# Daylighting Calculation Report

## 43A Kingsgate Road
## Building Design Consultants

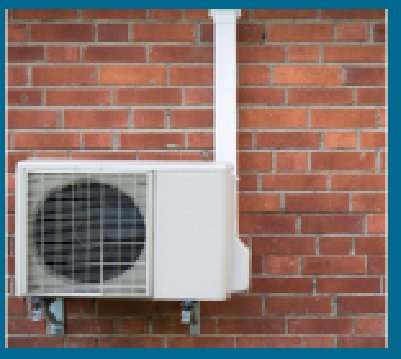
**Camden borough council**

October 2017

Version 1







BriaryEnergy

# Introduction

Briary Energy is an independent environmental consultancy with considerable experience in the renewable energy industry.

We are a focused team of professionals committed to securing success for our clients. Our service combines the personal commitment of our staff with the best of modern practices and resources. We provide independent advice within all aspects of Part L of planning for the development industry including the energy sector.

Briary Energy Consultants take an integrated approach to the areas of renewables and other low-carbon energy technologies, offering services from Energy Feasibility Studies, Energy Consumption statements, Ecohomes and Code for Sustainable Homes Assessments, SAP and SBEM Calculations, Pressure Testing and Daylight Calculations.

Building Design Consultants have commissioned us to carry out a Daylight and Sunlight Assessment associated with the proposed development and the effect that this proposed property will have on the existing neighbouring dwellings 41 and 45 Kingsgate Road.

The Building Research Establishment (BRE) has set out in their handbook "Site Layout Planning for Daylight and Sunlight: a Guide to Good Practice", 2nd Ed, guidelines and methodology for the measurement and assessment of daylight and sunlight within proposed buildings. This document states that it is also intended to be used in conjunction with the interior daylight recommendations found within the British Standard BS8206-2:2008 and the Applications Manual on Window Design of the Chartered Institution of Buildings Services Engineers (CIBSE).

The methodology used for our analysis, will be based on the key daylight and sunlight calculations as recommended in BRE Digest 209, which are: 1. Vertical Sky Component (VSC) - (Daylight). 2. Annual Probable Sunlight Hours - (Sunlight). 3. Annual Probable Sunlight Hours (APSH) for whole year and winter months.

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# Executive Summary

The average daylight factor has been calculated in order to examine whether the proposed development will receive adequate natural daylight in all highly occupied rooms.

All windows have been examined for daylight and sunlight compliance. Daylight compliance has been examined by addressing the Vertical Sky Component (VSC) for any windows that may be affected, and if the VSC is below 27%, whether the effect is more than 20%. The sunlight compliance has been examined by assessing the Annual Probable Sunlight Hours (APSH) which is the sunlight access at windows with 90deg. from south.

BR209 is mainly required in main living rooms and conservatories, with a lesser requirement in bedrooms and kitchens, but to establish adequate daylight and sunlight, all highly occupied spaces are examined. BR209 sets out a methodology to quantify access to daylight and sunlight at sensitive receptors on buildings and open spaces, whereby daylight access at windows is quantified in terms of Vertical Sky Component (VSC) and sunlight access at windows within 90° of south is quantified in terms of Annual Probable Sunlight Hours (APSH). The Vertical Sky Component (VSC) and Annual Probable Sunlight Hours (APSH) analysis have been carried out to all examined windows.

Regarding the Vertical Sky Component (VSC), the analysis demonstrates that there is no significant change between the access to daylight to the existing developments of number 41 and 45 Kingsgate Road, before and after the proposed development. All windows comply with the required margin on the proposed scenario.

Regarding the Annual Probable Sunlight Hours (APSH) percentages, we can observe that there is no difference between the existing and proposed scheme. In the existing scheme, as well as on the proposed. All the windows benefit from some sunlight hours in both summer and winter.

Regarding the Daylight Factor, we conclude that all of the examined rooms (highly occupied only), comply with the minimum British Standards values.

The proposed scheme does not have a negative effect on the neighbouring properties of 41 & 45 Kingsgate Road, in terms of daylight and sunlight, and the proposed building will receive adequate natural daylight in all highly occupied spaces.

