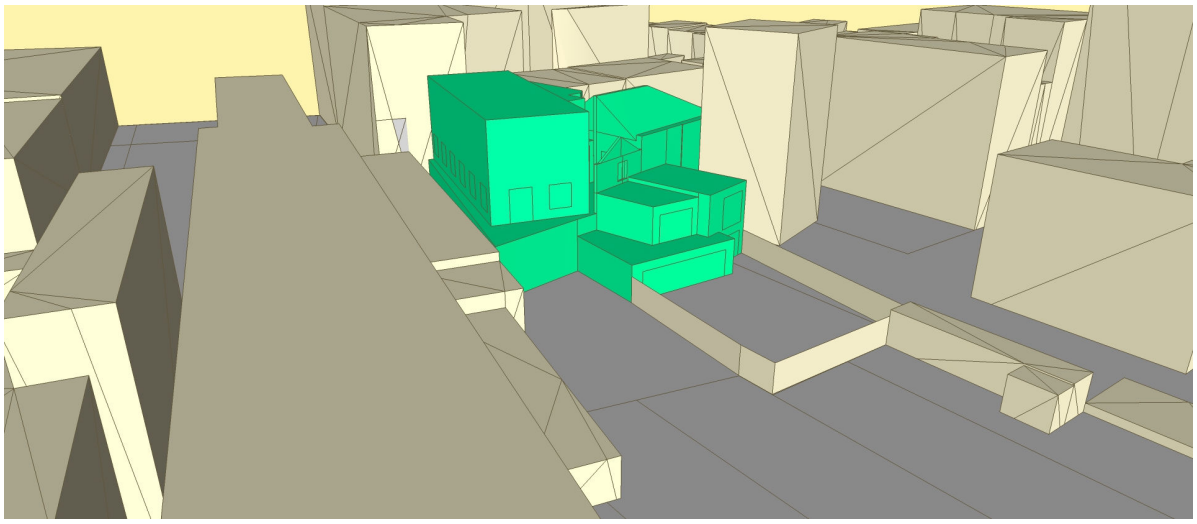


**Figure 3.3: 3D model of the Proposed Development – View 2**

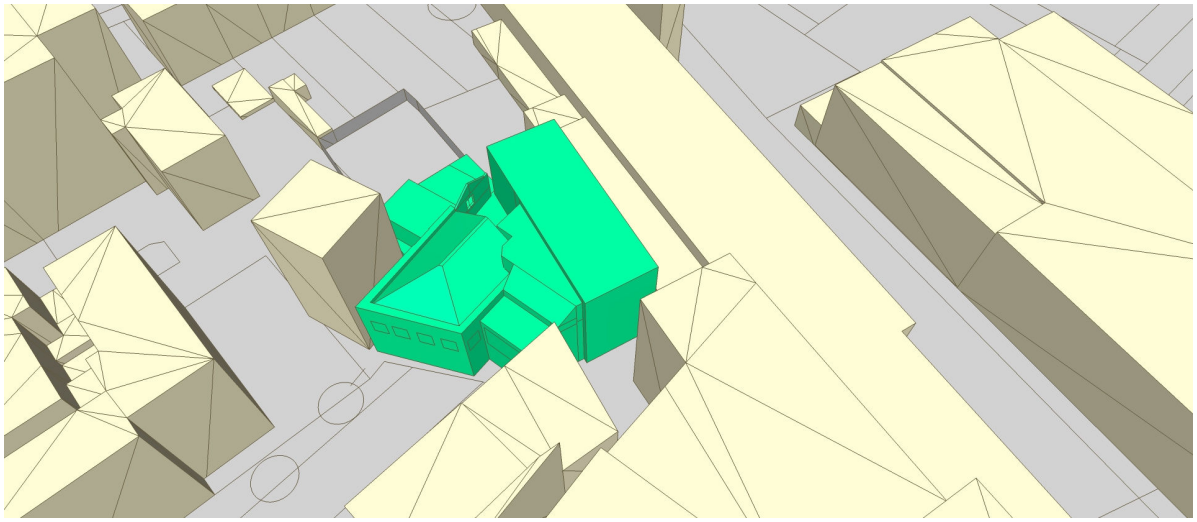


**Figure 3.4: 3D model of the Proposed Development – View 3**

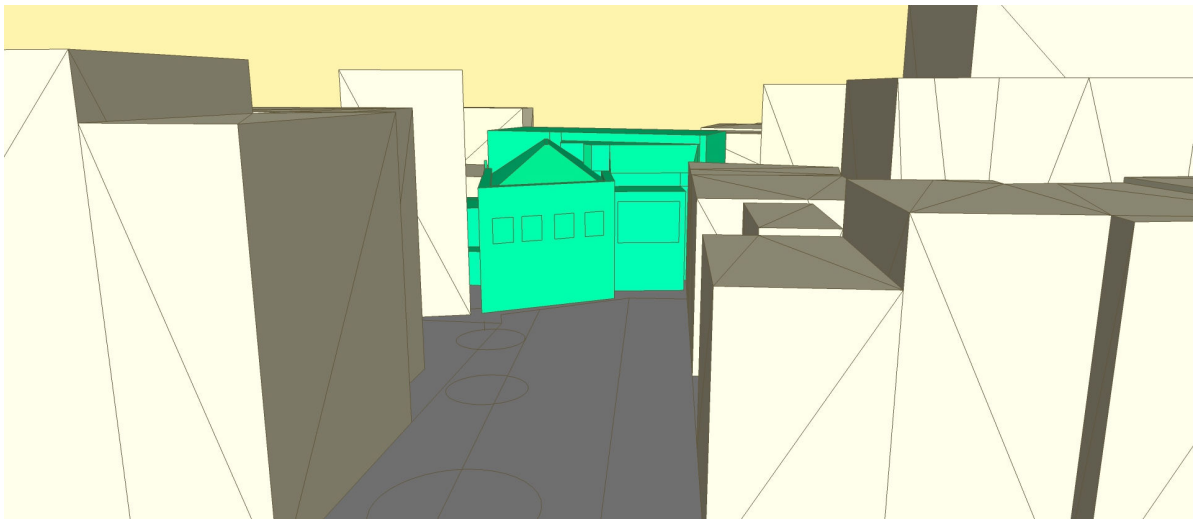
