Hawkins environmental

Daylight/Sunlight Assessment: 3 Inverforth Close, London

Certus Limited

5th January 2017

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1. INTRODUCTION

Hawkins Environmental Limited has been instructed by Certus Limited to undertake a daylight/sunlight assessment for the redevelopment of 3 Inverforth Close, situated between Hampstead and Golders Green in the London Borough of Camden.

The site currently comprises a single dwelling, partly attached to 2 Inverforth Close. The proposals will see the construction of a *"replacement roof to facilitate loft conversion including front and side dormer windows and creation of raised terrace; erection of two bay-windows and porch extension at the front and conversion of garages into habitable space at ground floor level"*. A site location plan can be seen in **Appendix 1**.

The pre-application advice response from the London Borough of Camden states that *"Policy DP26 seeks to protect the quality of life of occupiers and neighbours by only granting permission for development that does not cause harm to amenity. Factors to consider, and which is particularly relevant to this case, include sunlight, daylight, artificial light levels, outlook and visual privacy and overlooking"*. Consequently, Camden go on to ask that a daylight/sunlight assessment is submitted with the planning application *"outlining the impact upon adjacent habitable room windows"*. 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.

This report fully incorporates the changes in methodology as a consequence of the publication of the Second Edition of the BRE Report in 2011.

2. POLICY & ASSESSMENT CRITERIA

2.1. Daylight and Sunlight

When assessing the effects of proposed building projects on the potential to cause issues relating to light, it is important to recognise the distinction between daylight and sunlight. Daylight is the combination of all direct and indirect sunlight during the daytime, whereas sunlight (for the purposes of this report) comprises only the direct elements of sunlight. On a cloudy or overcast day diffused daylight still shines through windows, even when sunlight is absent.

2.2. National Policy

The Department for Communities and Local Government (DCLG) sets national planning policy. Their document 'The Planning System: General Principles (2005), published in conjunction with Planning Policy Statement 1: Delivering Sustainable Development, now replaced by the National Planning Policy Framework (NPPF), discusses the need to protect amenities in the public's interest, of which the need for daylight/sunlight could be considered one such amenity. However, the government does not have an adopted policy on daylight, sunlight and the effects of overshadowing, and does not have targets, criteria or relevant planning guidance, in the way it has for other environmental impacts such as noise, landscape or air quality.

However, the **Building Research Establishment (BRE) report, *"Site layout planning for daylight and sunlight"* Second Edition 2011 by PJ Littlefair** (referred to as the BRE Report) 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; In addition, the **British Standard BS 8206:2008 Lighting for buildings – Part 2: Code of practice for daylighting** contains guidance on the minimum recommended levels of interior daylighting and introduces some of the calculation procedures used in the BRE Report.

2.3. The BRE Report

The BRE Report contains guidance on how to design developments, whilst minimising the impacts on existing buildings from overshadowing and reduced levels of daylight and sunlight. 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 lighting:

- **Daylight** – i.e. the combined impacts of all direct sunlight and indirect skylight during the daytime;
- **Sunlight** – i.e. the impacts of only the direct sunlight; and
- **Overshadowing of Gardens and Open spaces**.

It is important to note that the BRE Report "Site Layout Planning for Daylight and Sunlight" is not a test to determine whether a development "Passes" or "Fails", rather "*A Guide to Good Practice*". Therefore, whilst one should try to achieve the numerical guidance within the report (e.g. ADF, VSC, APSH etc.), the failure to do so does not indicate that the development is unsuitable, nor is it an indication that planning permission should be refused.

2.4. Daylight Impact Assessment Criteria

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, store rooms, 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, hospitals, hotels and some offices.

When assessing daylight, the numerical criteria must be viewed flexibly and should be considered against other site layout constraints. In addition, it is important to consider whether the existing building is itself a good neighbour, standing a reasonable distance from the boundary and not taking more than its fair share of light.

Figure 2.1 shows the decision chart, showing the processes involved in determining daylight impact. The assessment takes on several specific stages:

1) **The Distance Test**: loss of light to windows need not be analysed if the distance from the existing window to the development is three of more times its height above the centre of the existing window;

2) **The 25° Rule**: loss of light to windows need not be analysed if the angle to the horizontal subtended by the new development from the centre of the existing window is less than 25°;

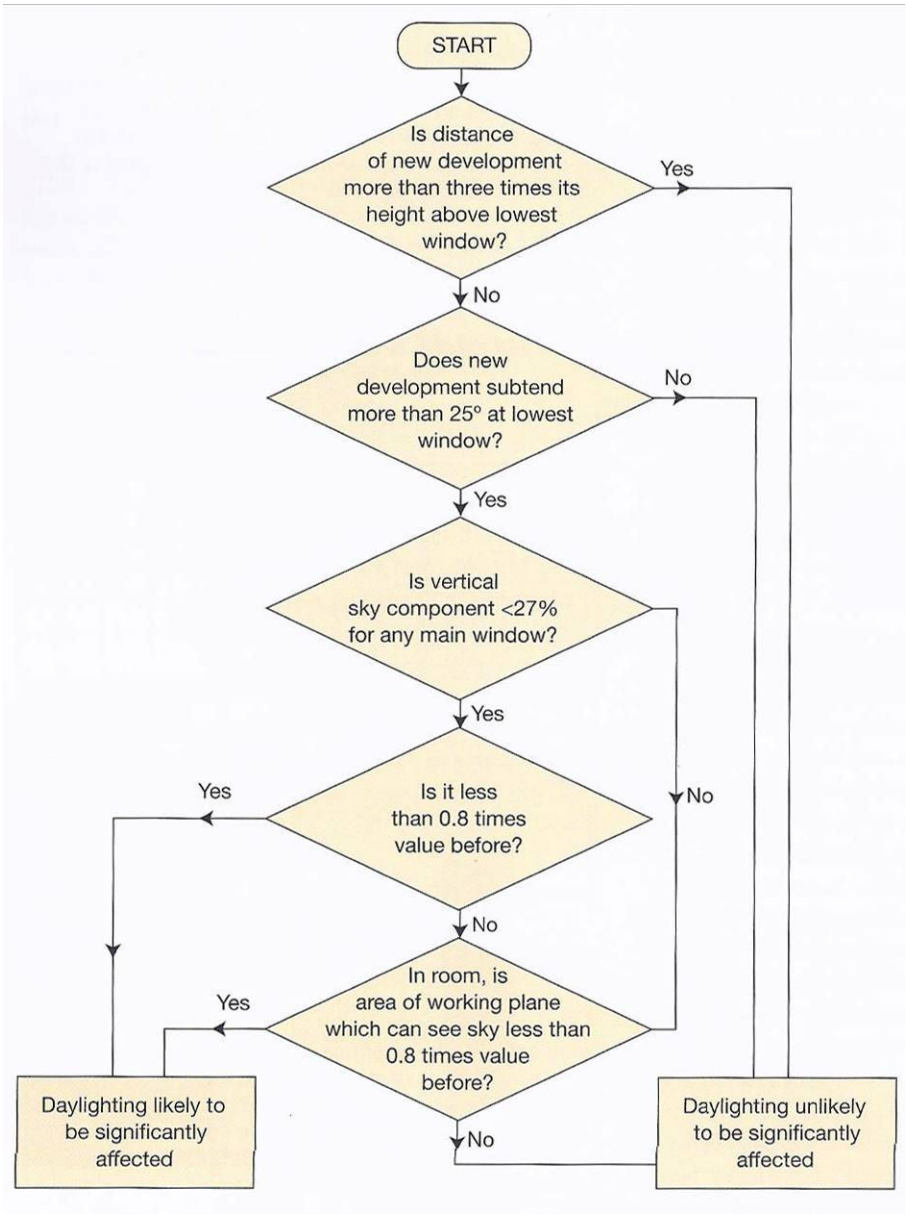
3) **Daylight Assessment**: diffuse daylight of an existing building may be affected by a proposed development if either:

    a. 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

    b. 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.

Figure 2.1: Decision Chart – Diffuse Daylight in Existing Buildings (taken from the BRE Report)



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. For example, in an inner city location when building are generally more than two storeys in height and when the street patter is tighter, absolute VSC values in the mid-teens are the norm, and anything above 20% will be considered "good".

2.5. Sunlight Impact Assessment Criteria

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.

As with daylight, the numerical criteria for sunlight should be viewed flexibly and should be considered against other site layout constraints. It is important to stress that sunlight is not an essential requirement of a dwelling, unlike daylight availability. Therefore, larger reductions in sunlight may be acceptable, for example if new development is to match the height and proportion of existing buildings nearby.

