



Daylight, Sunlight & Overshadowing Assessment:

Former Battle of Britain Site, Coldharbour Road, Gravesend

Frontier Estates Limited

15th August 2022



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V1	24 th May 2022	Original Issue	Emily Hawkins BSc	Nick Hawkins MSc MEnvSc
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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

1.1. Overview

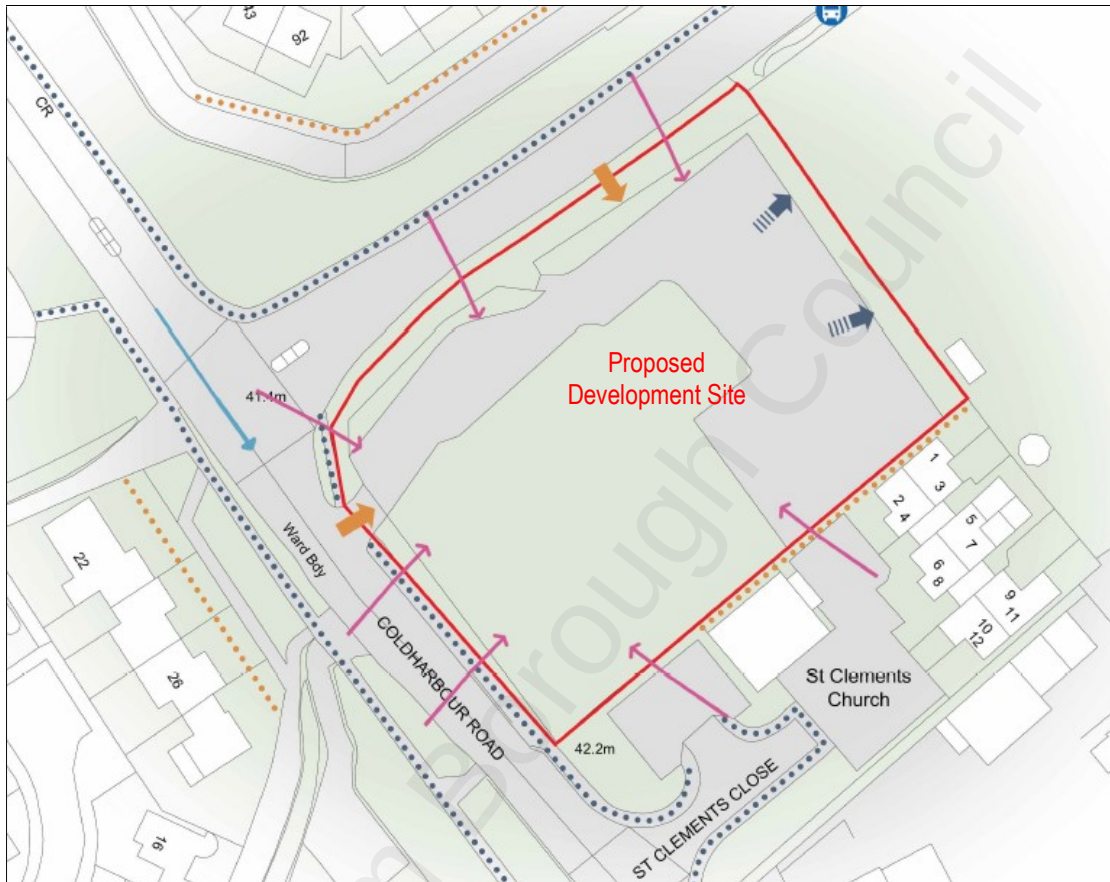
Hawkins Environmental Limited has been instructed by Frontier Estates Limited to undertake a daylight, sunlight & overshadowing assessment for the redevelopment of the Former Battle of Britain Site, Coldharbour Road, located in the town of Gravesend.

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. A glossary of terms in relation to daylight and sunlight can be found in **Appendix 1**.

1.2. Site Description

The development site is situated along Coldharbour Road in Northfleet, Gravesend. The site currently comprises a derelict and vacant site associated with the former demolished Battle of Britain public house. The proposed development will see the construction of a care home comprising of 65 rooms featuring new landscaping and private parking space. A location plan of the proposed site can be seen in **Figure 1.1**.

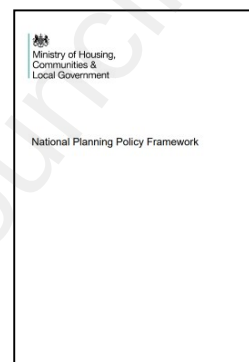
Figure 1.1: Site Location Plan



2. PLANNING POLICY & GUIDANCE

2.1. National Planning Policy Framework (2021)

The National Planning Policy Framework (NPPF) was first published on the 27th March 2012 and revised July 2018, February 2019 and again in July 2021. 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 174).

Since the publication of the revised 2018 version of the NPPF (which has been retained in the 2019 and 2021 version), the NPPF talks specifically about daylight for the first time. Paragraph 125 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

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.

In the guidance note "Effective use of land", last updated in 2019, guidance is provided on making effective use of land, including planning for higher density development.



The guidance notes that daylight is a consideration: “Where a planning application is submitted, local planning authorities will need to consider whether the proposed development would have an unreasonable impact on the daylight and sunlight levels enjoyed by neighbouring occupiers, as well as assessing whether daylight and sunlight within the development itself will provide satisfactory living conditions for future occupants (Paragraph: 006 Reference ID: 66-006-20190722)”.

It goes on to note that “all developments should maintain acceptable living standards. What this means in practice, in relation to assessing appropriate levels of sunlight and daylight, will depend to some extent on the context for the development as well as its detailed design. For example in areas of high-density historic buildings, or city centre locations where tall modern buildings predominate, lower daylight and daylight and sunlight levels at some windows may be unavoidable if new developments are to be in keeping with the general form of their surroundings.

In such situations good design (such as giving careful consideration to a building’s massing and layout of habitable rooms) will be necessary to help make the best use of the site and maintain acceptable living standards (Paragraph: 007 Reference ID: 66-007-20190722)”.

Therefore, whilst it is important to ensure that levels of internal daylight within dwellings are maximised, the numerical guidelines are flexible and may vary depending on the context of the site.

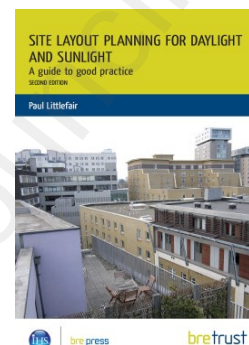
3. ASSESSMENT METHODOLOGY & GUIDANCE

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

3.1.1. Overview

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.

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.

3.1.2. BRE 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.

3.1.3. BRE Daylight Criteria

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.

3.1.4. BRE Sunlight Criteria

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.

The BRE Guidance is explicit that sunlight in living rooms is much more important than to bedrooms or kitchens. The guidance is clear that all window of habitable rooms facing within 90° of due south (regardless of use) should be assessed, as it is still important to ensure impacts to bedrooms and kitchens are minimised, but any impacts to these room uses would be less significant.

3.1.5. BRE Overshadowing Criteria

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.

3.1.6. BRE 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 mean 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

4.

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 the plans of the development, a number of windows that could be affected have been identified. The properties of interest can be seen in the site plan in **Figure 1.1**. The windows under consideration can be seen in **Appendix 2**.

The main properties of interest are:

- 1 St Clements Close;
- 2 St Clements Close;
- 4 St Clements Close;
- 6 St Clements Close;
- 8 St Clements Close;
- 10 St Clements Close;
- 12 St Clements Close; and
- St Clements Church.

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 4.10** 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. In addition, information collected from planning records have been used, in connection with Ordnance Survey information (including Lidar data in relation to building heights) 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 of the existing site layout from the North

