Avenue South

Daylight, Sunlight & Overshadowing Assessment

March 2023

DOCUMENT CONTROL SHEET	
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CONTENTS

1 EXECUTIVE SUMMARY

1.1 NRG Consulting have been commissioned to undertake a Daylight, Sunlight and Overshadowing Assessment on a proposed development consisting of a new house at 15A Avenue South Surbiton KT5 8PJ

1.2 The following guidelines have been followed to assess the proposed development:

- BRE's *Site Layout Planning for Daylight and Sunlight, A guide to good practice (BR 209)*, by P J Littlefair, 3rd Ed.
- *BS EN 17037:2018 Daylight in Buildings*

1.3 The BRE document is a guide whose stated aim "is to help rather than constrain the designer". The document provides advice and states that "it should not be mandatory and should not be seen as an instrument of planning policy. In special circumstances, the developer or planning authority may wish to use different target values".

1.4 The results of this report show that there is only a minor adverse effect on the sunlighting levels to the neighbouring properties at 17 Avenue South. While the proposed development also shows that all the rooms achieve compliance with the internal daylight requirements set out in BS EN 17037:2018.

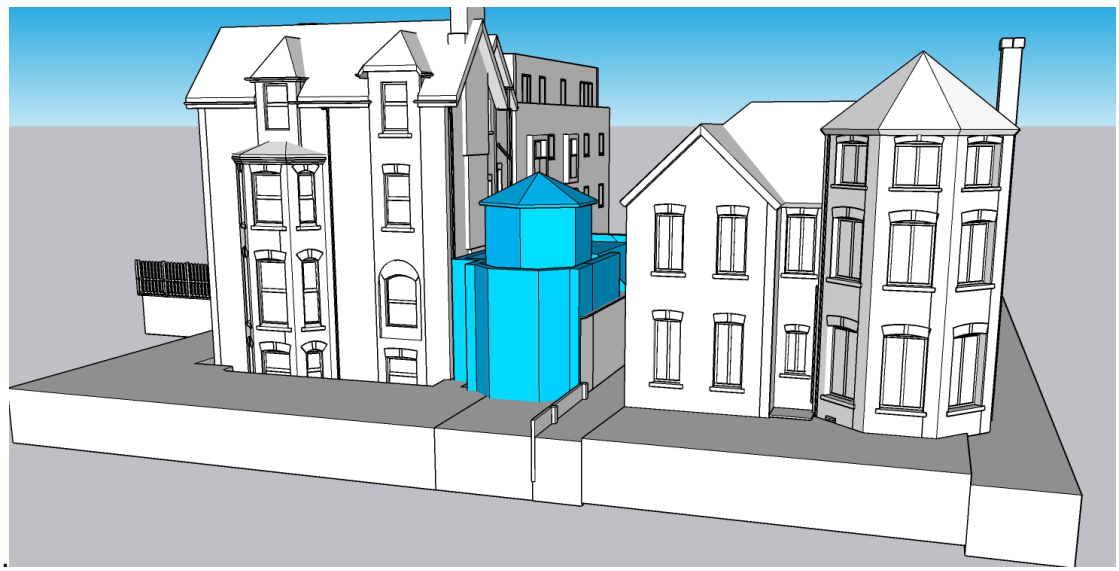

Figure 1: *3D model of proposed building.*

2 INTRODUCTION

2.1 Background

The Building Research Establishment (BRE) has set out in their handbook "Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice", 3rd 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 BS EN 17037:2018 and the Applications Manual on Window Design of the Chartered Institution of Buildings Services Engineers (CIBSE).

The guide also provides advice on site layout planning to determine the quality of daylight and sunlight within open spaces between buildings.

The BSI has set out in BS EN 17037:2018 Daylight in Buildings guidance to good practice in daylighting design, and presents criteria intended to enhance the well-being and satisfaction of people in buildings.

This study assesses the availability of Daylight and Sunlight to the façades of the local dwellings and their amenity areas with respect to the design proposals prepared by the design team and the availability of internal daylight to the proposed building.