The assessment of sunlight takes on several specific stages:

1. **Facing South**: loss of sunlight to windows only needs to be assessed if the window faces within 90° of due south;
2. **The Distance Test**: loss of sunlight to windows need not be analysed if the distance from the existing window to the development is three of more times its height above the centre of the existing window;
3. **The 25° Rule**: loss of sunlight to windows need not be analysed if the angle to the horizontal subtended by the new development from the centre of the existing window is less than 25°;
4. **Sunlight Assessment**: direct sunlight of an existing windows may be affected by a proposed development if at the centre of a window:
    a. receives less than 25% of Annual Probable Sunlight Hours (APSH), or less than 5% APSH between 21st September and 21st March; **and**
    b. receives less than 0.8 times its former APSH during either period; **and**
    c. has a reduction in sunlight over the whole year of greater than 4% APSH.

2.6. Overshadowing of Gardens and Open Spaces Impact Assessment Criteria

The effects of overshadowing and the loss of sunlight on open spaces and gardens is another important element of any sunlight or daylight assessment. Assessments should not restrict themselves to looking at just the effects on providing good natural lighting within buildings as sunlight in the spaces between buildings has an important impact on the overall appearance and ambience of a development.

The Second Edition of the BRE Report, published in 2011, requires 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 was greater than 0.8 times its former value, no impact would have occurred. 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.

2.7. The Impacts of Vegetation

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.

2.8. Determining Significance

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."*

Often, Local Planning Authorities interpret the failure of a development to meet the guideline criteria as an indicator as to whether a development is acceptable. However, this is not the case and the BRE report suggests that the numerical values are purely advisory and that where circumstances are a departure from the low-density suburban housing model upon which the numerical targets in the Guidelines are based, alternative targets may be used, as described in Appendix F of the 2011 Edition of the BRE Report. For example:

- where the site already has an extant planning permission that the developer wants to vary, the VSC and APSH of the permitted scheme may be used as alternative benchmarks;
- in historic city centre environments or where general development is greater than a domestic scale, it is often not possible to achieve 27% VSC, therefore it is sensible to use a target value consistent with levels of daylight typically experienced in the street. For example, if the obstruction angle from ground floor level at other properties in the street is typically 40°, which corresponds to a VSC of 18%, this level could be used as a target value for development in that street, if new development is to match the scale and size of the existing development;
- where an existing building has windows that are unusually close to the site boundary and taking more than their fair share of light, to ensure that new development matches the height and proportions of existing buildings, the VSC and APSH targets for these windows could be set to those for a "mirror-image" building of the same height and size, an equal distance away on the other side of the boundary.

In addition, Appendix I of the 2011 Edition of the BRE Report provides new guidance on how to assess impact, which suggests that a semantic scale can be used to describe the impact, which can then be used help place the impact in context. **Table 2.1** summarises the impact magnitude criteria as described in the BRE Report.

Table 2.1: Impact Magnitude Criteria (adapted from Appendix I of the BRE Report 2011)

Criteria	Impact Magnitude
Where the decrease in daylight or sunlight fails to meet the guidelines, and one or more of the following scenarios applies: • a large number of windows or 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 is only just within the guidelines and a larger number of windows or open space are affected; or Where the decrease in daylight or sunlight fails to meets the guidelines, but one or more of the following scenarios applies: • 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 only a small number of windows are affected; 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 large and/or the number of affected windows or area of open space affected is large.	Major Beneficial

Note: Appendix I of the BRE report also suggests the use of "moderate adverse" and "moderate beneficial" impacts. However, there is no guidance on how to designate moderate impacts, although the guidance suggests that judgement should be used when classifying impact magnitude.

2.9. The London Plan

The London Plan, published in 2011 with minor revisions in October 2013, March 2015 and March 2016, provides an overall strategic plan for London, and it sets out a fully integrated economic, environmental, transport and social framework for the development of the capital to 2031. The Plan brings together the Mayor's strategies, including policy on a range on environmental issues, such as climate change, air quality, noise and

waste. London boroughs' local plans need to be in general conformity with the London Plan, and its policies guide decisions on planning applications by councils and the Mayor.

Policy 3.5 relates to the quality and design of housing developments and states that

"Housing developments should be of the highest quality internally, externally and in relation to their context and to the wider environment, taking account of strategic policies in this Plan to protect and enhance London's residential environment and attractiveness as a place to live."

2.10. London Plan – Housing Supplementary Planning Guidance

The Housing SPG, published in March 2016 highlights the elements of the London Plan that are relevant to housing development, and where applicable, provides more detail. The SPG states:

"Daylight and sunlight good practice:

Standard 5.5.1 - Glazing to all habitable rooms should be not less than 20% of the internal floor area of the room.

Standard 5.5.2 - All homes should provide for direct sunlight to enter at least one habitable room for part of the day. Living areas and kitchen dining spaces should preferably receive direct sunlight.

2.3.38 Daylight enhances residents' enjoyment of an interior and reduces the energy needed to provide light for everyday activities, while controlled sunlight can help to meet part of the winter heating requirement. Sunlight is particularly desirable in living areas and kitchen dining spaces. The risk of overheating should be taken into account when designing for sunlight (see Standard 6.3.1).

2.3.39 The Code for Sustainable Homes requires a minimum average daylight factor of 2% in kitchens and 1.5% in living rooms, dining rooms and bedrooms in order to achieve credits. These measures define a minimum acceptable level to make an interior feel day-lit, but they do not guarantee a comfortable level of light for a range of daily activities. Good practice standards 5.5.1 and 5.5.2 seek to achieve that higher level of comfort."

3. DAYLIGHT/SUNLIGHT IMPACT ASSESSMENT

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

3.1. Identification of Receptors

Based on a site visit on the 16th December 2016, and also based on the plans of the development, it has been identified that the primary dwelling of concern is windows on the front and side facades of 2 Inverforth Close. The property of concern can be seen in the site plan in **Appendix 1**. The windows under consideration can be seen in **Appendix 2**.

3.2. Methodology

This section summarises the daylight and sunlight impacts of the proposed development on surrounding properties. To determine these impacts, the software packages created by MBS Survey Software Limited have been utilised 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 Building Research Establishment (BRE) report, *"Site layout planning for daylight and sunlight"* Second Edition 2011 by PJ Littlefair and is widely acknowledged to be a suitable tool for undertaking daylight, sunlight and overshadowing assessments in accordance with the BRE Guidance. For the purposes of the assessment, a three dimensional computer model was constructed both with and without the proposed development in place. **Figures 3.1** to **Figure 3.10** 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. 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.

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Figure 3.1: 3D model without new development from the North

