BrooksDevlin

248 Kilburn High Road, London, NW6
Skylight and Sunlight Impact Assessment

Prepared for:	Inside Out Architecture
Written by:	Leigh Caller
Checked by:	Nick Devlin
Date:	19th October 2013
Revision:	V.4 PLANNING

Unit 12, Pineapple Business Park, Salway Ash, Bridport, Dorset, DT6 5DB
T: 01308 487011 www.brooksdevlin.com
Registered in England no: 6528144 VAT No: 931 3259 39

Table of Contents

1 Executive Summary

This report details the results from a skylight and sunlight impact assessment of the proposed new development at 248 Kilburn High Road in the London Borough of Camden as designed by Inside Out Architecture.

Three dimensional computer modelling of the development proposals in Autodesk Ecotect have delivered the quantitative results presented in this report in accordance with the methodologies set out in BRE report 209 – *Site Layout Planning for Sunlight and Daylight, Littlefair, 2nd Edition, 2011* (BR 209). On this basis of the modelling carried out the following observations and conclusions can be drawn:

- Detailed assessment has shown that all but one of the existing windows serving rooms in adjacent properties covered under BR 209 are predicted to enjoy a VSC either above 27% and/or not less than 0.8 times a previous value after development in accordance with the advisory guidance.

- A small high level bedroom window along the South East boundary of the site is predicted to have its VSC reduced beyond the above suggested limits. However, as this particular window lies close to the site boundary and is therefore taking more than its fair share of light, a revised VSC target value of 17% has been derived in accordance with Appendix F of BR 209 and is achieved.

- Overall, the development is predicted to have a slight negative impact on access to sunlight to windows covered under BR 209. However, the extent of this impact is wholly within the limits given by BR 209.

2 Glossary

Daylight:
Visible part of the global solar radiation – includes sunlight and skylight components as described below. Note the term 'daylight' is often misused to describe skylight.

Sunlight:
Visible part of the solar radiation that reaches the Earth's surface directly as parallel rays after selective attenuation by the atmosphere. Note, this is sometimes known as beam radiation.

Skylight:
Visible part of the solar spectrum that reaches the Earth's surface diffusely as a result of scattering by the Earth's atmosphere.

Obstruction Angle:
The angular altitude of the top of an obstruction above the horizontal, measured from a given reference point in a vertical plane in a section drawn perpendicular to the vertical plane.

Annual Probable Sunlight Hours (APSH):
Long-term average of the total number of hours during the year that direct sunlight reaches the unobstructed ground.

Vertical Sky Component (VSC):
The ratio, expressed as a percentage, of that part of illuminance, at a point on a given vertical plane that is received directly from a standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky.

Visible Sky Angle θ (VSA):
An angular measurement that results from deducting the obstruction angle from a right angle taken from a given reference point in a vertical plane. Ignoring the effects of shading by window reveals, the VSA is equal to 90° minus the Obstruction Angle.

3 Introduction

Brooks Devlin were appointed by Inside Out Architecture to undertake a skylight and sunlight impact study in relation to the existing residential properties adjacent to the proposed new residential development at 248 Kilburn High Road, London NW6. This report has been drafted to meet the requirements of Camden Council Planning guidance which states:

'*A daylight and sunlight assessment should accompany planning applications where a proposed development has the potential to negatively impact the existing levels of daylight or sunlight on neighbouring properties.'*

The predicted impact of the proposed development has been assessed in relation to the guideline standards defined in accordance with the BRE Report *BR 209: Site Layout Planning for Sunlight and Daylight, 2nd Edition 2011* by Paul Littlefair.