# Assessment of the Effect of 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 comprises only the direct elements of sunlight. On a cloudy or overcast day, diffused daylight still shines through windows, even when sunlight is absent. Care should also be taken when the development is situated to the south of existing buildings, as 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 few sunlight hours during summer months, specifically early mornings and late evenings.

The Building Research Establishment (BRE) report, "Site Layout Planning for daylight and sunlight- a guide to good practice" by P J Littlefair, looks at two separate areas when considering the impacts of a new development on an existing property:

1. Daylight - The impacts of all direct and indirect sunlight during daytime.
2. Sunlight - The impacts of only the direct sunlight; and overshadowing of garden and open spaces (does not apply in our study)

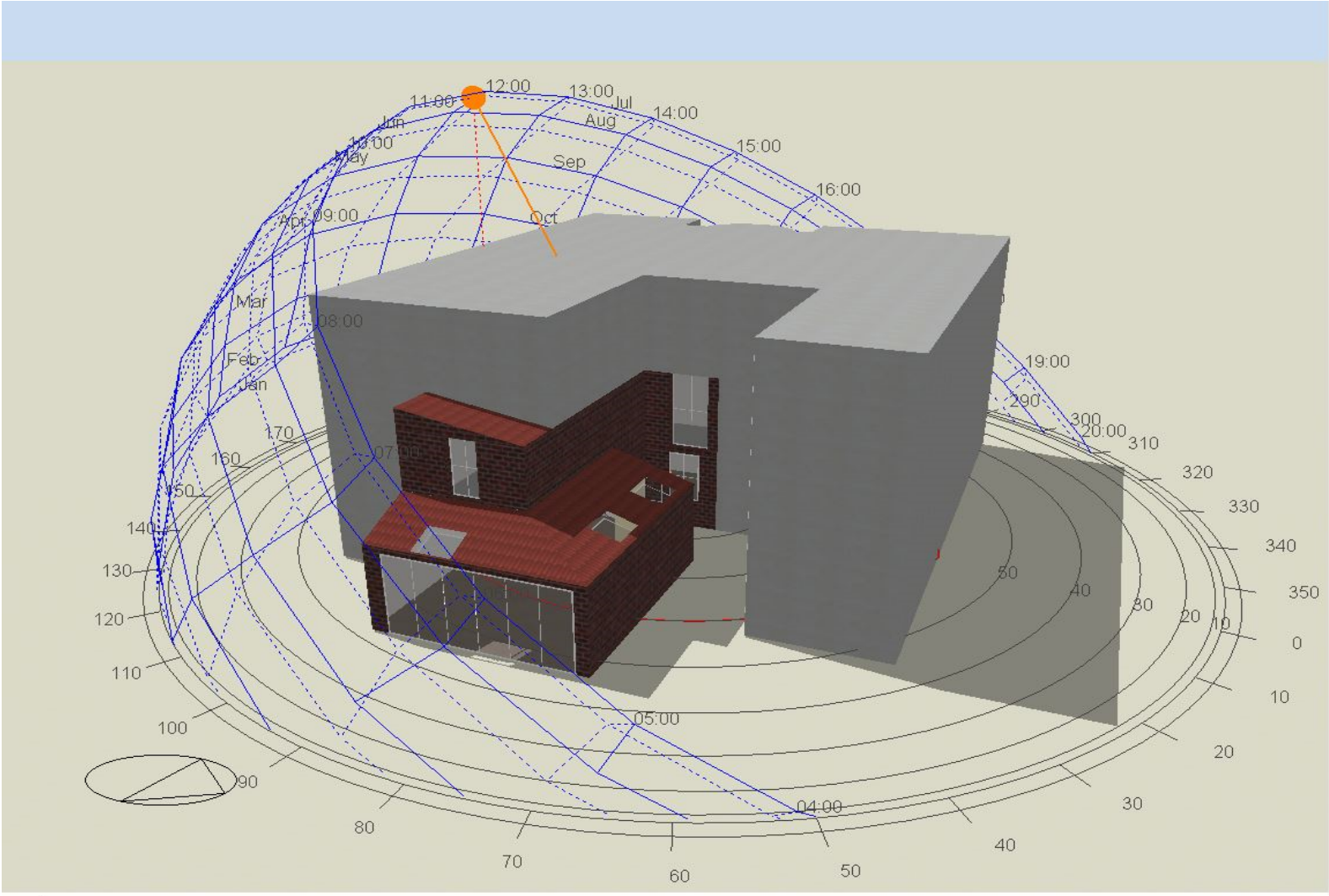
BS 8026-2:2008 describes good practice in daylight design and presents criteria intended to enhance the well-being satisfaction of people in

