

# Daylight, Sunlight & Shading Report

42 Hight Street, Teddington

September 2023



**Pro Sustainability Ltd**

Stow House

Stowhill

Childrey

OX12 9XQ

[www.prosustainability.co.uk](http://www.prosustainability.co.uk)

## Executive summary

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This report outlines the results of the analysis for the detailed planning application of 42 High Street, Teddington, primarily assessing the daylight and sunlight levels of the proposed and the potential overshadowing on the adjacent properties.

The methodology set out in this report is in accordance with BRE's "Site Layout Planning for Daylight and Sunlight, A Guide to Good Practice" by PJ Littlefair (2022) which is accepted as good practice by Planning Authorities.

The modelling part has been carried out using a dynamic modelling software: (IES-VE) version 2023. The RADIANCE lighting simulation package, developed by the Lawrence Berkeley Laboratory in California, in conjunction with IES modelling software interface has been used to perform the daylight simulations.

### Daylight & Sunlight Assessment of the proposed

Sunlight and daylight were assessed based on: BRE Guide / BS 8206-2:2008 & BS EN 17037:2018. Results indicate that all habitable rooms tested within the proposed residential units pass all requirements in terms of sunlight and daylight.

### Overshadowing

The client is keen to eliminate any possible daylight or sunlight impact on neighboring properties, an overshadowing assessment looking at the overshadowing from the proposed building, compared to the existing has been carried out to determine if any of the properties might be impacted, results highlight that there is no impact on any of the neighboring building.

Date	Prepared by	Signature	Version	Comments
September 2023	Halla Huws	<i>Halla Huws.</i>	V1	Meeting all thresholds

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## Section 1 Introduction

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This report outlines the results of the analysis for the detailed planning application of 42 High Street, Teddington, primarily assessing the daylight and sunlight levels of the proposed and the potential overshadowing on the adjacent properties.

The approach is based on the BRE's "Site Layout Planning for Daylight and Sunlight, a Guide to Good Practice" PJ Littlefair 2022, BRE Guide / BS 8206-2:2008 & EN 17037:2018. which is generally accepted as good practice by Town and Country Planning authorities.

It should be noted that although the numerical values stated in the BRE provide useful guidance to designers, consultants and planning officials, these are purely advisory and may vary depending on context.

### Site Location

The proposal site is a corner site on the High Street, and Cedar road in Teddington.

The proposal is for commercial units on the ground floor and basement, and a total of 8 residential units above.