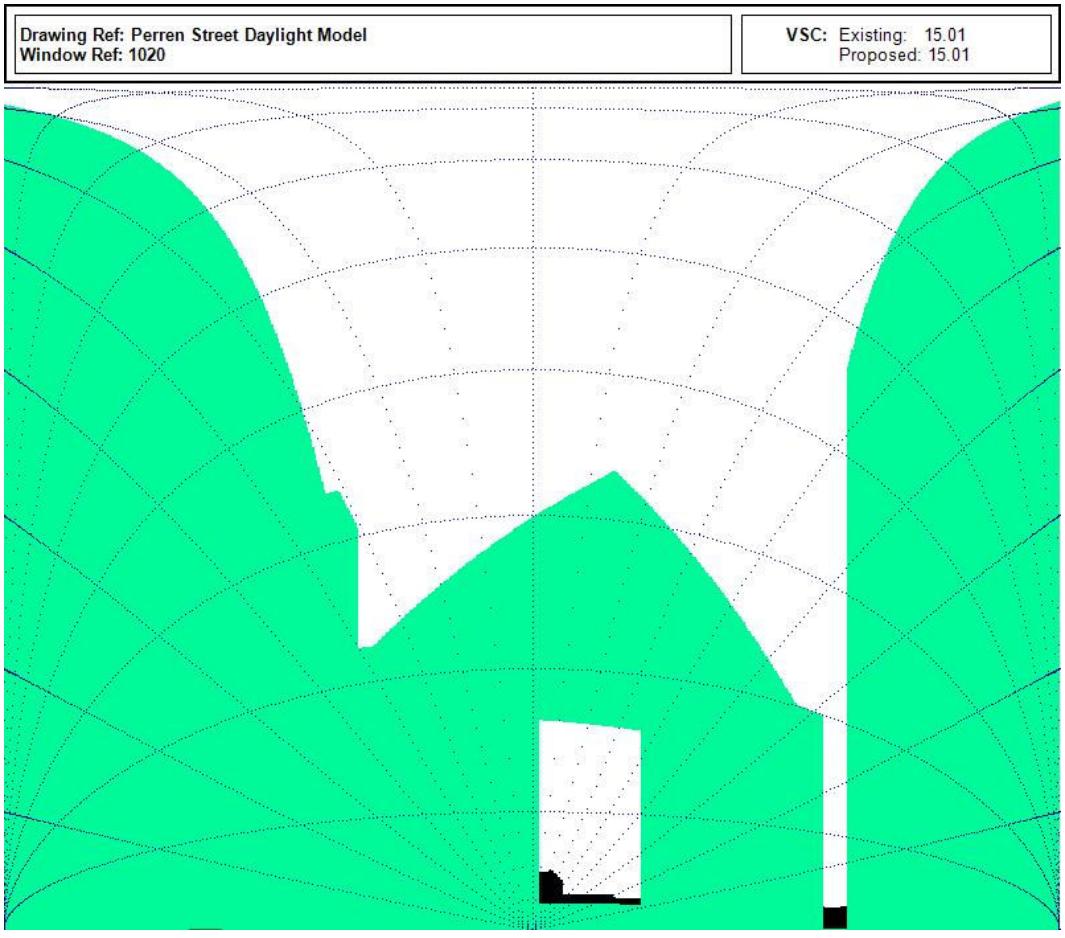


**Figure 3.5: Sample Waldram Diagram**



For the proposed dwellings, **Table 3.1** shows the daylight factor calculations for each window, with **Table 3.2** showing the aggregated results of these calculations for each room.