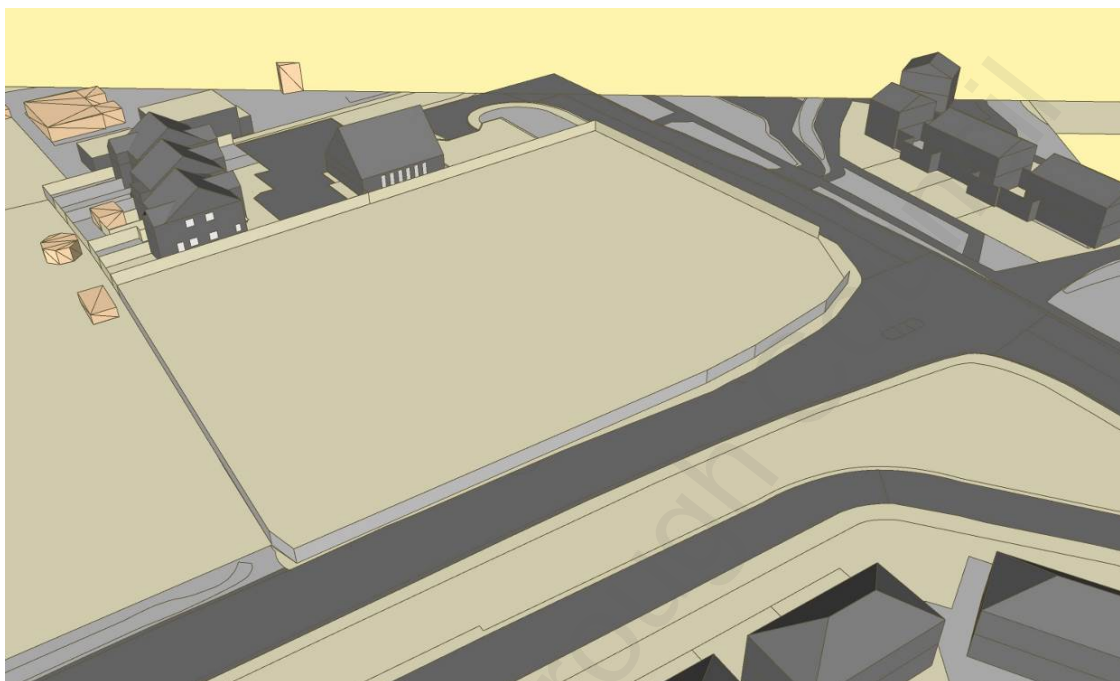


Figure 4.2: 3D model of the proposed development from the North



Figure 4.3: 3D model of the existing site layout from the East



Figure 4.4: 3D model of the proposed development from the East

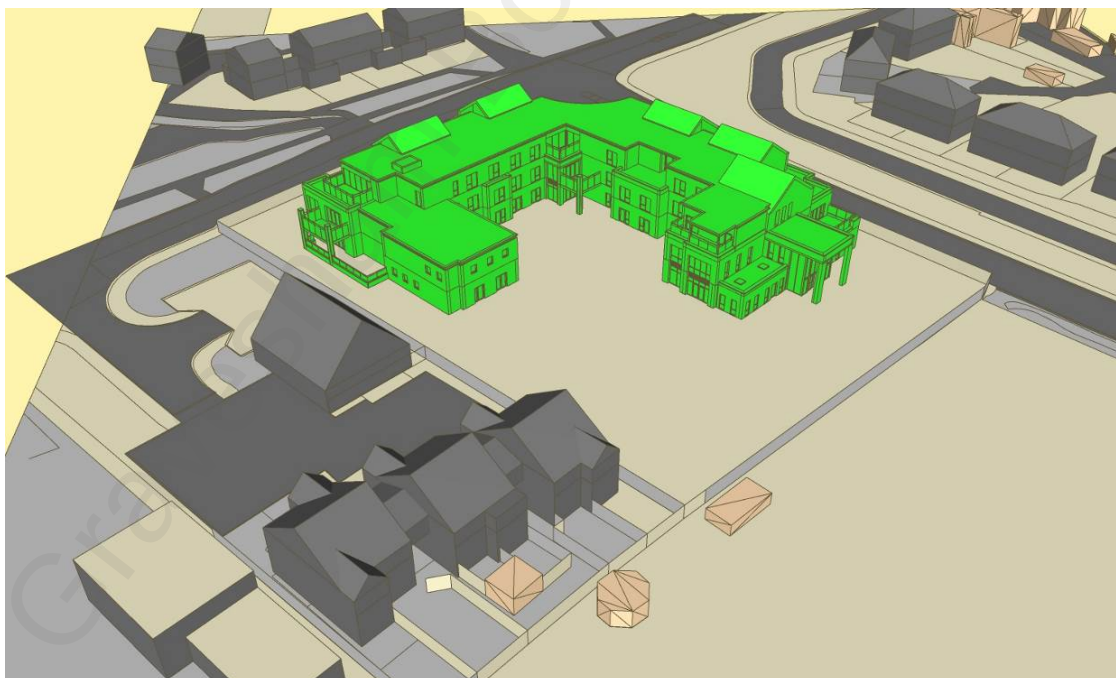


Figure 4.5: 3D model of the existing site layout from the South

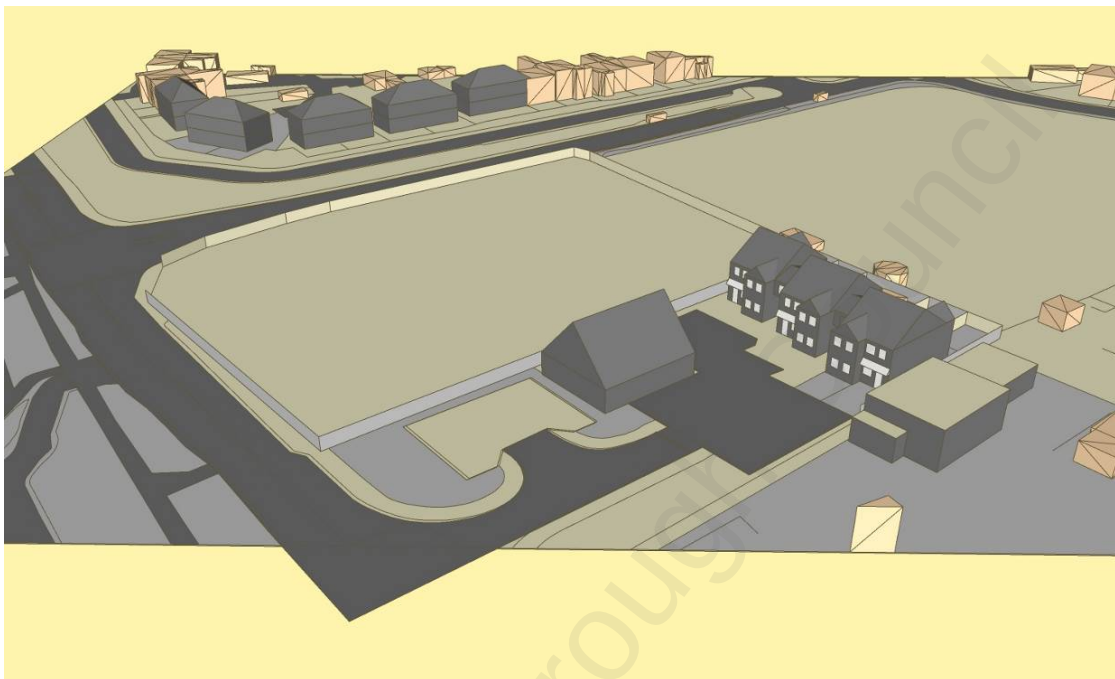


Figure 4.6: 3D model of the proposed development from the South

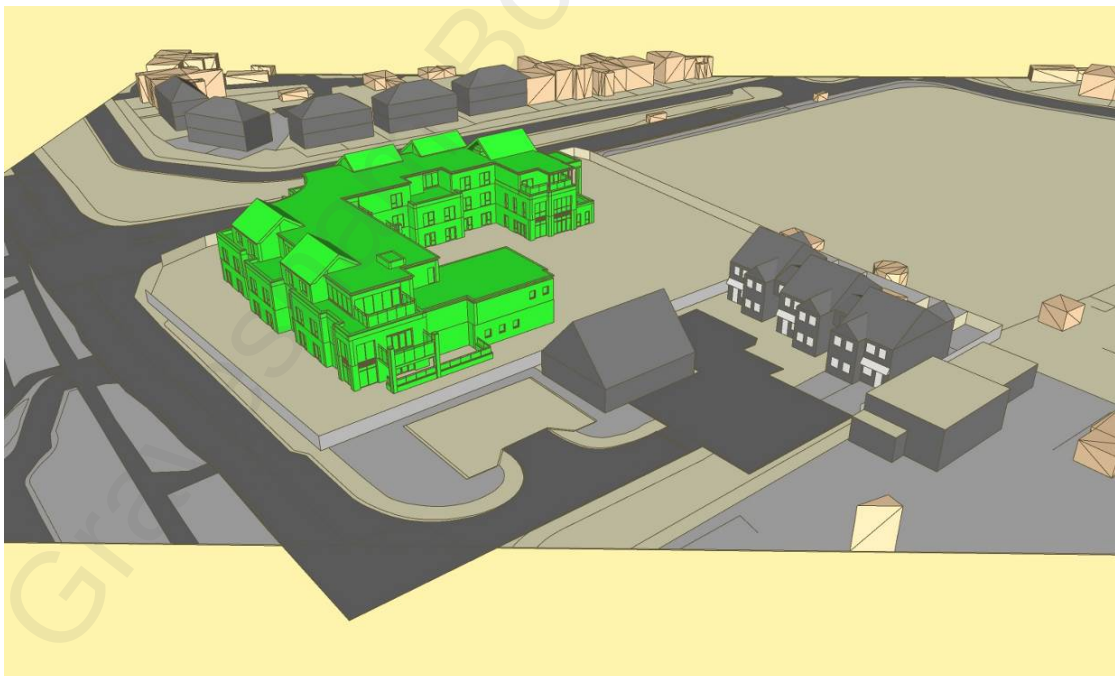


Figure 4.7: 3D model of the existing site layout from the West



Figure 4.8: 3D model of the proposed development from the West

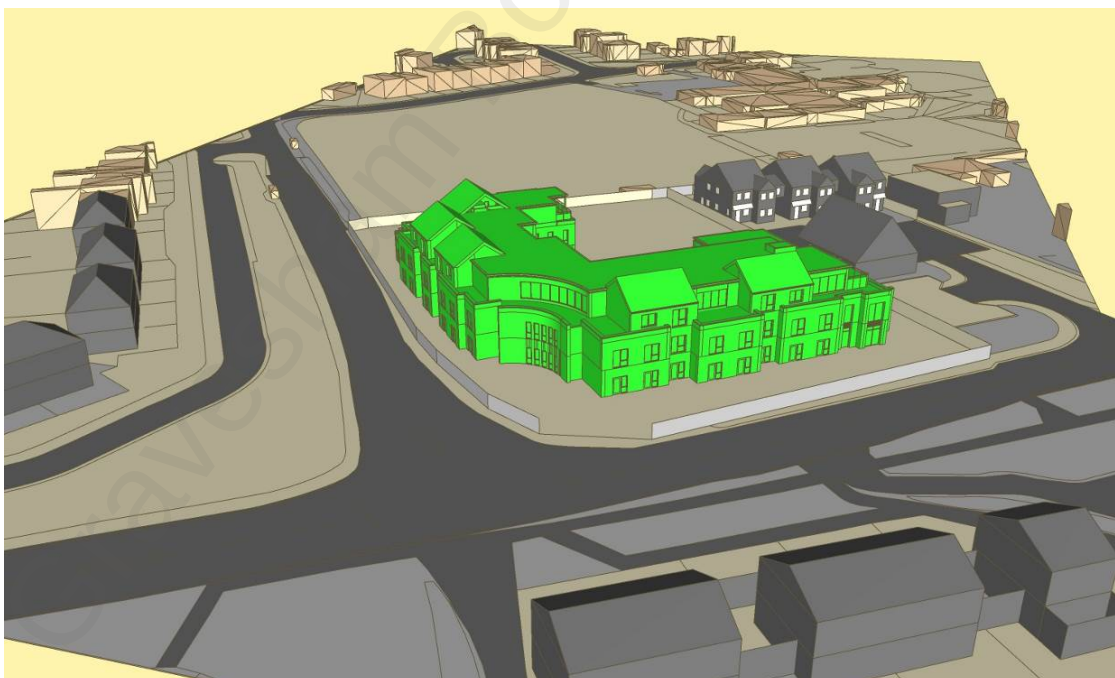


Figure 4.9: 3D model of the existing site layout from Overhead

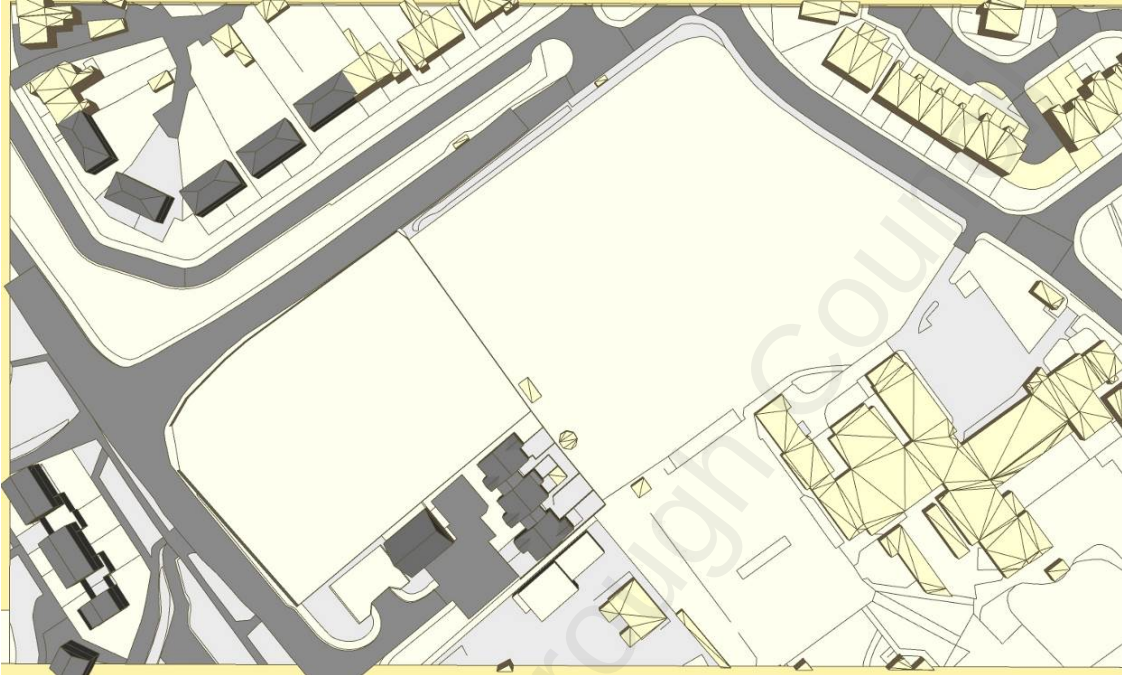


Figure 4.10: 3D model of the proposed development from Overhead



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**, with the Waldram Diagrams replicated in **Appendix 3**.

The results show that at all affected windows, whilst there is a small reduction in daylight to some of the windows, 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 under the guidance contained within Appendix I of the BRE Report and replicated in **Table 3.1** of this report, the impact of the proposed development on levels of daylight is considered to be “negligible”.

Table 4.1: Daylight Impact Assessment

Window Ref	Window ID	Vertical Sky Component %			Meets BRE Guide?	Window Orientation
		Existing	Proposed	Ratio*		
1 St Clements Close - First - 1	1	39.23	37.65	0.96	YES	319°N
1 St Clements Close - Ground - 2	2	38.48	36.27	0.94	YES	319°N
2 St Clements Close - First - 3	3	39.20	37.51	0.96	YES	319°N
2 St Clements Close - First - 4	4	37.26	36.06	0.97	YES	229°
2 St Clements Close - First - 5	5	32.76	31.71	0.97	YES	226°
2 St Clements Close - Ground - 6	6	38.52	36.14	0.94	YES	319°N
2 St Clements Close - Ground - 7	7	38.52	35.89	0.93	YES	319°N
2 St Clements Close - Ground - 8	8	21.20	19.66	0.93	YES	226°
4 St Clements Close - First - 9	9	38.24	37.19	0.97	YES	229°
4 St Clements Close - First - 10	10	38.19	37.21	0.97	YES	229°
4 St Clements Close - Ground - 11	11	35.99	34.45	0.96	YES	229°
4 St Clements Close - Ground - 12	12	35.90	34.49	0.96	YES	229°
6 St Clements Close - First - 13	13	28.54	28.22	0.99	YES	229°

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Window Ref	Window ID	Vertical Sky Component %			Meets BRE Guide?	Window Orientation
		Existing	Proposed	Ratio*		
6 St Clements Close - First - 14	14	37.14	36.42	0.98	YES	229°
6 St Clements Close - First - 15	15	33.03	32.38	0.98	YES	229°
6 St Clements Close - Ground - 16	16	21.33	20.50	0.96	YES	229°
8 St Clements Close - First - 17	17	38.06	37.56	0.99	YES	229°
8 St Clements Close - First - 18	18	37.81	37.37	0.99	YES	229°
8 St Clements Close - Ground - 19	19	36.13	35.50	0.98	YES	229°
8 St Clements Close - Ground - 20	20	35.64	35.10	0.98	YES	229°
10 St Clements Close - First - 21	21	25.79	25.79	1.00	YES	228°
10 St Clements Close - First - 22	22	38.35	38.15	0.99	YES	229°
10 St Clements Close - First - 23	23	38.37	38.20	1.00	YES	229°
10 St Clements Close - Ground - 24	24	36.37	36.12	0.99	YES	229°
10 St Clements Close - Ground - 25	25	36.03	35.82	0.99	YES	229°
12 St Clements Close - First - 26	26	32.47	32.47	1.00	YES	229°

Window Ref	Window ID	Vertical Sky Component %			Meets BRE Guide?	Window Orientation
		Existing	Proposed	Ratio*		
12 St Clements Close - First - 27	27	37.08	37.08	1.00	YES	229°
12 St Clements Close - Ground - 28	28	20.02	20.02	1.00	YES	229°
St Clements Church - Ground - 35	35	37.12	30.65	0.83	YES	320°N
St Clements Church - Ground - 36	36	37.11	29.99	0.81	YES	320°N
St Clements Church - Ground - 37	37	37.10	29.25	0.79	YES	320°N
St Clements Church - Ground - 38	38	37.09	28.59	0.77	YES	320°N
St Clements Church - Ground - 39	39	37.08	27.97	0.75	YES	320°N
St Clements Church - Ground - 40	40	37.07	27.49	0.74	YES	320°N

*= Ratio of proposed levels compared to existing levels

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**.

Table 4.2 notes that whilst there is a small reduction in sunlight to some of the windows, the reduction in sunlight would be within the parameters of the BRE Guidance and therefore, under the guidance contained within Appendix I of the BRE Report and replicated in **Table 3.1** of this report, the impact of the proposed development on levels of sunlight is considered to be “negligible”.