The analysis presented in this report is based on the following information provided by Inside Out Architecture:

- P1112_200 Rev D – *Proposed Ground Floor Plan*
- P1112_201 Rev D – *Proposed First Floor Plan*
- P1112_202 Rev D – *Proposed Second Floor Plan*
- P1112_203 Rev D – *Proposed Third Floor Plan*
- P1112_204 Rev D – *Proposed Fourth Floor Plan*
- P1112_P_300 Rev B – *Proposed Rear Block North West Elevation*
- P1112_P_301 Rev B – *Proposed Rear Block South West Elevation*
- P1112_P_302 Rev B – *Proposed Rear Block South East Elevation*
- P1112_P_303 Rev B – *Proposed Front Block Street Elevation*
- P1112_P_304 Rev B – *Proposed Front Block Rear Elevation*
- 3D Sketchup model of the proposals supplied by Inside Out Architecture.
- Existing Site Photographs.
- Site visit undertaken by Brooks Devlin

3.1 Site Description

The site is located to the North of Kilburn High Road between the main road (A5) and Kilburn Grange Park as shown in Figure 1.

The site is currently cleared as shown in Figure 2; with a three storey residential building occupying the Northern edge of the site as shown in Figures 3 and 4. The site is bounded and overlooked by a number of existing buildings, which are believed to be a mixture of residential and commercial premises, see figures 5 and 6.

Figure 1: Site Location Plan (NTS)

Figure 2: Existing Site (Looking South West) towards Kilburn High Road

Figure 3: Recently Constructed Residential Building (Looking North East)

Figure 4: Recently Constructed Residential Building (Looking North)

Figure 5: Rear of existing terrace facing Kilburn High Road (Looking South West) Showing Existing Windows

Figure 6: Rear of existing neighbouring commercial building facing Kilburn Grange Park (Looking North) Showing Existing Windows

3.2 Methodology

Due to the complexity of daylight modelling, it was deemed necessary to construct a 3D computer model of the existing and proposed conditions in Autodesk Ecotect software in order to accurately and objectively assess the impact of the proposals on the existing windows of neighbouring buildings. To complete the assessment of the predicted skylight and sunlight availability for the existing and proposed conditions, it has been necessary to complete the following assessments:

- A first stage qualitative assessment of the existing and proposed conditions
- Vertical Sky Component (VSC) Analysis for existing windows
- Calculation of Annual Probable Sunlight Hours for existing windows (APSH)

The objective of this study is to test the impact of the proposed development on the existing buildings in terms of the availability of skylight and sunlight, measured using VSC and APSH calculations. As detailed in the BRE Guidelines, the use of ADF calculations are not appropriate (Appendix F) as the internal layout of the existing buildings is unknown.

For the development proposal, VSC calculations are best suited to inform any loss of light to the existing windows because the VSC depends only on obstruction and is therefore a measure of the daylit environment as a whole.

It should be noted that in some instances it has not been possible to accurately determine the size of some existing windows due to access restrictions. Therefore, these windows have been plotted and sized using site photographs and aerial photography.

4 First Stage Assessment

Before conducting detailed numerical analysis, a 'first stage' assessment was undertaken, using simple graphical methods in Autodesk Ecotect, to determine which, if any, of the existing windows to neighbouring properties the proposals are likely to have a negative impact on in terms of the amount of daylight available based on the 25° rule described in BR209, paragraph 2.2.5.

4.1 Visible Sky Angle θ

BR 209 states the quality and quantity of daylight inside a room will be impaired if obstructing buildings (existing or proposed) are large in relation to their distance away. Furthermore, the amount of daylight entering a room with a wide obstruction opposite is proportional to the angle of visible sky θ (Greek theta), measured horizontally from the centre of the window under consideration.

For vertical windows, the VSA is equal to 90 degrees minus the obstruction angle measured from the horizontal plane. If the VSA is greater than 65 degrees (obstruction angle less than 25 degrees) then enough skylight should still be reaching the window of the existing window, negating the requirement for any further assessment.

