Hawkins environmental

Daylight Assessment: 34 Shootup Hill

Kingscroft Estates Ltd

30th January 2017

Report Details:

Report Title	Daylight Assessment: 34 Shootup Hill
Client	Kingscroft Estates Ltd
Project Number	H2329

Version History:

Version No.	Date Issued	Comments	Author	Checked
V01	30th November 2016	Original Issue	Nick Hawkins MIOA MIAQM	Nick Hawkins MIOA MIAQM
V02	30th January 2017	Minor changes to layout	Nick Hawkins MIOA MIAQM	Nick Hawkins MIOA MIAQM

Table of Contents

List of Tables

List of Figures

1. INTRODUCTION

Hawkins Environmental Limited has been instructed by Kibble & Hargreaves to undertake a daylight assessment for the redevelopment of garages at 34 Shootup Hill, in the Kilburn area of the London Borough of Camden.

It is understood that there is some concern regarding the level of daylight within the proposed dwellings. Consequently, this daylight assessment assesses the level of daylight within the basement 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. Daylight and Sunlight

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. On a cloudy or overcast day diffused daylight still shines through windows, even when sunlight is absent.

2.2. 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, now replaced by the National Planning Policy Framework (NPPF), 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 whether a development meets good practice standards of daylight and sunlight and for determining the impact of a development on daylight and sunlight availability; In addition, 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.

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

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

It is important to note that the BRE Report "Site Layout Planning for Daylight and Sunlight" is not a test to determine whether a development "Passes" or "Fails", rather "*A Guide to Good Practice*". Therefore, whilst one should try to achieve the numerical guidance within the report (e.g. ADF, VSC, APSH etc.), the failure to do so does not indicate that the development is unsuitable, nor is it an indication that planning permission should be refused.

2.4. 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 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 day lit. 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

Criteria	Minimum Daylight Factor
Suitable for kitchens	2%
Suitable for living rooms	1.5%
Suitable for bedrooms	1%

2.5. The London Plan

The London Plan[1], published in July 2011, 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 Plan brings together the Mayor's strategies, including policy on a range on 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."

1 The London Plan - Spatial Development Strategy for Greater London (July 2011), Mayor of London.

2.6. London Plan – Housing Supplementary Planning Guidance

The Housing SPG, published in November 2012 highlights the elements of the London Plan that are relevant to housing development, and where applicable, provides more detail. The SPG states:

"Daylight and sunlight good practice:

Standard 5.5.1 - Glazing to all habitable rooms should be not less than 20% of the internal floor area of the room.

Standard 5.5.2 - 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.

2.3.38 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 risk of overheating should be taken into account when designing for sunlight (see Standard 6.3.1).

2.3.39 The Code for Sustainable Homes requires a minimum average daylight factor of 2% in kitchens and 1.5% in living rooms, dining rooms and bedrooms in order to achieve credits. These measures define a minimum acceptable level to make an interior feel day-lit, but they do not guarantee a comfortable level of light for a range of daily activities. Good practice standards 5.5.1 and 5.5.2 seek to achieve that higher level of comfort."

3. INTERIOR DAYLIGHTING CALCULATIONS

It has been determined during the process of the planning application that the proposed rooms will require an internal daylight assessments 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);

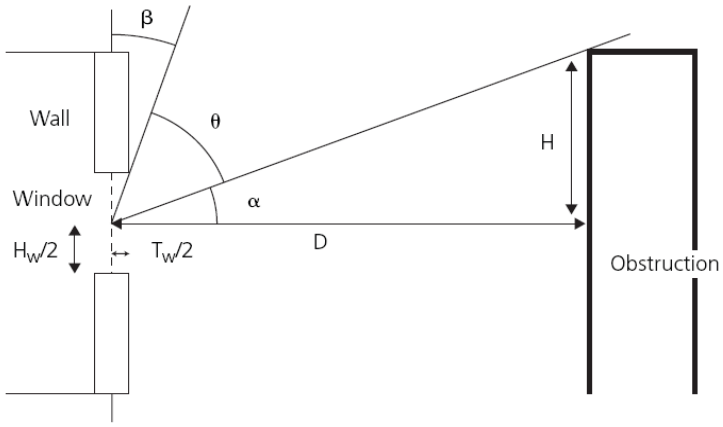
θ is the angle of visible sky in degrees;

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 within 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 and 3.3** show a view 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 3.2: 3D Model of the Proposed Development – View 1