Table 4.2: Sunlight Impact Assessment

Window Ref	ID	Annual Probable Sunlight Hours %				Winter Probable Sunlight Hours %			
		Existing	Proposed	Ratio*	Meets BRE Guide?	Existing	Proposed	Ratio*	Meets BRE Guide?
1 St Clements Close - First - W1	1	Sunlight Assessment Not Required (not within 90° of due south)							
1 St Clements Close - Ground - W1	2	Sunlight Assessment Not Required (not within 90° of due south)							
2 St Clements Close - First - W1	3	Sunlight Assessment Not Required (not within 90° of due south)							
2 St Clements Close - First - W2	4	63	62	0.98	YES	19	18	0.95	YES
2 St Clements Close - First - W3	5	54	53	0.98	YES	11	10	0.91	YES
2 St Clements Close - Ground - W1	6	Sunlight Assessment Not Required (not within 90° of due south)							
2 St Clements Close - Ground - W2	7	Sunlight Assessment Not Required (not within 90° of due south)							
2 St Clements Close - Ground - W3	8	35	32	0.91	YES	7	6	0.86	YES
4 St Clements Close - First - W1	9	68	68	1.00	YES	24	24	1.00	YES
4 St Clements Close - First - W2	10	67	67	1.00	YES	23	23	1.00	YES
4 St Clements Close - Ground - W1	11	64	62	0.97	YES	20	19	0.95	YES
4 St Clements Close - Ground - W2	12	65	63	0.97	YES	22	21	0.95	YES

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Window Ref	ID	Annual Probable Sunlight Hours %				Winter Probable Sunlight Hours %			
		Existing	Proposed	Ratio*	Meets BRE Guide?	Existing	Proposed	Ratio*	Meets BRE Guide?
6 St Clements Close - First - W1	13	42	42	1.00	YES	11	11	1.00	YES
6 St Clements Close - First - W2	14	62	62	1.00	YES	18	18	1.00	YES
6 St Clements Close - First - W3	15	53	53	1.00	YES	10	10	1.00	YES
6 St Clements Close - Ground - W1	16	36	35	0.97	YES	8	8	1.00	YES
8 St Clements Close - First - W1	17	66	66	1.00	YES	22	22	1.00	YES
8 St Clements Close - First - W2	18	65	65	1.00	YES	21	21	1.00	YES
8 St Clements Close - Ground - W1	19	63	62	0.98	YES	19	19	1.00	YES
8 St Clements Close - Ground - W2	20	61	61	1.00	YES	19	19	1.00	YES
10 St Clements Close - First - W1	21	36	36	1.00	YES	9	9	1.00	YES
10 St Clements Close - First - W2	22	68	68	1.00	YES	25	25	1.00	YES
10 St Clements Close - First - W3	23	68	68	1.00	YES	25	25	1.00	YES
10 St Clements Close - Ground - W1	24	62	62	1.00	YES	21	21	1.00	YES
10 St Clements Close - Ground - W2	25	63	63	1.00	YES	21	21	1.00	YES

Window Ref	ID	Annual Probable Sunlight Hours %				Winter Probable Sunlight Hours %			
		Existing	Proposed	Ratio*	Meets BRE Guide?	Existing	Proposed	Ratio*	Meets BRE Guide?
12 St Clements Close - First - W1	26	61	61	1.00	YES	25	25	1.00	YES
12 St Clements Close - First - W2	27	69	69	1.00	YES	25	25	1.00	YES
12 St Clements Close - Ground - W1	28	36	36	1.00	YES	15	15	1.00	YES
St Clements Church - Ground - W1	35	Sunlight Assessment Not Required (not within 90° of due south)							
St Clements Church - Ground - W2	36	Sunlight Assessment Not Required (not within 90° of due south)							
St Clements Church - Ground - W3	37	Sunlight Assessment Not Required (not within 90° of due south)							
St Clements Church - Ground - W4	38	Sunlight Assessment Not Required (not within 90° of due south)							
St Clements Church - Ground - W5	39	Sunlight Assessment Not Required (not within 90° of due south)							
St Clements Church - Ground - W6	40	Sunlight Assessment Not Required (not within 90° of due south)							

*= 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.

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.

Figure 4.11 shows the extent of overshadowing to outdoor amenity space with the existing site layout and **Figure 4.12** shows the extent of overshadowing to outdoor amenity space with the proposed site layout. The areas marked in yellow receive direct sunlight for at least two hours on the 21st March. **Figure 4.13** shows the areas where additional shading has occurred. On **Figure 4.13**, the areas marked in red are the areas where additional shading has occurred. **Table 4.3** shows the results of the analysis and shows that on the 21st of March, in all of the gardens and outdoor amenity space, there is no significant change in overshadowing. As a consequence, any impact upon this amenity space is considered to be insignificant.

Figure 4.11: Existing Overshadowing of Gardens and Outdoor Amenity Space – 21st March

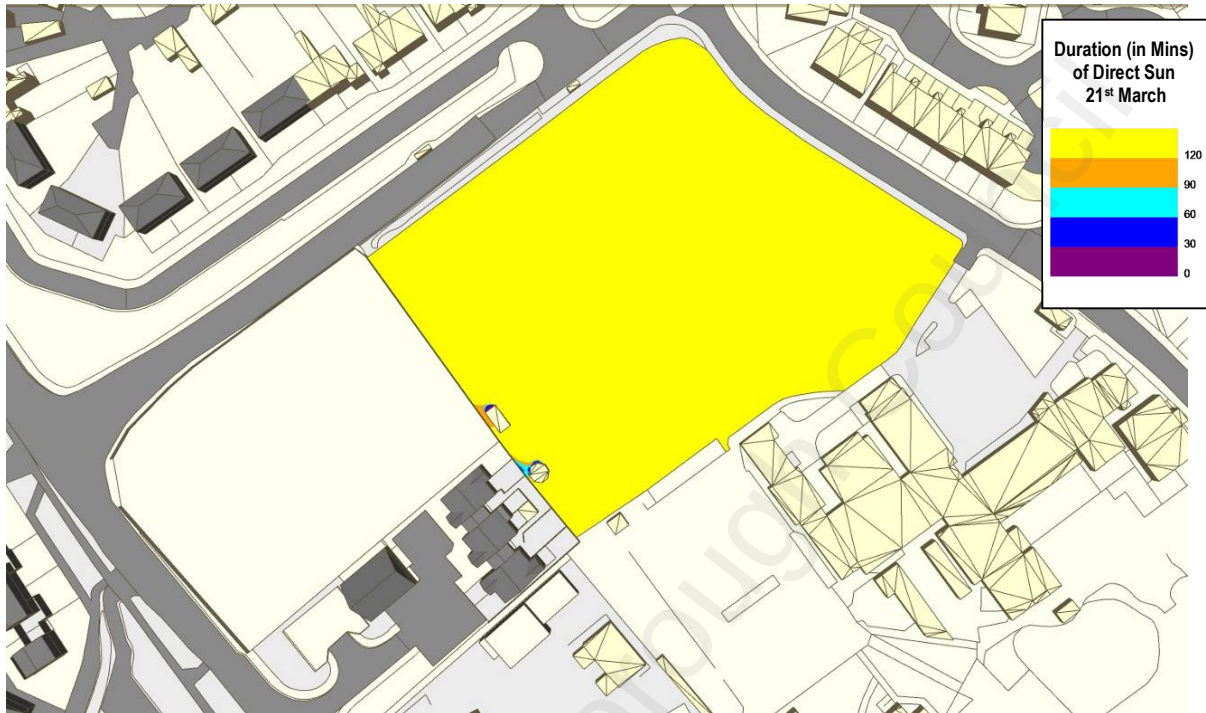


Figure 4.12: Proposed Overshadowing of Gardens and Outdoor Amenity Space – 21st March



Figure 4.13: Addition Overshadowing of Gardens and Outdoor Amenity Space – 21st March



Table 4.3: Results of the Overshadowing Analysis

Receptor	Percentage of the Garden/Outdoor Amenity Space Which Receives Direct Sunlight for at Least Two Hours on the 21 st March			
	Existing	Proposed	Ratio*	Meets BRE Guide?
Shears Green School	100%	100%	1.00	YES

*= Ratio of proposed levels compared to existing levels

5. 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 the Former Battle of Britain Site, Coldharbour Road 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 "*negligible*" impact on surrounding properties and therefore daylight and sunlight will not have a constraint upon the development of the site.

Appendix 1

Glossary of Lighting Terms

Appendix 1: Glossary of Daylighting Terms

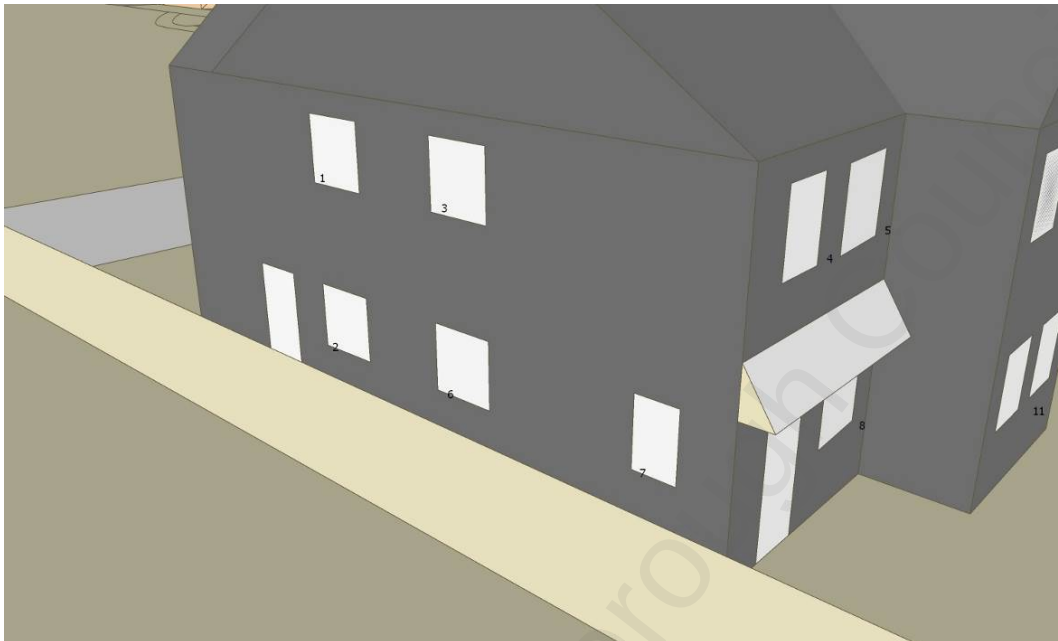
From the BRE Guidance

Average daylight factor (ADF)	Ratio of total daylight flux incident on the working plane to the area of the working plane, expressed as a percentage of the outdoor illuminance on a horizontal plane due to an unobstructed CIE standard overcast sky. Thus a 1% ADF would mean that the average indoor illuminance would be one hundredth the outdoor unobstructed illuminance.
CIE standard overcast sky	A completely overcast sky for which the ratio of its luminance L_γ at an angle of elevation γ above the horizontal to the luminance L_z at the zenith is given by: $L_\gamma = L_z \frac{(1 + 2 \sin \gamma)}{3}$ A CIE standard overcast sky is darkest at the horizon and brightest at the zenith (vertically overhead).
Daylight, natural light	Combined skylight and sunlight.
No sky line	The outline on the working plane of the area from which no sky can be seen.
Obstruction angle	The angular altitude of the top of an obstruction above the horizontal, measured from a reference point in a vertical plane in a section perpendicular to the vertical plane.
Probable sunlight hours	The long-term average of the total number of hours during a year in which direct sunlight reaches the unobstructed ground (when clouds are taken into account).
Sky factor	Ratio of the parts of illuminance at a point on a given plane that would be received directly through unglazed openings from a sky of uniform luminance, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. The sky factor does not include reflected light, either from outdoor or indoor surfaces.
Vertical sky component (VSC)	Ratio of that part of illuminance, at a point on a given vertical plane, that is received directly from a CIE standard overcast sky, to illuminance on a horizontal plane due to an unobstructed hemisphere of this sky. Usually the 'given vertical plane' is the outside of a window wall. The VSC does not include reflected light, either from the ground or from other buildings.
Working plane	Horizontal, vertical or inclined plane in which a visual task lies. Normally the working plane may be taken to be horizontal, 0.85 m above the floor in houses and factories, 0.7 m above the floor in offices.

Appendix 2 Window Schedules

Appendix 2: Window Schedules

1 – 2 St Clements Close



4, 6, 8, 10 & 12 St Clements Close



Appendix 3 Waldram Diagrams

Appendix 3: 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.

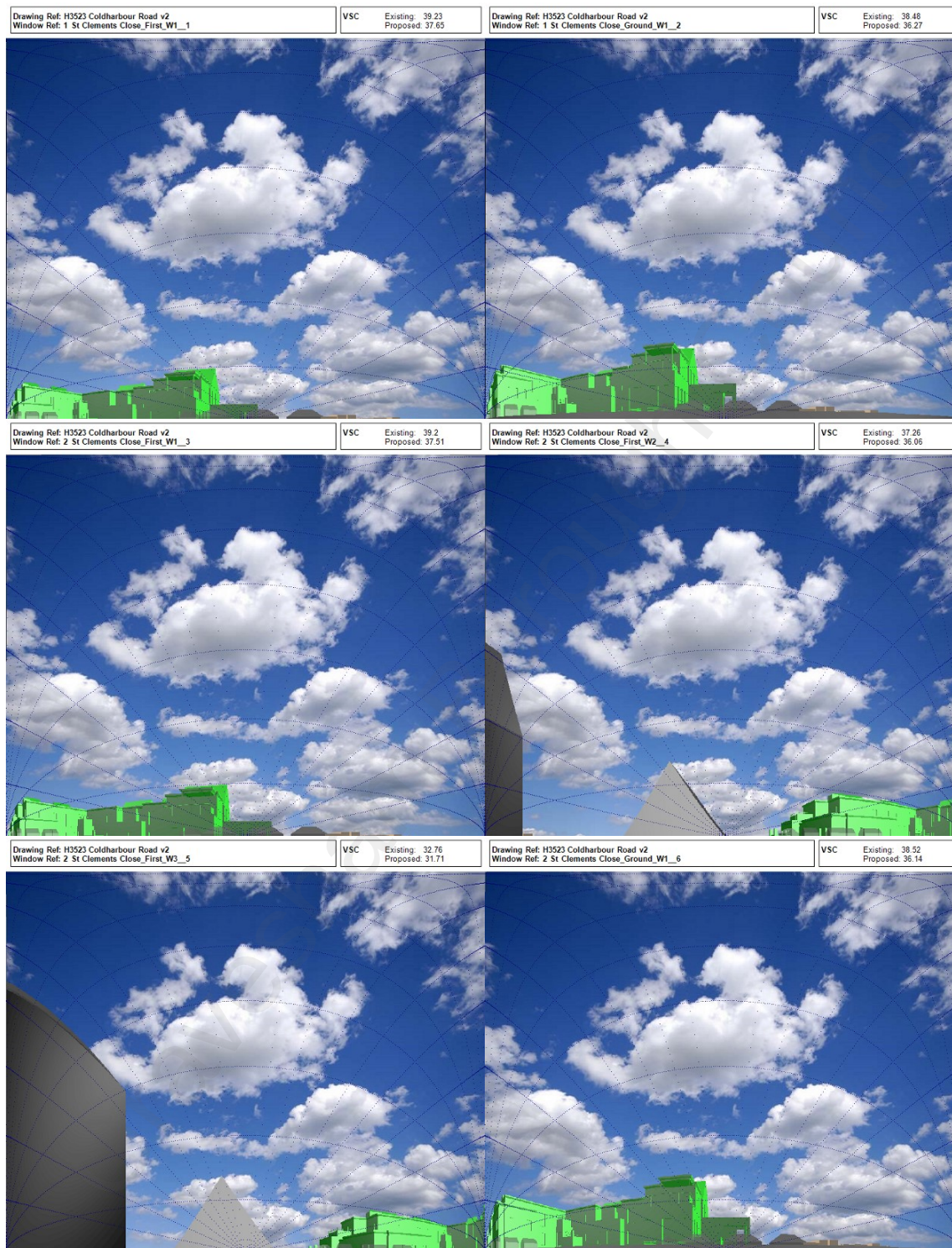
The following pages show a copy of the Waldram Diagrams for each of the affected windows. In the following Waldram Diagrams, the green areas represent the obstructions formed by the proposed development.