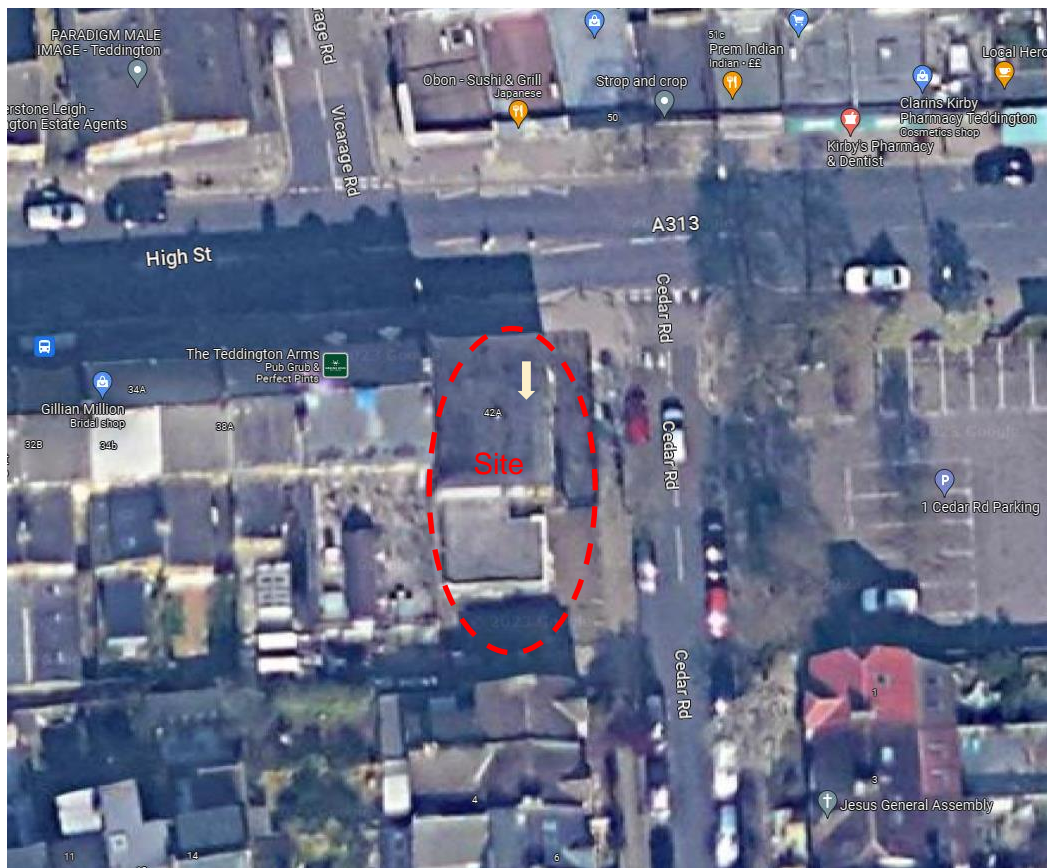


Figure 1 Site Location

## Documents Considered

Table 1: List of Drawings

<b>Description</b>	<b>Drawing Reference</b>
<b>Site Plan</b>	Teddington OS Map
<b>Proposed Plans</b>	Teddington_August_2023 Teddington OS Map
<b>Proposed Elevations</b>	Teddington - plans - elevations - V8

## Calculation Data

Weather file: London

Software: IES-VE 2023

Sky Model: CIE Standard Overcast Sky

## Section 2 Sunlight - Proposed Development

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### Guidance – BRE Guide / BS8206-2:2008

The British Standard BS 8206-2:2008 recommends that interiors where the occupants expect sunlight should receive at least one quarter (25%) of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months, between 21<sup>st</sup> September and 21<sup>st</sup> March. Here 'probable sunlight hours' means the total number of hours in the year that the sun is expected to shine on unobstructed ground, allowing for average levels of cloudiness for the location in question.

If a window reference point can receive more than one quarter of annual probable sunlight hours, including at least 5% of annual probable sunlight hours during the winter months between 21<sup>st</sup> September and 21<sup>st</sup> March, then the room should still receive enough sunlight.

Any reduction in sunlight access below this level should be kept to a minimum. As stated in Section 3.1.12 of the BRE Guide, "If window positions are already known, the centre of each main living room window can be used for the calculation".

#### Summary (new buildings)

3.1.15 In general a dwelling, or non-domestic building that has a particular requirement for sunlight, will appear reasonably sunlit provided:

- at least one main window wall faces within 90° of due south and
- a habitable room, preferably a main living room, can receive a total of at least 1.5 hours of sunlight on 21 March. This is assessed at the inside centre of the window(s); sunlight received by different windows can be added provided they occur at different times and sunlight hours are not double counted.

3.1.16 Where groups of dwellings are planned, site layout design should aim to maximise the number of dwellings with a main living room that meets the above recommendations.

Figure 2 Extract from the BRE Guide

### BRE Guide 2022 Guidance – BS EN 17037:2018

Section 5.3.1 of BS EN 17037:2018 states that "exposure to sunlight is an important quality criterion of an interior space and can contribute to human well-being." Table A.6 from BS EN 17037:2018 summarises the recommendation for daily sunlight exposure.

**Table A.6 — Recommendation for daily sunlight exposure**

Level of recommendation for exposure to sunlight	Sunlight exposure
<b>Minimum</b>	<b>1,5 h</b>
<b>Medium</b>	<b>3,0 h</b>
<b>High</b>	<b>4,0 h</b>

Figure 3 Extract from BS EN 17037:2018

Within the context of a domestic property, EN 17037:2018 states that at least one habitable space within a dwelling should receive the recommended minimum value of 1.5 hours of sunlight on the 21st of March. The test is carried out on a clear, cloud free day.