| PARAMETER | ASSESSMENT | ACCEPTABILITY CRITERIA |
|---|---|---|
| Sunlight | APSH Not less than 392 hours | |
| Daylight | If any part of the new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, subtends an angle of more than 25° to the horizontal, then the diffuse daylighting of the existing building may be adversely affected if the VSC is less than 27% at the center of an existing window, and less than 0.8 times its former value. | |
| Average Daylight Factor | Living room – 1.5%<br>Kitchen – 2%<br>Bedroom – 1% | |

# Methodolgy and data applied

All the information has taken from the proposed plans supplied by Building Design Consultants. Briary Energy has proposed the following methodology in order to examine all required parameters: -

- Prepare a 3D model using Design Builder Version 5.0.3.007 daylighting module, to understand and visualize the existing and the proposed scenario.
- Carry out a daylight assessment using the methodologies set out in by BRE and British Standard Guidelines for diffuse daylight and sunlight conditions in order to determine the VSC (Vertical Sky Component).
- Carry out a sunlight assessment using the methodologies set out in by BRE and British Standard Guidelines for diffuse daylight and sunlight conditions in order to determine the APSH (Annual Probable Sunlight Hours).
- Carry out a daylight assessment using the methodologies set out by the British Standard Guidelines in order to determine the average daylight factor (ADF) for the highly occupied spaces regarding the proposed development.




For the daylight and sunlight assessment a 3D model of the property has been created, including block massing for neighbouring buildings.

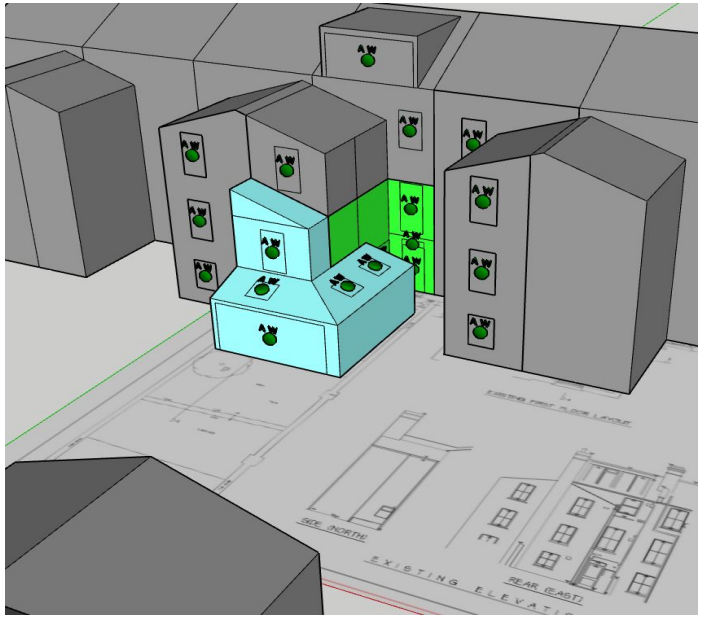
# Vertical Sky Component (VSC) - (Daylight)

The BRE Guidance is summarised below and is the basis for the criteria used in the assessment of daylight and sunlight impacts.