A visual assessment was undertaken in Autodesk Ecotect by plotting a solid plane perpendicular to each existing window at an angle of 25 degrees from the horizontal. For windows where the new development extended above this plane, a further detailed assessment was deemed necessary to find the loss of skylight. An example of the above procedure is shown in Figure 7 below. This clearly shows the proposed Block B (shown in red) projecting above the limiting plane for the selected window (shown in blue). In this case the selected window is the lowest of the existing windows to the rear of the terrace facing Kilburn High Road.

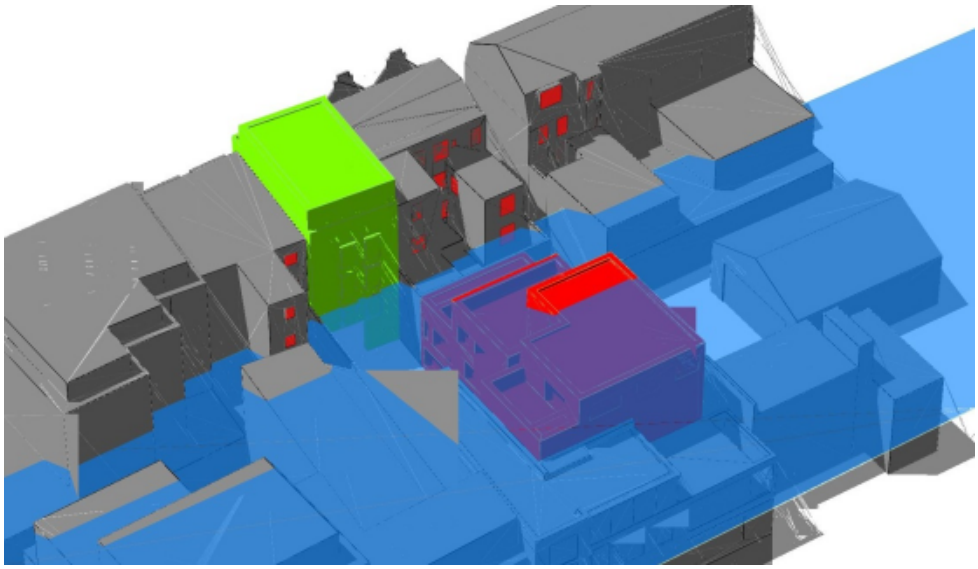

Figure 7: Solid Plane Plotted in Autodesk Ecotect at 25 degrees from horizontal

5 Further Analysis

BR 209 states that when designing a new development or extension to a building, it is important to safeguard the daylight to nearby buildings. A badly planned development may make adjoining properties feel gloomy and unattractive, possibly affecting their future value and rights to light.

In addition, BR 209 also states that an existing building will retain the potential for good interior daylighting if:

- The proposed scheme does not subtend an angle of 25°, measured horizontally in section in a plane perpendicular to each affected window (See Section 4.1 above).

- The proposed development does not reduce the Vertical Sky Component (VSC) below 27 per cent **and** is not less than 0.8 times its previous value before development (default target criteria).

- Where the above VSC is not achieved, an alternative target may be derived for skylight availability in accordance with BRE Report 209 Appendix F.

It should be noted that quoted figures are purely advisory and should be interpreted flexibly as daylighting is just one of many factors considered in site design of new buildings in the overall site context. One important consideration is weather the existing building(s) is itself a good neighbour, standing a reasonable distance from the site boundary. Since the obstruction angle for the proposed scheme subtends an angle greater than 25° measured from some (but not all) of the existing windows, it is deemed necessary to conduct further detailed analysis in order to determine the loss of skylight to these windows as a result of the proposed development.

5.1 Vertical Sky Component Results

BR 209 guidelines state that for a room to be able to receive sufficient daylight, the windows should be capable of achieving a VSC of greater than 27%. Furthermore, new development should seek to limit any reduction to within 0.8 times its' original value, to ensure adequate daylighting potential is maintained. The guidelines define no maximum allowable reduction for instances where the existing VSC is below the 27% threshold (which is often the case for urban development). With this in mind, it is suggested that a reduction in the region of 0.8 times the previous value may be reasonable for existing ground floor windows in this case.