NRG Consulting has proposed the following methodology to assess the layouts proposed:

- Prepare a 3D computer model to understand and visualize sunlight for the neighbours.
- Carry out daylight sunlight assessment using the methodologies set out in by BRE and British Standard Guidelines for diffuse daylight and sunlight conditions.
- Prepare a 3D computer model to assess the internal daylight/illuminances for the living rooms, kitchens, and bedrooms of the proposed development.

2.2 The Nature and Effect of Daylight and Sunlight

The BRE "Site layout planning for daylight and sunlight – A guide to good practice" 3rd edition by Paul J. Littlefair was released in June 2022 and superseded the second edition of the same guidance. The most important update from the previous version of the guidelines is represented by the methods for assessing daylight within a proposed building within section 2.1 and Appendix C of the handbook. These are based on the methods detailed in the BS EN 17037 which suggests two possible methodologies for appraising daylight across a room's working plane: Illuminance Method Daylight Factor Method.

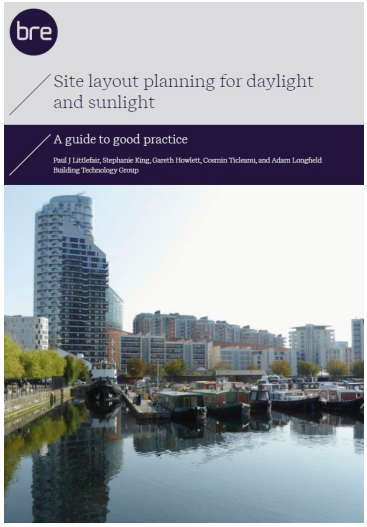

Figure 2: BRE guidelines

3 DAYLIGHT AND SUNLIGHT ASSESSMENT GUIDANCE

3.1 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 recognize 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 fewer sunlight hours during summer months, specifically early mornings and late evenings.

The Building Research Establishment (BRE) report, BRE 209 "Site Layout Planning for daylight and sunlight- a guide to good practice" by P J Littlefair, looks at three separate areas when considering the impacts of a new development on an existing property:

- Daylight - The impacts of all direct and indirect sunlight during daytime.
- Sunlight - The impacts of only the direct sunlight to a dwelling and its garden and open spaces.

Appendix 1 in the BRE Report details the methodologies and criteria.

The BRE report provides guidelines for when the obstruction to sunlight may become an issue:

- If the proposed or existing development has a window that faces within 90° of due south, and
- On this window wall, all points on a line 2m above ground level are within 4m (measured sideways) of a point which receives at least a quarter of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months, between 21st September and 21st March.

BSI guidance BS EN 17037:2018 "Daylight in Buildings" provides criteria for internal daylight in various internal spaces.

Table 1 below summarises the criteria used in this report to assess the impacts from new development on the sunlight reaching existing properties, and for internal daylight.

PARAMETER	REPORT REFERENCE	ACCEPTABILITY CRITERIA	
Sunlight to Amenity Areas	BRE 209 Section 3.3	It is recommended that for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21 March. If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable.	
Vertical Sky Component	BRE 209 Section 2.2	Any reduction in the total amount of skylight can be calculated by finding the VSC at the centre of each existing window. If the VSC is both less than 27%, and less than 0.8 times its former value occupants will notice the reduction in the amount of skylight..	
APSH/WPSH	BRE 209 Section 3.2	It is recommended that interiors where the occupants expect sunlight receive at least one quarter (25%) of Annual Probable Sunlight Hours (APSH), including the winter months between 21st September and 21st March at least 5% of Annual Probable Sunlight Hours (WPSH). If the available sunlight hours are both less than these values and less than 0.8 times their former value, then the occupants will notice the loss of sunlight.	
Internal Daylight	BRE 209 Appendix C	Bedrooms	100lx
		Living Rooms	150lx
		Kitchens	200lx

Table 1:BRE daylighting criteria

3.2 Angle to sky from horizontal.

In general, a building will retain the potential for good interior diffuse daylighting provided that, on all its main faces no obstruction, measured in a vertical section perpendicular to the main face, from the centre of the lowest window, subtends an angle of 25 ° to the horizontal or less.

