



Daylight, Sunlight & Overshadowing Assessment:

Mulberry House, 1A Eldon Road, Reading

Trevor Jenkin – The Faculty Limited

26th March 2021



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This report has been prepared by Hawkins Environmental Limited for the sole purpose of assisting in gaining planning consent for the proposed development described in the introduction of this report.

This report has been prepared by Hawkins Environmental Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This assessment takes into account the prevailing conditions at the time of the report and assesses the impact of the development (if applicable) using data provided to Hawkins Environmental Limited by third parties. The report is designed to assist the developer in refining the designs for the proposed development and to demonstrate to agents of the Local Planning Authority that the proposed development is suited to its location. This should be viewed as a risk assessment and does not infer any guarantee that the site will remain suitable in future, nor that there will not be any complaints either from users of the development or from impacts emanating from the development site itself.

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1. INTRODUCTION

Hawkins Environmental Limited has been instructed by Trevor Jenkin at the Faculty Limited to undertake a daylight, sunlight & overshadowing assessment for the redevelopment of Mulberry House, at 1A Eldon Road, Reading.

The proposed development will see the construction of a five-storey building, comprising 9 new dwellings. A site location plan can be seen in **Appendix 1**. The site was previously a single storey dental surgery, but this has now been demolished.

It has been identified that the site may require a daylight/sunlight assessment to determine whether the proposed development may affect the levels of daylight and sunlight falling on the windows of adjacent buildings. As a consequence, a daylight/sunlight 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 summarises an assessment of the impacts of the proposed development on the surrounding properties potential to receive daylight and sunlight.

In addition, it has been identified that the proposed accommodation may not be well internally lit. Therefore, this report also calculates the internal level of daylight within these rooms to determine whether these rooms meet the best practice guidance on levels of internal daylight.

2. PLANNING POLICY & GUIDANCE

2.1. National Planning Policy Framework (2019)

The National Planning Policy Framework (NPPF) was first published on the 27th March 2012 and revised July 2018 and again on the 20th February 2019. The NPPF outlines the Government's environmental, economic and social policies for England. The NPPF sets out a presumption in favour of sustainable development which should be delivered with three main dimensions: economic; social and environmental (Paragraphs 7, 8 10 and 11). The NPPF aims to enable local people and their councils to produce their own distinctive local and neighbourhood plans, which should be interpreted and applied in order to meet the needs and priorities of their communities.

The NPPF states that in the planning system *"Planning policies and decisions should contribute to and enhance the natural and local environment by... e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans"* (Paragraph 170).

Since the publication of the revised 2018 version of the NPPF (which has been retained in the 2019 version), the NPPF talks specifically about daylight for the first time. Paragraph 123 states that:

"Where there is an existing or anticipated shortage of land for meeting identified housing needs, it is especially important that planning policies and decisions avoid homes being built at low densities, and ensure that developments make optimal use of the potential of each site. In these circumstances...local planning authorities should refuse applications which they consider fail to make efficient use of land, taking into account the policies in this Framework. In this context, when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site (as long as the resulting scheme would provide acceptable living standards)".

2.2. Planning Practice Guidance (2015)

The Planning Practice Guidance (PPG) was launched on 6th March 2014 and provides additional guidance and interpretation to the Government's strategic policies, outlined within the NPPF, in a web-based resource. This is updated regularly.

The PPG discusses the importance of good design and references daylight and sunlight on a number of occasions, specifically the need to ensure that daylight and sunlight patterns are considered when considering the form and scale of a new building, especially in relation to tall buildings.

2.3. Local Policy

The Reading Borough Local Plan (Adopted November 2019) states in Policy CC8: Safeguarding Amenity:

"Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of... Access to sunlight and daylight".

In the associated guidance, the documents states that:

“There is good practice guidance available on some of these issues... For instance, reference to the ‘BRE Site Layout Planning for Daylight and Sunlight: A guide to good practice’ document may be of use in ensuring that new development adjacent to residential properties is not of adverse bulk and does not block out sunlight and daylight to habitable rooms and outdoor living spaces.”

With reference to central Reading, especially in relation to taller buildings, Reading's Local Plan notes: *“In terms of effects of development, the Building Research Establishment (BRE) has guidelines on assessing daylight and sunlight effects of development, which the Council will apply flexibly given the high density of the central area”.*

2.4. Site Layout Planning for Daylight and Sunlight (2011)

The Building Research Establishment (BRE) report, “Site layout planning for daylight and sunlight” Second Edition 2011 by PJ Littlefair (referred to as the BRE Guidance) 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.

The BRE Guidance contains guidance on how to design developments, whilst minimising the impacts on existing buildings from overshadowing and reduced levels of daylight and sunlight, as well as solar dazzle from sloping buildings. 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 natural lighting:

1. **Daylight** – i.e. the impacts of diffuse daylight.
2. **Sunlight** – i.e. the impacts of only the direct sunlight; and
3. **Overshadowing** of Gardens and Open Spaces.

It is important to note that the methods contained within the BRE Guidance are not tests to determine whether a development meets the guidance, rather *“A Guide to Good Practice”*. Therefore, whilst one should try to achieve the numerical guidance within the report, a transgression from the BRE Guidance does not indicate that the development is unsuitable, nor is it an indication that planning permission should be refused.

3. ASSESSMENT METHODOLOGY

3.1. Methodology Overview

The assessment of daylight, sunlight and overshadowing considered several different areas, specifically:

1. The impact of the Proposed Development on levels of daylight reaching surrounding windows;
2. The impact of the Proposed Development on levels of sunlight reaching surrounding windows; and
3. The impact of the Proposed Development on sunlight and shadowing to surrounding gardens and outdoor amenity space.

The BRE Guidance provides a methodology for calculating the amount of daylight and sunlight falling on a window. The Vertical Sky Component (VSC) is used to describe the amount of daylight falling on a window, with the Annual Probable Sunlight Hours (APSH) used to describe the amount of sunlight falling on the window.

A three-dimensional computer model has been constructed using site survey information for the surrounding buildings. For each potentially affected window, the VSC and APSH have been calculated using the software packages created by MBS Survey Software Limited to create both Waldram Diagrams which plot VSC, as well as the Sunlight Availability Indicators which plot APSH. The tools created by MBS are one of the only tools in the Daylight/Sunlight sector that fully incorporate the methodologies introduced in the BRE Guidance and are widely acknowledged to be a suitable tool for undertaking daylight, sunlight and overshadowing assessments in accordance with the BRE Guidance.

The three-dimensional computer model can also be used to plot transient overshadowing. The BRE Guidance stipulates the Spring Equinox on the 21st March as the control date; however, the winter and summer solstices on the 21st December and 21st June are also commonly plotted.

It is important to note that according to the BRE Report, calculations normally do not take into account vegetation. The exception is when evergreen vegetation exists that forms a continuous barrier.

3.2. Methodology for Determining Sensitive Receptors

The BRE Guidance suggests that the assessment of daylight is required for windows serving rooms in adjoining dwellings where daylight is required, including living rooms, kitchens and bedrooms. Windows to bathrooms, toilets, storerooms, circulation areas and garages need not be assessed. The guidelines also apply to any room that may have a reasonable expectation of daylight, including schools and hospitals. Commercial properties and hotels are deemed to have a greater reliance on supplementary electric lighting and are therefore not included in this assessment. For the purposes of this assessment, only habitable rooms within residential properties surrounding the site have been assessed.

The BRE Guidance suggests that the assessment of sunlight is generally applied to all main living rooms and conservatories. Kitchens and bedrooms are less important, although care should be taken not to block too much sun.

Regarding overshadowing, the BRE Report suggests that the following open spaces should be checked:

- Gardens, usually the main back garden of a house;

- Parks and playing fields;
- Children's playgrounds;
- Outdoor swimming pools and paddling pools;
- Sitting out areas such as those between non-domestic buildings and in public squares; and
- Focal points for views such as a group of monuments or fountains.

3.3. Methodology for Determining Impacts

To determine the impact of the proposed development, the VSC, APSH and shadow diagrams are plotted with the proposed development in place based on the three-dimensional computer model of the proposed development and the software packages created by MBS Survey Software Limited.

3.3.1. Daylight

To determine the impact on daylight to windows, diffuse daylight of an existing building may be affected by a proposed development if either:

- The Vertical Sky Component (VSC) measured at the centre of an existing main window is less than 27% and less than 0.8 times its former value; or
- The area of the working plane which can receive direct skylight is reduced to less than 0.8 times its former value.

It should be noted that determining the area of the working plane which can receive direct light from the sky (which is often referred to as the No-Sky Line or NSL) is seen as an additional assessment, rather than as an alternative to VSC. However, since plotting the NSL requires knowledge of the room geometry, which is not usually available during an impact assessment, it is not always possible to calculate the NSL since the use of too many assumptions would make the results meaningless and unreliable.

3.3.2. Sunlight

To determine the impact on sunlight on windows, direct sunlight to existing windows may be affected by a Proposed Development if at the centre of a window:

- Receives less than 25% of Annual Probable Sunlight Hours (APSH) throughout the whole year, or less than 5% APSH between 21st September and 21st March;
- Receives less than 0.8 times its former APSH during either period; and
- Has a reduction in sunlight over the whole year of greater than 4% APSH.

It should be noted that loss of sunlight to windows only needs to be assessed if the window faces within 90° of due south.

3.3.3. Overshadowing

For a garden or outdoor amenity space to be considered well sunlit, at least 50% of the garden or amenity space must receive at least two hours of direct sunlight on the 21st March. If this cannot be achieved, providing

that the area overshadowed with the Proposed Development in place would be greater than 0.8 times the existing level of shadowing, it is considered that no effect on overshadowing would occur.

3.4. Significance Criteria

The BRE Guidance indicates that if the reduction in daylight or sunlight as a consequence of the impact of a development fails to meet the guidelines, the impact could be considered significant.

However, the BRE Guidance makes note that the guidance represents “Best Practice Guidance” and transgressions from the numerical guidelines within the Guidance does not necessarily meet that the development's impact would be significant or unacceptable. The BRE Report states: *“The advice given (in the report) is not mandatory and 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.”*

It should be noted that the numerical targets set out in the main text of the BRE Guidelines have been derived from a low-density suburban housing model of well-spaced two-storey houses, hence the VSC target of 27%, which is equivalent to an obstruction of 25°. This is why reference is made to the circumstances for setting alternative numerical targets in Appendix F of the Guidelines where the nature of an area is dense or higher rise.

Whilst the thresholds contained within the Guidance are an important indicator when determining the impact magnitude and the significance of an impact, the BRE Guidance suggests that professional judgement should be used and the assessment of the impact should rely on a range of factors.

Whilst the threshold of noticeability has a numerical threshold, the method to describe the magnitude of the impact is less rigid and relies on judgement and the consideration of various factors. Appendix I of the BRE Guidance provides guidance on how this can be described. **Table 3.1** shows the impact descriptors on individual receptors.

Table 3.1: Impact Descriptor

Criteria	Impact Descriptor
Where the decrease in daylight or sunlight fails to meet the guidelines, and one or more of the following scenarios apply: • a large number of windows or a large area of open space is affected; • the loss of light is substantially outside the guidelines; • all windows in a particular property are affected; • the affected building or outdoor space has a particularly strong requirement for light, e.g. a living room in a dwelling or a children's playground.	Major Adverse
Where the decrease in daylight or sunlight fails to meet the guidelines, and one or more of the scenarios to describe a Minor Adverse Impact applies, and one or more of the scenarios to describe a Major Adverse Impact applies.	Moderate Adverse
Where the decrease in daylight or sunlight fails to meet the guidelines, and one or more of the following scenarios apply: • only a small number of windows or limited area of open space is affected; • the loss of light is only just outside the guidelines; • an affected room has other sources of light; • the affected building or outdoor space has a low-level requirement for light.	Minor Adverse
Where the increase/decrease in daylight or sunlight fully meets the guidelines and if there is an increase in daylight or sunlight, the increase is "tiny".	Negligible
Where the increase in daylight or sunlight is small and/or the number of affected windows or area of open space affected is small.	Minor Beneficial
Where the increase in daylight or sunlight is moderate and/or the number of affected windows or area of open space affected is moderate.	Moderate Beneficial
Where the increase in daylight or sunlight is large and/or the number of affected windows or area of open space affected is large.	Major Beneficial

Source: Adapted from Appendix I of the BRE Guidance

3.5. 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 daylight. 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 daylight. Different types of rooms have different minimum requirements for daylighting. **Table 3.2** details the acceptable criteria for average daylight factor for habitable rooms.

Table 3.2: Daylight Factor Criteria

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

4. ASSESSMENT OF IMPACTS

This section summarises the impact of the proposed development on levels of daylight and sunlight on surrounding windows.

4.1. Identification of Receptors

Based on a site visit in October 2017, and also based on the plans of the development, a number of windows that could be affected have been identified. The properties of concern can be seen in the site plan in **Appendix 1**. The windows under consideration can be seen in **Appendix 2**.

The main properties of interest are:

- Hanover House;
- 4-9 Town Place; and
- 1 Eldon Road.

4.2. Computer Model

For the purposes of the assessment, a three-dimensional computer model was constructed both with and without the proposed development in place. **Figures 4.1** to **Figure 4.8** show the three-dimensional model of the development, with and without the proposed development.

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 have 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.