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.

Daylight, Sunlight & Overshadowing Assessment

Former Battle of Britain Site, Coldharbour Road, Gravesend

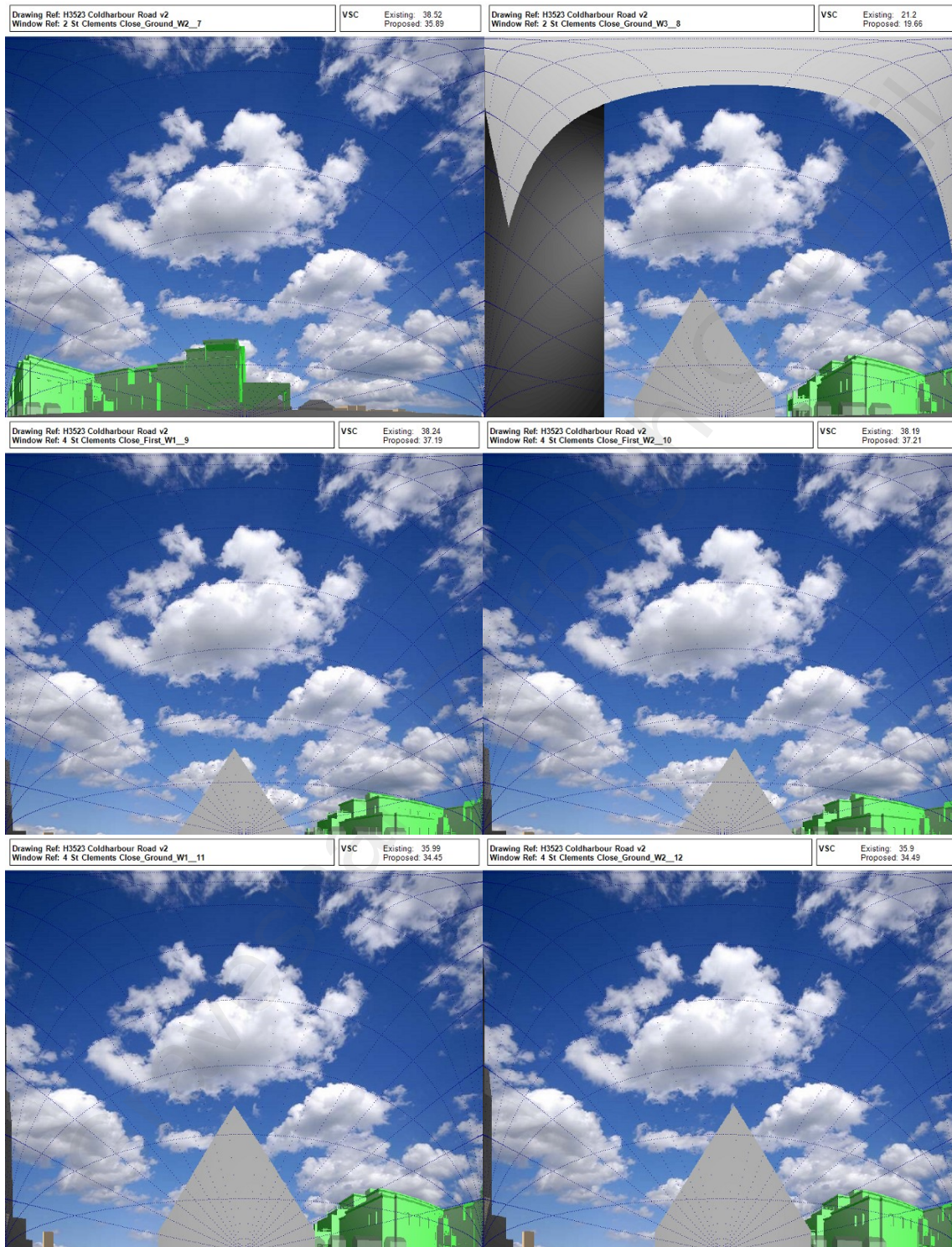
Frontier Estates Limited • 15th August 2022 • H3523 – DS – v2



Daylight, Sunlight & Overshadowing Assessment

Former Battle of Britain Site, Coldharbour Road, Gravesend

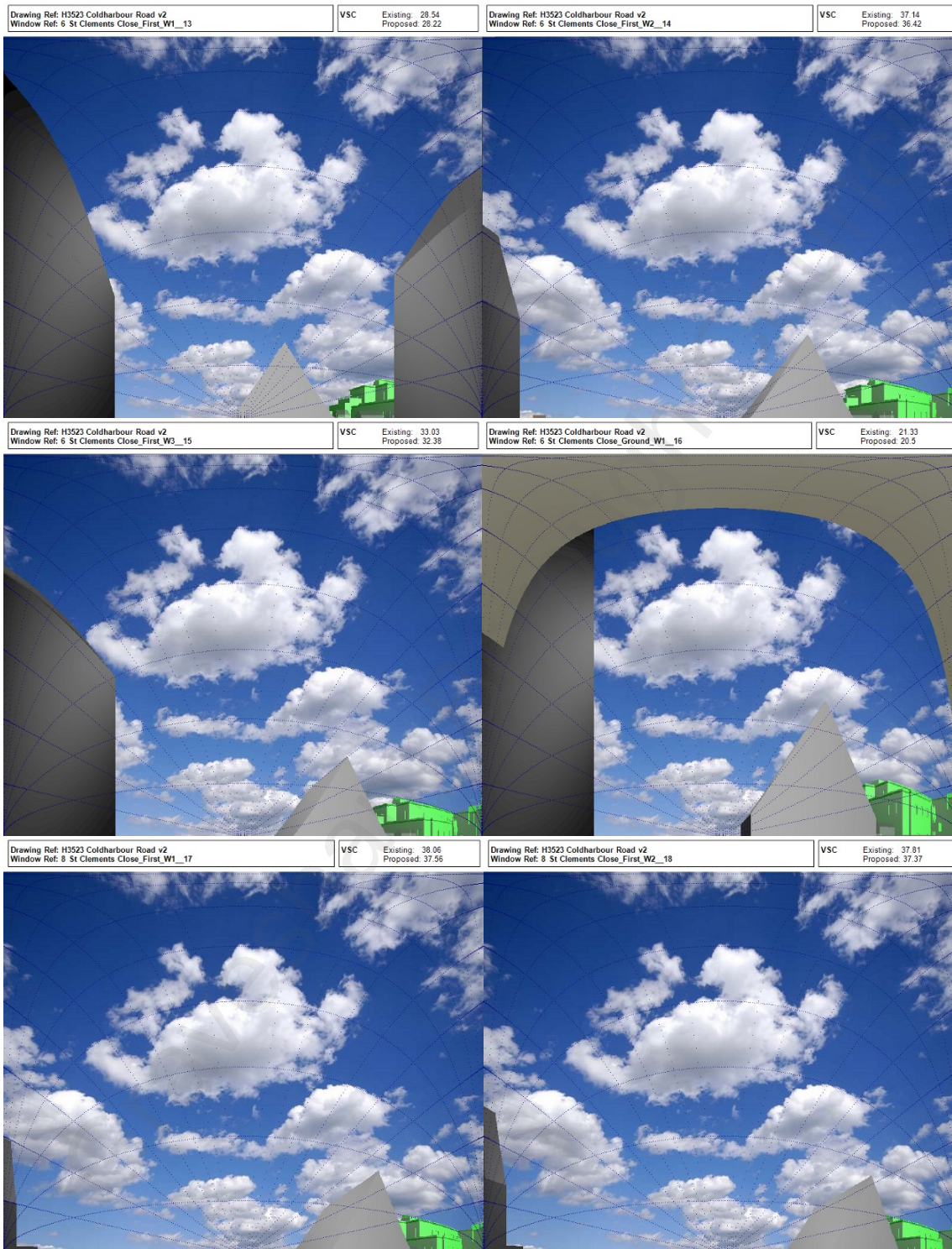
Frontier Estates Limited • 15th August 2022 • H3523 – DS – v2



Daylight, Sunlight & Overshadowing Assessment

Former Battle of Britain Site, Coldharbour Road, Gravesend

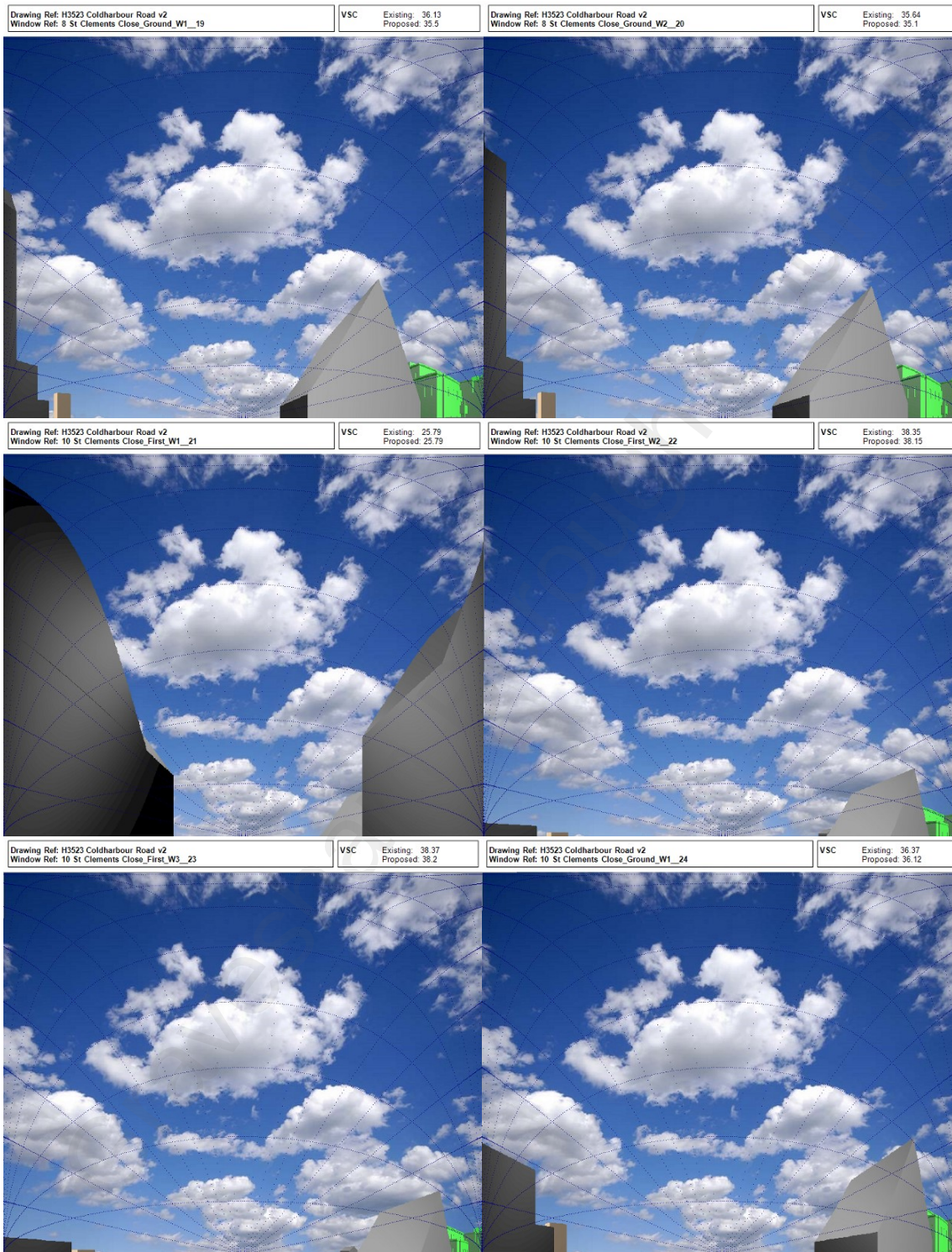
Frontier Estates Limited • 15th August 2022 • H3523 – DS – v2



Daylight, Sunlight & Overshadowing Assessment

Former Battle of Britain Site, Coldharbour Road, Gravesend

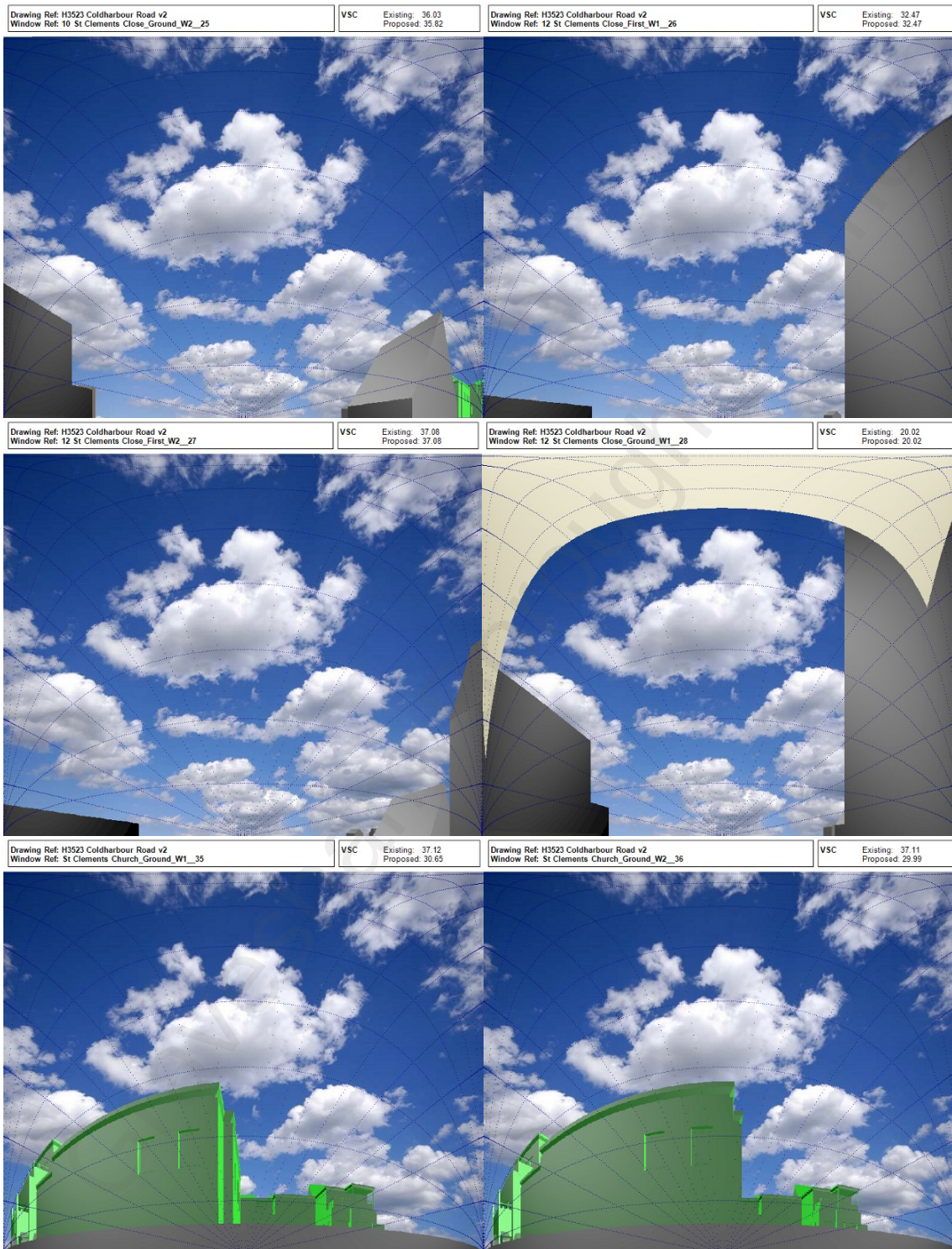
Frontier Estates Limited • 15th August 2022 • H3523 – DS – v2