If this criterion is satisfied, no further calculations are required as it is unlikely that daylighting will be significantly affected.

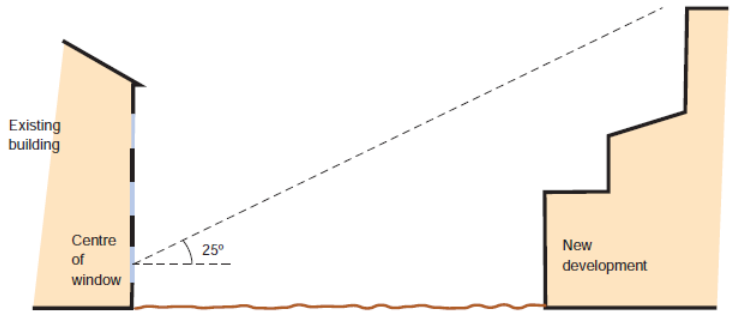

Figure 3: Section showing the angle to sky from horizontal criteria for diffuse daylighting

3.3 Assessment of the Internal Daylight

When assessing the internal daylight levels of proposed building projects, it is important to recognize 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, diffuse daylight still shines through windows, even when sunlight is absent.

The BS EN 17037 provides criteria for the two methodologies, Illuminance Method and Daylight Factor Method

Target illuminances from daylight over at least half of the daylight hours		
Level of recommendation	**Target illuminance E_T (lx) for half of assessment grid**	**Target illuminance E_{TM} (lx) for 95% of assessment grid**
Minimum	300	100
Medium	500	300
High	750	500
Target daylight factors (D) for London		
Level of recommendation	**Target daylight factor D for half of assessment grid**	**Target daylight factor D for 95% of assessment grid**
Minimum	2.1%	0.7%
Medium	3.5%	2.1%
High	5.3%	3.5%

***Table 2**: Targets for each internal daylight calculation method*

3.3.1 Specific recommendations for daylight provision in UK dwellings

These are intended for 'hard to light' dwellings, for example in basements or with significant external obstructions, or for existing buildings being refurbished or converted into dwellings:

Target illuminances from daylight over at least half of the daylight hours	
Room	**Target illuminance E_T (lx) for half of assessment grid**
Kitchen	200
Living Room	150
Bedroom	100

***Table 3**: Specific recommendations for daylight provision in UK dwellings*

Target daylight factors (DT) to achieve over at least 50% of the assessment grid			
Location	**D_T for 100 lx (Bedroom)**	**D_T for 150 lx (Living room)**	**D_T for 200 lx (Kitchen)**
London	0.7%	1.1%	1.4%

***Table 4**: Daylight factor target for 'hard to light' dwellings.*

4 METHODOLOGY APPLIED

4.1 Data

All the information has been taken directly from digital files provided by the Design Team. The height of any obstructions has been taken from survey data or from aerial photographs available online.