Figure 4.1: 3D model without new development from the North

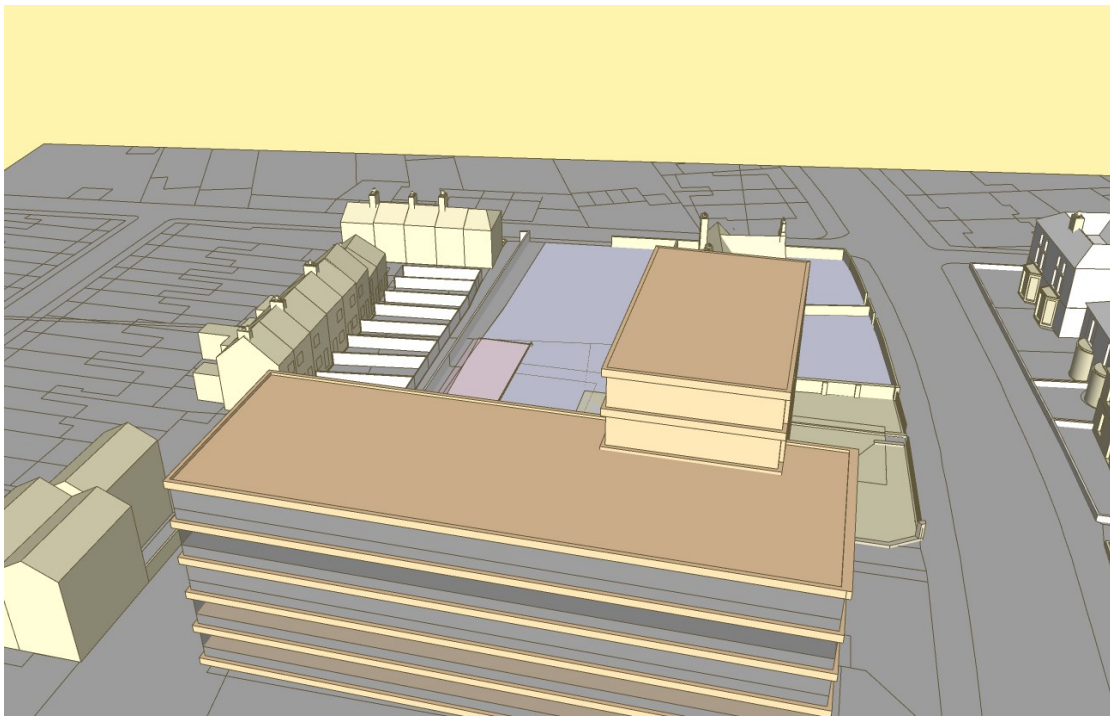


Figure 4.2: 3D model with new development from the North

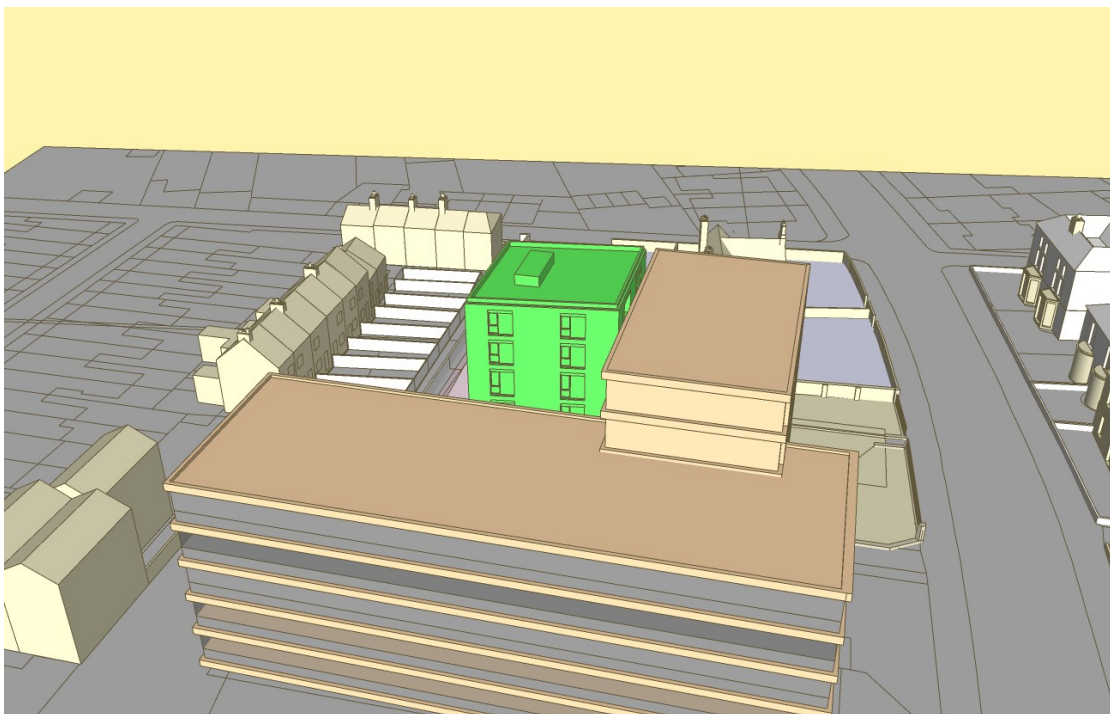


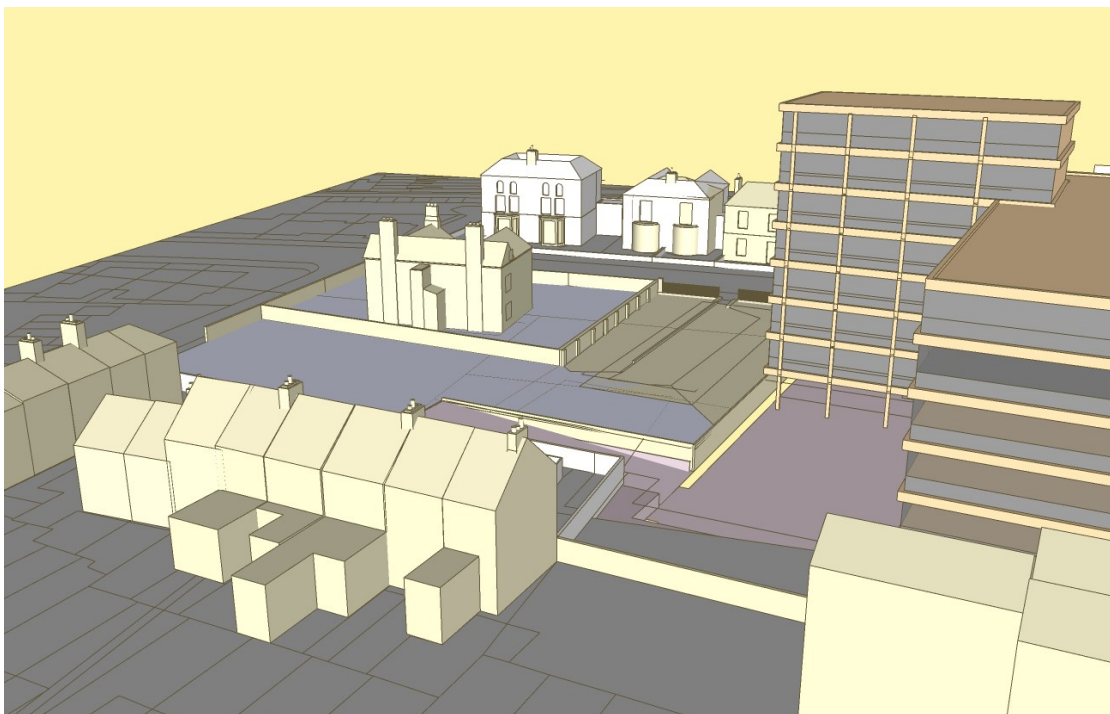
Figure 4.3: 3D model without new development from the East**Figure 4.4: 3D model with new development from the East**

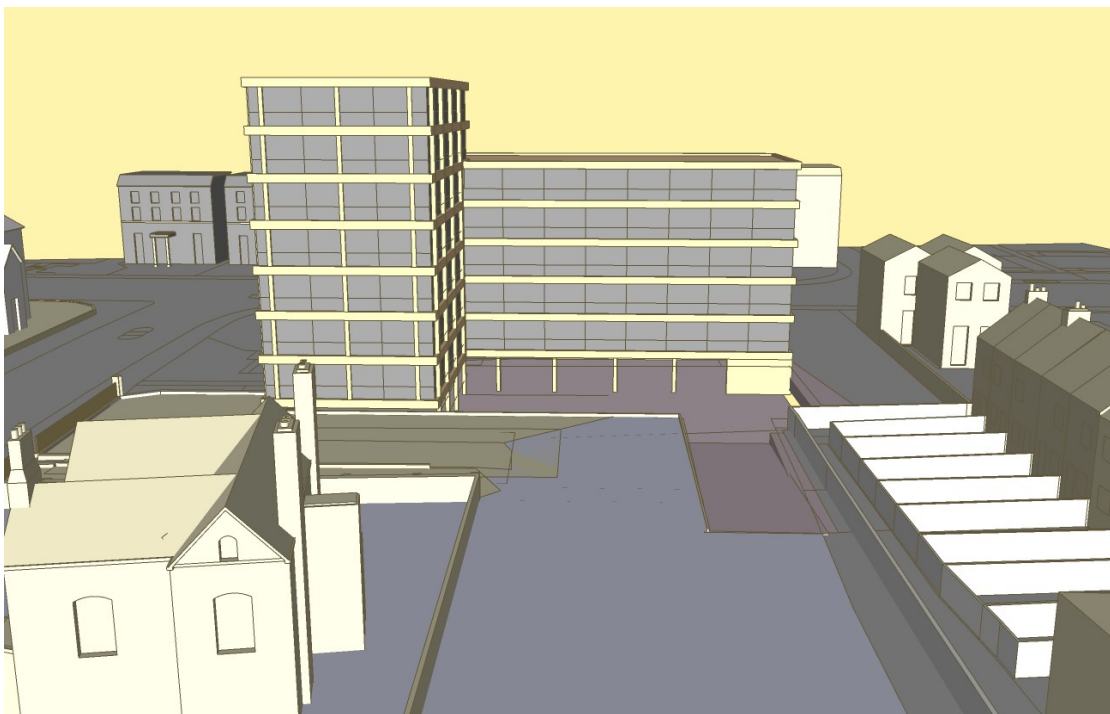
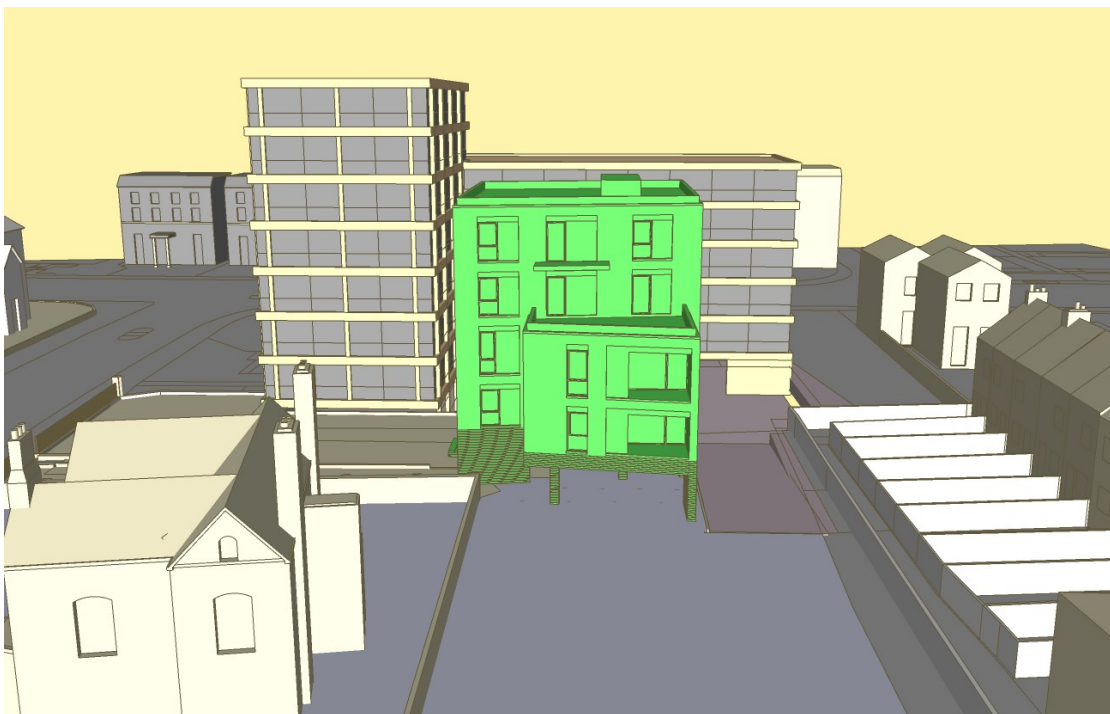
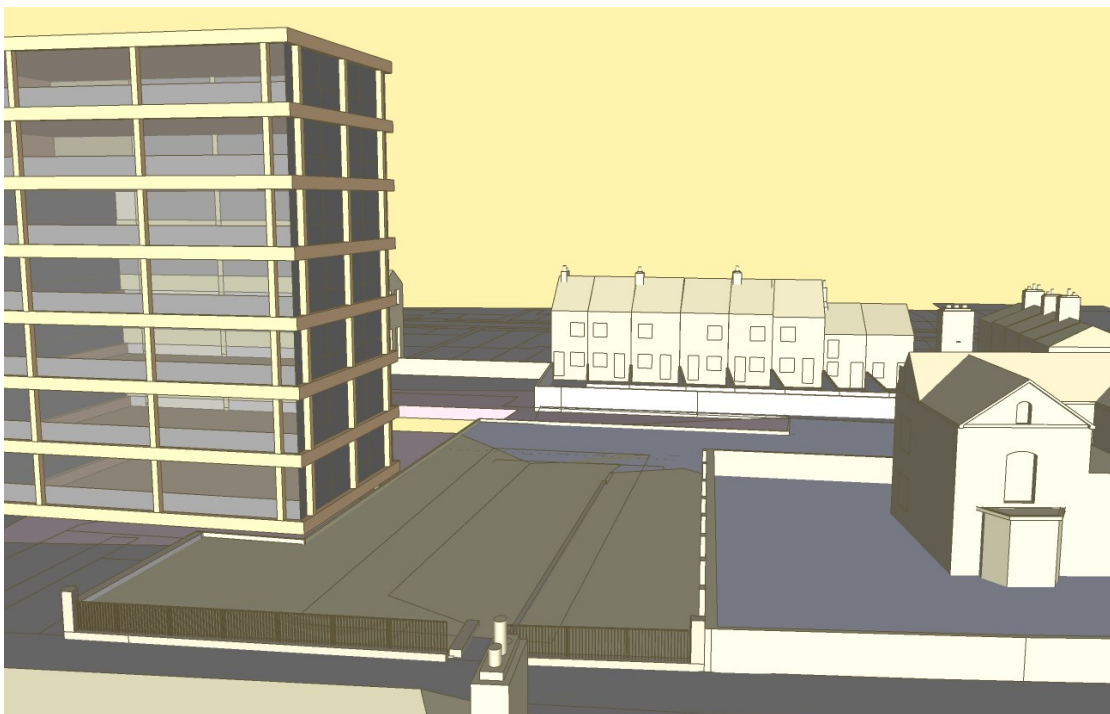
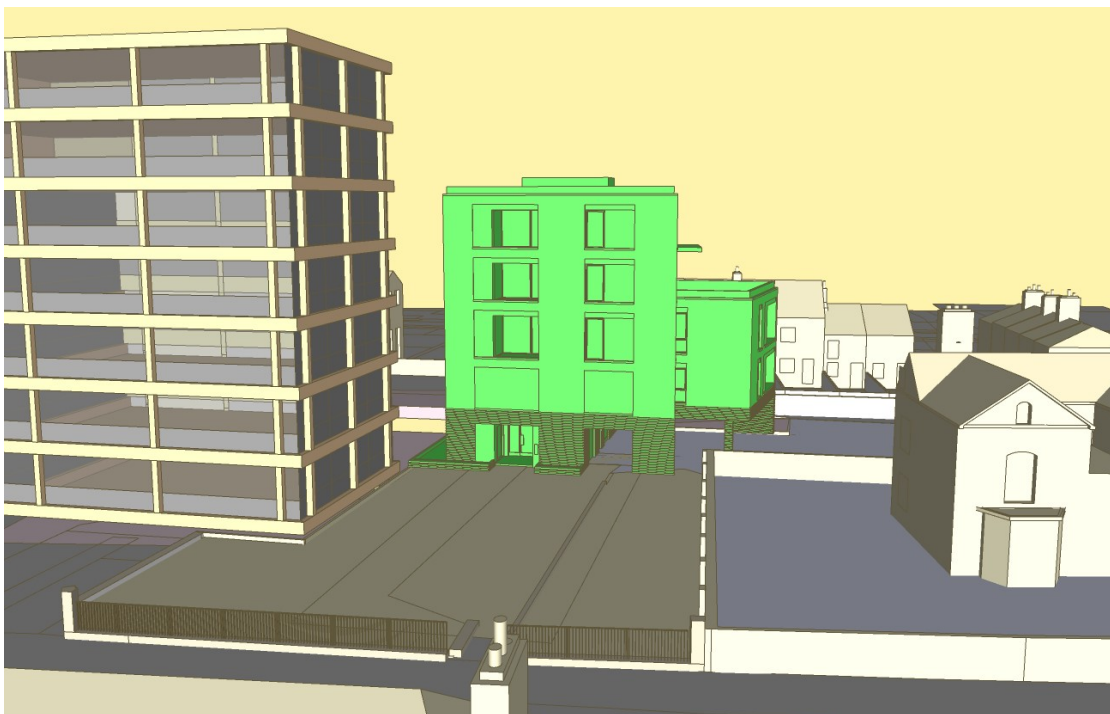
Figure 4.5: 3D model without new development from the South**Figure 4.6: 3D model with new development from the South**

Figure 4.7: 3D model without new development from the West**Figure 4.8: 3D model with new development from the West**

4.3. Daylight Assessment

Based on the plans of the site and the positions of the closest buildings, it is possible to calculate the vertical sky component for the residential buildings, for both with and without the proposed development. The results can be found in **Table 4.1** and summarised in **Table 4.2**, with sample Waldram Diagrams replicated in **Appendix 3**.

The results show that at assessed properties on Eldon Road and Town Place, whilst there is a small reduction in daylight to some of the windows, at all windows assessed at these buildings, the proposed level of daylight will either exceed 27% VSC, or where it does not exceed 27% VSC, the proposed level of daylight would be greater than 0.8 times the existing. Therefore, the reduction in daylight is unlikely to be noticeable and therefore the impact of the proposed development on levels of daylight at these properties would be considered to be “negligible”.

There are two exceptions - at 9 Town Place, (window 72) and 8 Town Place (window 74), where at both windows, the proposed level of daylight would be marginally below 27% (both around 24%) and the proposed level of daylight would be 0.79 times the existing level of daylight. Since both of the windows would receive a level of daylight with the proposed development of less than 27% VSC and the proposed level of daylight would be less than 0.8 times the existing level, the reduction in daylight may be noticeable. However, it has also been observed both windows fall short of the BRE VSC threshold by a very small margin. In this instance, it is unlikely that the difference between what would be considered acceptable and that that falls short of the BRE VSC threshold is unlikely to be perceptible to the human eye. As a consequence, overall, under the guidance contained within Appendix I of the BRE Report and replicated in **Table 3.1** of this report, it is considered that the proposed development will have a “minor adverse” impact to 8 and 9 Town Place.

At the Hannover House, a number of windows facing the proposed development site will not fully satisfy the BRE recommendations.