Daylight, Sunlight & Overshadowing Assessment

Former Battle of Britain Site, Coldharbour Road, Gravesend

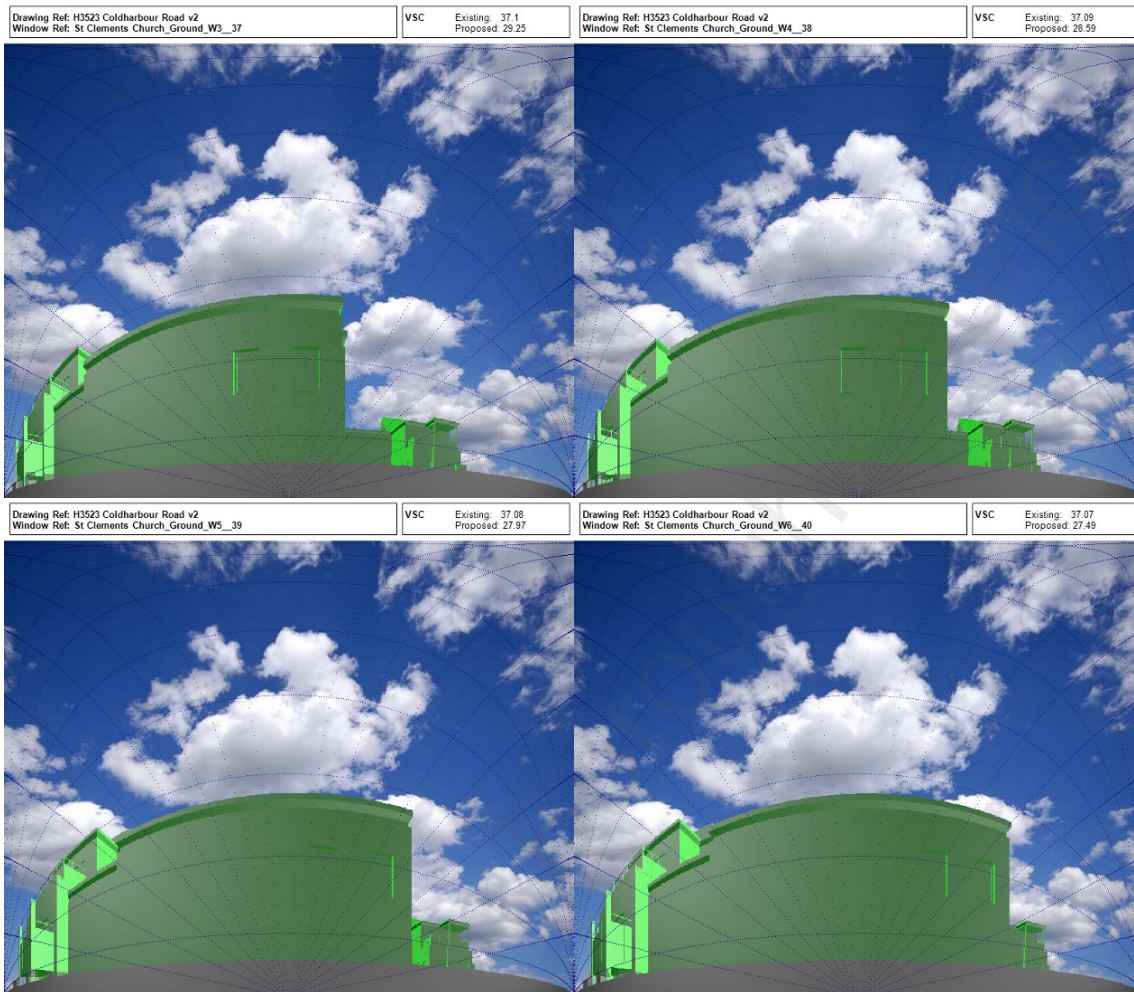
Frontier Estates Limited • 15th August 2022 • H3523 – DS – v2



Daylight, Sunlight & Overshadowing Assessment

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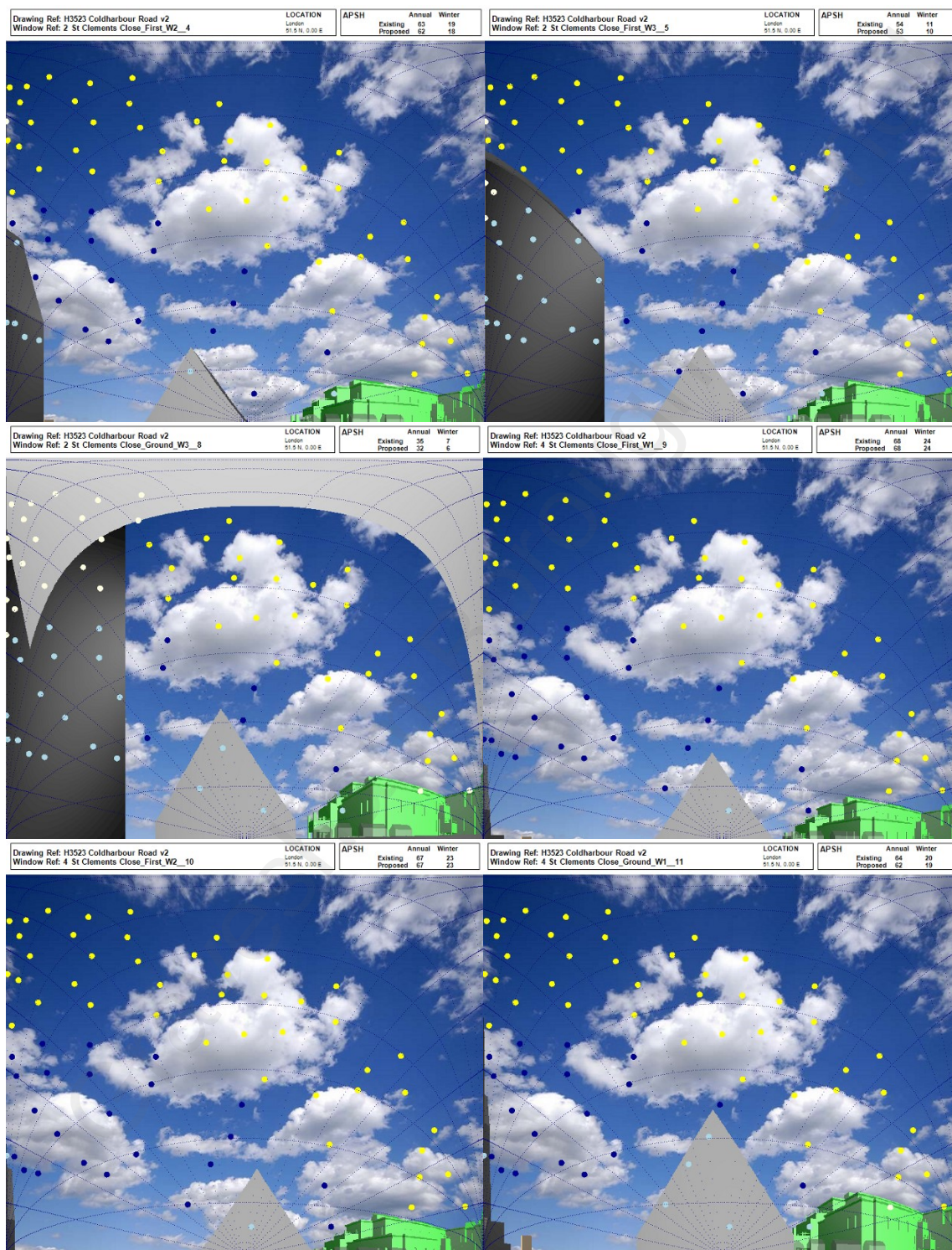
Frontier Estates Limited • 15th August 2022 • H3523 – DS – v2



Appendix 4

Sunlight Availability Indicators

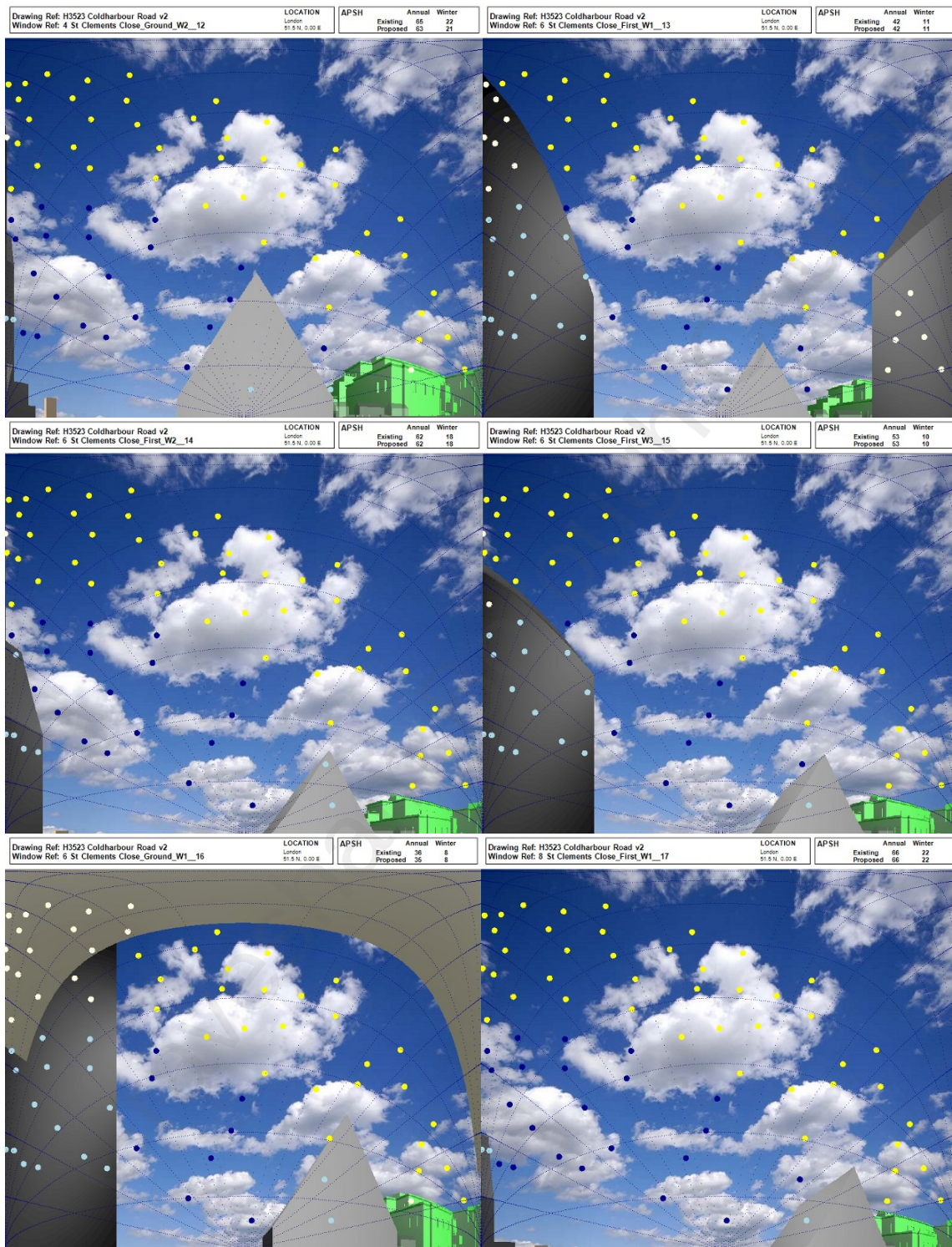
Appendix 4: Sunlight Availability Indicators