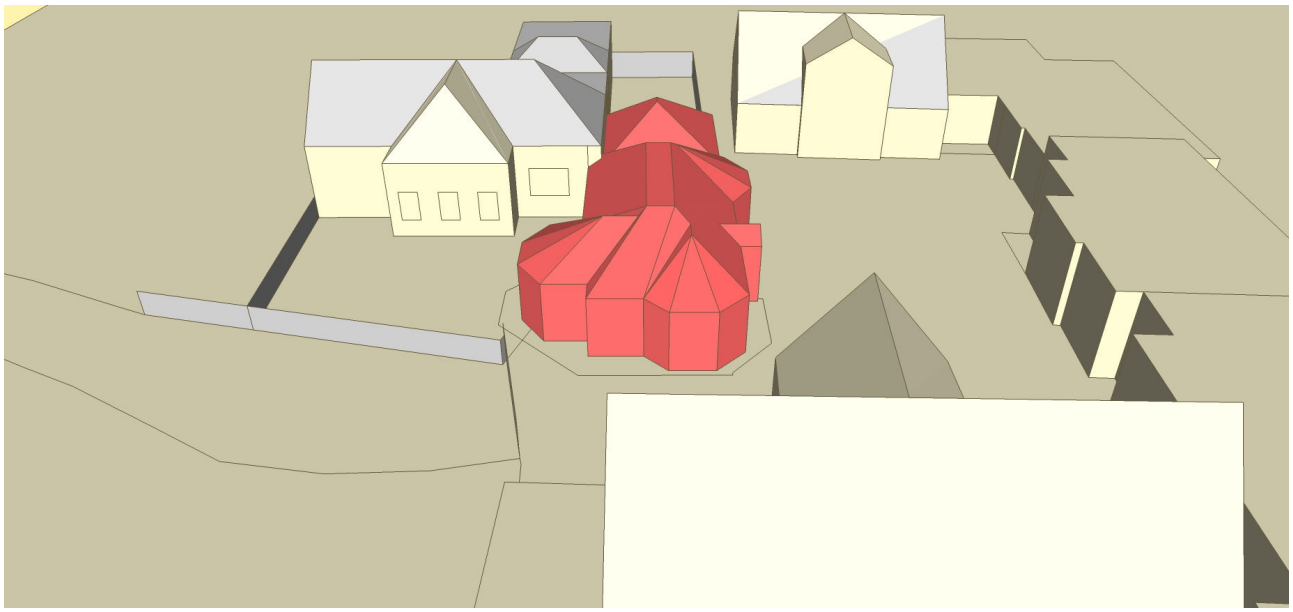


Figure 3.2: 3D model with new development from the North

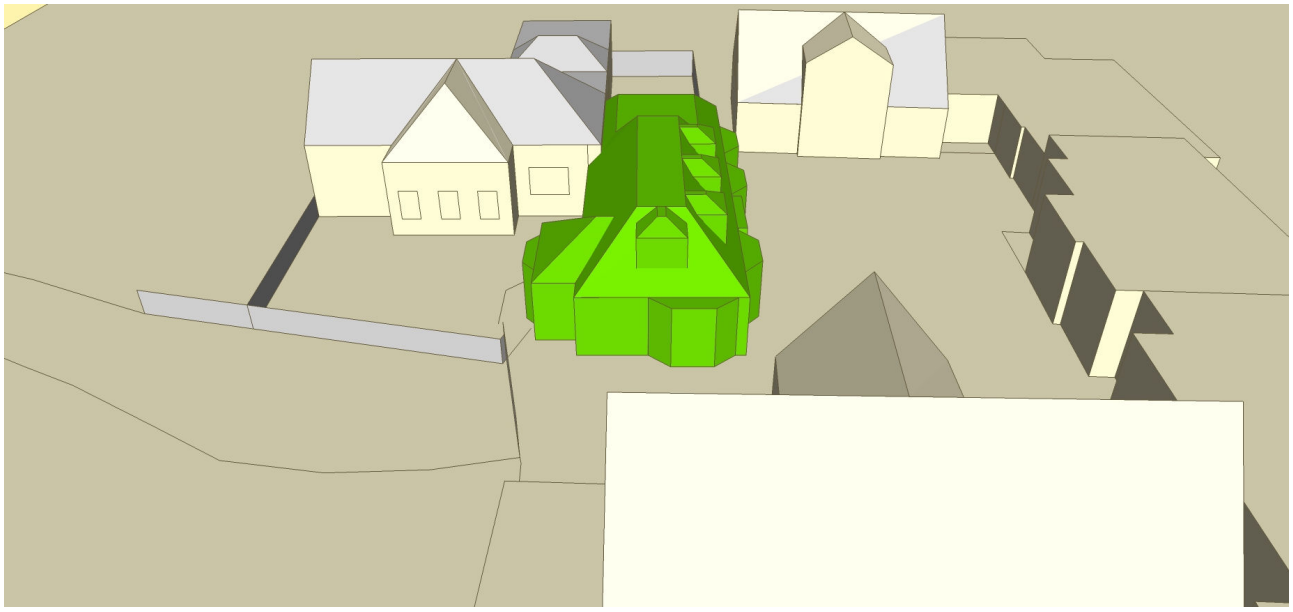


Figure 3.3: 3D model without new development from the East

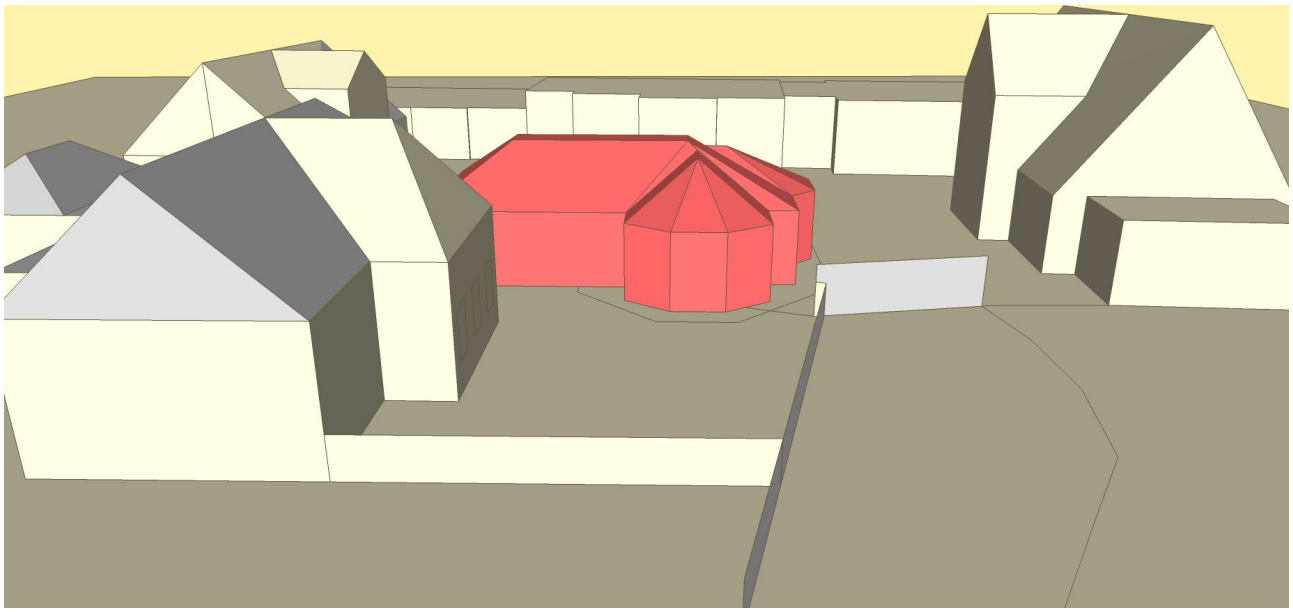


Figure 3.4: 3D model with new development from the East

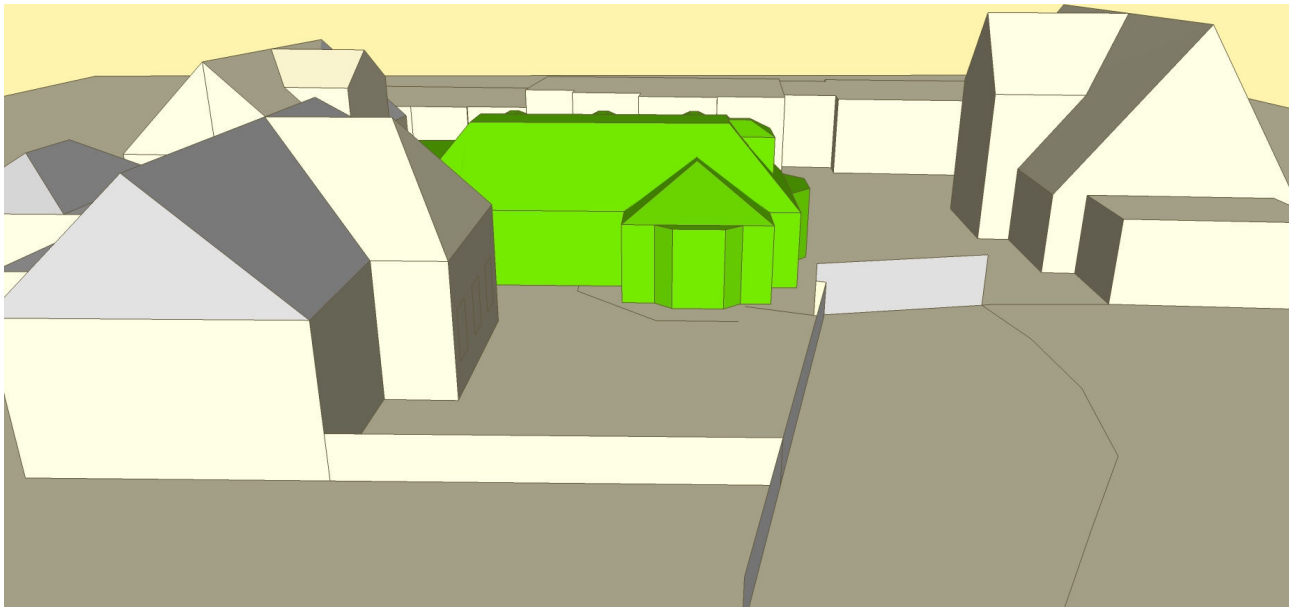


Figure 3.5: 3D model without new development from the South

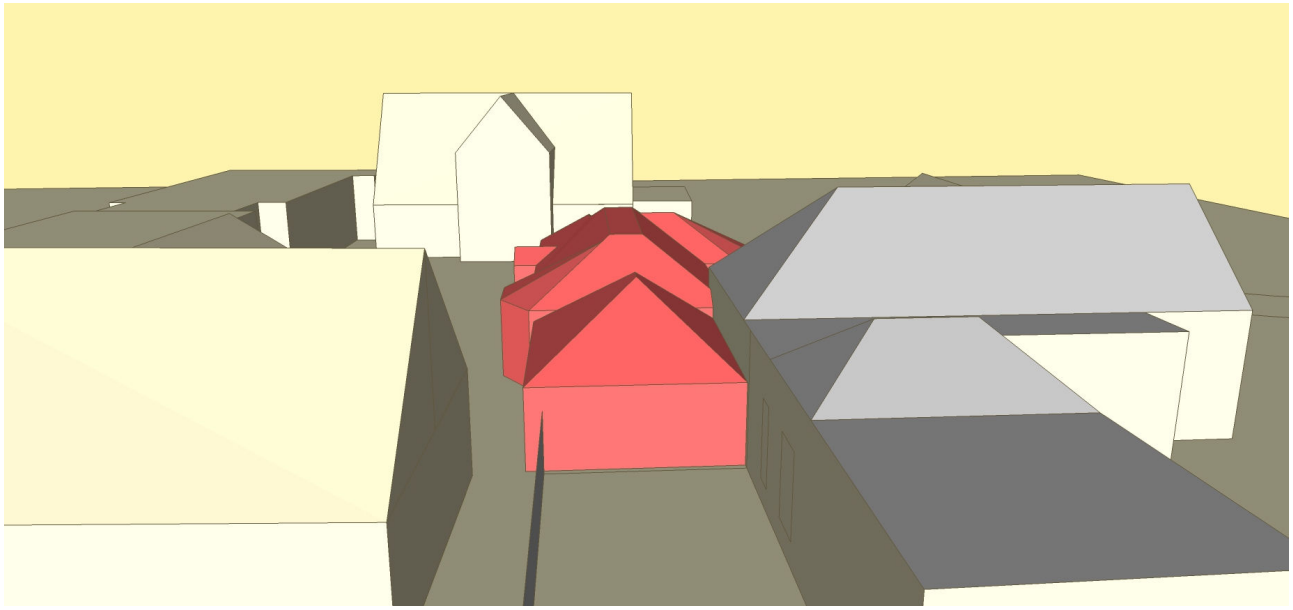


Figure 3.6: 3D model with new development from the South

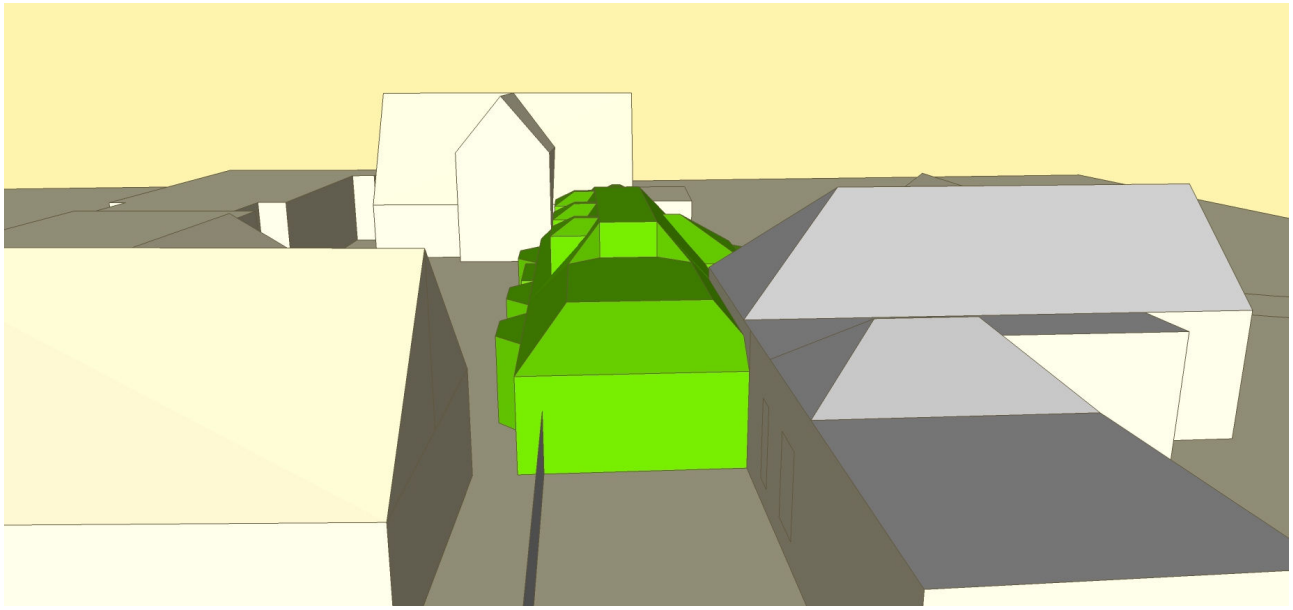


Figure 3.7: 3D model without new development from the West

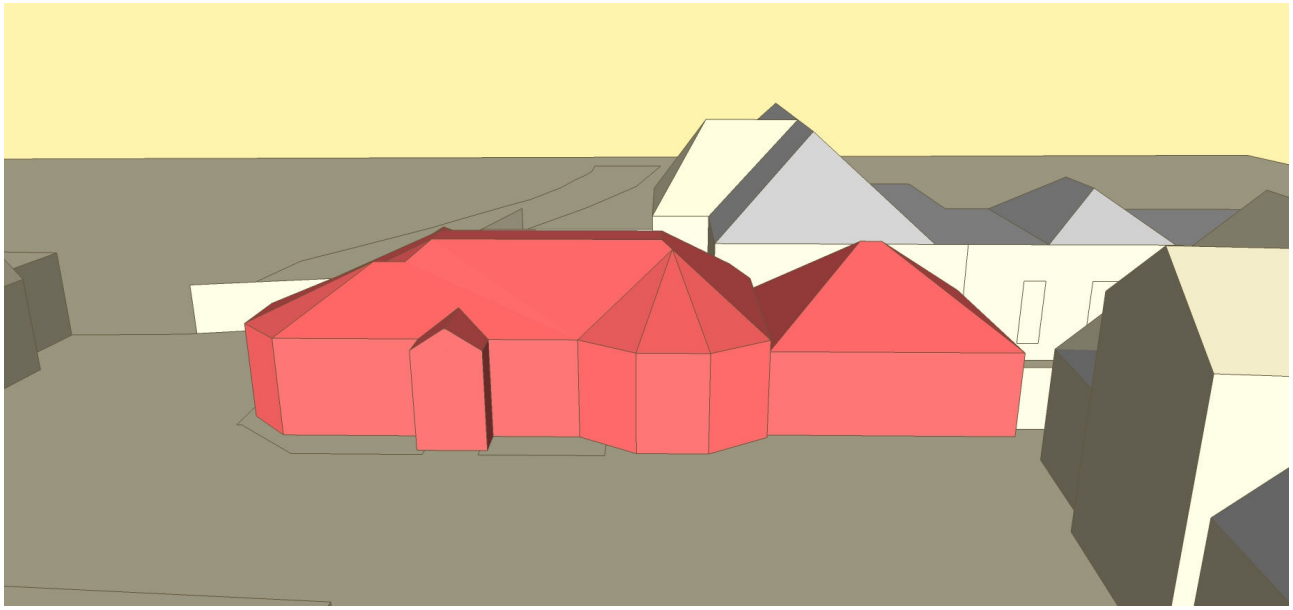


Figure 3.8: 3D model with new development from the West

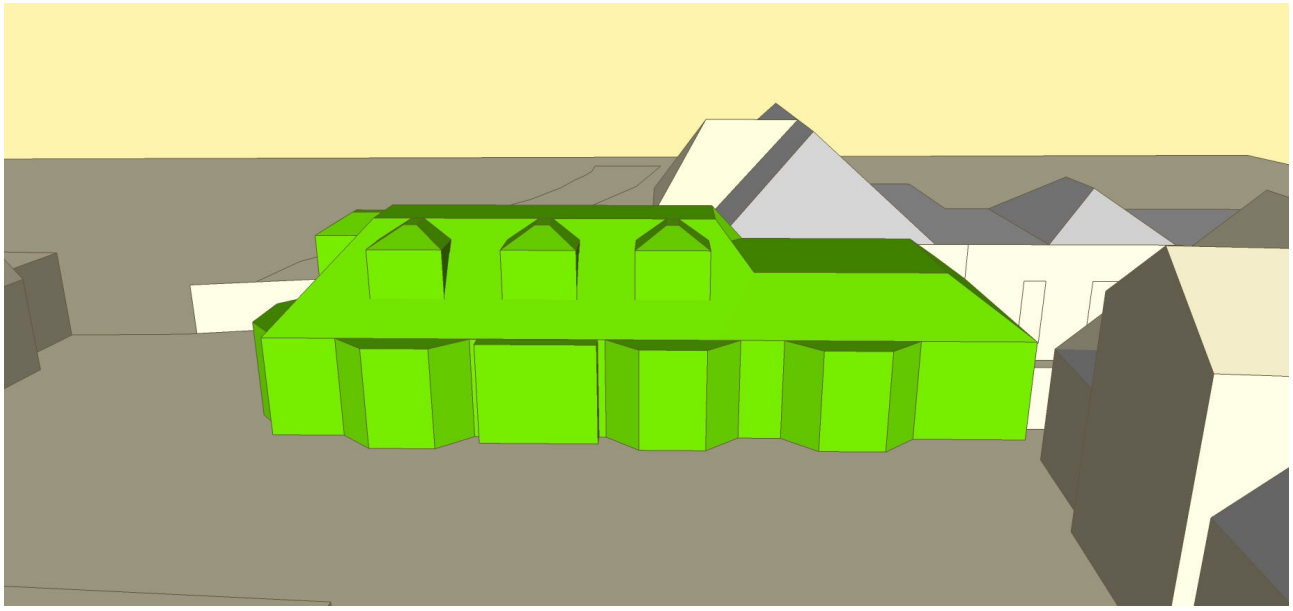


Figure 3.9: 3D model without new development from Overhead

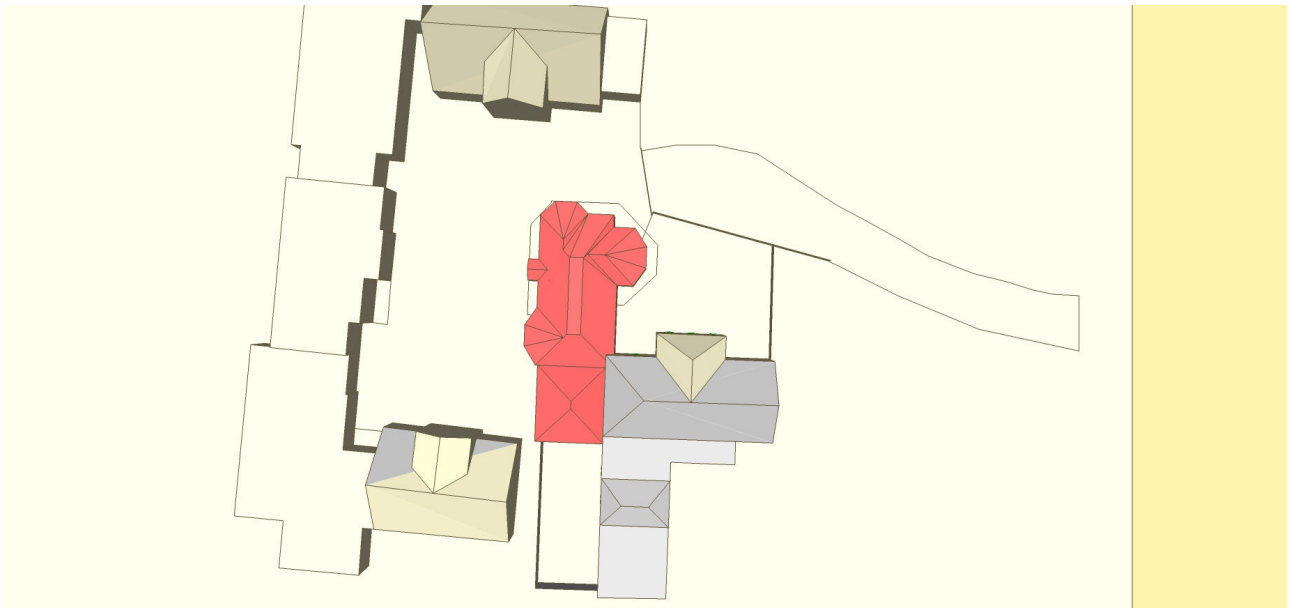
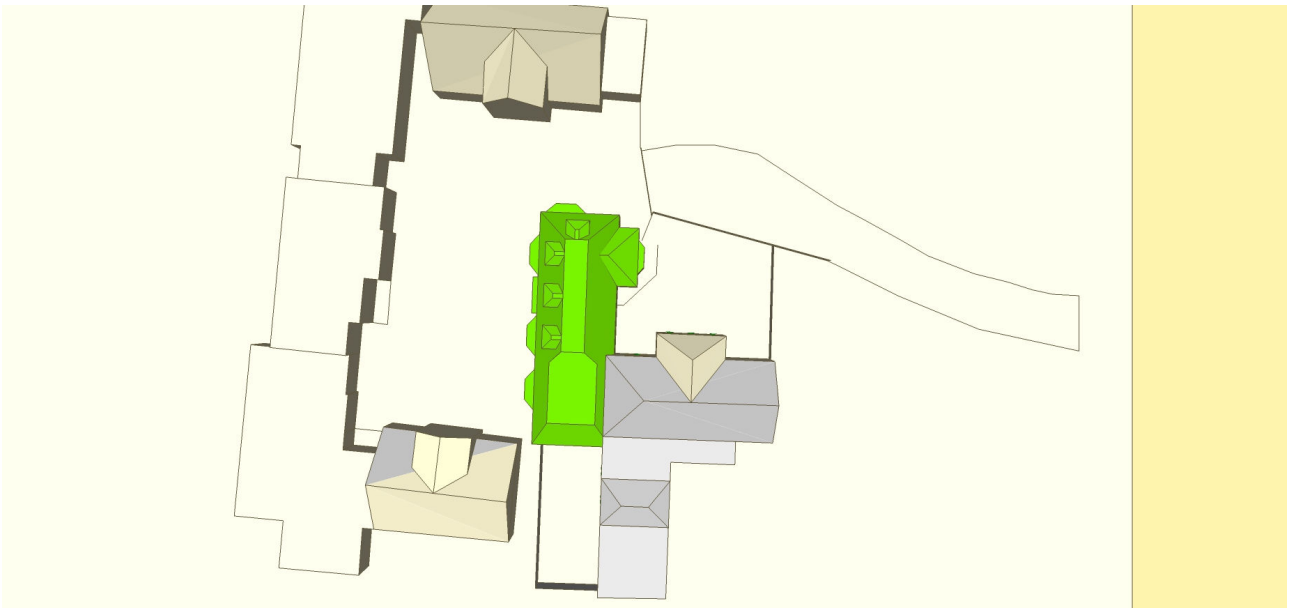


Figure 3.10: 3D model with new development from the Overhead



3.3. 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 are summarised in **Table 3.1**, with the Waldram Diagrams replicated in **Appendix 3**.

It can be seen from **Table 3.1** that all windows will continue to receive the recommended 27% VSC value and the proposed level of daylight will continue to be greater than 0.8 times the former. Therefore, at these windows, under the guidance contained within Appendix I of the BRE Report and replicated in **Table 2.1** of this report, the impact on these windows is considered *"negligible"*.