### APSH & Sunlight Exposure Assessment

Based on the above criteria for both the BRE Guide/BS8206-2:2008 and BS EN 17037:2018, all windows within the proposed development have been assessed with. Results highlight that all areas meet the requirements, where all flats have at least one habitable room with a window achieving the APSH and the minimum sunlight exposure of 1.5 hours Table 8.

Please note, the “Comment” symbol in each of the tables represents the following:

#### **BRE Guide / BS 8206-2:2008**

✓ / ✓ For these locations, both the annual and winter APSH results are greater than 25% and 5% respectively.

x / ✓ For these locations, the annual APSH results are less than the recommended values, however, the winter APSH results are greater than 5%.

✓ / x For these locations, the winter APSH results are less than the recommended values, however, the annual APSH results are greater than 25%.

x / x For these locations, both the annual and winter APSH results are less than the recommended values.

#### **BS EN 17037:2018**

✓ These rooms achieve the minimum 1.5 hours of recommended sunlight exposure on March 21st.

x These rooms do not achieve the minimum 1.5 hours of recommended sunlight exposure on March 21st.



Figure 4 Proposed Floor Plans



Table 2 Sunlight Assessment Results

Opening Ref	BRE Guide / BS 8206:2008 APSH Assessment			BS EN 17037:2018 Sunlight Exposure > 1.5 hrs
	APSH Annual (%)	APSH Winter (%)	Comment	Comment
<b>A</b>	68.08	25.08	✓/ ✓	✓
<b>B</b>	48.21	18.75	✓/ ✓	✓
<b>C</b>	48.51	18.75	✓/ ✓	✓
<b>D</b>	18.35	5.07	✓/ ✓	✓
<b>E</b>	64.25	25.65	✓/ ✓	✓
<b>F</b>	48.35	18.71	✓/ ✓	✓
<b>G</b>	79.85	36.80	✓/ ✓	✓
<b>H</b>	80.26	37.21	✓/ ✓	✓

## Section 3 Daylight - Proposed Development

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This section addresses daylight provision to the proposed apartments. The purpose of the calculations is to quantify an overall percentage of units which exceeds the daylight provision recommendations. Our proposed methodology is to complete the calculations for all of the apartments within the development.

### Reference Standard

The daylight provision to the proposed development was assessed against the following standards for completeness:

- BRE Guide / BS 8206-2:2008
- BS EN 17037:2018

The following sections summarise the various requirements of each standard.

### BRE Guide / BS 8206-2:2008

The BRE Guide states that the “advice is not mandatory and that the guide should not be seen as an instrument of planning policy”. Although this is true, appropriate and reasonable regard has still been taken to the BRE guide. It should be further noted, when trying to achieve height and density within a development where deep plan, single aspect, combined living, kitchen and dining spaces exist (in some situations with a balcony in place as well), it is very difficult to achieve good levels of daylight across the whole space. Therefore, when considering the modelling approach noted above, results should be interpreted with flexibility as noted in the BRE guide:

*“Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design.”*

### ADF Requirements

The BRE Guide states the following in Appendix C with respect to Average Daylight Factors (ADF):

C4 If a predominantly daylit appearance is required, then the ADF should be 5% or more if there is no supplementary electric lighting, or 2% or more if supplementary electric lighting is provided. There are additional recommendations for dwellings of 2% for kitchens, 1.5% for living rooms and 1% for bedrooms. These additional recommendations are minimum values of ADF which should be attained even if a predominantly daylit appearance is not achievable.

Figure 5 Extract from the BRE Guide

Therefore, the recommended Average Daylight Factors (ADF) are summarised as follows:

- Bedrooms – 1.0%
- Living Rooms – 1.5%
- Kitchens – 2.0%

The BRE Guide does not provide explicit guidance for an open space that is a combination of Living/Kitchen/Dining (LKD) functions. However, the BS 8206-2:2008 standard states: “Where one room serves more than one purpose, the minimum average daylight factor should be that for the room type with the highest value. For example, in a space which combines a living room and a kitchen the minimum average daylight factor should be 2%.”