**Table 3.1: Daylight Factor Calculations**

| Flat | Room | T | $A_w$ m² | VSC % | θ° | A m² | R |
|---|---|---|---|---|---|---|---|
| Flat 1a | Lounge / Kitchen | 0.68 | 13.08 | 30.9 | 72 | 177.8 | 0.5 |
| | Bedroom 1 | 0.68 | 4.68 | 25.8 | 63 | 83.4 | 0.5 |
| | Bedroom 2 | 0.68 | 3.12 | 32.9 | 75 | 54.8 | 0.5 |
| | Bedroom 3 | 0.68 | 4.00 | 30.8 | 72 | 74.4 | 0.5 |
| Flat 1d | Lounge / Kitchen | 0.68 | 2.34 | 36.3 | 82 | 115.5 | 0.5 |
| | | 0.68 | 2.92 | 35.5 | 80 | 115.5 | 0.5 |
| | | 0.68 | 2.34 | 35.8 | 81 | 115.5 | 0.5 |
| | Study | 0.68 | 2.34 | 36.5 | 82 | 51.8 | 0.5 |
| | Bedroom | 0.68 | 2.34 | 36.6 | 82 | 53.6 | 0.5 |
| Flat 1e | Bedroom 1 | 0.68 | 2.34 | 36.3 | 82 | 66.2 | 0.5 |
| | Bedroom 2 | 0.68 | 2.34 | 33.2 | 76 | 65.1 | 0.5 |
| | Lounge / Kitchen | 0.68 | 8.09 | 21.4 | 56 | 165.4 | 0.5 |
| Flat 1f | Lounge / Kitchen | 0.68 | 1.89 | 15.8 | 46 | 252.7 | 0.5 |
| | | 0.68 | 1.89 | 27.4 | 66 | 252.7 | 0.5 |
| | | 0.68 | 1.89 | 28.4 | 67 | 252.7 | 0.5 |
| | | 0.68 | 1.89 | 28.8 | 68 | 252.7 | 0.5 |
| | | 0.68 | 1.89 | 28.7 | 68 | 252.7 | 0.5 |
| | | 0.68 | 2.92 | 10.7 | 36 | 252.7 | 0.5 |
| | Bedroom 1 | 0.68 | 2.06 | 10.9 | 37 | 62.8 | 0.5 |
| | Bedroom 2 | 0.68 | 9.66 | 15.0 | 44 | 62.1 | 0.5 |

Where: T is the diffuse visible transmittance of the glazing;
$A_w$ 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.

**Table 3.2: ADF Results**

| Flat | Room | Average Daylight Factor |
|---|---|---|
| Flat 1a | Lounge / Kitchen | 4.8 |
| | Bedroom 1 | 3.2 |
| | Bedroom 2 | 3.9 |
| | Bedroom 3 | 3.5 |
| Flat 1d | Lounge / Kitchen | 4.8 |
| | Study | 3.4 |
| | Bedroom | 3.3 |
| Flat 1e | Bedroom 1 | 2.6 |
| | Bedroom 2 | 2.5 |
| | Lounge / Kitchen | 2.5 |
| Flat 1f | Lounge / Kitchen | 2.5 |
| | Bedroom 1 | 1.1 |
| | Bedroom 2 | 6.3 |

The BRE Report suggests that kitchens should have a minimum ADF of 2%, living rooms 1.5% and bedrooms 1%. **Table 3.2** shows that all rooms exceed the minimum recommended ADF, appropriate for the intended use of the room.

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# 4. CONCLUSIONS

Calculations were conducted in accordance with the BRE Report in order to determine the extent to which the proposed redevelopment of 1a Perren Street will experience good levels of internal daylight.

The assessment shows that all habitable rooms will be considered to be very well daylit, with expected levels of daylight in excess of the best practice guideline level. Therefore, it can be concluded that overall the proposed dwelling will benefit from a good level of daylight and daylight availability should not be a constraint upon the development of the site.