3.4. Sunlight Assessment

In order to assess the impact of a development on the levels of sunlight, the APSH is normally calculated for windows which face within 90° of due south and hence fall within the BRE Sunlight criteria. However, none of the six of the windows that are seen as of greatest concern fall within 90° of due south and therefore a detailed assessment of the impact on sunlight is not required and any impact on sunlight at any of the windows with the development in place will be considered *"negligible"* under Appendix I of the BRE Report.

Table 3.1: Daylight and Sunlight Impact Assessment

Address	Window No.	Sky Component			Annual Probable Sunlight Hours					
					Existing		Proposed		Ratio*	
		Existing	Proposed	Ratio*	Full Year	Winter Only	Full Year	Winter Only	Full Year	Winter Only
2 Inverforth Close	1001	30.88%	30.39%	0.98	Sunlight Assessment Not Required (North Facing)					
2 Inverforth Close	1002	29.37%	28.28%	0.96	Sunlight Assessment Not Required (North Facing)					
2 Inverforth Close	1003	28.65%	27.36%	0.95	Sunlight Assessment Not Required (North Facing)					
2 Inverforth Close	1004	35.57%	35.02%	0.98	Sunlight Assessment Not Required (North Facing)					
2 Inverforth Close	1005	36.35%	36.01%	0.99	Sunlight Assessment Not Required (North Facing)					
2 Inverforth Close	1006	36.95%	36.71%	0.99	Sunlight Assessment Not Required (North Facing)					

*= Ratio of proposed levels compared to existing levels

4. OVERSHADOWING IMPACT 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 March has been assessed. The 21st March is utilised because the day and night-time periods are of equal length. Furthermore, the 21st 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 ones garden or amenity space is important. **Appendix 4** shows the results of the overshadowing assessment at hourly intervals from 0700 hrs to 1700 hrs on the 21st 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 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 4** show that the outdoor amenity space of concern is to the front garden of 2 Inverforth Close. The shadow diagrams show that additional shading is created in the late afternoon between around 3pm to 4pm; however, the shadow diagrams also show that even with the proposed development, more than half of the garden will continue to receive direct sunlight for more than two hours on the 21st March; therefore, under the BRE Guidance, any impact upon this amenity space is considered insignificant.