The existing and proposed VSC has been calculated for each existing window identified from the first stage assessment as requiring further analysis. Results for both conditions are presented in Tables 1 below. The location for each window referenced in the table is identified in Figure 9 on page 16.

For each case the VSC has been obtained for the external plane of each window by counting up the number of un-obscured points plotted on a stereographic shading mask generated within Autodesk Ecotect software using the skylight indicator procedure described in BR209, Appendix A. Each point on the indicator corresponds to 0.5% VSC, therefore the total VSC is found by counting up the number of unobstructed points and multiplying the total by 0.5.

WINDOW REF	EXISTING VSC (%)	PROPOSED VSC (%)	REDUCTION FACTOR
1	32.9	32.0	1.0
2	32.8	31.2	1.0
3	32.7	30.1	0.9
4	32.5	25.2	0.8
5	35.2	32.9	0.9
6	35.2	28.3	0.8
7	28.9	27.2	0.9
8	22.0	19.1	0.9
9	27.2	24.9	0.9
10	31.2	21.3	0.7
11	35.2	30.7	0.9
12	29.8	26.3	0.9

Table 1: Existing and Proposed VSC Results for Existing Windows

Based on the results presented above, the following observations can be made:

- VSC's for existing windows 1 and 2 are only marginally affected by the proposed development. The level of change is insignificant.

- VSC's for windows 3 – 9, 11 and 12 are negatively affected by the proposed development, but are predicted to remain within 0.8 times their previous value.

- The proposed development is predicted to reduce the VSC for window 10 beyond 0.8 times its previous value **and** below 27% VSC.

5.2 Vertical Sky Component Discussion and Conclusions

It has been shown that, in the main, the proposed development is not predicted to impact the amount of skylight available to the existing windows tested. However, window 10 (pictured in figure 3 on page 7 of this report) is predicted to have its VSC reduced below 27% **and** is less than 0.8 times its previous value. As a result occupants of this building are likely to notice the reduction in the amount of skylight through this window if considered in isolation. However, the adjacent building features a number of small roof windows located in the lower roof level, immediately above window 10. The edge of this roof window is highlighted in Figure 8 below.

Notwithstanding the above, as the existing window, which is believed to be serving a bedroom, is positioned extremely close to the boundary, BR 209 suggests that an alternative target value may be set for VSC, below the 27% standard threshold. For example, taking an obstruction angle of 43 degrees as described in Section 2.3 of BR 209 a VSC of 17% would be an appropriate target. Setting this as a revised target would result in window 10 comfortably passing the assessment.