At windows 33, 46, 47, 48, 50, 51, 52, 53, 59, 60, 61, 62, 63, 64, 65, 66, 67 and 68 the reduction in daylight could be considered noticeable by the inhabitants; however, it was noted when visiting the site that since the dwellings are converted from offices via permitted development rights, they have unusually large windows, more in keeping with an office development rather than a residential development. Therefore, it was considered possible, that these dwellings would still be considered well lit even with the reduction in daylight, by virtue of the large windows.

Consequently, floor plans of the dwellings were obtained and Average Daylight Factor (ADF) calculations of these rooms with the proposed development in place were carried out. **Table 4.2** shows these calculations, with **Table 4.3** showing the results. **Table 4.3** shows that with the exception of the room served by window 64, each of the rooms will continue to receive a minimum of 2% ADF, which indicates that each of the rooms will continue to be considered well day lit. Consequently, even though there will be a noticeable reduction in daylight at these windows, any impact is considered to be less significant since the rooms will continue to be well lit. The room served by window 64, is expected to experience an ADF of 1.9%, only marginally below the BRE Recommendations of 2% for kitchens. However, the other rooms in at Hannover House are all expected to have ADFs in excess of 2%. Consequently, under the guidance contained within Appendix I of the BRE Report and replicated in **Table 3.1** of this report, it is considered that there will be a “minor adverse” impact to single dwelling within Hannover House.

The February 2019 version of the NPPF now specifically mentions daylight/sunlight in national planning policy, cementing what had always been known informally, that the BRE Guidance represents “Best Practice Guidance” and any failure to meet the numerical guidelines within the report does not necessarily mean that the development will be substandard or unacceptable, nor that planning consent should not be given. The NPPF states that:

“Where there is an existing or anticipated shortage of land for meeting identified housing needs, it is especially important that planning policies and decisions avoid homes being built at low densities, and ensure that developments make optimal use of the potential of each site. In these circumstances...local planning authorities should refuse applications which they consider fail to make efficient use of land, taking into account the policies in this Framework. In this context, when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site”.

This is an approach reinforced by local planning policy with the Reading Borough Local Plan noting that “in terms of effects of developments, the Building Research Establishment (BRE) has guidelines on assessing daylight and sunlight effects of development, which the Council will apply flexibly given the high density of the central area”.

As a consequence, the NPPF acknowledges that whilst impacts should always be minimised as far as reasonably possible, other considerations should take priority over impacts on daylight and sunlight. Therefore, providing that this development is not considered to be an over intensification of the site and is considered to be an efficient use of the land, within the context of national planning policy, this “minor adverse” impact to three dwellings could be considered acceptable, especially considering the urban context of the site and the fact that all three fail to meet the BRE Guidelines by a very small margin.

Table 4.1: Daylight Impact Assessment

Address	Window No.	Vertical Sky Component %			Meets BRE Guide?	Window Orientation
		Existing	Proposed	Ratio*		
Hanover House	1	35.79	35.46	0.99	YES	181°
Hanover House	2	35.71	35.27	0.99	YES	181°
Hanover House	3	35.62	34.90	0.98	YES	181°
Hanover House	4	35.76	34.68	0.97	YES	181°
Hanover House	5	35.25	33.65	0.95	YES	91°
Hanover House	6	34.86	34.14	0.98	YES	91°
Hanover House	7	33.26	32.87	0.99	YES	91°
Hanover House	8	23.40	22.88	0.98	YES	181°
Hanover House	9	29.60	29.00	0.98	YES	181°
Hanover House	10	33.63	32.97	0.98	YES	181°
Hanover House	11	35.94	35.29	0.98	YES	181°
Hanover House	12	37.27	36.68	0.98	YES	181°
Hanover House	13	38.06	37.56	0.99	YES	181°
Hanover House	14	38.55	38.11	0.99	YES	181°
Hanover House	15	35.79	34.36	0.96	YES	181°
Hanover House	16	35.71	33.82	0.95	YES	181°
Hanover House	17	35.62	32.52	0.91	YES	181°
Hanover House	18	35.76	31.23	0.87	YES	181°
Hanover House	19	33.79	27.12	0.80	YES	91°
Hanover House	20	32.14	29.14	0.91	YES	91°
Hanover House	21	27.74	26.18	0.94	YES	91°
Hanover House	22	20.50	18.41	0.90	YES	181°
Hanover House	23	25.32	22.89	0.90	YES	181°
Hanover House	24	28.99	26.30	0.91	YES	181°
Hanover House	25	31.47	28.79	0.91	YES	181°

Address	Window No.	Vertical Sky Component %			Meets BRE Guide?	Window Orientation
		Existing	Proposed	Ratio*		
Hanover House	26	33.05	30.65	0.93	YES	181°
Hanover House	27	34.05	32.02	0.94	YES	181°
Hanover House	28	34.69	32.94	0.95	YES	181°
Hanover House	29	35.67	33.11	0.93	YES	181°
Hanover House	30	35.60	32.25	0.91	YES	181°
Hanover House	31	35.51	30.32	0.85	YES	181°
Hanover House	32	35.64	28.45	0.80	YES	181°
Hanover House	33	32.26	21.79	0.68	NO	91°
Hanover House	34	29.70	24.44	0.82	YES	91°
Hanover House	35	24.77	21.94	0.89	YES	91°
Hanover House	36	20.03	16.22	0.81	YES	181°
Hanover House	37	24.35	19.94	0.82	YES	181°
Hanover House	38	27.84	22.98	0.83	YES	181°
Hanover House	39	30.37	25.53	0.84	YES	181°
Hanover House	40	32.07	27.75	0.87	YES	181°
Hanover House	41	33.20	29.52	0.89	YES	181°
Hanover House	42	33.96	30.79	0.91	YES	181°
Hanover House	43	34.69	31.32	0.90	YES	181°
Hanover House	44	34.67	30.26	0.87	YES	181°
Hanover House	45	34.58	28.13	0.81	YES	181°
Hanover House	46	34.71	26.15	0.75	NO	181°
Hanover House	47	30.20	17.95	0.59	NO	91°
Hanover House	48	27.32	20.51	0.75	NO	91°
Hanover House	49	22.77	18.90	0.83	YES	91°
Hanover House	50	19.74	14.31	0.73	NO	181°
Hanover House	51	23.70	17.48	0.74	NO	181°

Address	Window No.	Vertical Sky Component %			Meets BRE Guide?	Window Orientation
		Existing	Proposed	Ratio*		
Hanover House	52	27.04	20.25	0.75	NO	181°
Hanover House	53	29.55	22.84	0.77	NO	181°
Hanover House	54	31.25	25.27	0.81	YES	181°
Hanover House	55	32.40	27.28	0.84	YES	181°
Hanover House	56	33.17	28.76	0.87	YES	181°
Hanover House	57	33.30	29.50	0.89	YES	181°
Hanover House	58	33.28	28.34	0.85	YES	181°
Hanover House	59	33.18	26.20	0.79	NO	181°
Hanover House	60	33.29	24.24	0.73	NO	181°
Hanover House	61	28.11	15.58	0.55	NO	91°
Hanover House	62	25.24	17.73	0.70	NO	91°
Hanover House	63	21.23	16.74	0.79	NO	91°
Hanover House	64	19.08	12.42	0.65	NO	181°
Hanover House	65	22.71	15.08	0.66	NO	181°
Hanover House	66	25.86	17.60	0.68	NO	181°
Hanover House	67	28.28	20.13	0.71	NO	181°
Hanover House	68	29.89	22.62	0.76	NO	181°
Hanover House	69	30.99	24.73	0.80	YES	181°
Hanover House	70	31.72	26.28	0.83	YES	181°
9 Town Place	71	31.87	26.43	0.83	YES	271°N
9 Town Place	72	30.24	23.78	0.79	NO	271°N
8 Town Place	73	32.40	26.99	0.83	YES	271°N
8 Town Place	74	30.82	24.34	0.79	NO	271°N
7 Town Place	75	33.31	28.22	0.85	YES	270°N
7 Town Place	76	31.82	25.59	0.80	YES	270°N
6 Town Place	77	34.29	30.13	0.88	YES	271°N

Address	Window No.	Vertical Sky Component %			Meets BRE Guide?	Window Orientation
		Existing	Proposed	Ratio*		
6 Town Place	78	32.88	27.64	0.84	YES	271°N
5 Town Place	79	34.87	31.55	0.90	YES	271°N
5 Town Place	80	33.49	29.25	0.87	YES	271°N
4 Town Place	81	35.39	32.80	0.93	YES	266°
4 Town Place	82	33.97	30.63	0.90	YES	266°
1 Eldon Road	83	33.48	30.04	0.90	YES	350°N
1 Eldon Road	84	31.81	27.49	0.86	YES	350°N
1 Eldon Road	85	30.13	25.14	0.83	YES	350°N

Table 4.2: Daylight Factor Calculations – Hannover House

Window	Room Use	T	Aw m ²	VSC %	Θ Degrees	A m ³	R
33	Lounge/ Kitchen	0.68	4.6	21.79	56	91	0.5
46	Lounge/ Kitchen	0.68	4.6	26.15	63	91	0.5
47	Lounge/ Kitchen	0.68	4.6	17.95	50	91	0.5
48	Bedroom	0.68	3.6	20.51	54	54	0.5
50	Lounge/ Kitchen	0.68	3.9	14.31	43	75	0.5
51	Bedroom	0.68	2.7	17.48	49	43	0.5
52	Bedroom	0.68	2.7	20.25	54	43	0.5
53	Lounge/ Kitchen	0.68	3.9	22.84	58	75	0.5
59	Bedroom	0.68	2.9	26.20	64	43	0.5
60	Lounge/ Kitchen	0.68	4.6	24.24	60	91	0.5
61	Lounge/ Kitchen	0.68	4.6	15.58	46	91	0.5
62	Bedroom	0.68	3.6	17.73	50	54	0.5
63	Lounge/ Kitchen	0.68	3.9	16.74	48	75	0.5
64	Lounge/ Kitchen	0.68	3.9	12.42	39	75	0.5
65	Bedroom	0.68	2.7	15.08	45	43	0.5
66	Bedroom	0.68	2.7	17.60	49	43	0.5
67	Lounge/ Kitchen	0.68	3.9	20.13	54	75	0.5
68	Bedroom	0.68	3.9	22.62	58	51	0.5

Table 4.3: ADF Results – Hanover House

Window	Room Use	Average Daylight Factor (%)
33	Lounge/ Kitchen	2.6%
46	Lounge/ Kitchen	2.9%
47	Lounge/ Kitchen	2.3%

Window	Room Use	Average Daylight Factor (%)
48	Bedroom	3.3%
50	Lounge/ Kitchen	2.0%
51	Bedroom	2.8%
52	Bedroom	3.0%
53	Lounge/ Kitchen	2.7%
59	Bedroom	3.6%
60	Lounge/ Kitchen	2.8%
61	Lounge/ Kitchen	2.1%
62	Bedroom	3.0%
63	Lounge/ Kitchen	2.2%
64	Lounge/ Kitchen	1.9%
65	Bedroom	2.5%
66	Bedroom	2.8%
67	Lounge/ Kitchen	2.5%
68	Bedroom	4.0%

4.4. Sunlight Assessment

In order to assess the impact of a development on the levels of sunlight, the APSH has been calculated for those windows which face within 90° of due south and hence fall within the BRE Sunlight criteria.

According to the BRE Report, direct sunlight on an existing window may be affected by a proposed development if the centre of a window receives less than 25% of Annual Probable Sunlight Hours (APSH), or less than 5% APSH between 21st September and 21st March; **and** receives less than 0.8 times its former APSH during either period; **and** has a reduction in sunlight over the whole year of greater than 4% APSH.

Table 4.2 details the results of the Annual Probable Sunlight Hours (APSH) calculations for the windows under consideration, with the Sunlight Indicator Diagrams, replicated in **Appendix 4**.

It can be seen from **Table 4.4** that 6 windows will be affected during both the whole year and during the winter months, plus a further 3 windows will be affected during the winter months only. These windows serve a total of 6 dwellings. However, of the 6 dwellings, 4 are dual aspect with windows on an alternative façade that will remain well sunlit even with proposed development. Consequently, under the BRE guidance this reduction

would not necessarily be considered significant as the occupants would still have access to some direct sunlight. Similarly, the remaining single aspect dwelling will only be affected during the winter months and only to a single window and therefore it is considered that whilst there will be a reduction in the amount of sunlight received at this dwelling, the occupants will still have access to some direct sunlight and therefore the reduction in sunlight to all dwellings would be considered “negligible”.

Table 4.4: Sunlight Impact Assessment

Address	Window No.	Annual Probable Sunlight Hours %				Winter Probable Sunlight Hours %			
		Existing	Proposed	Ratio*	Meets BRE Guide?	Existing	Proposed	Ratio*	Meets BRE Guide?
Hanover House	1	79	79	1.00	YES	30	30	1.00	YES
Hanover House	2	77	77	1.00	YES	30	30	1.00	YES
Hanover House	3	78	77	0.99	YES	30	29	0.97	YES
Hanover House	4	78	76	0.97	YES	30	28	0.93	YES
Hanover House	5	40	39	0.98	YES	11	10	0.91	YES
Hanover House	6	41	41	1.00	YES	12	12	1.00	YES
Hanover House	7	40	40	1.00	YES	12	12	1.00	YES
Hanover House	8	53	53	1.00	YES	17	17	1.00	YES
Hanover House	9	62	62	1.00	YES	20	20	1.00	YES
Hanover House	10	73	73	1.00	YES	23	23	1.00	YES
Hanover House	11	77	77	1.00	YES	24	24	1.00	YES
Hanover House	12	84	84	1.00	YES	27	27	1.00	YES
Hanover House	13	84	84	1.00	YES	27	27	1.00	YES

Address	Window No.	Annual Probable Sunlight Hours %				Winter Probable Sunlight Hours %			
		Existing	Proposed	Ratio*	Meets BRE Guide?	Existing	Proposed	Ratio*	Meets BRE Guide?
Hanover House	14	86	86	1.00	YES	28	28	1.00	YES
Hanover House	15	79	75	0.95	YES	30	27	0.90	YES
Hanover House	16	77	74	0.96	YES	30	27	0.90	YES
Hanover House	17	78	73	0.94	YES	30	27	0.90	YES
Hanover House	18	78	68	0.87	YES	30	24	0.80	YES
Hanover House	19	39	29	0.74	YES	11	3	0.27	NO
Hanover House	20	40	36	0.90	YES	12	8	0.67	YES
Hanover House	21	40	39	0.98	YES	12	11	0.92	YES
Hanover House	22	45	45	1.00	YES	16	16	1.00	YES
Hanover House	23	53	53	1.00	YES	20	20	1.00	YES
Hanover House	24	63	63	1.00	YES	23	23	1.00	YES
Hanover House	25	69	69	1.00	YES	24	24	1.00	YES
Hanover House	26	72	72	1.00	YES	25	25	1.00	YES
Hanover House	27	75	74	0.99	YES	27	26	0.96	YES

Address	Window No.	Annual Probable Sunlight Hours %				Winter Probable Sunlight Hours %			
		Existing	Proposed	Ratio*	Meets BRE Guide?	Existing	Proposed	Ratio*	Meets BRE Guide?
Hanover House	28	78	77	0.99	YES	28	27	0.96	YES
Hanover House	29	79	74	0.94	YES	30	27	0.90	YES
Hanover House	30	77	69	0.90	YES	30	24	0.80	YES
Hanover House	31	78	66	0.85	YES	30	24	0.80	YES
Hanover House	32	78	61	0.78	YES	30	23	0.77	YES
Hanover House	33	39	16	0.41	NO	11	0	0	NO
Hanover House	34	40	30	0.75	YES	12	2	0.17	NO
Hanover House	35	37	31	0.84	YES	12	6	0.50	YES
Hanover House	36	43	39	0.91	YES	16	12	0.75	YES
Hanover House	37	52	48	0.92	YES	20	16	0.80	YES
Hanover House	38	59	53	0.90	YES	23	17	0.74	YES
Hanover House	39	63	58	0.92	YES	24	19	0.79	YES
Hanover House	40	68	64	0.94	YES	25	21	0.84	YES
Hanover House	41	72	68	0.94	YES	27	23	0.85	YES