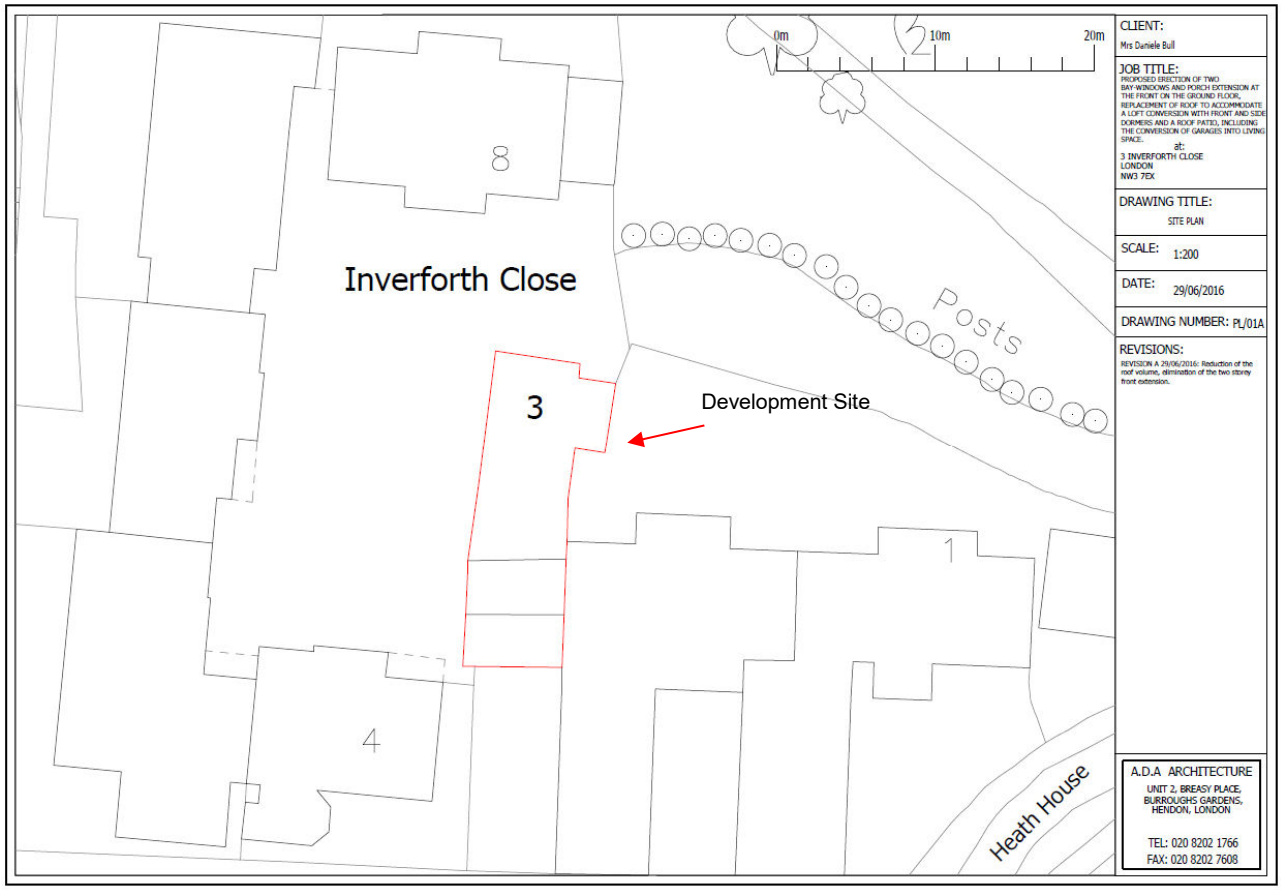
5. CONCLUSIONS

Calculations were conducted in accordance with the BRE Report in order to determine the extent to which the proposed redevelopment of 3 Inverforth Close will affect the levels of daylight and sunlight at adjacent properties.

The calculations have shown that generally the reductions in both daylight and sunlight to neighbouring properties will be fairly small and as such, under the BRE Guidance, the impacts are considered to be *"negligible"*. Therefore overall, it is recommended that daylight should not be a constraint upon the development of the site.