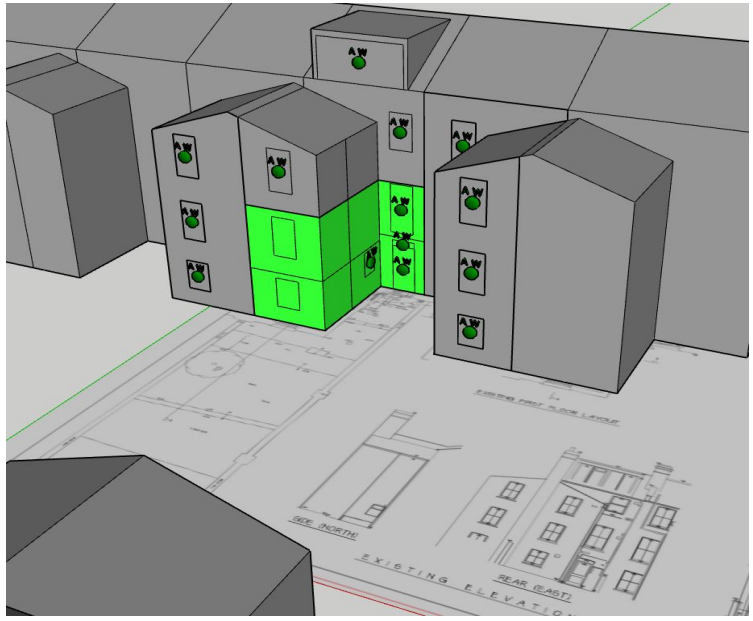
**Building Research Establishment (BRE) Criteria: -**

**Daylight** A window may be adversely affected if the vertical sky component (VSC) measured at the centre of the window is less than 27% and less than 0.8 times former value. A room may be adversely affected if the average daylight factor (ADF) is less than 1% for a bedroom, 1.5% for a living room or 2% for a kitchen. For offices a minimum figure of 2% is required. Daylight distribution (DD); a room may be adversely affected if; following the development, the area of the working plane that can receive direct skylight is less than 0.8 times its former value.

**Sunlight** A window may be adversely affected if a point at the centre of the window receives in the year less than 25% of the annual probable sunlight hours including at least 5% of the annual probable sunlight hours during the winter months (21 September to 21 March) > 0.8 times its former sunlight hours during either period.



A room within a neighbouring residential property is considered to suffer a materially adverse impact if, as a result of development proposals, the room fails to meet the minimum BRE standard for any of the three assessments. It should be noted that VSC results which can only be viewed as ""……a general test of potential for daylight."" The BRE Guide intends this assessment to be used as a tool to aid window positioning during the building design process. When testing neighbouring properties it should, be accompanied by an assessment of internal daylight distribution by calculation of the Daylight Distribution (DD). It is noted that the DD form of assessment is an accurate indication of the distribution of light within a room and takes the room and window dimensions into account.



A room may be adversely affected with an average daylight factor (ADF) of 1% for a bedroom, 1.5% for a living room or 2% for a kitchen.
Daylight distribution (DD); a room may be adversely affected if; following the development, the area of the working plane that can receive direct skylight is less than 0.8 times its former value.
The BRE guidance has been used to generate significant criteria used to assess the impact of the development. For VSC, Sunlight and Daylight Distribution this is:-

- Windows experiencing less than 20% reduction represent acceptable to minor beneficial impacts;
- Windows experiencing between 20 and 29.9% reduction represent minor adverse impacts;
- Windows experiencing between 30 and 39.9% reduction represent moderate adverse impacts; and
- Windows experiencing greater than 40% reduction represents substantial adverse impacts.

# Vertical Sky Component (VSC) - (Daylight)

The results of the Vertical Sky Component (VSC) analysis on the relevant residential windows overlooking the development of 43A Kingsgate Road are presented on following drawings and table.

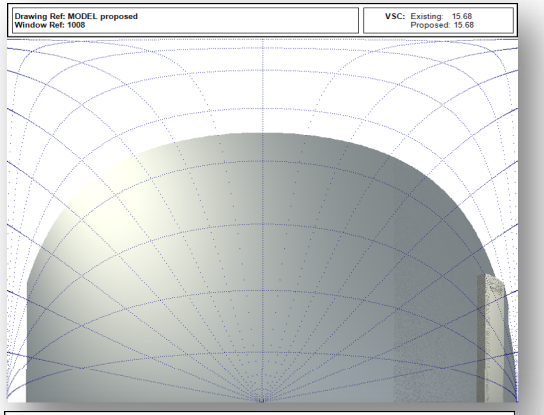
| Windows | Existing | Proposed | % of Existing | Compliance |
|---|---|---|---|---|
| No 41 - W1 | 15.68 | 15.68 | 100% | Yes |
| No 41 - W2 | 5.74 | 5.74 | 100% | Yes |
| No 41 - W3 | 3.47 | 3.47 | 100% | Yes |
| No 41- W4 | 30.44 | 30.44 | 100% | Yes |
| No 45 - W5 | 32.20 | 32.20 | 100% | Yes |
| No 45 -W6 | 29.70 | 29.70 | 100% | Yes |
| No 45 - W7 | 32.19 | 32.19 | 100% | Yes |
| No 45 - W8 | 30.26 | 30.26 | 100% | Yes |
| No 45 - W9 | 31.07 | 31.07 | 100% | Yes |