Address	Window No.	Annual Probable Sunlight Hours %				Winter Probable Sunlight Hours %			
		Existing	Proposed	Ratio*	Meets BRE Guide?	Existing	Proposed	Ratio*	Meets BRE Guide?
Hanover House	42	74	70	0.95	YES	28	24	0.86	YES
Hanover House	43	79	68	0.86	YES	30	25	0.83	YES
Hanover House	44	77	65	0.84	YES	30	24	0.80	YES
Hanover House	45	78	61	0.78	YES	30	24	0.80	YES
Hanover House	46	78	56	0.72	YES	30	21	0.70	YES
Hanover House	47	39	9	0.23	NO	11	0	0	NO
Hanover House	48	40	24	0.60	NO	12	2	0.17	NO
Hanover House	49	36	27	0.75	YES	12	3	0.25	NO
Hanover House	50	44	39	0.89	YES	16	11	0.69	YES
Hanover House	51	52	46	0.88	YES	20	14	0.70	YES
Hanover House	52	57	46	0.81	YES	23	12	0.52	YES
Hanover House	53	61	52	0.85	YES	24	15	0.63	YES
Hanover House	54	66	60	0.91	YES	25	19	0.76	YES
Hanover House	55	72	65	0.90	YES	27	20	0.74	YES

Address	Window No.	Annual Probable Sunlight Hours %				Winter Probable Sunlight Hours %			
		Existing	Proposed	Ratio*	Meets BRE Guide?	Existing	Proposed	Ratio*	Meets BRE Guide?
Hanover House	56	76	69	0.91	YES	28	21	0.75	YES
Hanover House	57	77	63	0.82	YES	28	23	0.82	YES
Hanover House	58	75	59	0.79	YES	28	22	0.79	YES
Hanover House	59	77	56	0.73	YES	29	22	0.76	YES
Hanover House	60	77	52	0.68	YES	29	20	0.69	YES
Hanover House	61	39	8	0.21	NO	11	0	0	NO
Hanover House	62	39	21	0.54	NO	11	2	0.18	NO
Hanover House	63	35	24	0.69	NO	11	2	0.18	NO
Hanover House	64	42	32	0.76	YES	15	5	0.33	YES
Hanover House	65	50	41	0.82	YES	19	10	0.53	YES
Hanover House	66	56	43	0.77	YES	22	9	0.41	YES
Hanover House	67	60	49	0.82	YES	23	12	0.52	YES
Hanover House	68	64	55	0.86	YES	24	15	0.63	YES
Hanover House	69	70	61	0.87	YES	27	18	0.67	YES

Address	Window No.	Annual Probable Sunlight Hours %				Winter Probable Sunlight Hours %			
		Existing	Proposed	Ratio*	Meets BRE Guide?	Existing	Proposed	Ratio*	Meets BRE Guide?
Hanover House	70	74	66	0.89	YES	28	20	0.71	YES
9 Town Place	71	Sunlight Assessment Not Required (North Facing)							
9 Town Place	72	Sunlight Assessment Not Required (North Facing)							
8 Town Place	73	Sunlight Assessment Not Required (North Facing)							
8 Town Place	74	Sunlight Assessment Not Required (North Facing)							
7 Town Place	75	Sunlight Assessment Not Required (North Facing)							
7 Town Place	76	Sunlight Assessment Not Required (North Facing)							
6 Town Place	77	Sunlight Assessment Not Required (North Facing)							
6 Town Place	78	Sunlight Assessment Not Required (North Facing)							
5 Town Place	79	Sunlight Assessment Not Required (North Facing)							
5 Town Place	80	Sunlight Assessment Not Required (North Facing)							
4 Town Place	81	50	47	0.94	YES	16	16	1.00	YES
4 Town Place	82	49	44	0.90	YES	15	15	1.00	YES
1 Eldon Road	83	Sunlight Assessment Not Required (North Facing)							

Daylight, Sunlight & Overshadowing Assessment

Mulberry House, 1A Eldon Road, Reading

Trevor Jenkin – The Faculty Limited • 26th March 2021 • H3291 – DS – v1

Address	Window No.	Annual Probable Sunlight Hours %				Winter Probable Sunlight Hours %			
		Existing	Proposed	Ratio*	Meets BRE Guide?	Existing	Proposed	Ratio*	Meets BRE Guide?
1 Eldon Road	84	Sunlight Assessment Not Required (North Facing)							
1 Eldon Road	85	Sunlight Assessment Not Required (North Facing)							

*= Ratio of proposed levels compared to existing levels

4.5. Overshadowing Assessment

This section summarises the overshadowing impacts of the proposed development on gardens and outdoor amenity space. In order to assess the effects of overshadowing on gardens and outdoor amenity space, a three-dimensional model of the development and surrounding buildings has been constructed and the shadows caused by the building on the 21st of March has been assessed. The 21st of March is utilised because the day and night-time periods are of equal length. Furthermore, the 21st of March has been chosen as it is the Spring Equinox and is considered to be the first day of the year when the ability to enjoy one's garden or amenity space is important. **Appendix 5** shows the results of the overshadowing assessment on the 21st of March for the existing and proposed site layout, as well as on the 21st of June (the Summer Solstice) and the 21st of December (the Winter Solstice).

The Second Edition of the BRE Report, published in 2011, requires at least 50% of the garden should be capable of receiving at least two full hours of direct sunlight on the 21st of March. If this cannot be achieved, providing that the area overshadowed was greater than 0.8 times its former value, no impact would have occurred.

The shadow diagrams in **Appendix 5** shows that on the 21st March, the proposed development causes some additional shading to the rear garden of 220 King's Road (which is used as an educational establishment) during the latter part of the day. However, the shadow diagrams show that the garden receives plenty of direct sunlight during the rest of the day. Consequently, any impact upon this amenity space is considered to be insignificant.

5. INTERIOR DAYLIGHTING & SUNLIGHTING CALCULATIONS

5.1. Overview

The following section summarises an internal daylight and sunlight assessment to determine whether they meet the best practice guidelines on internal daylighting.

5.2. Criteria

5.2.1. 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 m²);

θ is the angle of visible sky in degrees;

A is the total area of room surfaces (in m²), which includes walls, ceilings and floors; and

R is the average room reflectance (normally 0.5).

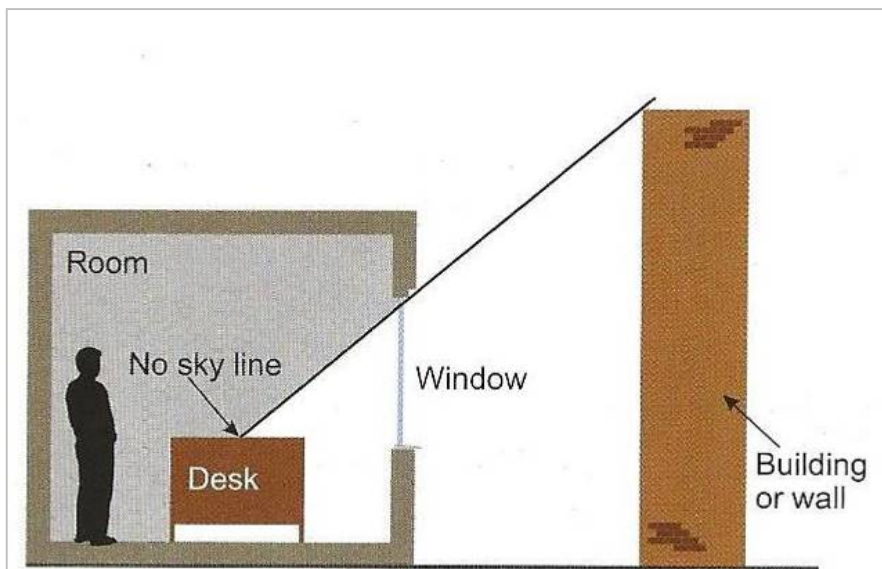
Daylight within the habitable rooms of the proposed development have been modelled using MBS Survey's Daylight for Sketchup software. Using the software, it is possible to simulate daylight availability within the rooms, using the parameters detailed within Appendix B of the Building Research Establishment (BRE) report, “*Site layout planning for daylight and sunlight – a guide to good practice*” by PJ Littlefair.

5.2.2. No Sky Line

The no-sky line (NSL) divides those areas of the working plane which can receive direct skylight, from those which cannot. It is important as it indicates how well daylight is distributed in a room. Areas beyond the no-sky line will generally look gloomy. The working plane is a notional surface, typically at about desk or table height, at which the daylight factor or the ‘no-sky line’ is calculated or plotted. For the calculations required here, it is set at 0.85 m above the floor.

The BRE documents suggests providing at least 80% of the working plane has a direct view of the sky (i.e. no more than 20% of the room is beyond the NSL) the room would not be considered gloomy and daylight within the room will be well distributed. **Figure 5.1** illustrates the position of the No-Sky Line (NSL).

Figure 5.1: Pictorial calculation of the No-Sky Line (from the BRE Report)



5.2.3. Annual Probable Sunlight Hours

Sunlighting within the proposed dwellings has been considered. The BRE guide suggests that a dwelling would appear reasonably sunlit providing that at least one main window faces within 90° of due south and the centre of a least one windows to a main living rooms can receive 25% of Annual Probable Sunlight Hours (APSH), including at least 5% APSH during the winter months between 21st September and 21st March.

The APSH is the average number of hours in the year that the sun expected to shine on an unobstructed surface, allowing for average levels of cloudiness for the location in question.

It is important to note that the BRE Guidance acknowledges that it may not be possible for every dwelling to have access to direct sunlight. The guidance infers that whilst sunlight is appreciated and valued, access to direct sunlight is not a prerequisite to development. Consequently, whilst the designer should try to maximise sunlight availability within dwellings, the absence of direct sunlight to a dwelling or number of dwellings should not be a constraint upon the development of the site.

5.3. Modelling

For the purposes of the assessment, a three-dimensional computer model was constructed of the proposed development. 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.

For the daylight simulations, the rooms have been modelled as per the proposals, including window locations, room layouts and window sizes. The calculations were performed in accordance with the Building Research Establishment (BRE) report, “*Site layout planning for daylight and sunlight – a guide to good practice*” by PJ Littlefair. The default parameters used in the calculations can be seen in **Table 5.1**.

Table 5.1: Parameters used in the Daylight Calculations

Parameter	Value	Justification
NSL Working Plane Height	0.85m	Default in the BRE Guidance
Floor Reflectance	0.5	Default in the BRE Guidance
Wall Reflectance	0.5	Default in the BRE Guidance
Ceiling Reflectance	0.5	Default in the BRE Guidance
Average room reflectance (R)	0.5	Default in the BRE Guidance
Transmittance of the glazing (T)	0.68	Recommended by the BRE for clear double glazing
Maintenance factor (M)	0.96	Recommended by the Home Quality Mark for vertical glazing
Floor to ceiling glazing factor	0.15	Default in the BRE Guidance
Glazing Multiplier (to account for the window frame)	0.9	Worst-case estimate

The daylight contours can be seen in **Figure 5.2** to **Figure 5.5**. The diagrams show the position of the NSL. In the diagrams, the areas shaded yellow are most well lit, with the areas in blue the least well lit; the areas marked in black are the areas without a direct view of the sky, i.e. beyond the NSL.

5.4. Results and Analysis

The results of the calculations can be seen in **Appendix 5**. The BRE Report suggests that kitchens should have a minimum ADF of 2%, living rooms 1.5% and bedrooms 1%.

Of the 22 habitable rooms assessed, seven rooms do not meet the minimum recommended best practice levels of average daylight (ADF), i.e. 68% of rooms meet the minimum recommended best practice levels of daylight. Of the rooms that fall short of the BRE recommendations, five are living room/kitchens, with the other two rooms to be used as bedrooms. Of these seven rooms, five fall short of the minimum recommended best practice levels by a small margin (i.e. 0.2% ADF or less).

All of the rooms that fall short of the minimum best practice guideline levels are rooms where the windows are located within recessed balconies. Recessed balconies restrict the amount of daylight reaching the windows.

It is important to note that the BRE Guidance represents “*Best Practice Guidance*” and it notes that the advice given in the report is not mandatory nor adopted planning policy and the numerical guidelines “*should be*

interpreted flexibly since natural lighting is only one of many factors in layout design". For example, one must consider that levels of daylight within these dwellings are restricted due to the provision of private outdoor amenity space; consequently, any improvements in levels of daylight may be to the detriment of amenity space.

The BRE guidance notes that for the daylight to be well distributed within the room, 80% or more of the working plane should receive direct light from the sky. **Appendix 5** notes that all rooms achieve this criterion, i.e. daylight within 100% of rooms would be considered well distributed.

With regards to sunlight within the dwellings, whilst not all windows achieve the minimum recommended APSH across the whole year, each dwelling does have at least one window that meets the BRE's recommendations on sunlight. Consequently, all future residents will have access to adequate levels of sunlight.