Appendix 1
Site Location Plan

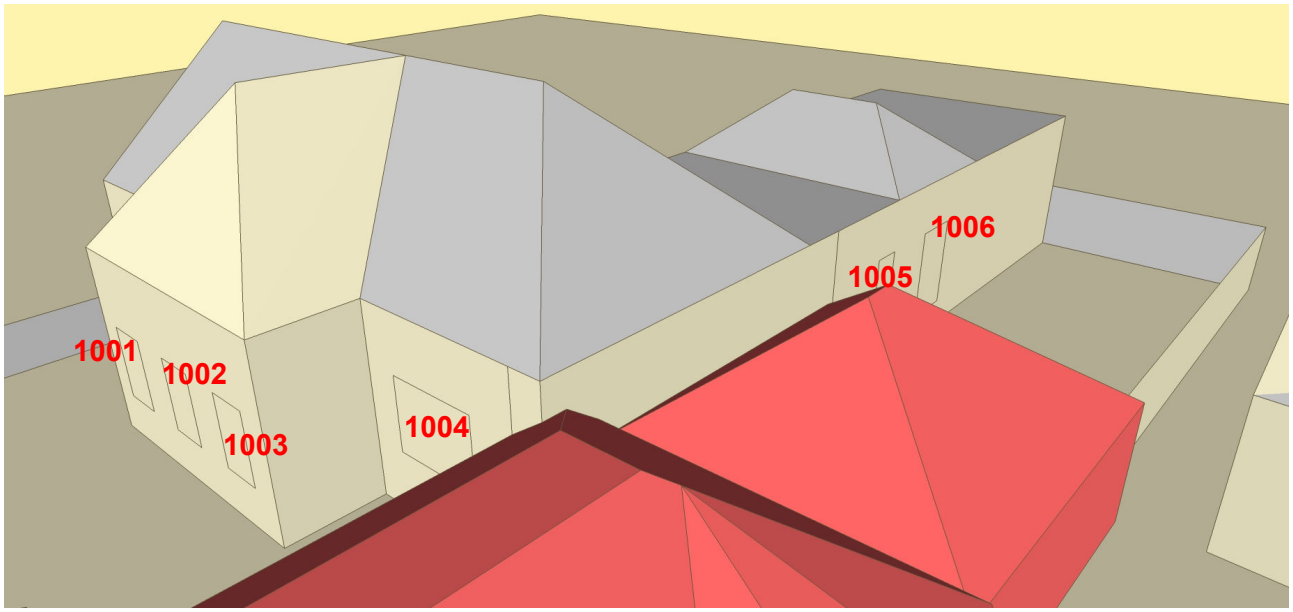
Appendix 1: Site Location Plan



Appendix 2
Window Schedules

Appendix 2: Window Schedules

2 Inverforth Close



Appendix 3
Waldram Diagrams

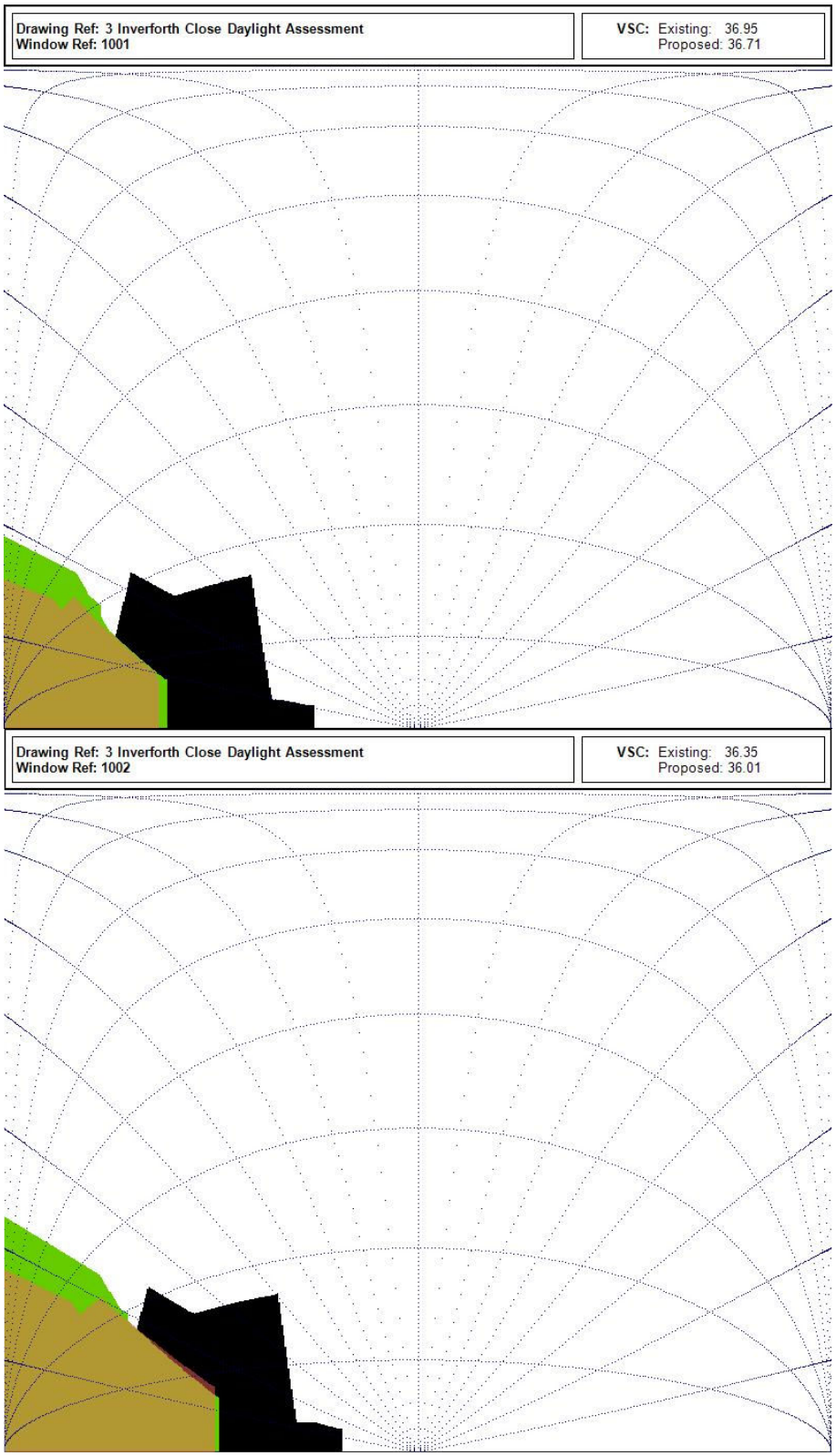
Appendix 3: Waldram Diagrams

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.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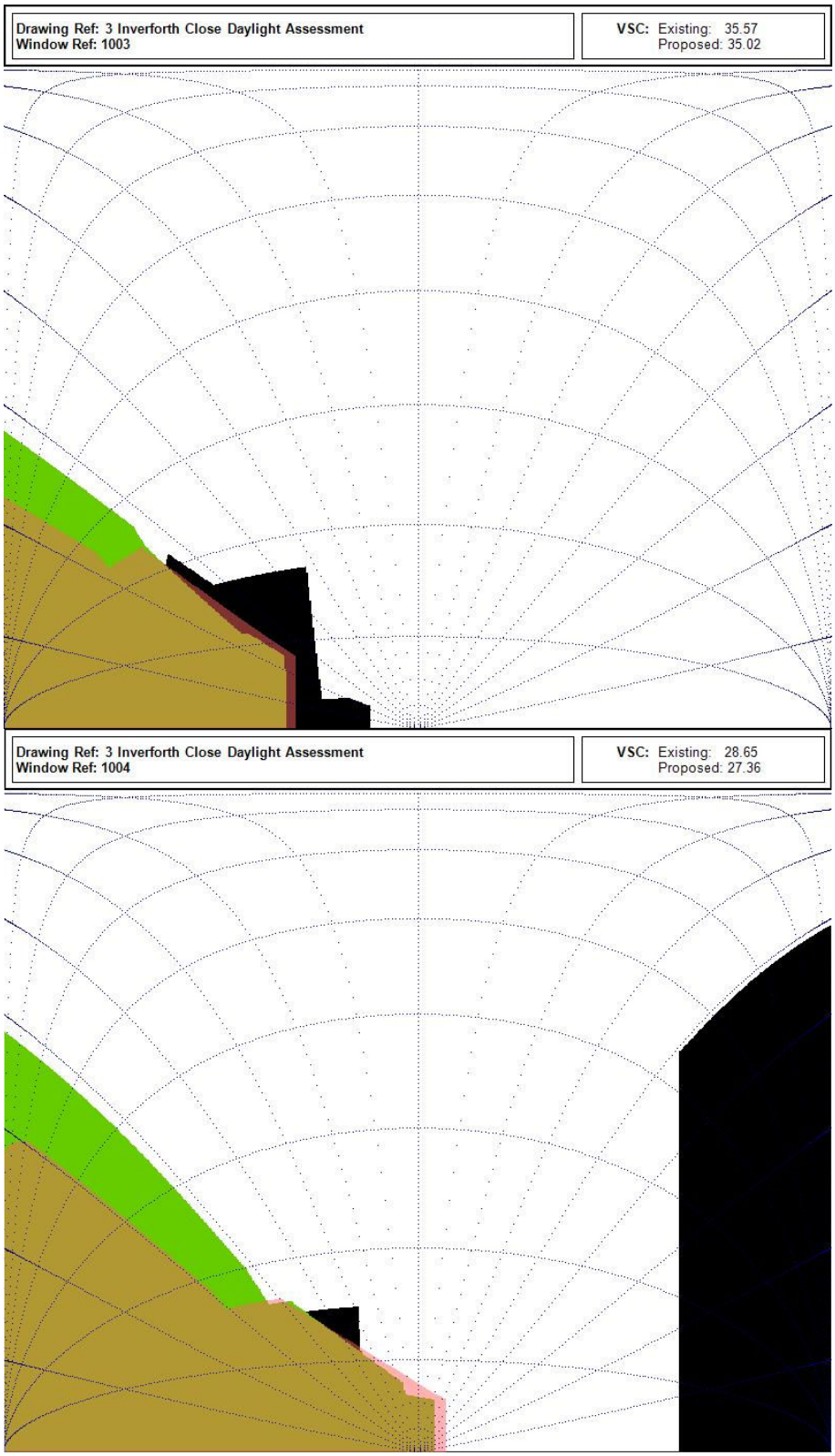
Window Ref: 1001
VSC: Existing: 36.95
Proposed: 36.71
Drawing Ref: 3 Inverforth Close Daylight Assessment
Window Ref: 1002
VSC: Existing: 36.35
Proposed: 36.01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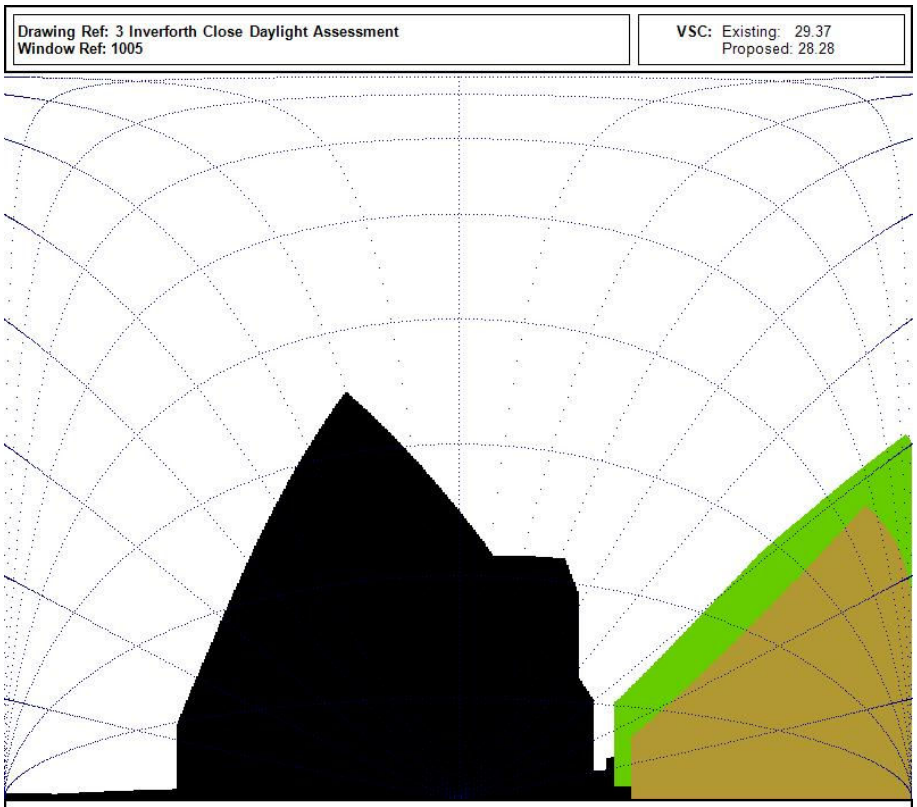
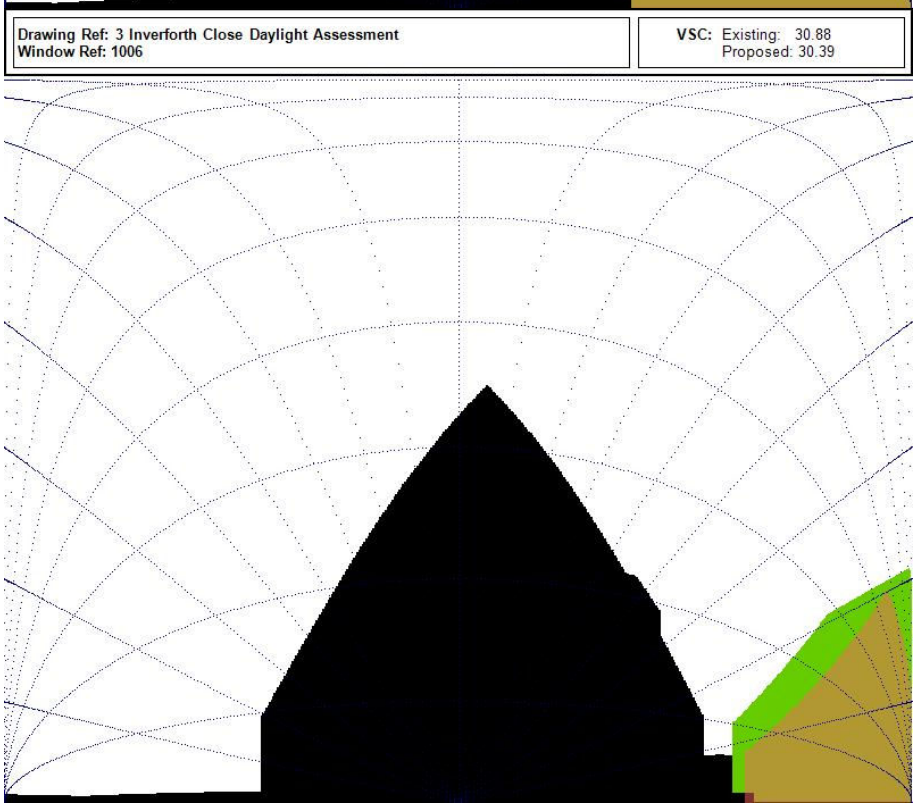
Window Ref: 1003
VSC: Existing: 35.57
Proposed: 35.02
Drawing Ref: 3 Inverforth Close Daylight Assessment
Window Ref: 1004
VSC: Existing: 28.65
Proposed: 27.36