It can be seen from the VSC table that all windows assessed will meet BRE criteria by virtue of the fact that the results are either unchanged or within 20% of the baseline figure. Therefore the results are considered to be acceptable in an urban setting such as this. This assessment indicates the neighbouring developments number 41 and 45 Kingsgate Road comply with minimun standards of VSC.

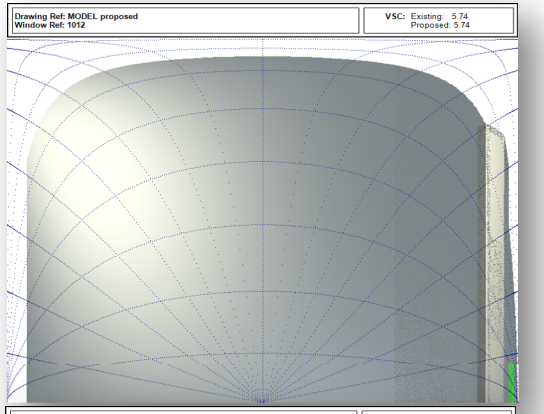
As you can see fromn the next page, A full Waldram Diagram has been carried out for every one of the neighbouring windows that could be affected by the new extension to 43A Kingsgate Road. As shown above, the effects on daylight for all the windows are with 80% guidance values. From a planning perspective, therefore, it is the conclusion of this report that the proposed development meets the recommended levels of change in line with the BRE 209 digest guidlaines and therefore considered acceptable in daylight terms.