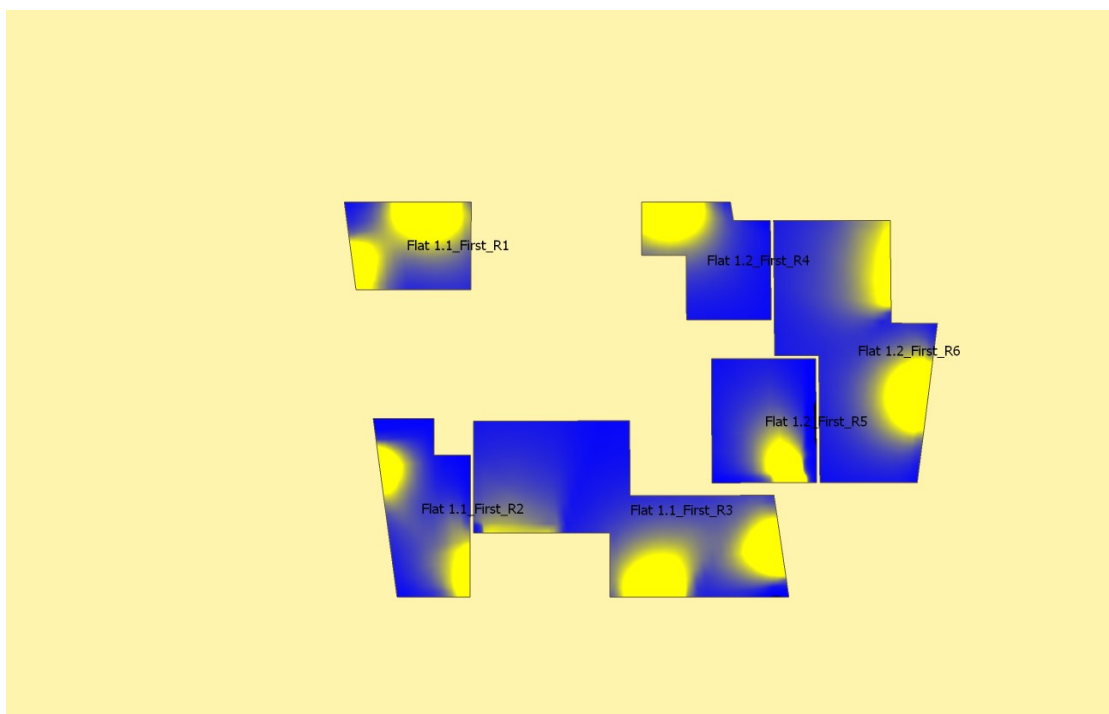
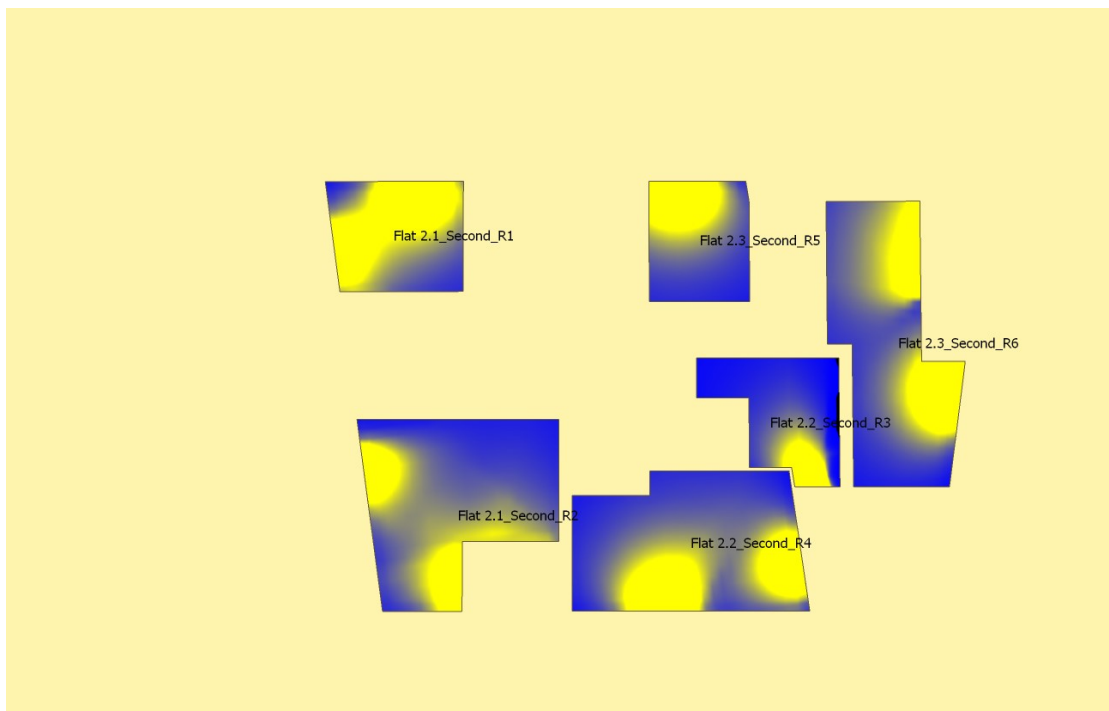
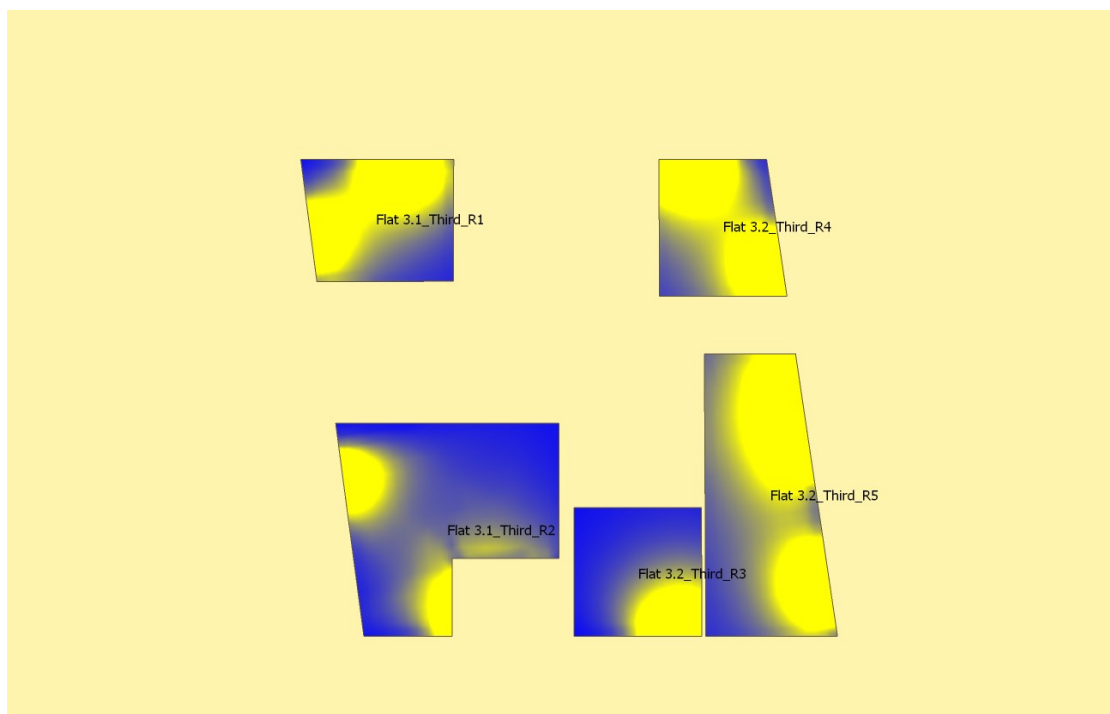
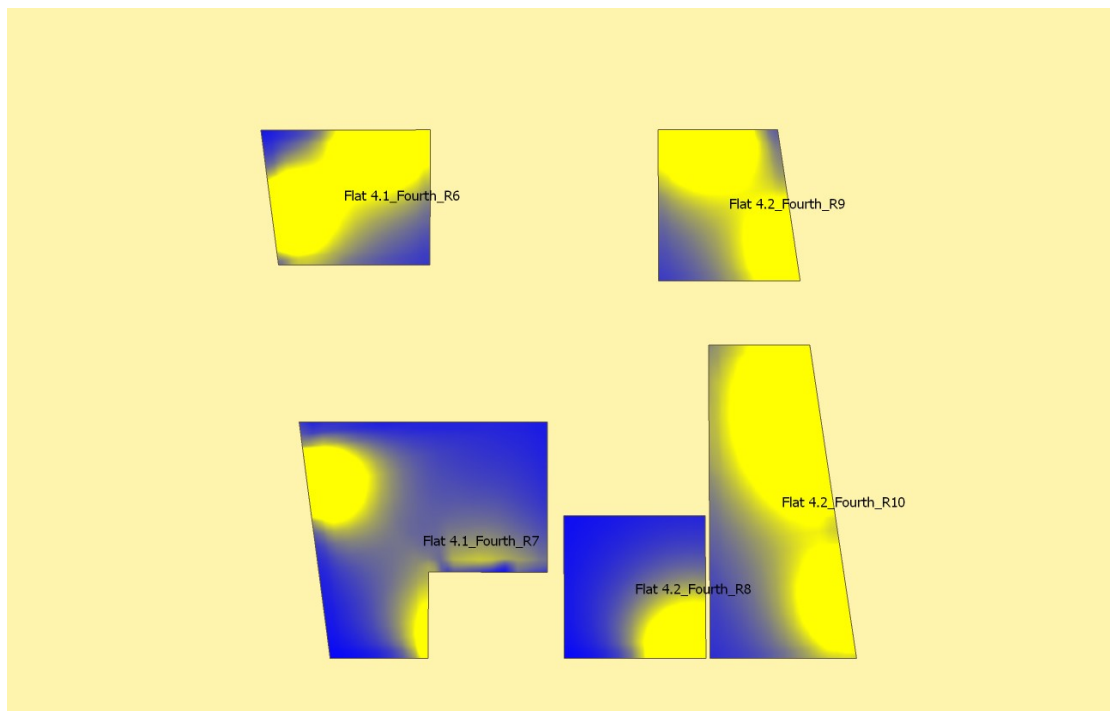
Figure 5.2: Positions of the No-Sky Line – First Floor**Figure 5.3: Positions of the No-Sky Line – Second Floor**

Figure 5.4: Positions of the No-Sky Line – Third Floor**Figure 5.5: Positions of the No-Sky Line – Fourth Floor**

6. CONCLUSIONS

A daylight/sunlight assessment has been carried out in accordance with The Building Research Establishment (BRE) report, “*Site layout planning for daylight and sunlight*” by PJ Littlefair which summarises the impacts of the proposed development at Mulberry House, Reading on the surrounding properties potential to receive daylight and sunlight.

The results of the assessment demonstrate that under the guidance contained within Appendix I of the BRE Report, it is considered that the proposed development will have a “*minor adverse*” impact on three dwellings. However, where windows do not fully meet the BRE Guidance, it does not necessarily mean that the development’s impact would be significant or unacceptable. The BRE Guidance represents “*Best Practice Guidance*” and it notes that the advice given in the report is not mandatory nor adopted planning policy and the numerical guidelines “*should be interpreted flexibly since natural lighting is only one of many factors in layout design*”.

The February 2019 version of the NPPF now specifically mentions daylight/sunlight in national planning policy. The NPPF states that:

“Where there is an existing or anticipated shortage of land for meeting identified housing needs, it is especially important that planning policies and decisions avoid homes being built at low densities, and ensure that developments make optimal use of the potential of each site. In these circumstances...local planning authorities should refuse applications which they consider fail to make efficient use of land, taking into account the policies in this Framework. In this context, when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site”.

This is an approach reinforced by local planning policy with the Reading Borough Local Plan noting that “*in terms of effects of developments, the Building Research Establishment (BRE) has guidelines on assessing daylight and sunlight effects of development, which the Council will apply flexibly given the high density of the central area*”.

As a consequence, the NPPF acknowledges that whilst impacts should always be minimised as far as reasonably possible, other considerations should take priority over impacts on daylight and sunlight. Therefore, providing that is development is not considered to be an over intensification of the site and is considered to be an efficient use of the land, within the context of national planning policy, this “*minor adverse*” impact could be considered acceptable.

An internal daylight assessment has been carried out within the proposed development at the results show that 15 of the 22 habitable rooms meets the Best Practice Guideline Levels on interior daylight (ADF), with all 22 rooms meeting the Best Practice Guideline Levels on daylight distribution (NSL).

Appendix 1

Site Location Plan

Appendix 1: Site Location Plan

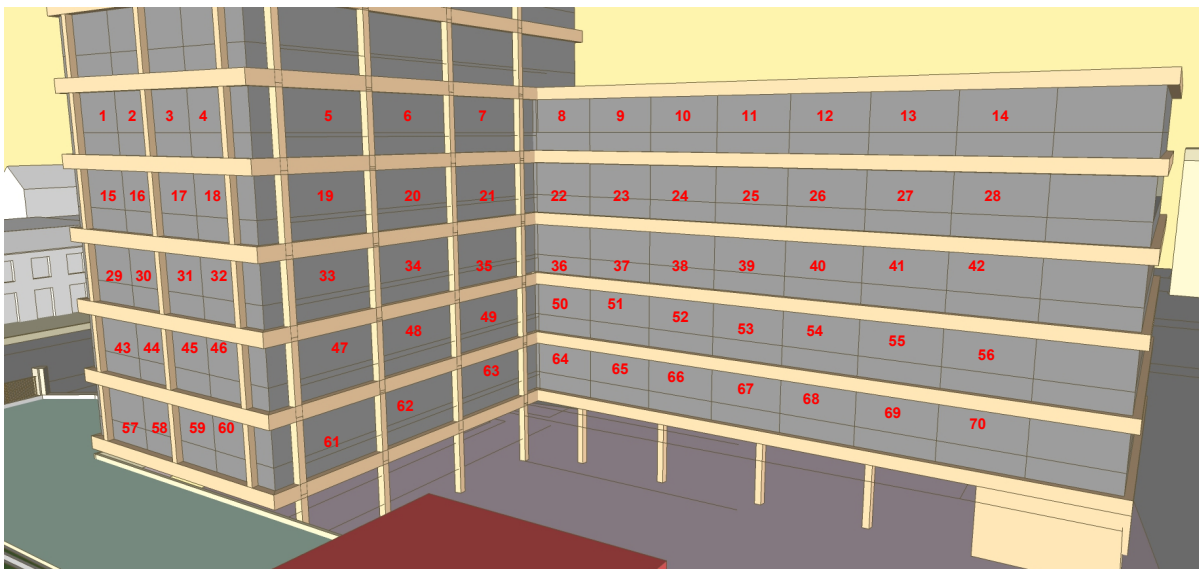


Mulberry House
Existing Site Location Plan 1: 500 @ A3

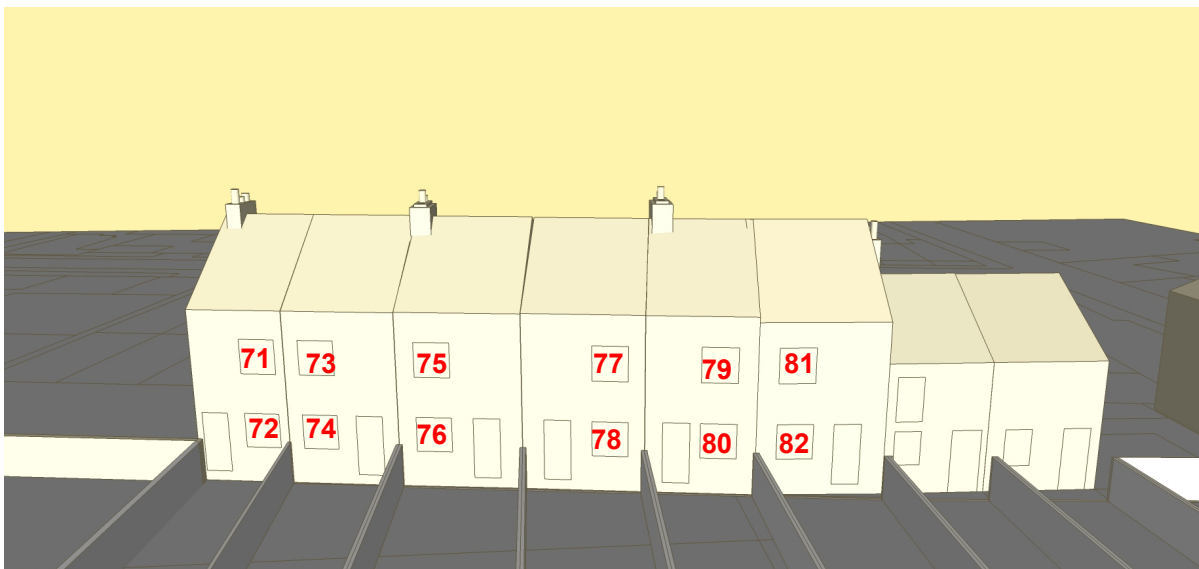
Appendix 2 Window Schedules

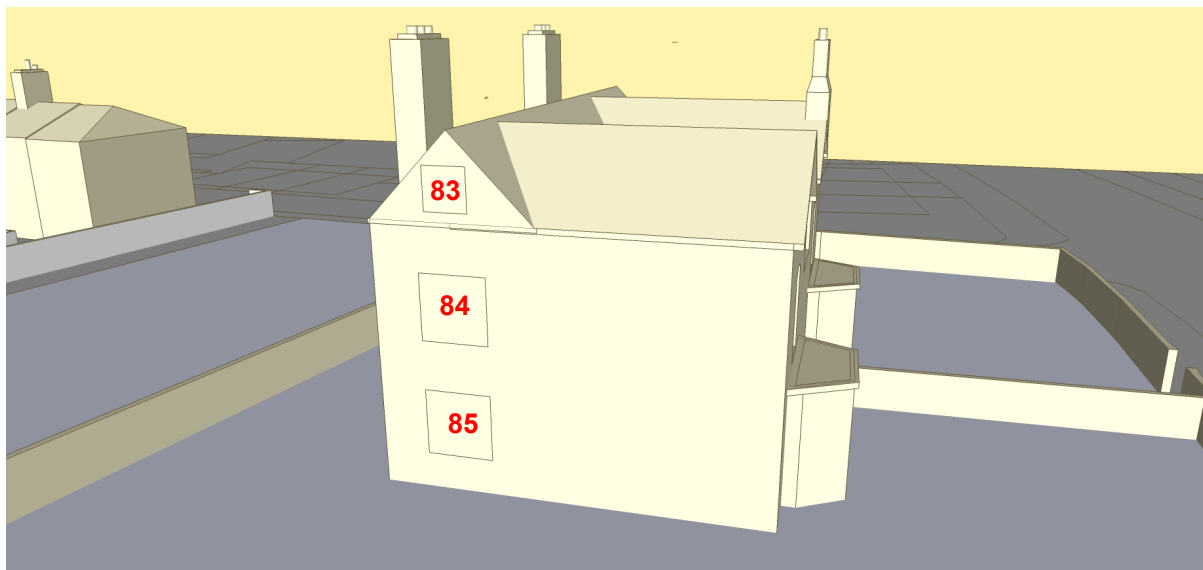
Appendix 2: Window Schedules

Hannover House



9, 8, 7, 6, 5 and 4 Town Place



1 Eldon Road

Appendix 3

Sample Waldram Diagrams

Appendix 3: Sample Waldram Diagrams

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.