For the purposes of clarity, we have assessed all LKDs against the 2% ADF target.

### BRE Guide 2022: BS EN 17037:2018

As outlined in Section 5.1.2 of the BS EN 17037:2018 standard: “A space is considered to provide adequate daylight if a target illuminance level is achieved across a fraction of the reference plane within a space for at least half of the daylight hours. In addition, for spaces with vertical or inclined daylight openings, a minimum target illuminance level is also to be achieved across the reference plane”.

Annex A of BS EN 17037:2018 gives three levels of recommendation for the assessment of daylight provision in interior spaces which are summarised as follows: “The three levels are: minimum, medium and high, and the minimum recommendation should be provided.”

It is important to note that EN 17037:2018 does not provide different illuminance targets for different space types. Therefore, in the case of residential developments; bedrooms, living rooms, kitchens and combined LKDs all have the same daylight provision targets.

Table A.1 of BS EN 17037:2018 provides recommendations for daylight provision by daylight openings in vertical and inclined surfaces. Note, Table A.2 provides similar recommendations for daylight openings in horizontal surfaces, e.g. rooflights.

**Table A.1 — Recommendations of daylight provision by daylight openings in vertical and inclined surface**

Level of recommendation for vertical and inclined daylight opening	Target illuminance $E_T$ lx	Fraction of space for target level $F_{plane,\%}$	Minimum target illuminance $E_{TM}$ lx	Fraction of space for minimum target level $F_{plane,\%}$	Fraction of daylight hours $F_{time,\%}$
Minimum	300	50 %	100	95 %	50 %
Medium	500	50 %	300	95 %	50 %
High	750	50 %	500	95 %	50 %

NOTE Table A.3 gives target daylight factor ( $D_T$ ) and minimum target daylight factor ( $D_{TM}$ ) corresponding to target illuminance level and minimum target illuminance, respectively, for the CEN capital cities.

Figure 6 Extract from BS EN 17037:2018

**Table A.2 — Recommendations of daylight provision by daylight openings in a horizontal surface**

Level of recommendation for horizontal daylight opening	Target illuminance $E_T$ lx	Fraction of space for target level $F_{\text{plane},\%}$	Fraction of daylight hours $F_{\text{time},\%}$
Minimum	300	95 %	50 %
Medium	500	95 %	50 %
High	750	95 %	50 %

NOTE Tables A.3 and A.4 give target daylight factor ( $D_T$ ) corresponding to target illuminance level for the CEN capital cities. Note, that for spaces with horizontal daylight openings, there is no minimum target illuminance recommendations. Table A.4 is only for horizontal daylight openings with diffusing material.

Figure 7 Extract from BS EN 17037:2018

To achieve the minimum level of daylight provision for vertical and inclined openings as per Table A.1, the following must be achieved:

- A target illuminance (ET) of 300 lux must be achieved on over 50% of the floor area for over 50% of the available daylight hours, and
- A minimum target illuminance (ETM) of 100 lux must be achieved on over 95% of the floor area for over 50% of the available daylight hours.
- Both targets above must be satisfied for a space to be deemed compliant with the requirements.

The recommendations in Table A.1 can also be expressed in terms of a daylight factor “D”. Table A.3 provides the corresponding daylight factor (D) relative to a recommended target illuminance ET (lx) and target minimum illuminance ETM (lx) depending on the location for daylight openings in vertical and inclined surfaces. Note, Table A.4 provides similar target values for openings in horizontal surfaces, e.g. rooflights.