Figure 4: Aerial view of the site as existing

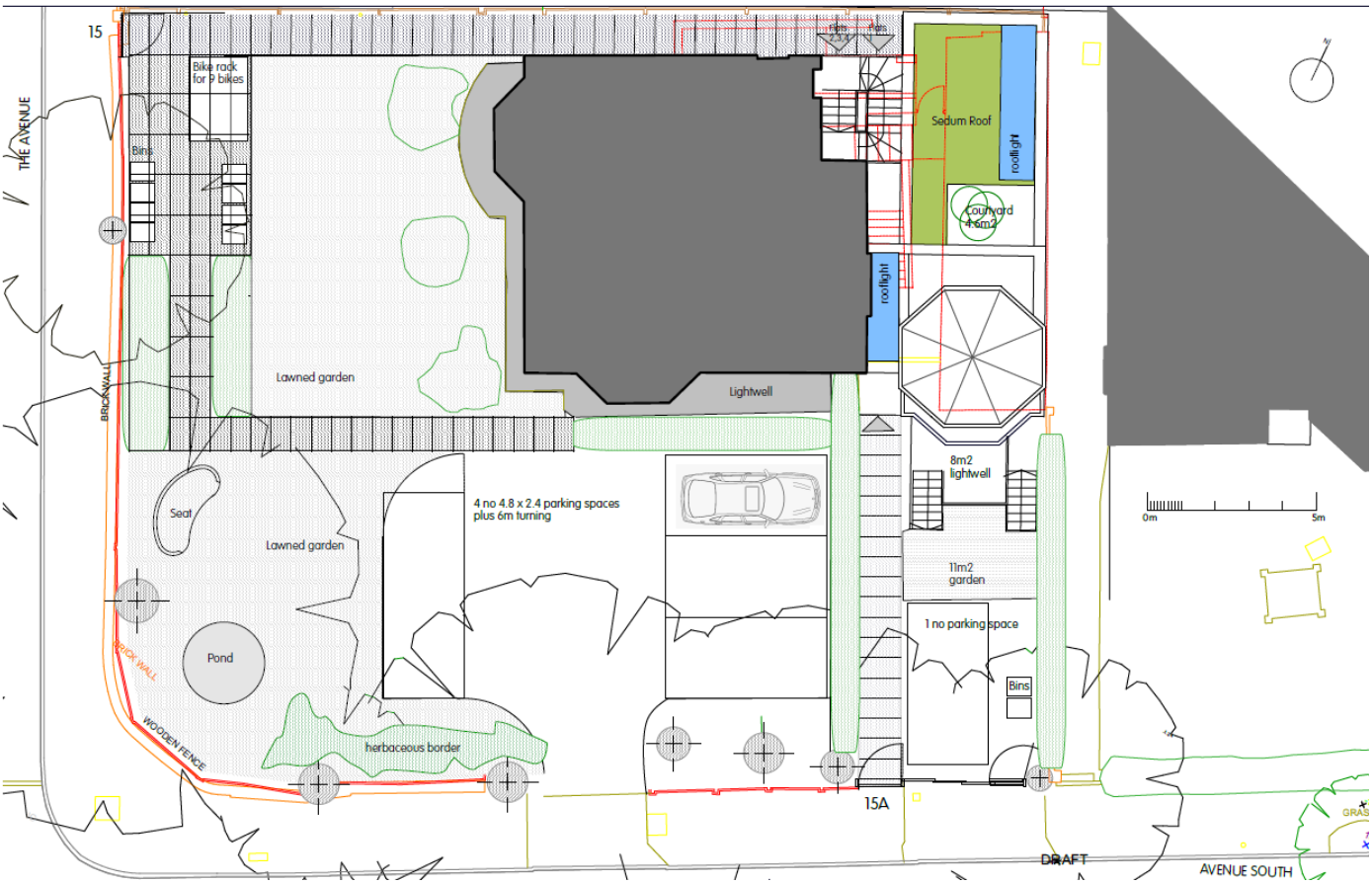

Figure 5: Proposed site plan

4.2 Proposed Floor Plans

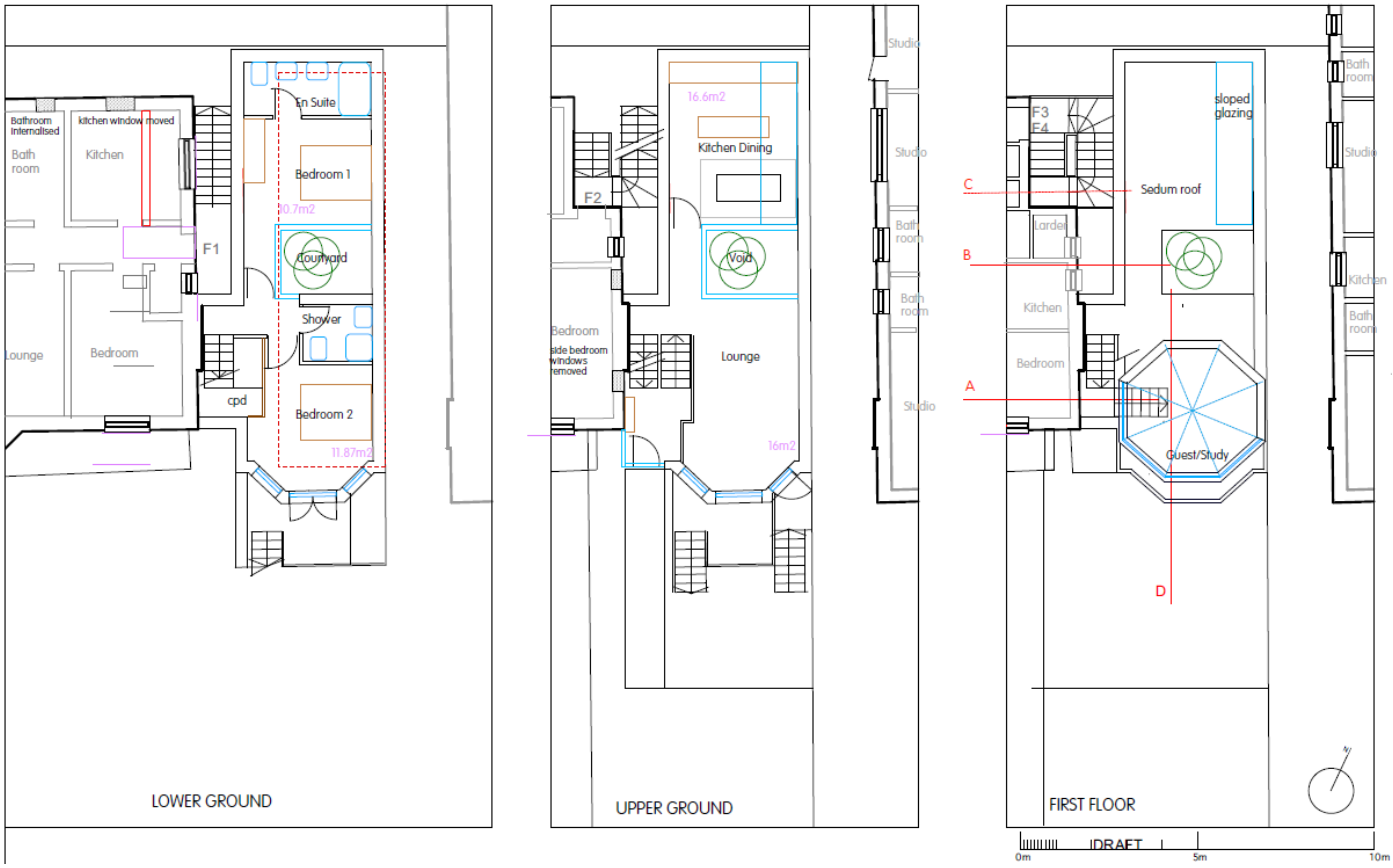

Figure 6: Proposed floor plans

4.3 3D Model

To complete the daylight, sunlight and overshadowing assessment for the adjacent properties, a full-size 3D model of the existing area, including existing buildings and neighbouring properties was constructed in Trimble SketchUp 2021. The measure of the angle to sky from horizontal has been made manually within the model space, MBS Daylight software has been used to assess the Vertical Sky Component and the APSH/WPSH.

To measure the internal daylight levels for the proposed development a 3D model was constructed in IES ModelIT. The internal daylight has been assessed with IES Radiance, a thermal and environmental analysis program.