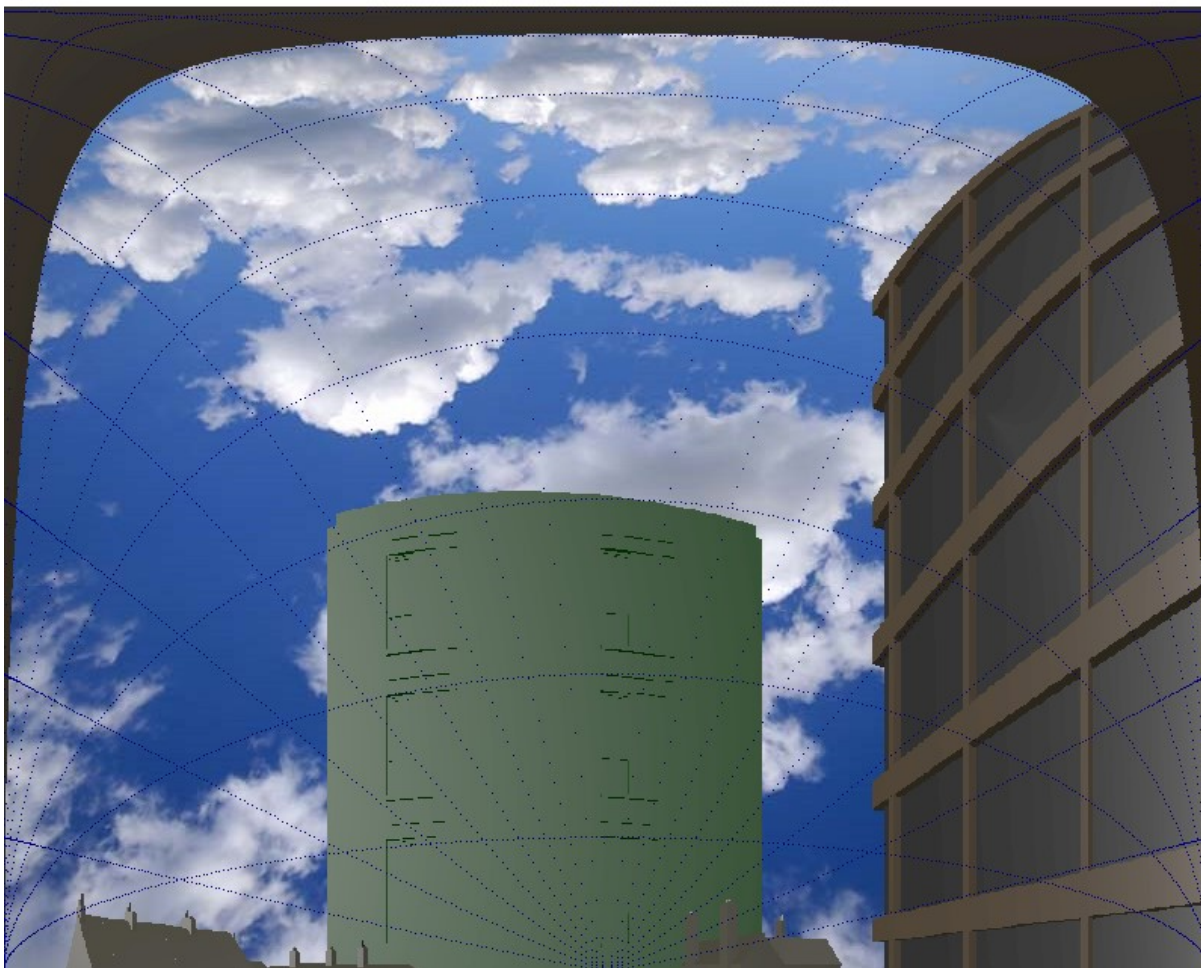
The Waldram Diagram dates back to 1923 and consists of a grid of squares, each representing an equal portion of available daylight. Upon the grid, it is possible to draw projections of obstructions as seen from a reference point, plotted with reference to the azimuth angles and altitude angles measured 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.

The following pages shows sample Waldram Diagram. It should be noted that the Waldram Diagrams provided here are for information only. The Waldram Diagrams should only be interpreted by professionals with appropriate experience. The full results from these diagrams are provided earlier in the report.

Drawing Ref: Mulberry House, Reading
Window Ref: __52

VSC

Existing: 27.04
Proposed: 20.25



Appendix 4

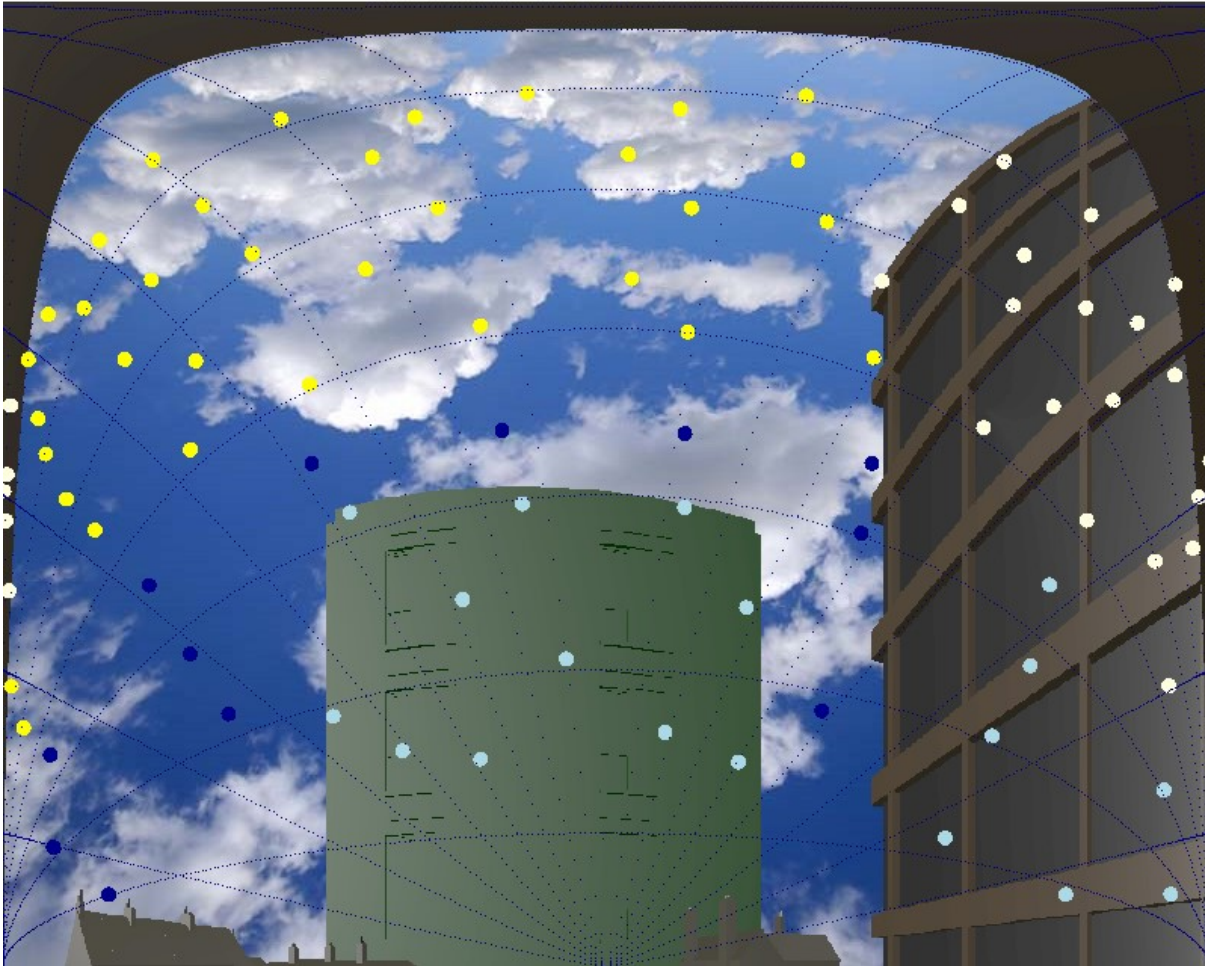
Sample Sunlight Availability Indicators

Appendix 4: Sample Sunlight Availability Indicators

Drawing Ref: Mulberry House, Reading
Window Ref: __52

LOCATION
LONDON
51.5 N, 0.00 E

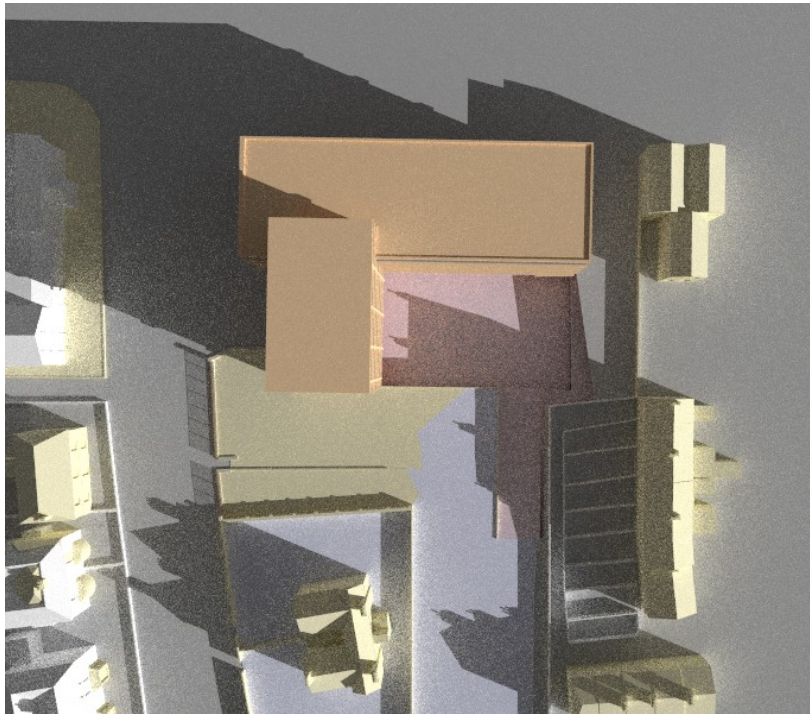
APSH	Annual	Winter
Existing	57	23
Proposed	46	12



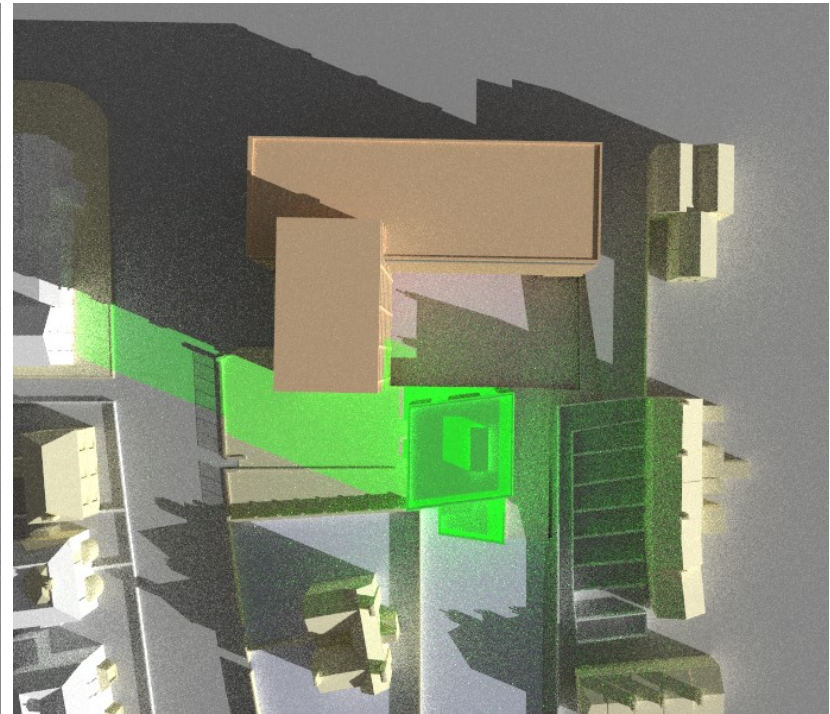
Appendix 5 Shadow Path Diagrams

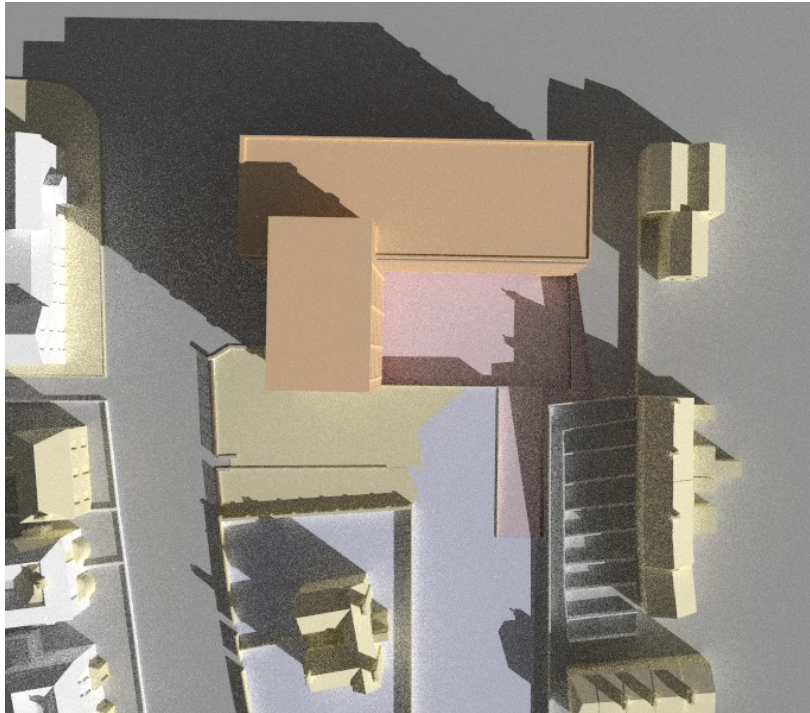
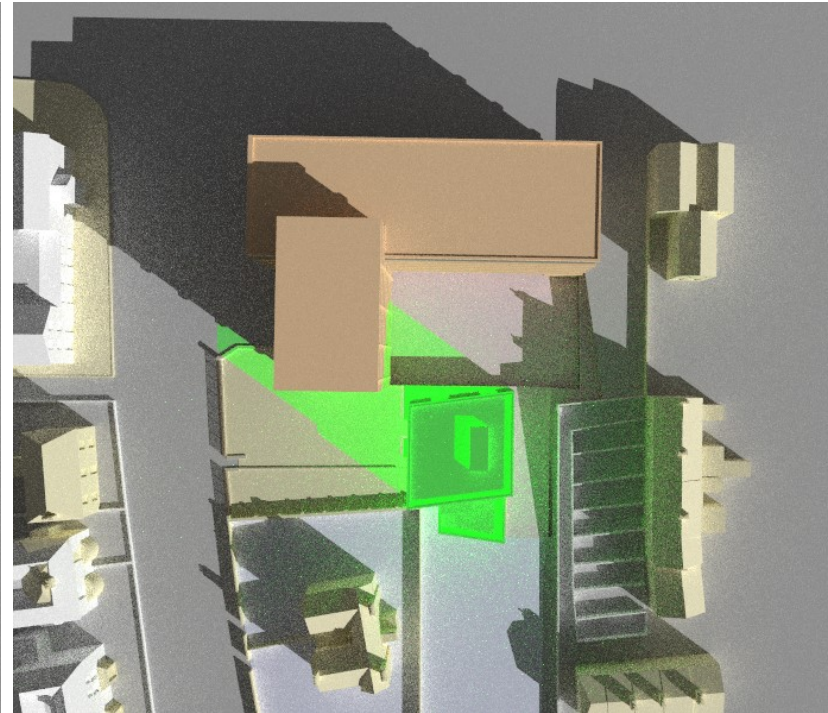
Appendix 5: Shadow Path Diagrams