# Vertical Sky Component (Daylight) Waldram diagrams

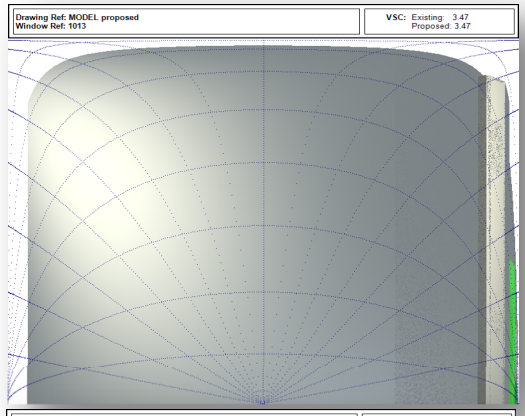
No 41
W1



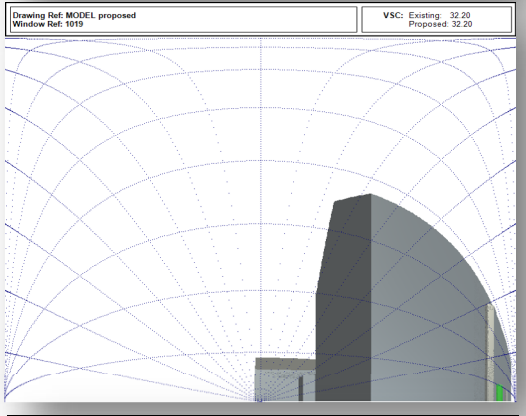

No 41
W2



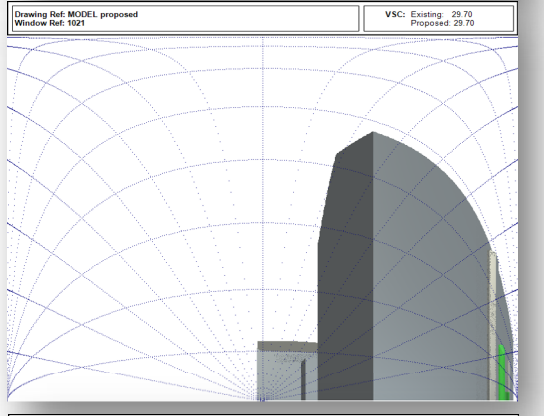

No 41
W3



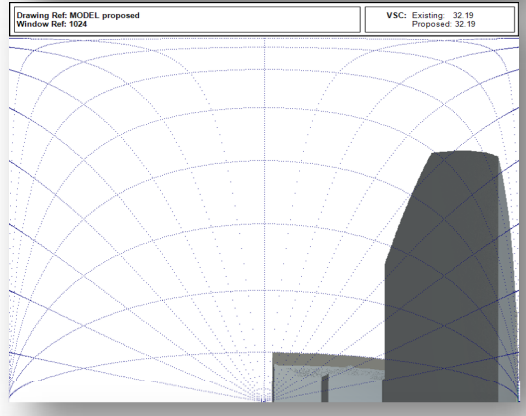

No 41
W4



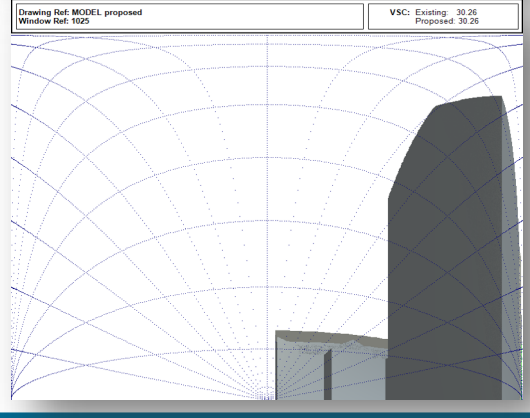

No 45
W5



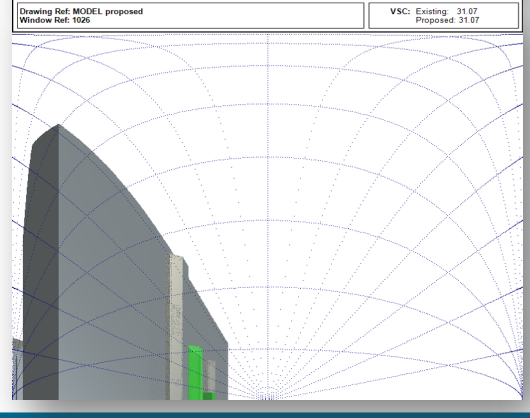

No 45
W6



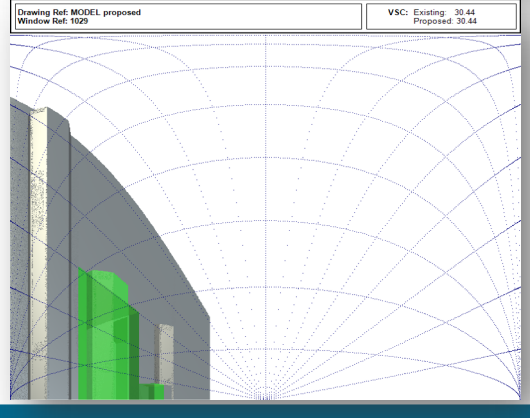

No 45
W7




No 45
W8




No 45
W9



# Annual Probable Sunlight Hours (APSH)

The assessment of the APSH demonstrates that most of examined windows will not achieve the minimum % requirement for compliance which corresponds to not less than 392 hours. The total annual sunlit hours according to BRE are 1486 From the results below we understand that there is no difference between existing and proposed scenario, therefore the proposed scenario does not have any negative impact on neighbouring properties.

| | Existing building | | | | | Proposed extension | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Window | Annual | Summer | Winter | Annual Result | Winter Result | Annual | Summer | Winter | Annual Result | Winter Result |
| No 41 - W1 | 48 | 48 | 0 | Pass | Pass | 48 | 48 | 0 | Pass | Pass |
| No 41 - W2 | 14 | 14 | 0 | Pass | Pass | 14 | 14 | 0 | Pass | Pass |
| No 41 - W3 | 12 | 12 | 0 | Pass | Pass | 12 | 12 | 0 | Pass | Pass |
| No 41 - W4 | 23 | 23 | 0 | Pass | Pass | 23 | 23 | 0 | Pass | Pass |
| No 45 - W5 | 76 | 18 | 58 | Pass | Pass | 76 | 18 | 58 | Pass | Pass |
| No 45 - W6 | 70 | 18 | 52 | Pass | Pass | 70 | 18 | 52 | Pass | Pass |
| No 45 - W7 | 72 | 23 | 49 | Pass | Pass | 72 | 23 | 49 | Pass | Pass |
| No 45 - W8 | 67 | 23 | 44 | Pass | Pass | 67 | 23 | 44 | Pass | Pass |
| No 45 - W9 | 32 | 5 | 27 | Pass | Pass | 32 | 5 | 27 | Pass | Pass |