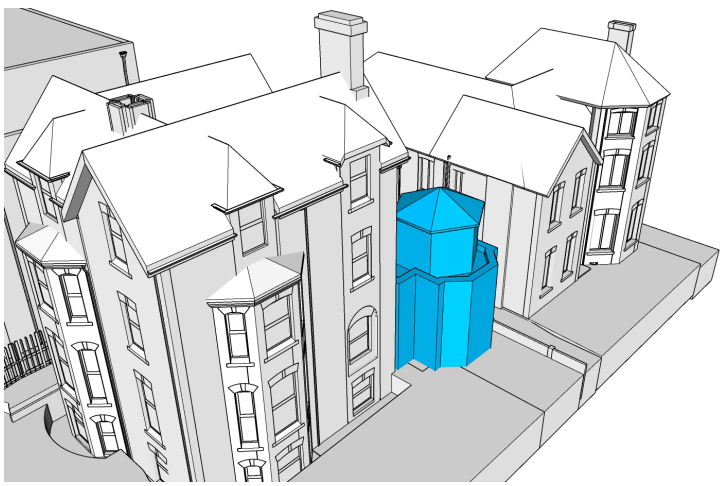

Figure 7: SketchUp 3D model of the proposed development

4.4 Internal Surface Properties

Reflectance for rooms internal surfaces affect the resulting internal daylight. Lighter colours result in higher reflectance (white: 1.0; black:0.0). Windows Light Transmittance is the amount of light that enter the glazed surface.

Surface	Reflectance	
Floor	0.4 (e.g. light wood or grey tiles)	
Walls	0.7 (e.g. light pastel or white paint)	
Ceiling	0.7 (e.g. light pastel or white paint)	
Window	Light Transmittance	0.68

***Table 5**: Internal surface properties*

4.5 Design Data

Architects: Imago architects
Drawing pack issued for Assessment on March 2023

5 RESULTS

5.1 Vertical Sky Component Analysis and APSH/WPSH Analysis

The assessment of the VSC demonstrates that there is minimal change between the VSC available to the windows analysed as existing and after the proposed development. The analysis of Annual and Winter Probable Sunlight Hours shows that there is only a minor adverse effect to existing properties.

The analysed windows and their addresses are found in Table 3 and 4 below, all are deemed BRE compliant.

ADDRESS	WINDOW No	PRE CONSTRUCTION VSC	POST CONSTRUCTION VSC	AFFECT RATIO	MEETS BRE CRITERIA
17 Avenue South	1	Non habitable room			
	2	Non habitable room			
	3	15.00	12.98	0.86	YES
	4	19.47	18.86	0.97	YES
	5	18.51	16.59	0.90	YES
	6	Non habitable room			

Table 6: Results of Visual Sky Component Analysis. If a window were to achieve less than 27% Post Construction VSC the Affect Ratio must be at least 0.80 to ensure BRE compliance.

ADDRESS	WINDOW No	PRE CONSTRUCTION APSH	POST CONSTRUCTION APSH	AFFECT RATIO	PRE CONSTRUCTION WPSH	POST CONSTRUCTION WPSH	AFFECT RATIO	MEETS BRE CRITERIA
17 Avenue South	1	Non habitable room						
	2	Non habitable room						
	3	23	16	0.7	10	4	0.4	NO
	4	28	28	1	6	6	1	YES
	5	24	22	0.92	8	6	0.75	YES
	6	Non habitable room						

Table 7: Results of Annual Probable Sunlight Hours. If a window were to achieve less than 25% Post Construction APSH or 5% WPSH the Affect Ratio must be at least 0.80 to ensure BRE compliance