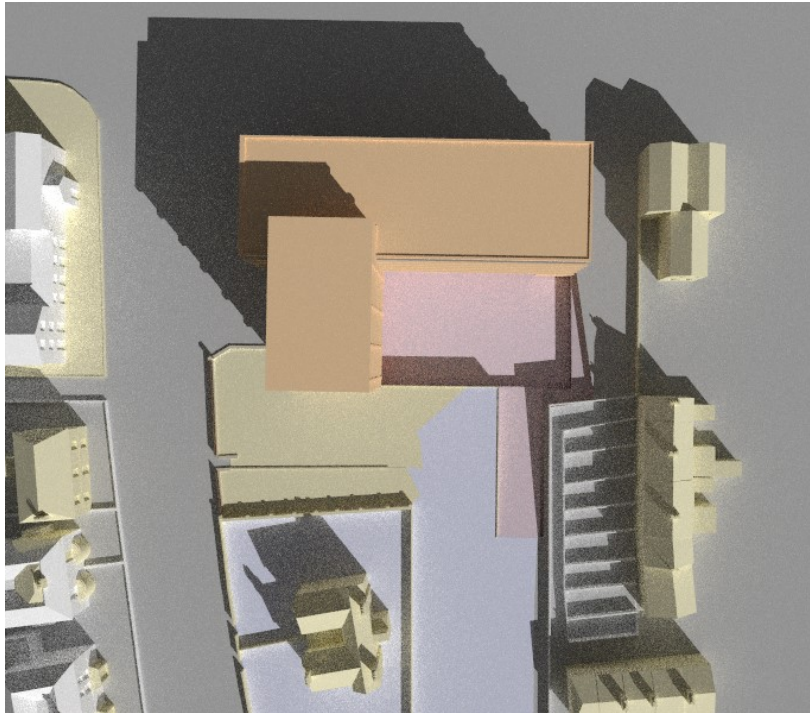
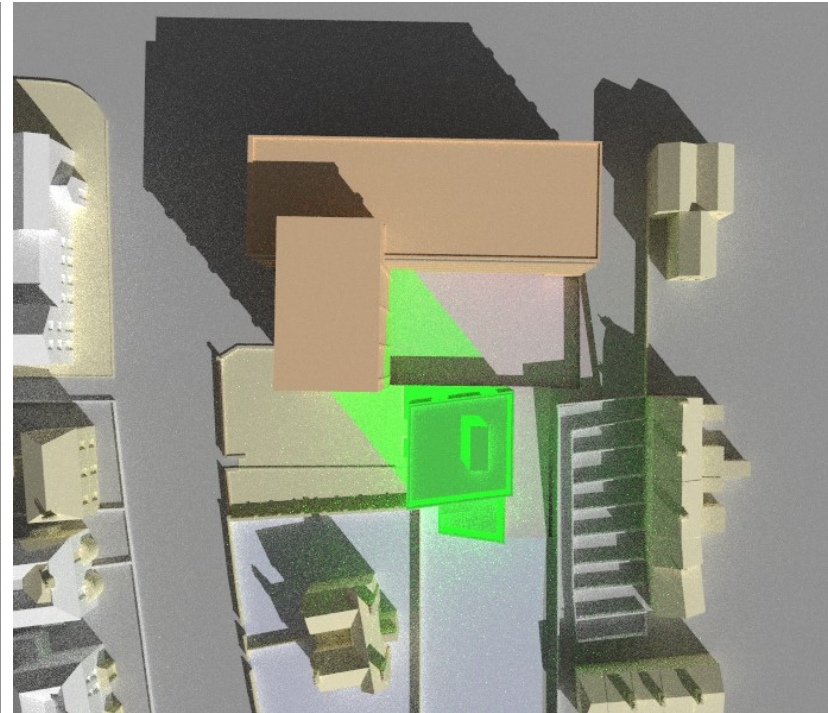
Existing Site Layout – Spring Equinox - 21st March – 0800 hrs

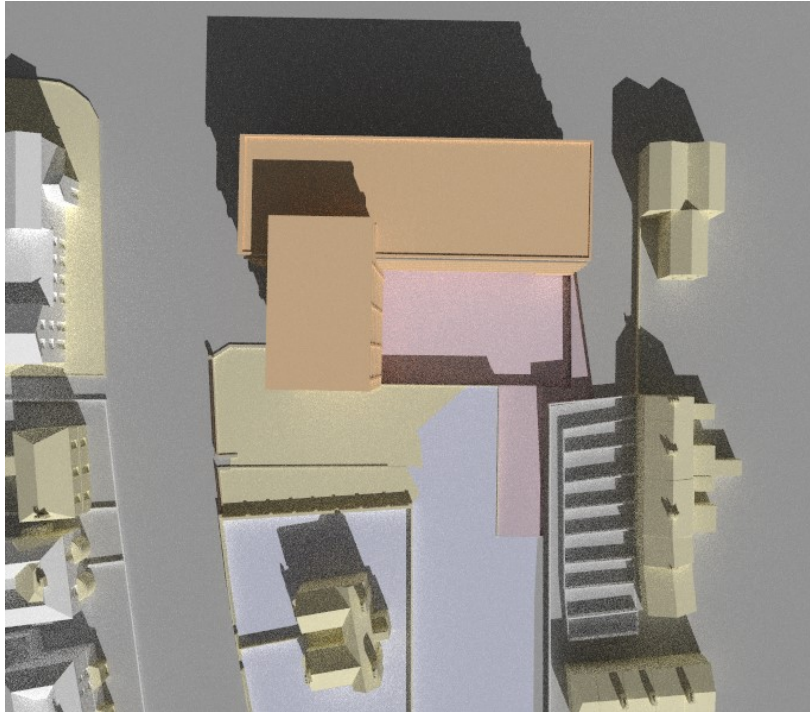
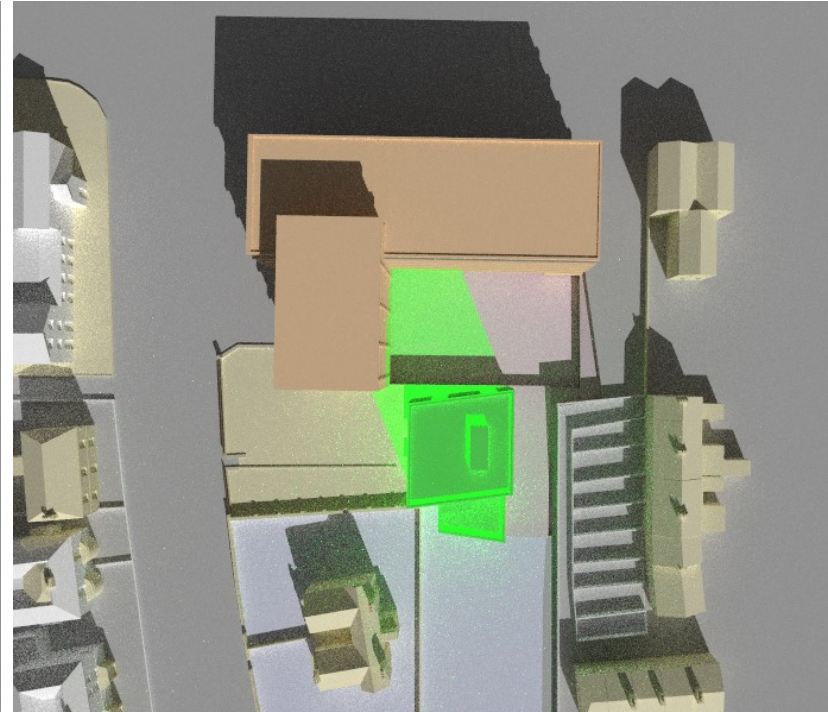


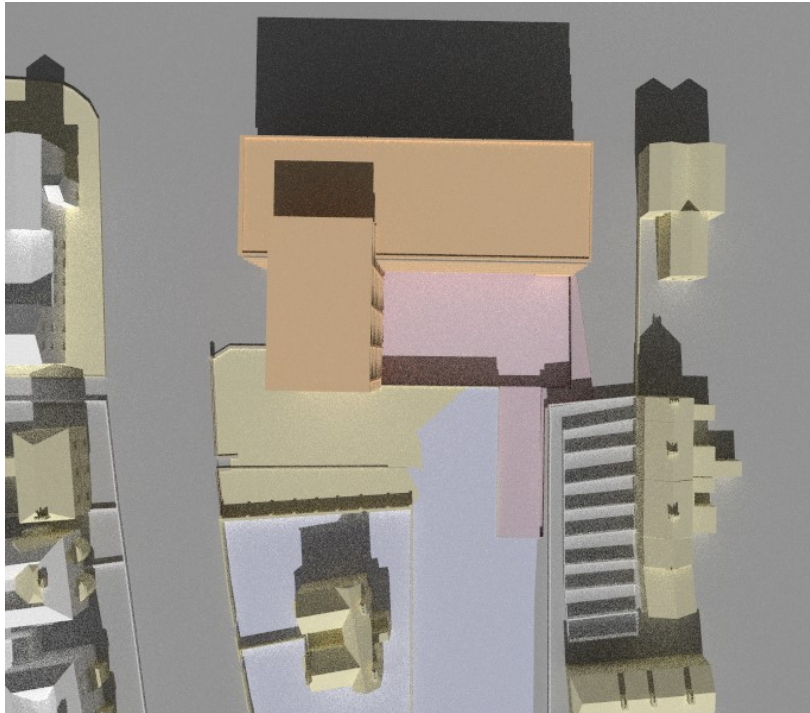
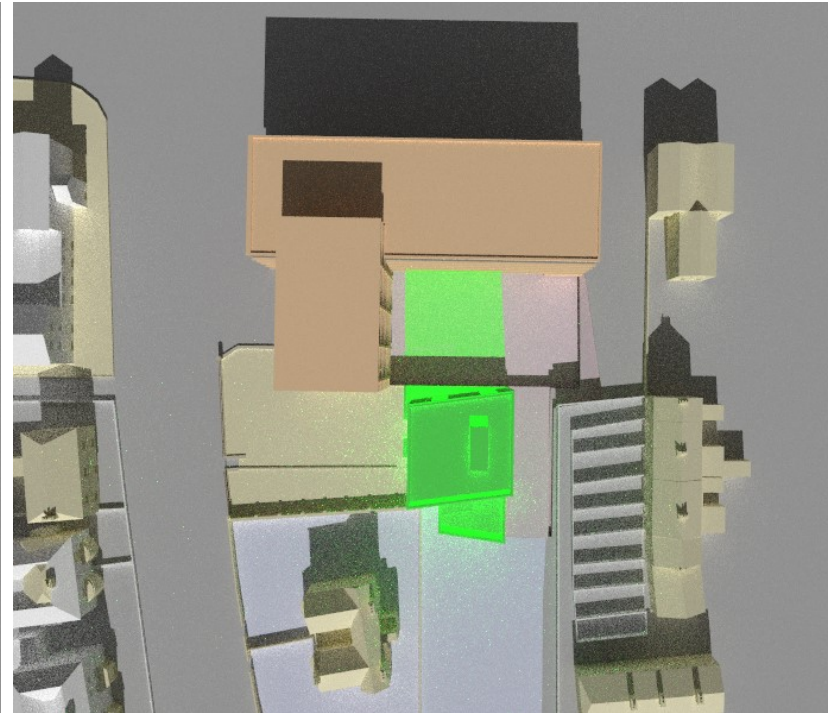
Proposed Site Layout – Spring Equinox - 21st March – 0800 hrs

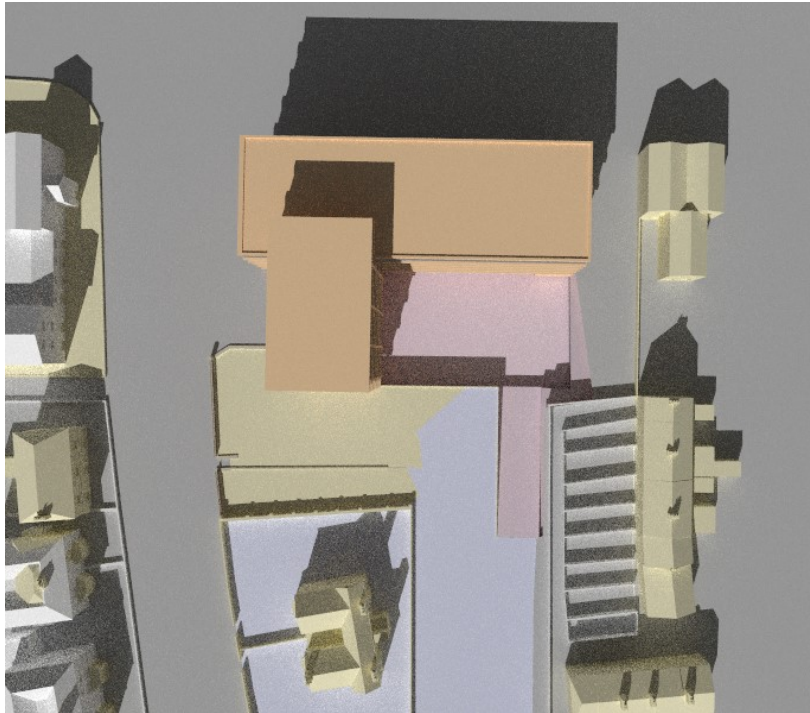
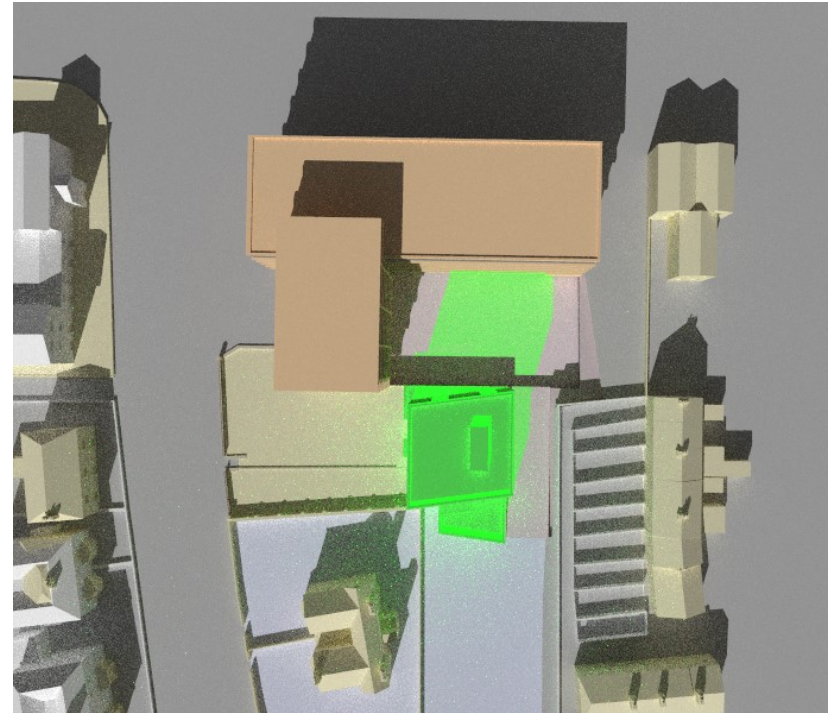


Existing Site Layout – Spring Equinox - 21st March – 0900 hrsProposed Site Layout – Spring Equinox - 21st March – 0900 hrs

Existing Site Layout – Spring Equinox - 21st March – 1000 hrsProposed Site Layout – Spring Equinox - 21st March – 1000 hrs

Existing Site Layout – Spring Equinox - 21st March – 1100 hrsProposed Site Layout – Spring Equinox - 21st March – 1100 hrs

Existing Site Layout – Spring Equinox - 21st March – 1200 hrsProposed Site Layout – Spring Equinox - 21st March – 1200 hrs

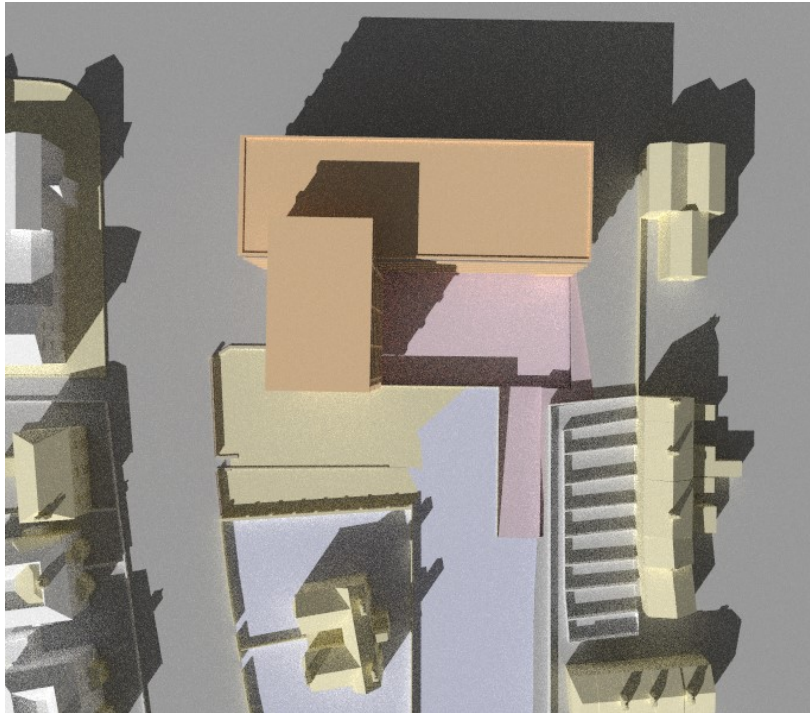
Existing Site Layout – Spring Equinox - 21st March – 1300 hrsProposed Site Layout – Spring Equinox - 21st March – 1300 hrs