Daylight, Sunlight & Overshadowing Assessment

Former Battle of Britain Site, Coldharbour Road, Gravesend

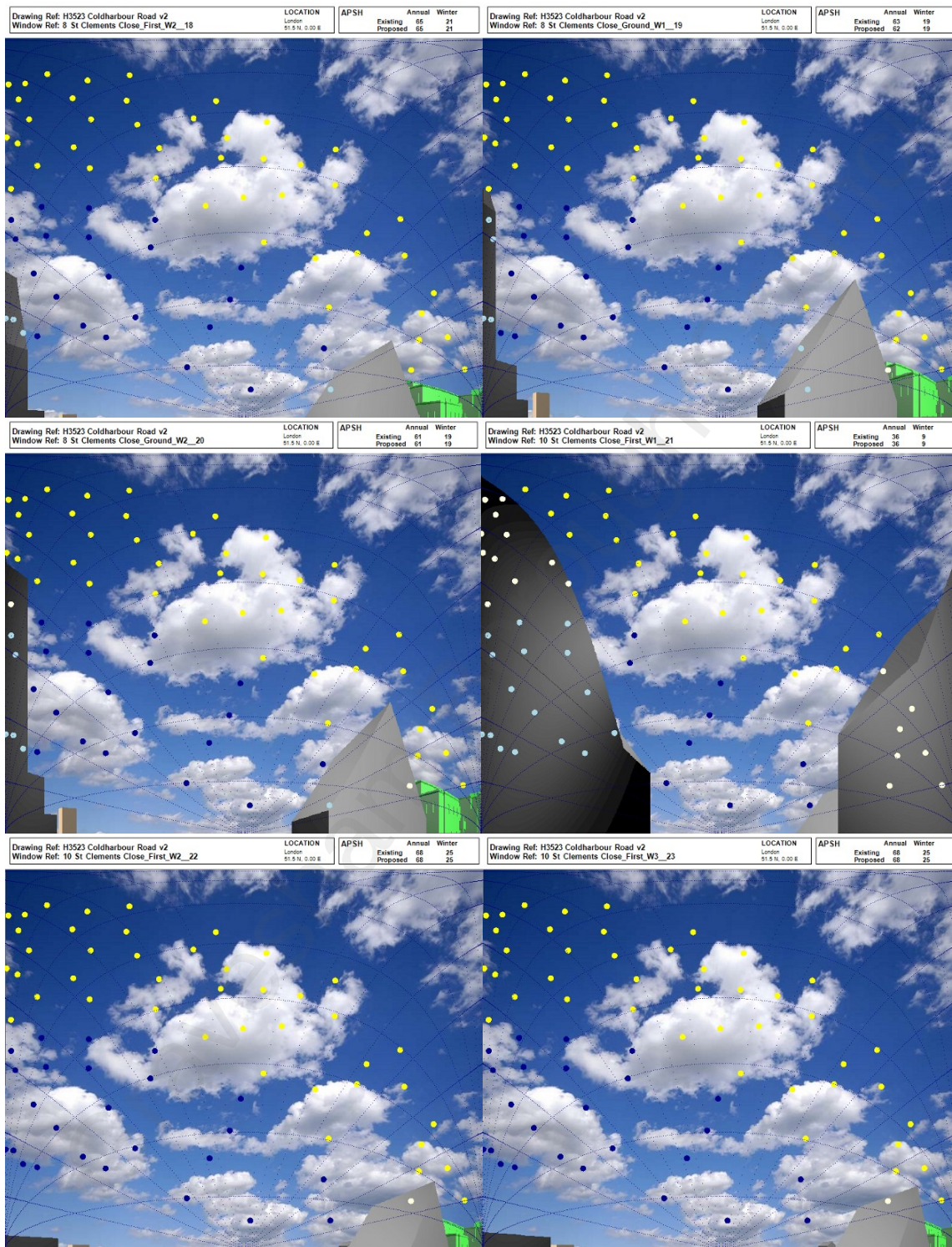
Frontier Estates Limited • 15th August 2022 • H3523 – DS – v2



Daylight, Sunlight & Overshadowing Assessment

Former Battle of Britain Site, Coldharbour Road, Gravesend

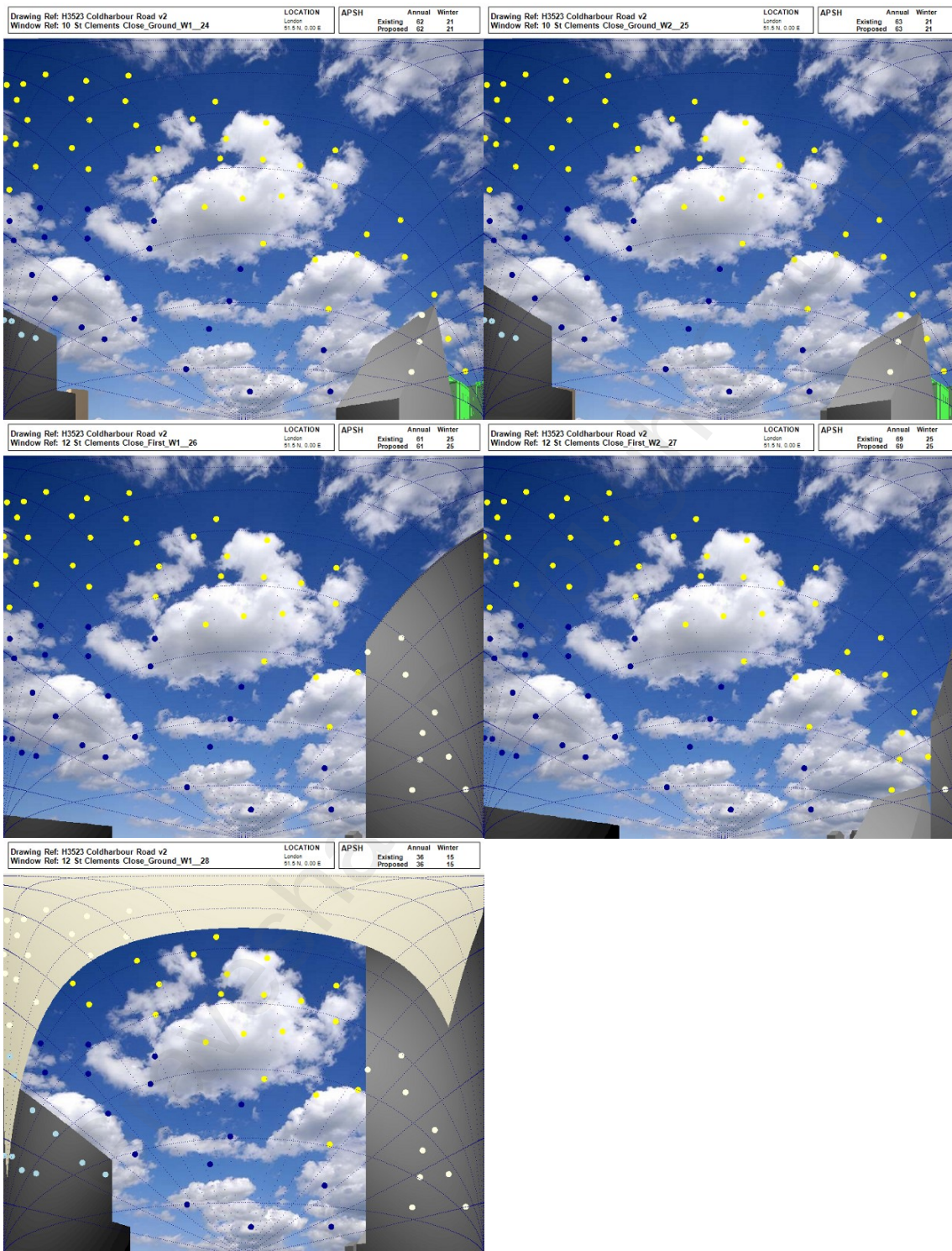
Frontier Estates Limited • 15th August 2022 • H3523 – DS – v2



Daylight, Sunlight & Overshadowing Assessment

Former Battle of Britain Site, Coldharbour Road, Gravesend

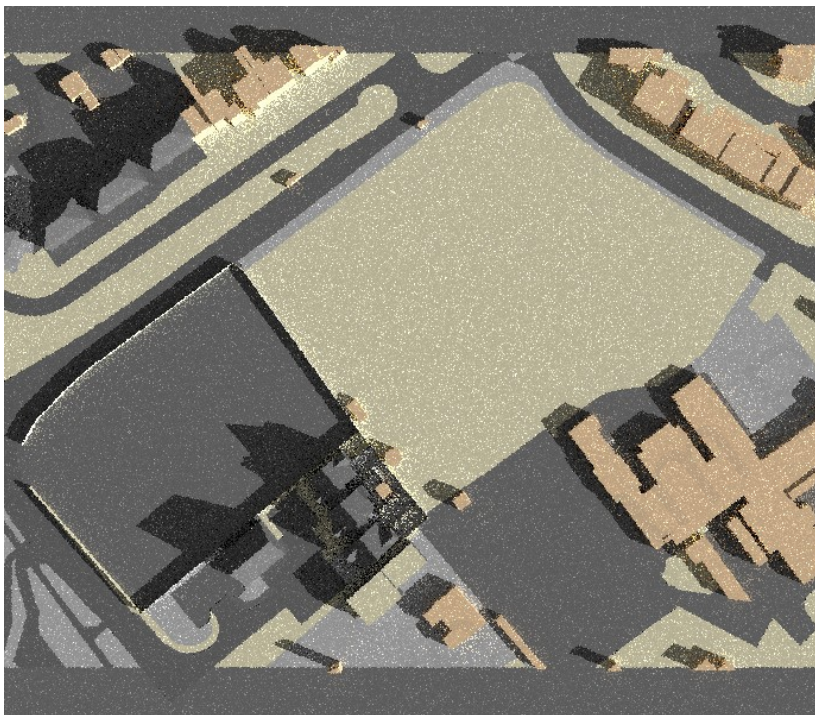
Frontier Estates Limited • 15th August 2022 • H3523 – DS – v2