Nation	Capital <sup>a</sup>	Geographical latitude $\varphi$ [°]	Median External Diffuse Illuminance $E_{v,d,med}$	D to exceed 100 lx	D to exceed 300 lx	D to exceed 500 lx	D to exceed 750 lx
United Kingdom	London	51,51	14 100	0,7 %	2,1 %	3,5 %	5,3 %

Figure 8 Extract from BS EN 17037:2018, Location UK

Therefore, to achieve the minimum level of daylight provision for vertical and inclined openings as per Table A.3, the following must be achieved:

- A target daylight factor (DT) of 2.1% must be achieved on over 50% of the floor area for over 50% of the available daylight hours, and
- A minimum target daylight factor (DTM) of 0.7% must be achieved on over 95% of the floor area for over 50% of the available daylight hours.

- Both targets above must be satisfied for a space to be deemed compliant with the requirements.

There are two methods to assess daylight provision to the interior which are based on target values in either Table A.1 or Table A.3 which are summarised as follows:

Method 1: This calculation method uses the daylight factor targets on the reference plane. The assessment is carried out on a representative day and time during the year, i.e. 21st September @ 12:00 under standard CIE overcast sky conditions.

Method 2: This calculation method uses the illuminance targets on the reference plane as per Table A.1. The assessment is carried out for each hour over the course of the year (8,760 hours) using a local weather file which accounts for varying sky conditions and sun positions throughout the year.

Based on the above criteria, the daylight provision to the proposed development has been assessed using an adequate software (i.e. IES VE), using the Method 1: Average Daylight Factor

Based on the modeling results of the Average Daylight Factors, and the illuminance Lx calculations and thresholds analysis as shown in Table 3, and Fig 9-11 , all Living/ kitchen areas and bedrooms achieve the daylight requirement.

Table 3: Average Daylight Factor Results

Room	ADF	Result
Flat 1 LKD	3.8%	Pass
Flat 1 Bedroom	1.0%	Pass
Flat 2 LKD	2.9%	Pass
Flat 2 Bedroom	2.3%	Pass
Flat 3 LKD	6.9%	Pass
Flat 3 Bedroom	3.6%	Pass
Flat 4 LKD	3.8%	Pass
Flat 4 Bedroom	1.0%	Pass
Flat 5 LKD	2.9%	Pass
Flat 5 Bedroom	1.6%	Pass
Flat 6 LKD	2.5%	Pass
Flat 6 Bedroom	2.3%	Pass
Flat 7 LKD	3.8%	Pass
Flat 7 Bedroom 1	6.6%	Pass
Flat 7 Bedroom 2	4.0%	Pass
Flat 7 Bedroom 3	5.9%	Pass
Flat 8 LKD	2.7%	Pass
Flat 8 Bedroom 1	2.6%	Pass
Flat 8 Bedroom 2	3.2%	Pass