Figure 8: Skylight above Window 10

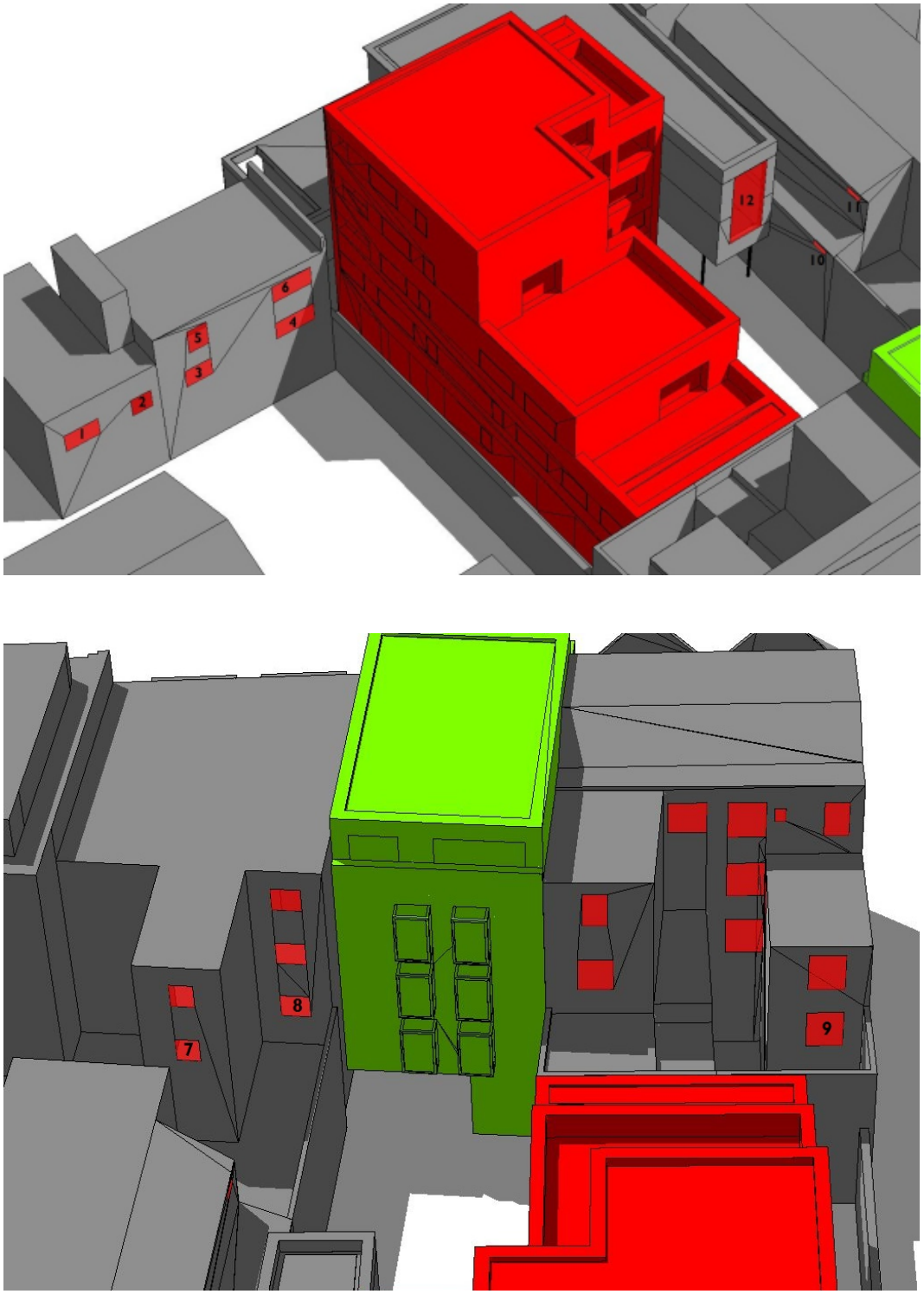

Figure 9: Window Reference Locations (un-referenced windows have been excluded from further detailed assessment following the first stage assessment)

5.3 Annual Probable Sunlight Hours

Whilst there is a Right to Light from the skylight, there is no right to receive direct sunlight. However, the BRE guidelines do suggest a minimum number of annual sunlight hours are maintained for all facades orientated within 90 degrees of south. BR 209 states that a window should be able to receive at least 25% of available probable annual sunlight hours, with at least 5% of these being available in the winter months, between the autumn and spring equinox (September – March).

Shadow animation images are often used to assess the potential impact of a proposed scheme, but by their nature can only provide a subjective view of the impact. They can be used to determine the time and date of potential overshadowing but are based solely on solar geometry and do not account for the likelihood of cloud for any given position of the sun (and therefore time of day/year). In order to determine the statistical impact of any given proposals it is necessary to calculate the impact on the Annual Probable Sunlight Hours.