# Average daylight factor (ADF)

| Zone | Floor Area (m2) | Floor Area above T... | Floor Area above T... | Average Daylight F... | Minimum Daylight F... | Maximum Daylight ... | Uniformity ratio (Mi... | Uniformity ratio (Mi... | Min Illuminance (lux) | Max Illuminance (lux) |
|---|---|---|---|---|---|---|---|---|---|---|
| Block4:Bathroom | 4.386 | 2.212 | 50.439 | 2.840 | 0.280 | 13.872 | 0.099 | 0.020 | 28.0 | 1387.9 |
| Block4:Bedroom3 | 14.573 | 1.732 | 11.885 | 1.048 | 0.085 | 17.567 | 0.081 | 0.005 | 8.5 | 1757.4 |
| Block1:KitchenDini... | 32.394 | 22.420 | 69.210 | 6.609 | 0.478 | 34.132 | 0.072 | 0.014 | 47.9 | 3415.8 |
| Block1:Bedroom1 | 12.715 | 5.515 | 43.372 | 3.761 | 0.402 | 25.455 | 0.107 | 0.016 | 40.2 | 2547.4 |
| Block1:ShowerRo... | 2.887 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.0 | 0.0 |
| Block1:Bedroom2 | 11.593 | 1.058 | 9.124 | 0.892 | 0.043 | 10.670 | 0.049 | 0.004 | 4.4 | 1067.6 |
| Block1:HallAndStairs | 13.850 | 3.623 | 26.163 | 1.844 | 0.000 | 25.465 | 0.000 | 0.000 | 0.0 | 2547.4 |
| **Total** | **92.398** | **36.561** | **39.568** | **3.523** | **0.000** | **34.132** | **0.000** | **0.000** | **0.0** | 3415.8 |

The assessment demonstrates that not all examined rooms (highly occupied rooms) comply with the minimum standards set by British Standards. Bedroom 2 does not comply with the minimum standards, the proposed will only achieve ADF of 0.892, when a 1.0 is required. Full analysis of the results are presented above for each room.

# Conclusion

The results of this assessment with respect to the proposed development at 43A Kingsgate Road Road, London indicate the following: -

- VSC: There is no significant difference between the existing and the proposed scenarios. Therefore we can state that the proposed building will not have a negative daylight impact on the neighbouring properties (number 41 & 45).
- APSH: There is no difference between the existing and the proposed scenarios. Therefore we can state that the proposed building will not have a negative sunlight impact on the neighbouring properties (number 41 & 45).
- ADF: The majority of the rooms comply with the minimum standards set out by the British Standards and only bedroom 2 in the basement fails to comply with these. Therefore we can state that the basement occupied room needs to be re evaluated, while all the rooms on the floors above achieve a very comfortable pass.

To assess the development's potential impact on daylight and sunlight on the neighbouring properties a baseline assessment was undertaken using the Vertical Sky Component (VSC), where appropriate a daylight distribution (DD) and average daylight factor (ADF) method for daylight analysis using the Waldram diagram template drawings; the sunlight analysis was undertaken by measuring annual probable sunlight hours (APSH) for the main windows of rooms which face within 90o of due south provided by the Building Research Establishment.
The VSC, daylight analysis indicates that all of neighbouring windows assessed will remain adequately lit as a result of the development proposals and will comply with the BRE criteria.
The sunlight analysis indicates that the neighbouring windows will remain adequately sunlit as a result of the development proposals and will comply with the BRE criteria for APSH and winter assessments.

**As a general statement – the proposed building will not have any negative impact in terms of daylight and sunlight to the neighbouring properties, but a re-evaluation is required for the basement rooms of the proposed building in order to achieve the minimum standard of ADF.**