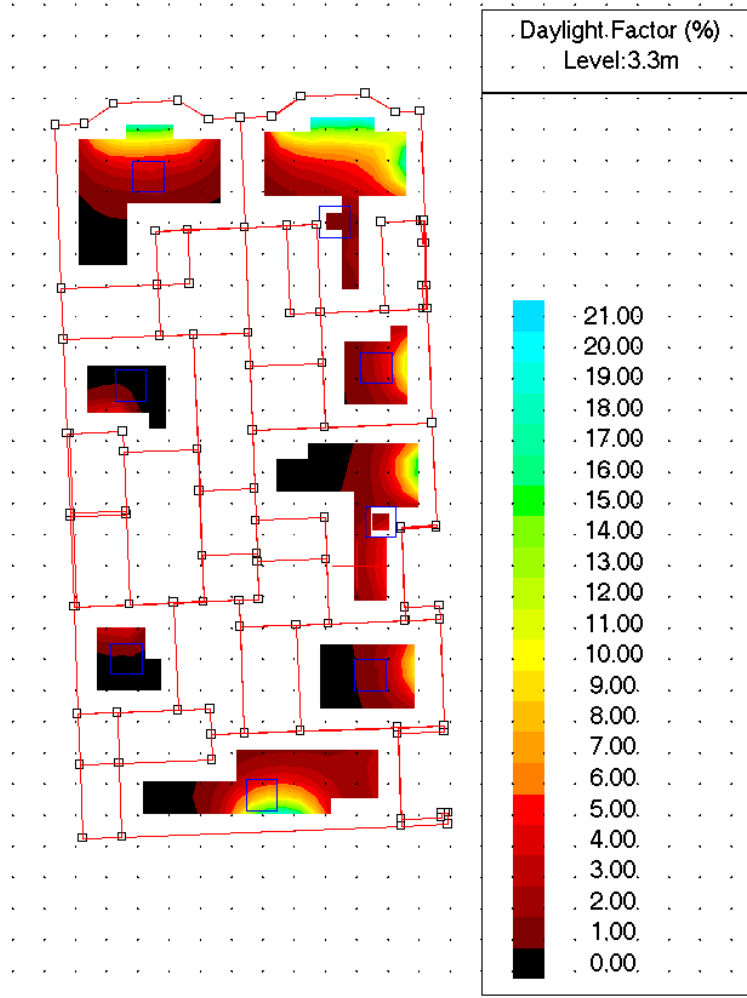


Figure 9 Average Daylight Factor- First Floor

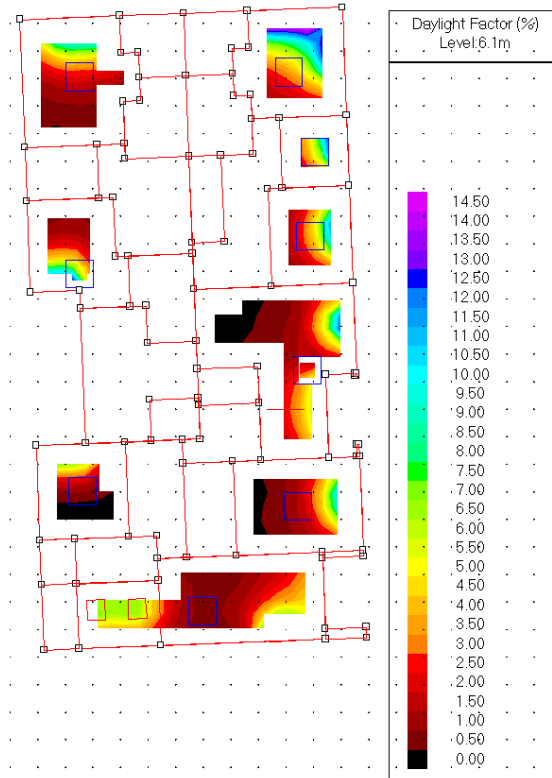


Figure 10 Average Daylight Factor- Second Floor

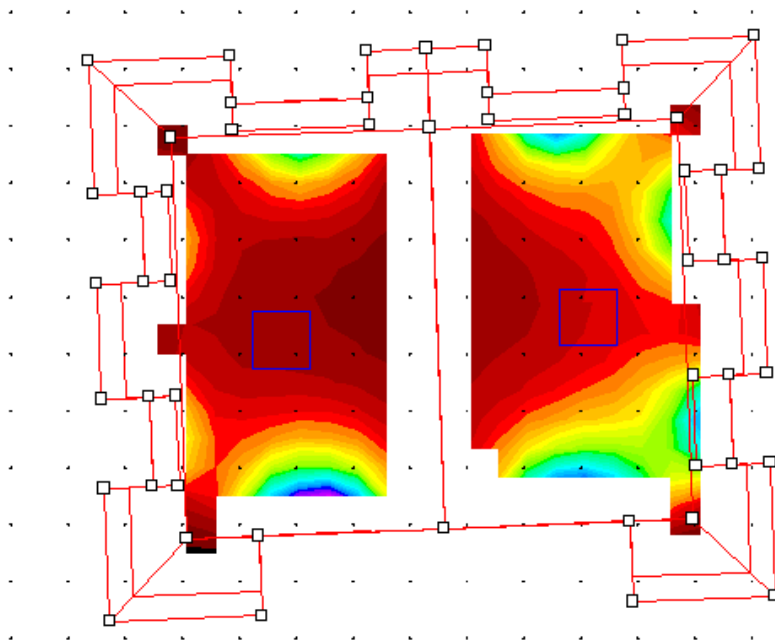


Figure 11 Average Daylight Factor- Third Floor

## Section 4 Overshadowing

The client is keen to eliminate any possible daylight or sunlight impact on neighboring properties, an overshadowing assessment looking at the overshadowing from the proposed building, compared to the existing has been carried out to determine if any of the properties might be impacted.