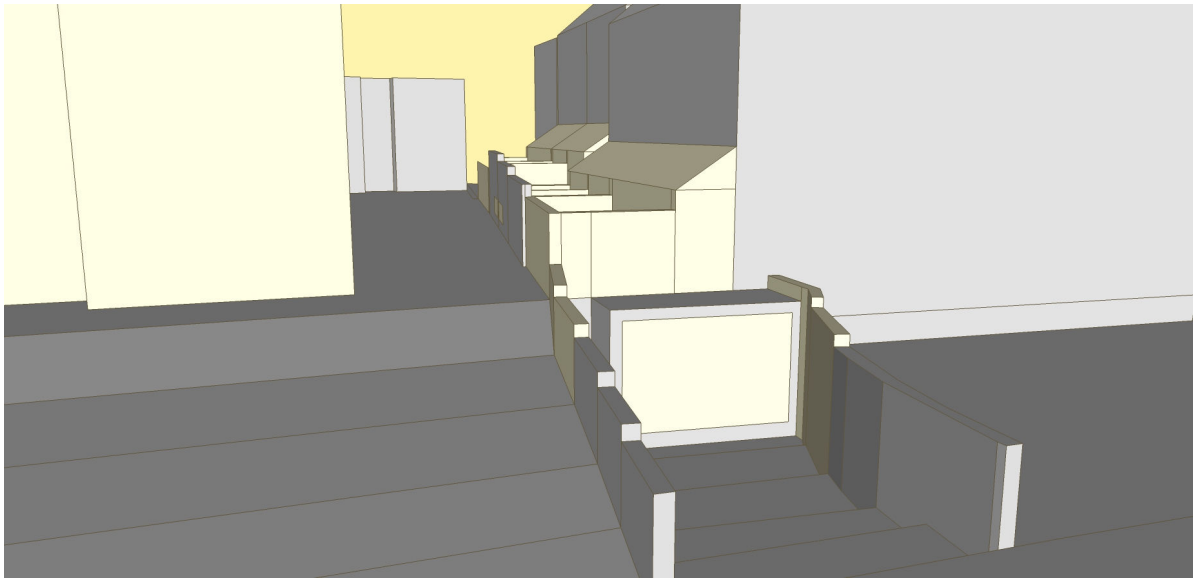
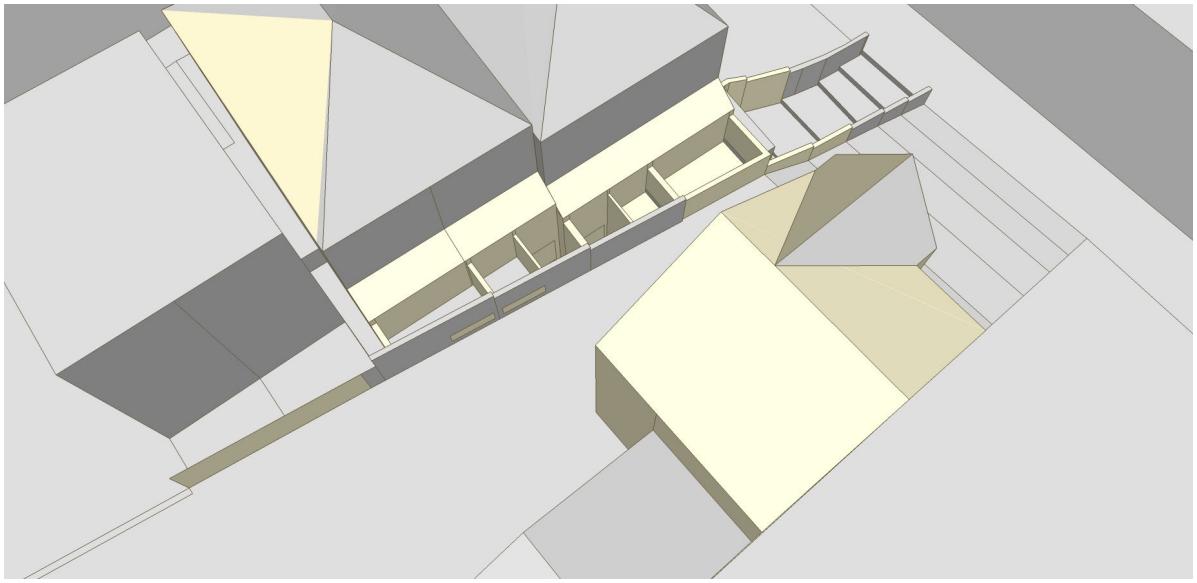


Figure 3.3: 3D Model of the Proposed Development – View 2



For the proposed basement dwelling, **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	Window	T	A_w m^2	VSC %	Θ Degrees	A m^3	R
Flat E	Lounge / Kitchen	Window	0.68	9.1	22.1	57	121	0.5
		Rooflight	0.52	2.7	32.5	75		
	Bedroom	Window	0.68	3.7	0.5	7	57	0.5
Flat C	Bedroom	NW facing window	0.68	4.1	0.4	7	82	0.5
		SW facing window	0.68	2.2	2.4	17		
		Rooflight	0.52	2.6	25.8	63		
Flat D	Bedroom	Rooflight	0.52	3.4	29.1	69	82	0.5

Table 3.2: ADF Results

Flat	Room Use	Average Daylight Factor (%)
Flat E	Lounge / Kitchen	5.1
Flat E	Bedroom	0.4
Flat C	Bedroom	2.1
Flat D	Bedroom	1.9

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 in the proposed dwellings, light within the lounge/kitchen of Flat E and in the new bedrooms within Flats C and D would be considered in excess of the best practice levels; however, the levels of daylight within the bedroom of the Flat would not meet the best practice guidelines. However, it is important to note that the BRE Guidance only contains recommendations on internal daylighting. The numerical values given within the report are not minimum standards, but rather aspirational good practice design criteria. Whilst it may be desirable to meet the recommendations within the BRE Guidance, failure to meet these recommendations does not mean that the accommodation is sub-standard, nor should be refused planning permission on this basis. 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."* Therefore, since the design of the development has been crafted to maximise the available daylight within all rooms, overall, it is recommended that daylight should not be a constraint upon the development of the site.

4. CONCLUSIONS

Calculations were conducted in accordance with the BRE Report in order to determine the extent to which the proposed redevelopment of 34 Shootup Hill will experience good levels of internal daylight.

The assessment shows that light within the lounge/kitchen of Flat E and in the new bedrooms within Flats C and D would be considered in excess of the best practice levels; however, the levels of daylight within the bedroom of Flat E would not meet the best practice guidelines.