5.2 Window Arrangement

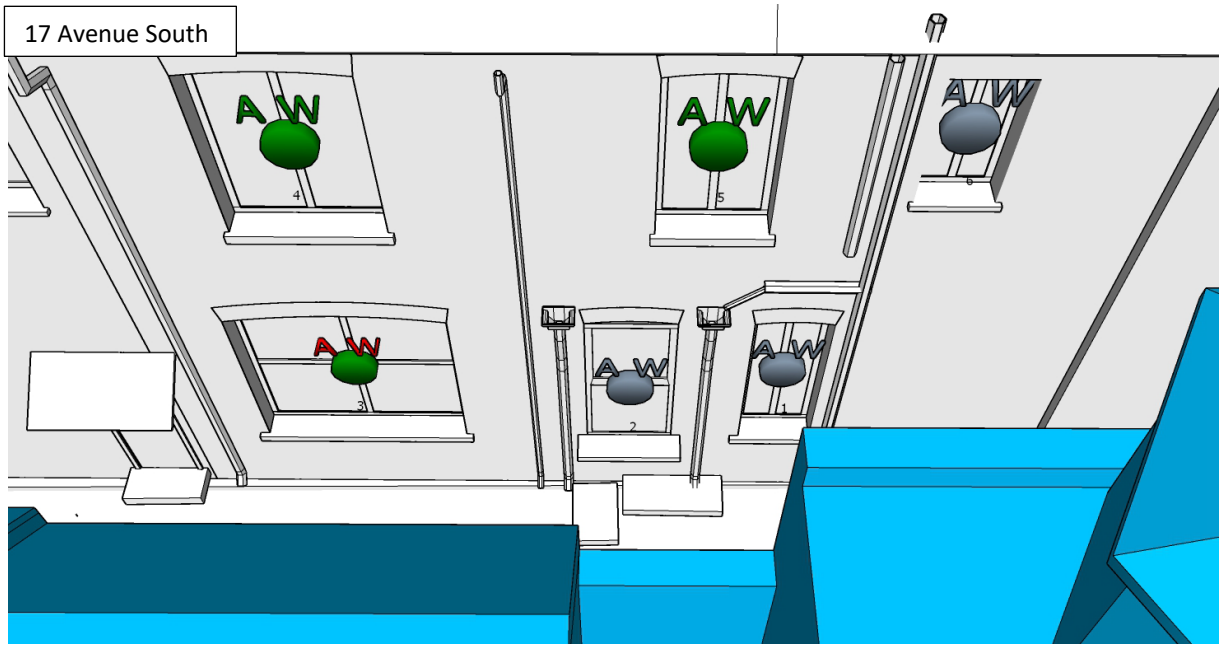

Figure 8: Window arrangement

5.3 Target Illuminance Factor – Proposed Development

We have assessed the proposed new accommodation to determine whether the internal spaces will be provided with adequate daylight by reference to Target Illuminance (E_T) Factor. This method involves the computation of the illuminance level at each calculation point on an assessment grid.

The analysis of the internal space of the proposed development indicates that all the comfortably exceed the acceptable criteria of both the BRE Guide and as also set within BS EN 17037:2018 in terms of Daylight Factor.

The results are summarised in the table below.

Room	Floor area that achieves the target (%)	Target to be achieved over 50% of the floor area (E_T)	BRE Compliant
Kitchen	100	200	**YES**
Lounge	100	150	**YES**
Front Bedroom	100	100	**YES**
Rear Bedroom	100	100	**YES**
Study	100	150	**YES**

Table 8: Internal daylight results

6 CONCLUSION

6.1 The daylight and sunlight analysis indicates that there will be no impact on the surrounding properties at 17 Avenue South arising from the proposed development at 15A Avenue South Surbiton KT5 8PJ.

6.2 The results of our analysis [Sections 5.1-5.3] show that the neighbouring habitable windows/rooms analysed satisfy the target requirements of the BRE Guide in terms of daylight and sunlight in the proposed situation with a minor adverse material effect.

6.3 The VSC Analysis demonstrates that there is a minimal change between the access to daylight to the existing buildings before and after the proposed development. None of the various windows analysed were adversely affected by the proposed development and all comfortably comply with BRE guidelines for the recommended levels of adequate daylighting [Section 5.1].

6.4 The APSH and WPSH assessment show that proposed development doesn't significantly affect the existing building with only one of the various windows analysed suffering a sunlight loss while all the remainder comfortably comply with and BS EN 17037:2018 [section 5.1]

6.5 The internal daylight for the internal spaces of the proposed development has been carried out as part of this assessment. We conclude that daylight levels within the proposed habitable rooms are adequate and exceed the target criteria set within BS EN 17037:2018 and BRE publication "Site Layout Planning for Daylight & Sunlight – A guide to good practice" [Section 5.3].

6.6 Overall, the proposed development fully complies with BRE Guidelines and will cause only a minor impact to daylight and sunlight access for the surrounding buildings. Its habitable rooms also achieve the minimum target internal daylight levels.