Daylight, Sunlight & Overshadowing Assessment

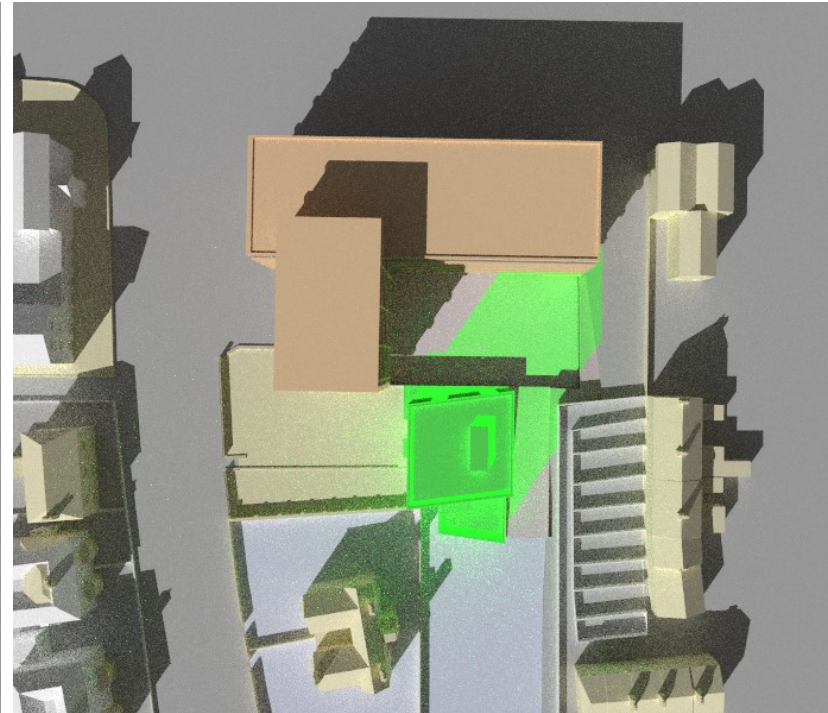
Mulberry House, 1A Eldon Road, Reading

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Existing Site Layout – Spring Equinox - 21st March – 1400 hrs



Proposed Site Layout – Spring Equinox - 21st March – 1400 hrs

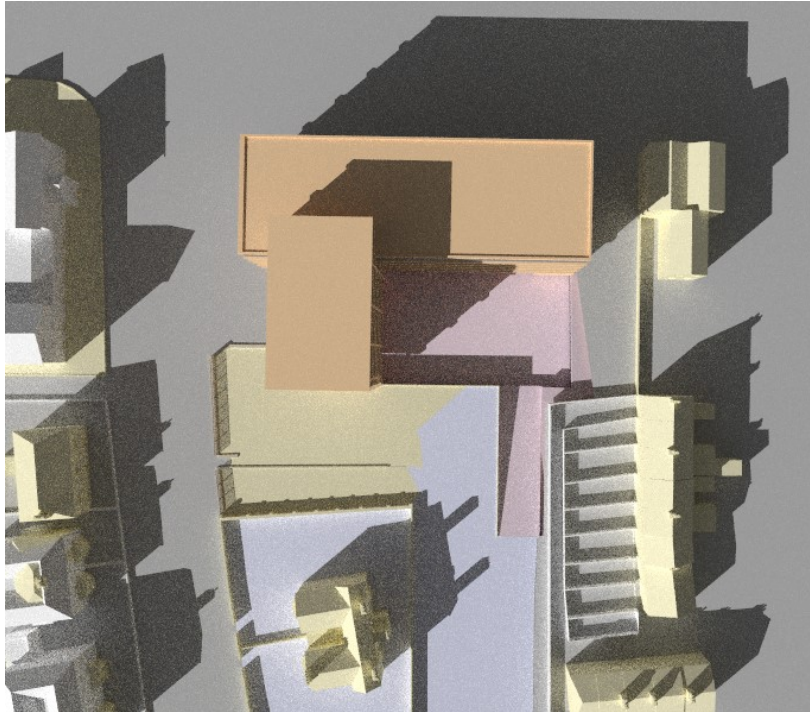


Daylight, Sunlight & Overshadowing Assessment

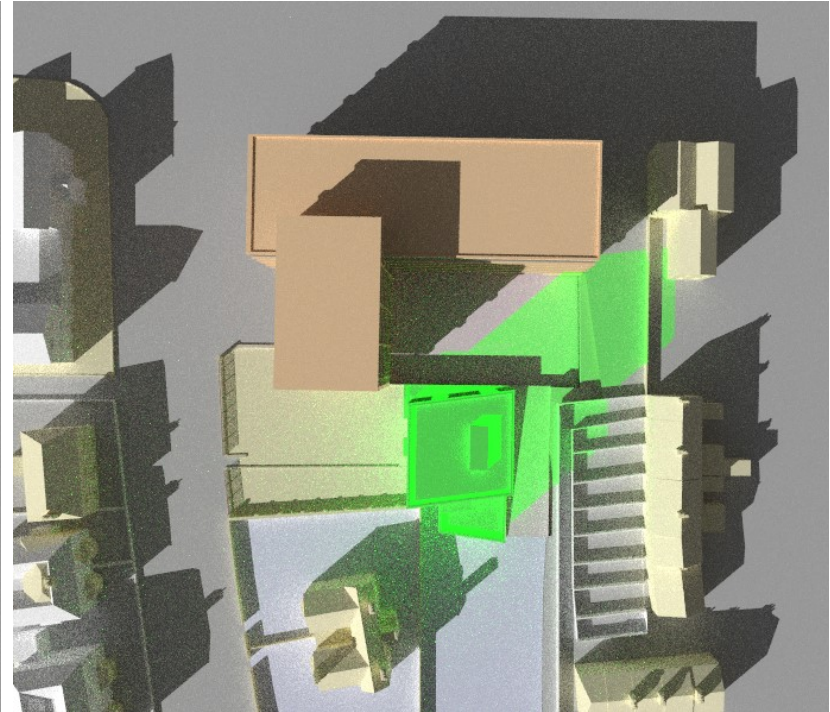
Mulberry House, 1A Eldon Road, Reading

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Existing Site Layout – Spring Equinox - 21st March – 1500 hrs



Proposed Site Layout – Spring Equinox - 21st March – 1500 hrs

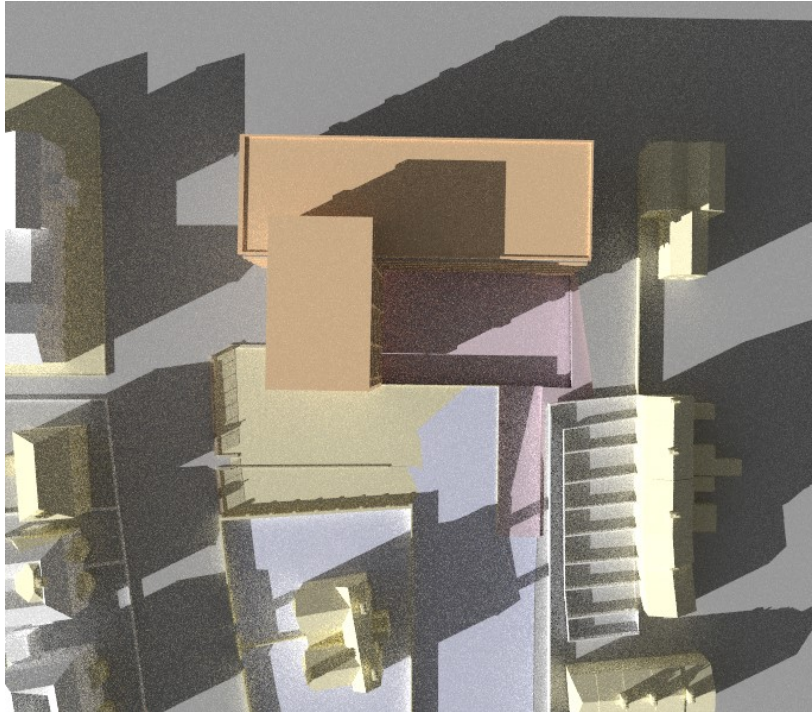


Daylight, Sunlight & Overshadowing Assessment

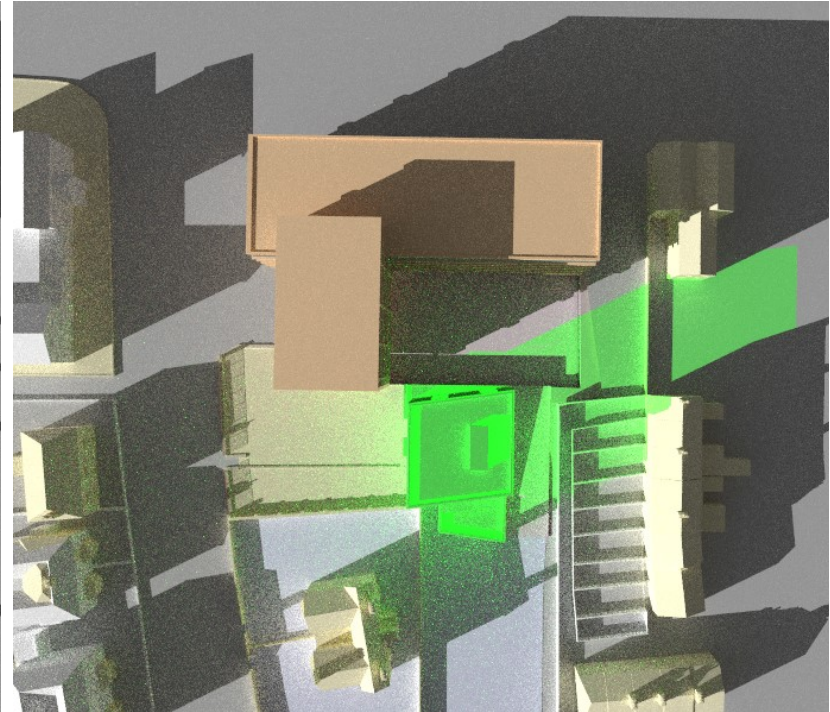
Mulberry House, 1A Eldon Road, Reading

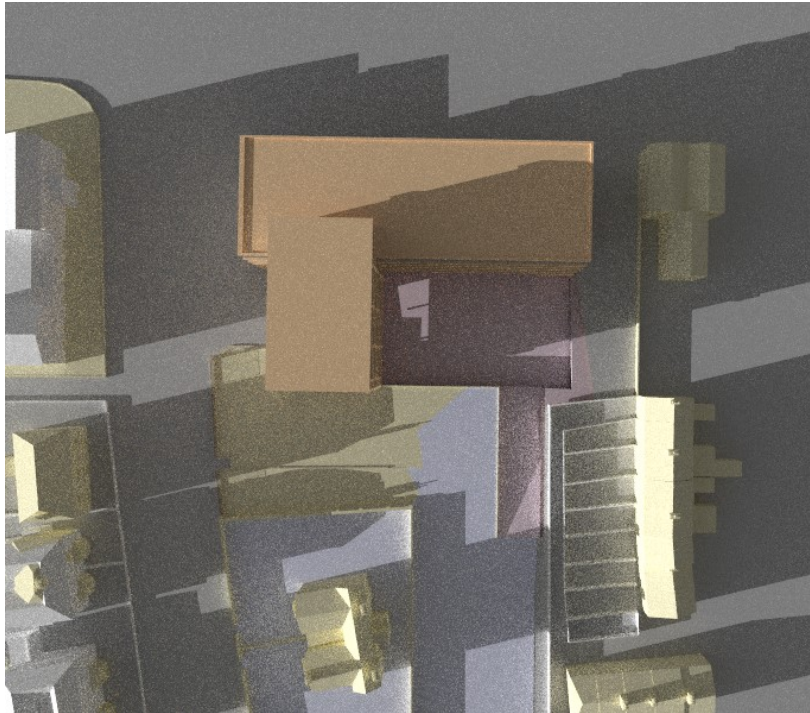
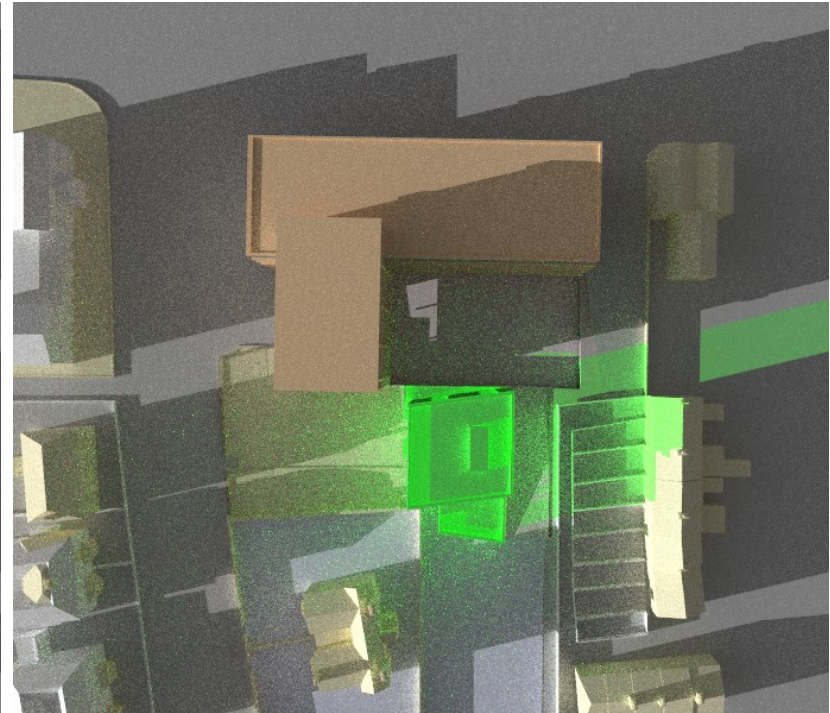
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Existing Site Layout – Spring Equinox - 21st March – 1600 hrs



Proposed Site Layout – Spring Equinox - 21st March – 1600 hrs



Existing Site Layout – Spring Equinox - 21st March – 1700 hrsProposed Site Layout – Spring Equinox - 21st March – 1700 hrs

Appendix 6

Internal Daylight Analysis

Appendix 6: Internal Daylight Analysis

Flat	Floor	Room ID	Room Use	ADF %	Target ADF %	Meets BRE ADF?	Proposed NSL %	Meets BRE NSL?	Min of 1x Window with AHSP Target?	Min of 1x Window with Winter Sunlight Target?
Flat 1.1	First	R1	Bedroom	2.6	1	YES	100%	YES	Yes	Yes
Flat 1.1	First	R2	Bedroom	1.4	1	YES	100%	YES	No	Yes
Flat 1.1	First	R3	Living Room/Kitchen	1.5	2	NO	100%	YES	Yes	Yes
Flat 1.2	First	R4	Bedroom	1.5	1	YES	100%	YES	Yes	Yes
Flat 1.2	First	R5	Bedroom	0.9	1	NO	98%	YES	Yes	Yes
Flat 1.2	First	R6	Living Room/Kitchen	1.5	2	NO	100%	YES	Yes	Yes
Flat 2.1	Second	R1	Bedroom	3.2	1	YES	100%	YES	Yes	Yes
Flat 2.1	Second	R2	Living Room/Kitchen	2.3	2	YES	100%	YES	No	Yes
Flat 2.2	Second	R3	Bedroom	0.9	1	NO	97%	YES	Yes	Yes
Flat 2.2	Second	R4	Living Room/Kitchen	1.9	2	NO	100%	YES	Yes	Yes
Flat 2.3	Second	R5	Bedroom	2.4	1	YES	100%	YES	Yes	Yes
Flat 2.3	Second	R6	Living Room/Kitchen	2.5	2	YES	100%	YES	Yes	Yes
Flat 3.1	Third	R1	Bedroom	2.9	1	YES	100%	YES	Yes	Yes

Flat	Floor	Room ID	Room Use	ADF %	Target ADF %	Meets BRE ADF?	Proposed NSL %	Meets BRE NSL?	Min of 1x Window with AHSP Target?	Min of 1x Window with Winter Sunlight Target?
Flat 3.1	Third	R2	Living Room/Kitchen	1.8	2	NO	100%	YES	No	Yes
Flat 3.2	Third	R3	Bedroom	1.7	1	YES	100%	YES	Yes	Yes
Flat 3.2	Third	R4	Bedroom	3.8	1	YES	100%	YES	Yes	Yes
Flat 3.2	Third	R5	Living Room/Kitchen	3.3	2	YES	100%	YES	Yes	Yes
Flat 4.1	Fourth	R6	Bedroom	3.1	1	YES	100%	YES	Yes	Yes
Flat 4.1	Fourth	R7	Living Room/Kitchen	1.9	2	NO	100%	YES	No	Yes
Flat 4.2	Fourth	R8	Bedroom	1.7	1	YES	100%	YES	Yes	Yes
Flat 4.2	Fourth	R9	Bedroom	4.0	1	YES	100%	YES	Yes	Yes
Flat 4.2	Fourth	R10	Living Room/Kitchen	5.1	2	YES	100%	YES	Yes	Yes