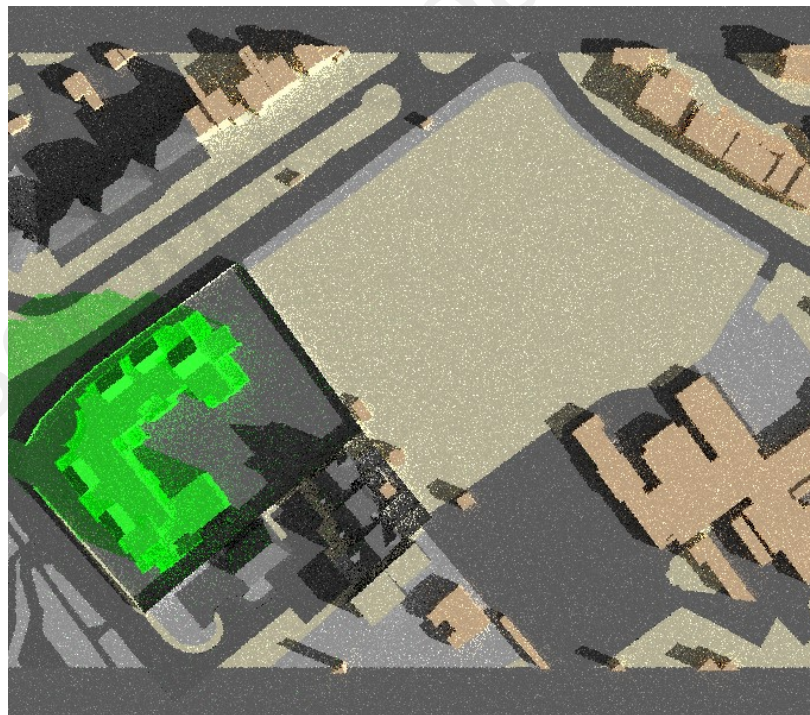
Appendix 5 Shadow Path Diagrams

Appendix 5: Shadow Path Diagrams

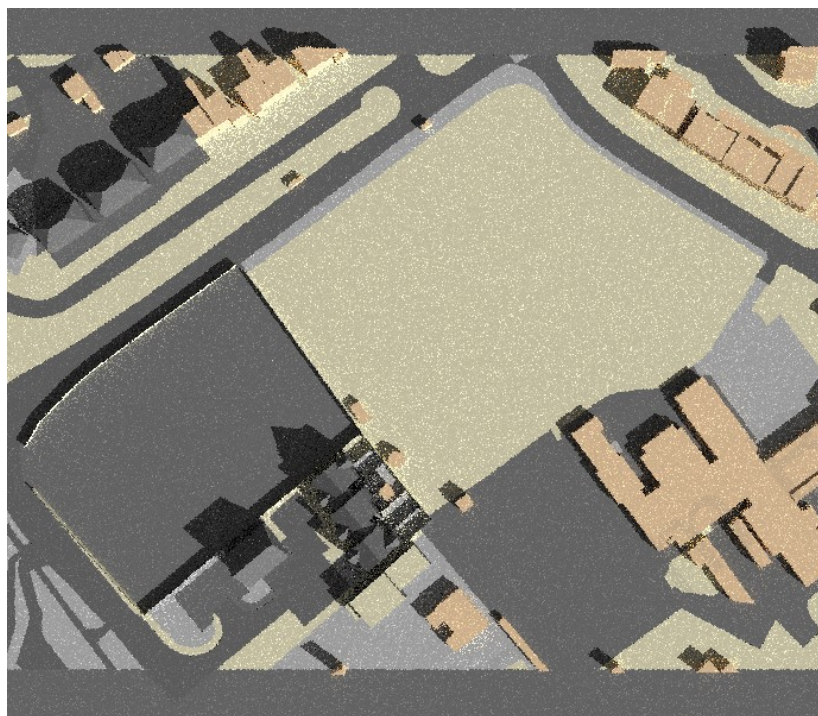
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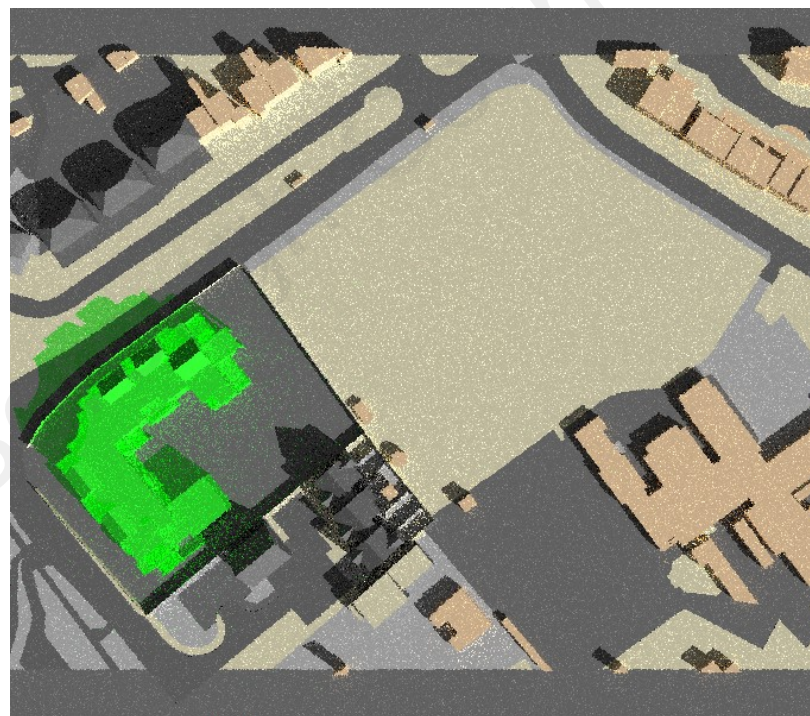
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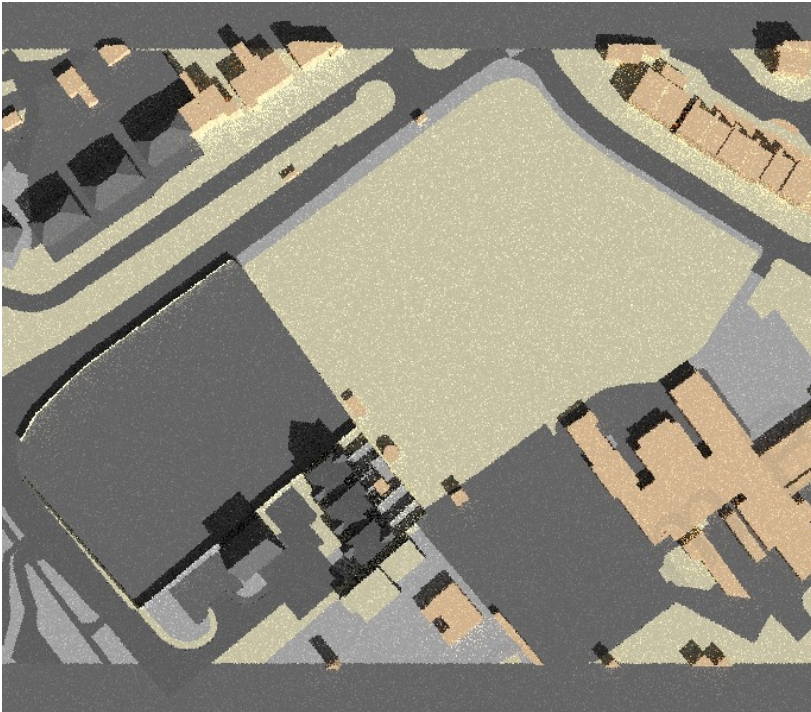
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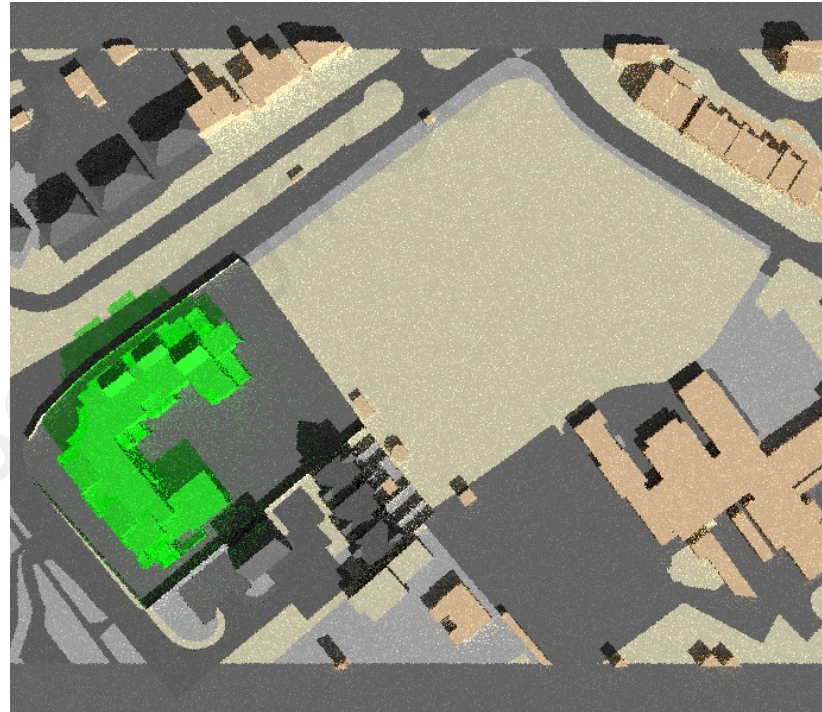
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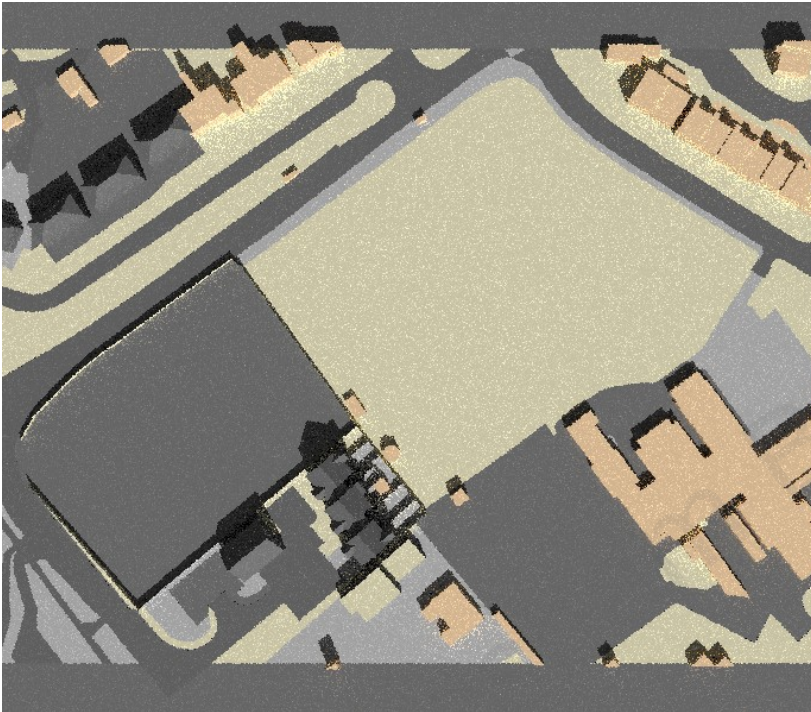
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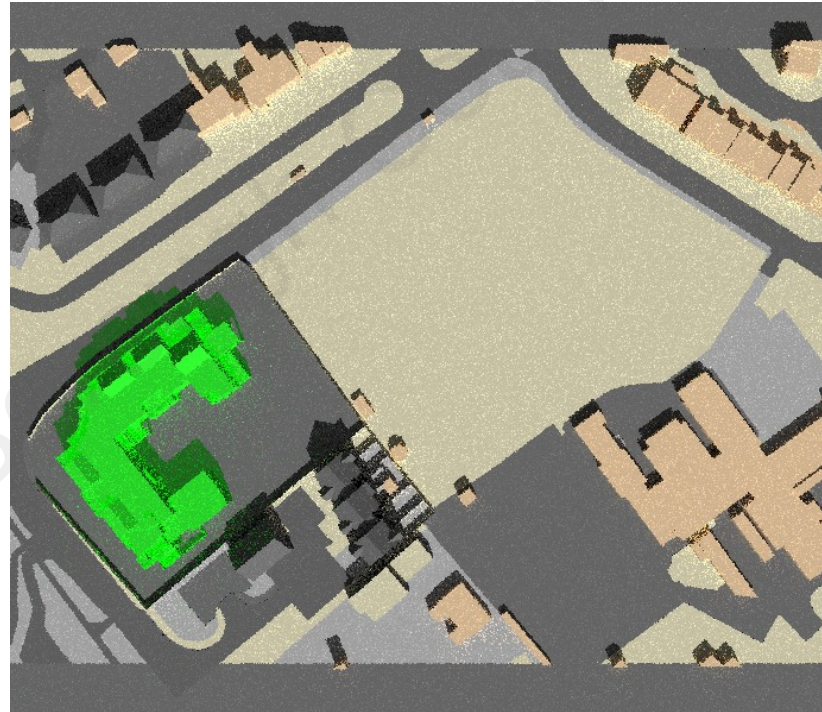
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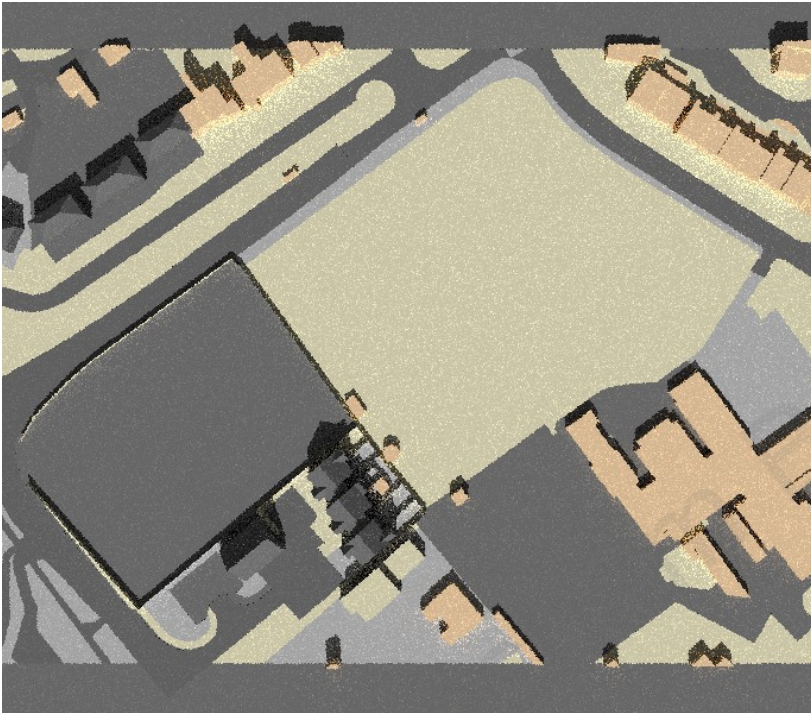
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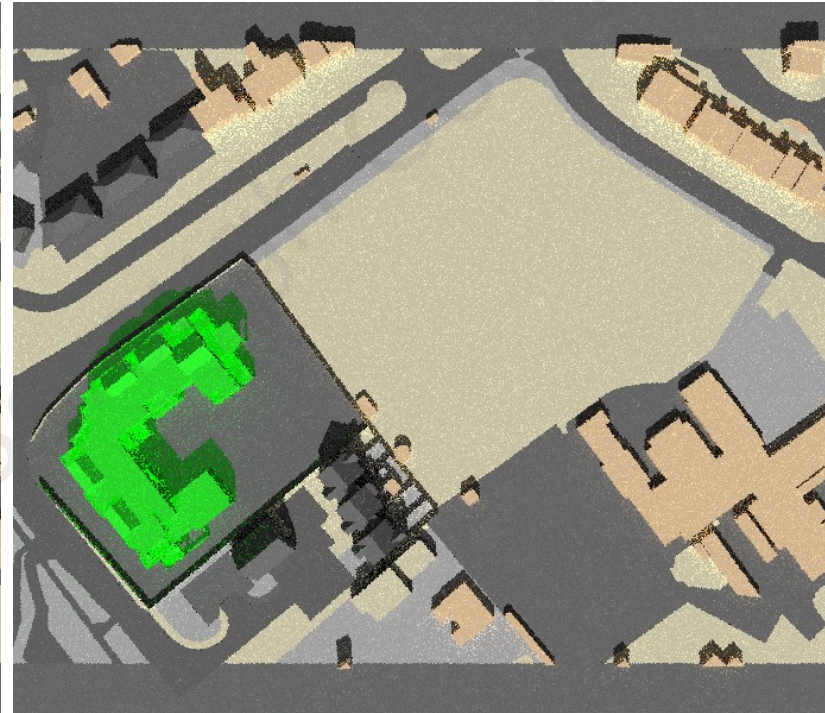
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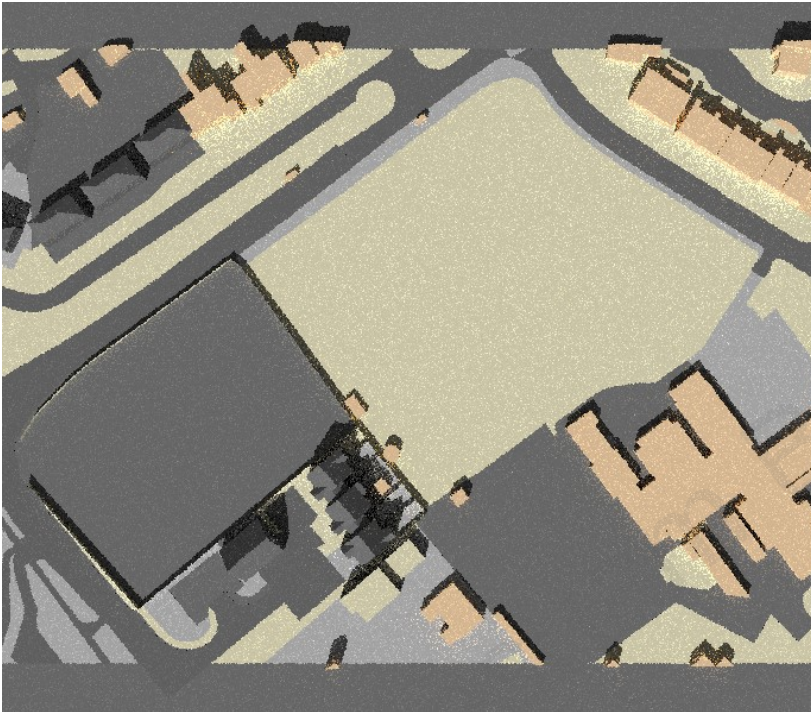