The IES-ve overshadowing results, highlight that there is no impact on any of the neighboring building, as shown in Tables 4, 5 & 6.

Owners of number 14 Christchurch Avenue had concerns in relation to the daylight and sunlight potential reduction, this property is to the south west of the proposed building, and at a distance of nearly 20m, the overshadowing analysis indicates that it is not possible to have any overshadowing from the proposed development.

Table 4: Shading 21<sup>st</sup> of December




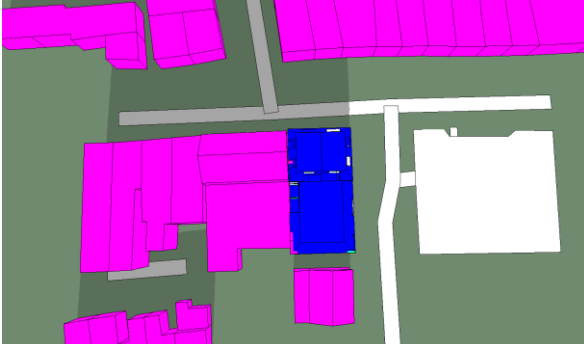







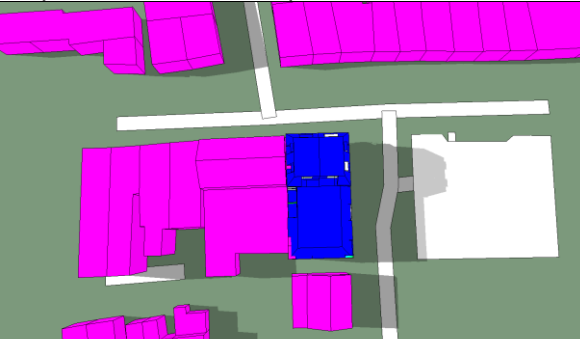
<p>Existing: 21<sup>st</sup> of December 9am</p> 	<p>Proposed: 21<sup>st</sup> of December 9am</p> 
<p>Existing: 21<sup>st</sup> of December 12 Midday</p> 	<p>Proposed: 21<sup>st</sup> of December 12 Midday</p> 
<p>Existing: 21<sup>st</sup> of December 3pm</p> 	<p>Proposed: 21<sup>st</sup> of December 3pm</p> 



Table 5: Shading 21<sup>st</sup> of March

<p>Existing: 21<sup>st</sup> of March 9am</p>	<p>Proposed: 21<sup>st</sup> of March 9am</p>
<p>Existing: 21<sup>st</sup> of March 12 Midday</p>	<p>Proposed: 21<sup>st</sup> of March 12 Midday</p>
<p>Existing: 21<sup>st</sup> of March 5pm</p>	<p>Proposed: 21<sup>st</sup> of March 5pm</p>

Table 6: Shading 21<sup>st</sup> of June

<p>Existing: 21<sup>st</sup> of June 9am</p> 	<p>Proposed: 21<sup>st</sup> of June 9am</p> 
<p>Existing: 21<sup>st</sup> of June 12 Midday</p> 	<p>Proposed: 21<sup>st</sup> of June 12 Midday</p> 
<p>Existing: 21<sup>st</sup> of June 5pm</p> 	<p>Proposed: 21<sup>st</sup> of June 5pm</p> 

## Conclusion

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A daylight and sunlight analysis has been carried out for the habitable rooms of the proposed development; all 8 flats were tested. Results indicate that all flats will benefit from sunlight and daylight levels in excess of the requirements of BS 8206-2:2008 & BS EN 17037:2018.

Additionally, an overshadowing analysis highlighted that the proposed development would not have an impact on neighboring properties, specifically 14 Christchurch Avenue.