Annual Probable Sunlight Hours (APSH) are measured at the window face, and are calculated using the probable sunlight hours overlay available from the BRE and a fish-eye type view of the adjacent building obstructions and skydome from the chosen reference point generated within Autodesk Ecotect. The overlay represents the sky dome, and each dot represents 1% of available sunlight hours. Dots located below the equinox line are hours of sunshine during the winter months described above. By placing a copy of the overlay on the correctly scaled fish eye view, it is possible to count the number of dots that are not obstructed by the adjacent buildings to determine the APSH.

BR 209 states that if a window can receive more than 25% of APSH, including at least 5% during the winter months (see definition above), then the window should be receiving its fair share of sunlight. New development that reduces sunlight access should be designed to keep the reduction to a minimum, but if the available sunlight hours are both below the 25% minimum **and** less than 0.8 times the previous level, then occupants of an existing building are likely to notice a loss of sunlight. Furthermore, if the loss of sunlight is greater than 4% of APSH, rooms in existing buildings may appear colder and less appealing.

APSH's were determined for existing windows orientated within 90 degrees of south in accordance with BR 209 paragraph 3.2.3.

Results from the APSH modelling exercise are presented in Tables 4 and 5.

	EXISTING		PROPOSED	
WINDOW REF	APSH %	WINTER %	APSH %	WINTER %
1	65	20	61	16
2	65	20	57	12
3	65	20	53	9
4	66	21	39	5
5	66	21	58	13
6	67	22	44	6
12	58	13	54	10

Table 4: Existing and Proposed APSH Results

WINDOW REF	REDUCTION FACTOR	
	APSH	WINTER
1	0.9	0.8
2	0.9	0.6
3	0.8	0.5
4	0.6	0.2
5	0.9	0.6
6	0.7	0.3
12	0.9	0.8

Table 5: APSH Reduction Factors

Based on the results presented in Tables 4 and 5, the following observations can be made:

Of the windows assessed, all enjoy in excess of 25% APSH, with 5% during the winter period (September – March) following development.

5.4 Annual Probable Sunlight Hours Discussion and Conclusions

Overall, the development is predicted to have a slight negative impact on the windows identified in Tables 4 and 5. However, the extent of the impact is wholly within the limits given by BR 209.

5.5 Other Matters

As illustrated in Figure 10 below, the currently exists a window in the flank elevation of 250 Kilburn High Road, overlooking the front portion of the proposed development site. It is thought that this window may not be original to the building and serves circulation space rather than a habitable room or kitchen. Therefore, it is not necessary to consider or assess any impact of the development proposals on the existing skylight levels under BRE Report 209.

Figure 10: Existing window in flank elevation of 250 Kilburn High Road.

6 Final Conclusion

The results presented here indicate that the development proposals appear in the main to be of reasonable scale and massing. The form of the proposals are sympathetic to the daylighting needs of the existing terrace behind and features stepped massing towards the rear of existing properties facing Kilburn High Road in order to mitigate any impact on access to skylight.

From the detailed analysis presented, the VSC is predicted to negatively affect some neighbouring buildings in terms of access to skylight for existing windows.

However, detailed assessment has shown that all but one of the existing windows are predicted to enjoy a VSC either above 27% and/or within 0.8 times a previous value meeting the advisory guidance given in BR 209. A small high level bedroom window along the South East boundary of the site is predicted to have its VSC reduced beyond the above suggested limits, but as this particular window lies close to the site boundary and taking more than its fair share of light, a revised VSC target value of 17% is achieved. It is for local planning authorities to consider the loss of skylight to this window and decide, in the context of other material considerations, what may be acceptable in this particular case. It should be pointed out that the numerical values given in BR 209 are for guidance only. It is reiterated that although there is predicted to be a notable loss of skylight to this window, the internal daylighting conditions are likely to remain largely unaffected due to the presence of a skylight that will be unaffected by the proposed development.

A detailed analysis of the Annual Probable Sunlight Hours (APSH) has shown the proposals are predicted to negatively affect some neighbouring buildings in terms of access to sunlight for existing windows. However, of these, all are predicted to receive in excess of the minimum suggested APSH given in BR 209 following development.