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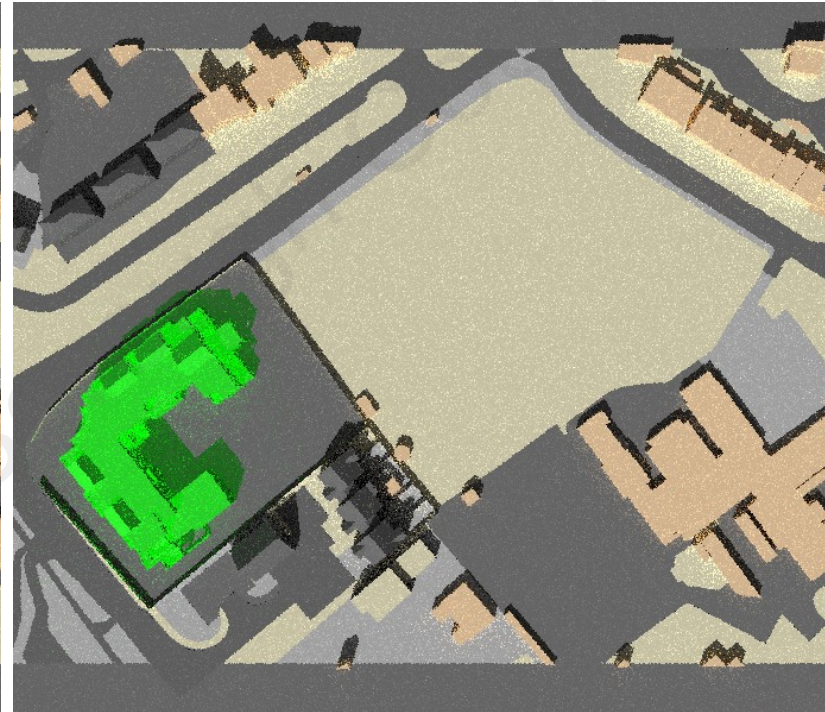
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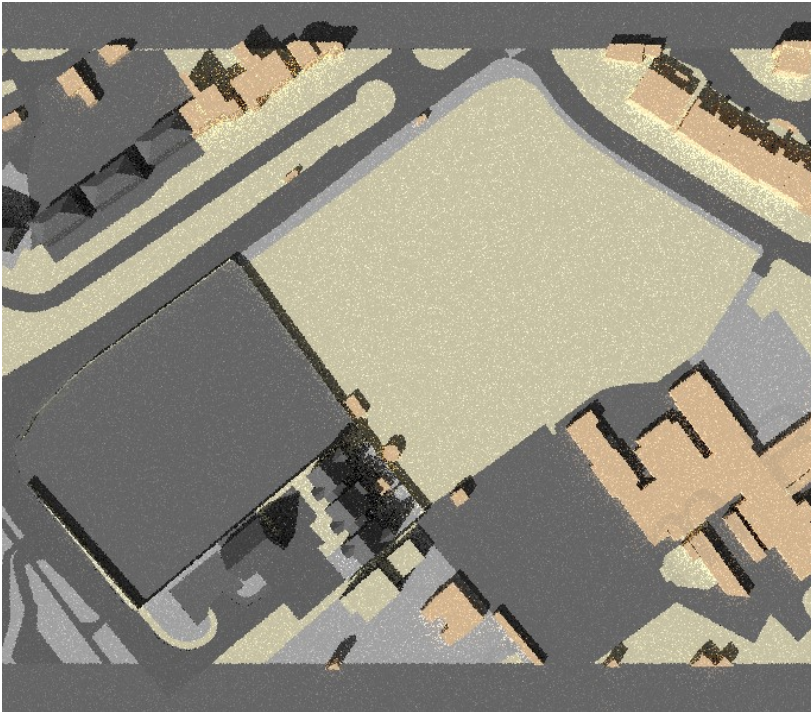
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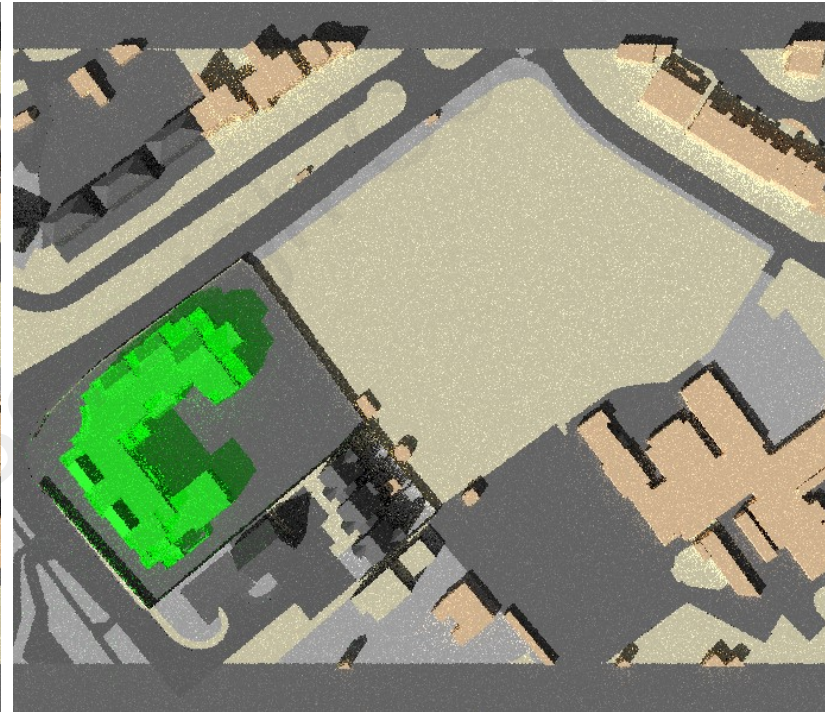
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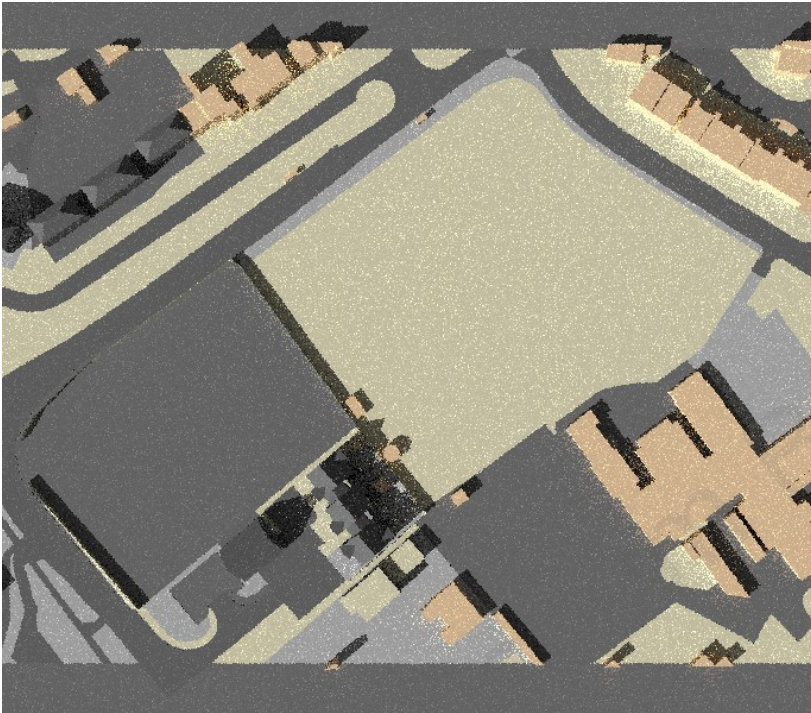
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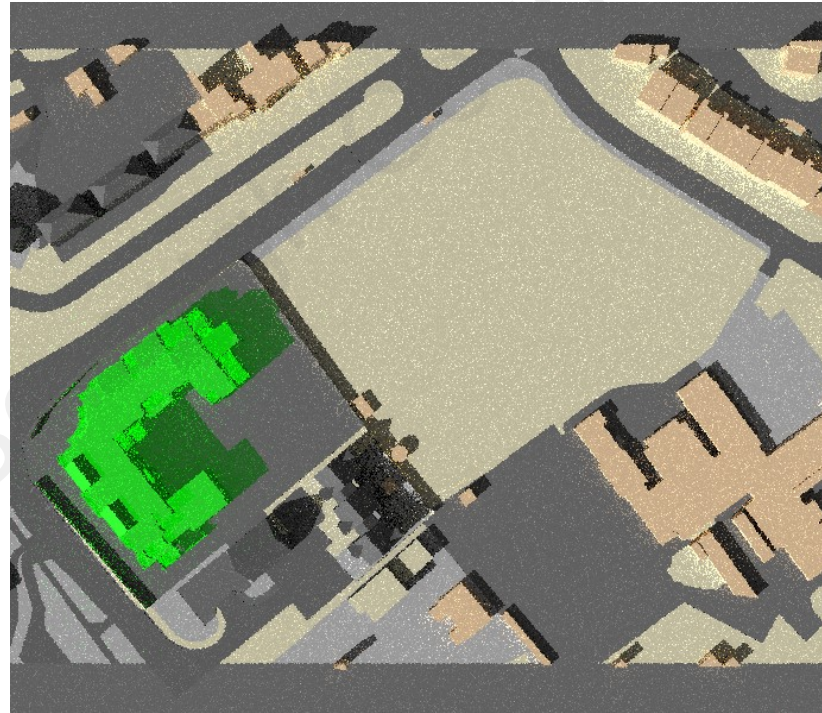
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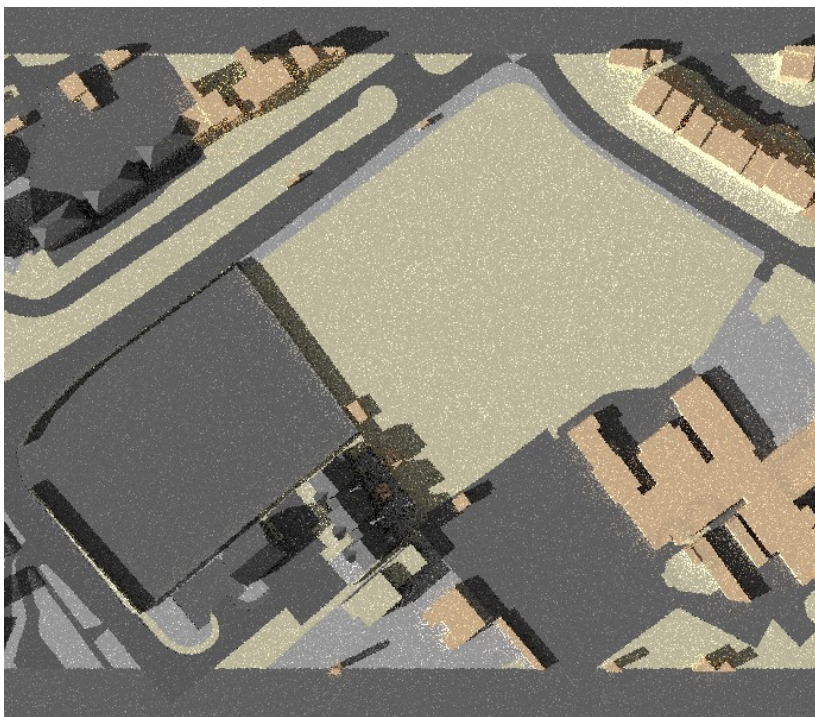
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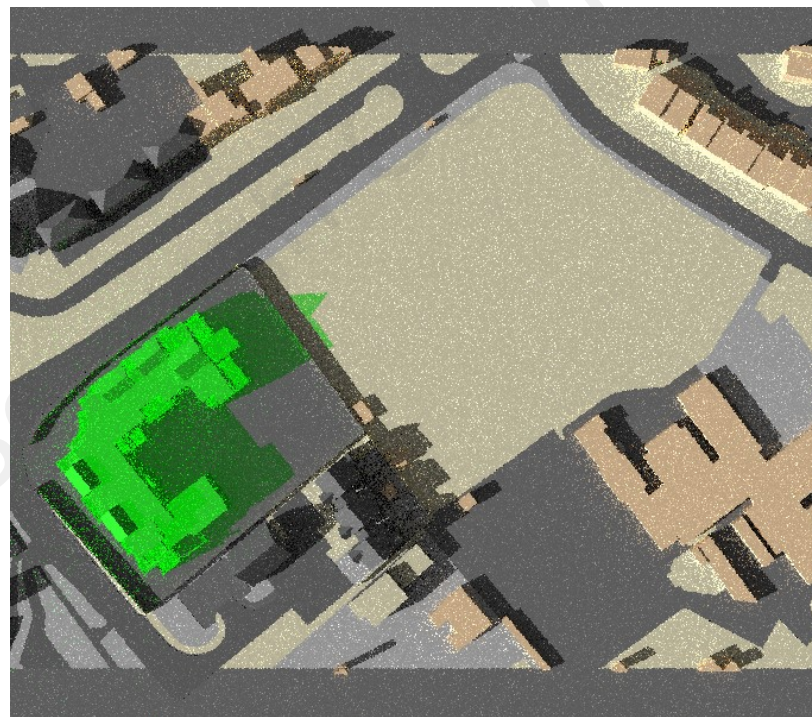
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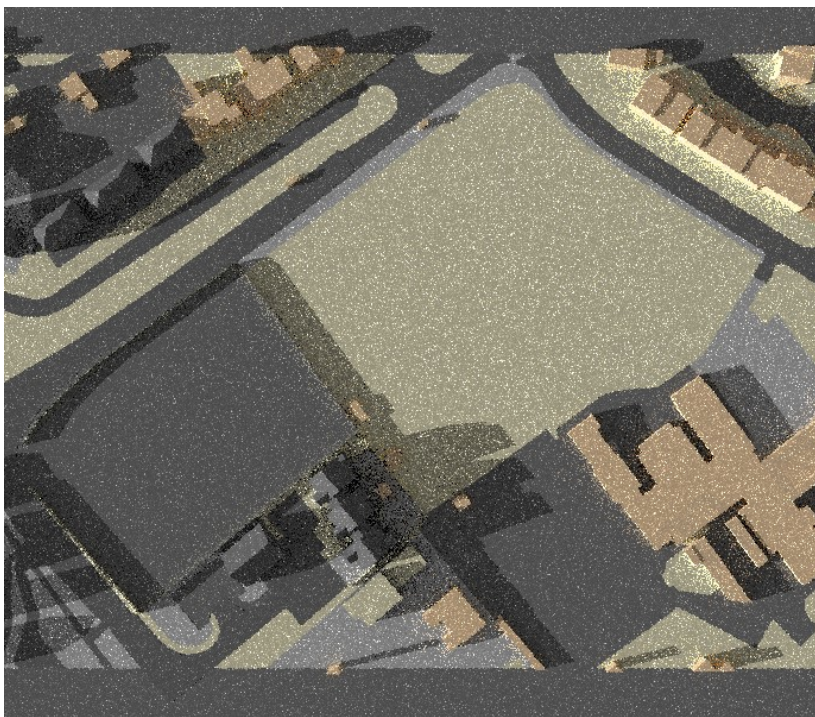
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Proposed Site Layout – Spring Equinox - 21st March – 1600 hrs



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



Proposed Site Layout – Spring Equinox - 21st March – 1700 hrs