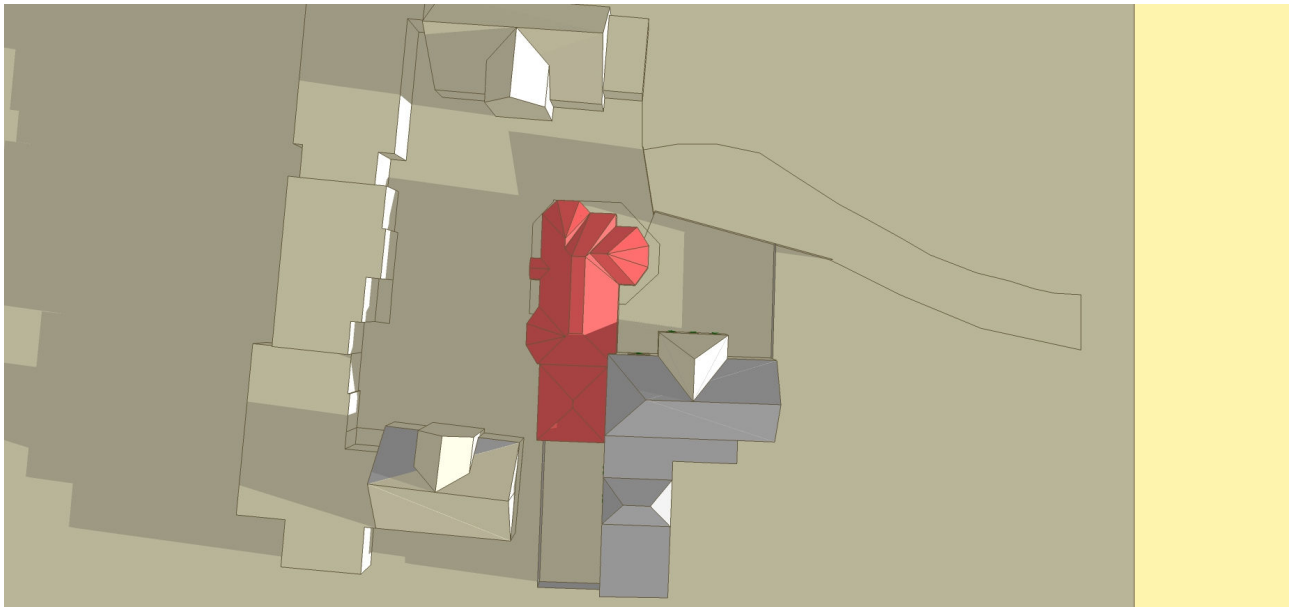

Drawing Ref: 3 Inverforth Close Daylight Assessment
Window Ref: 1005
VSC: Existing: 29.37
Proposed: 28.28


Drawing Ref: 3 Inverforth Close Daylight Assessment
Window Ref: 1006
VSC: Existing: 30.88
Proposed: 30.39

Appendix 4
Shadow Path Diagrams

Appendix 4: Shadow Path Diagrams

Existing Site Layout – 21st March – 0700 hrs



Proposed Site Layout – 21st March – 0700 hrs

Existing Site Layout – 21st March – 0800 hrs

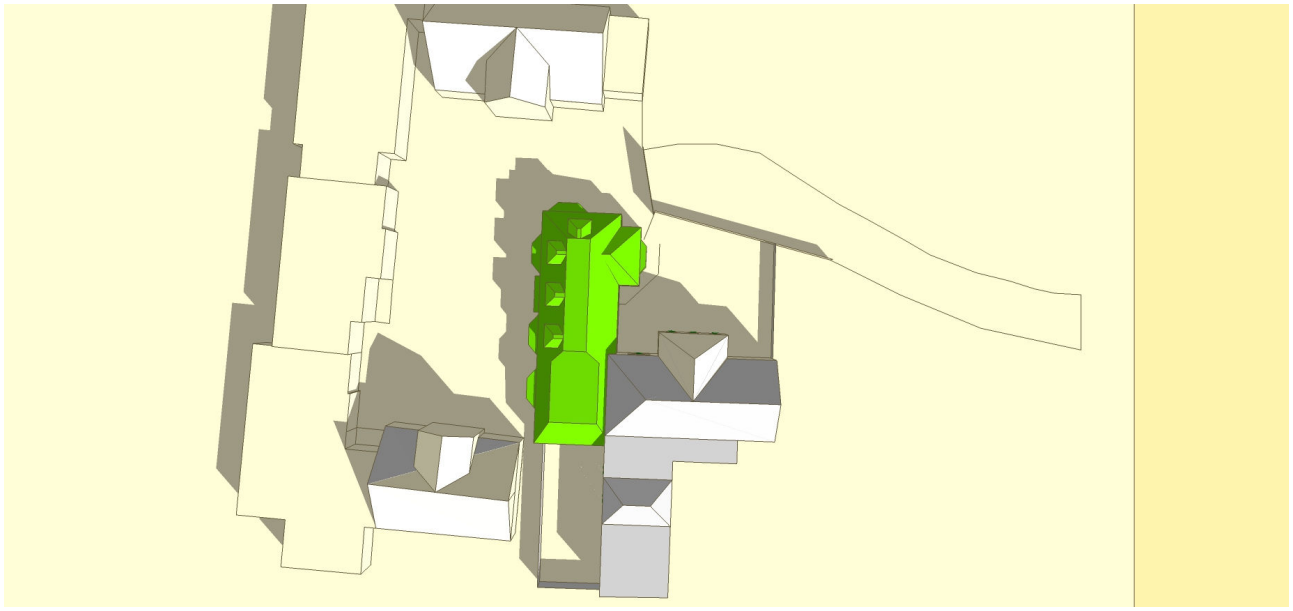
Proposed Site Layout – 21st March – 0800 hrs

Existing Site Layout – 21st March – 0900 hrs

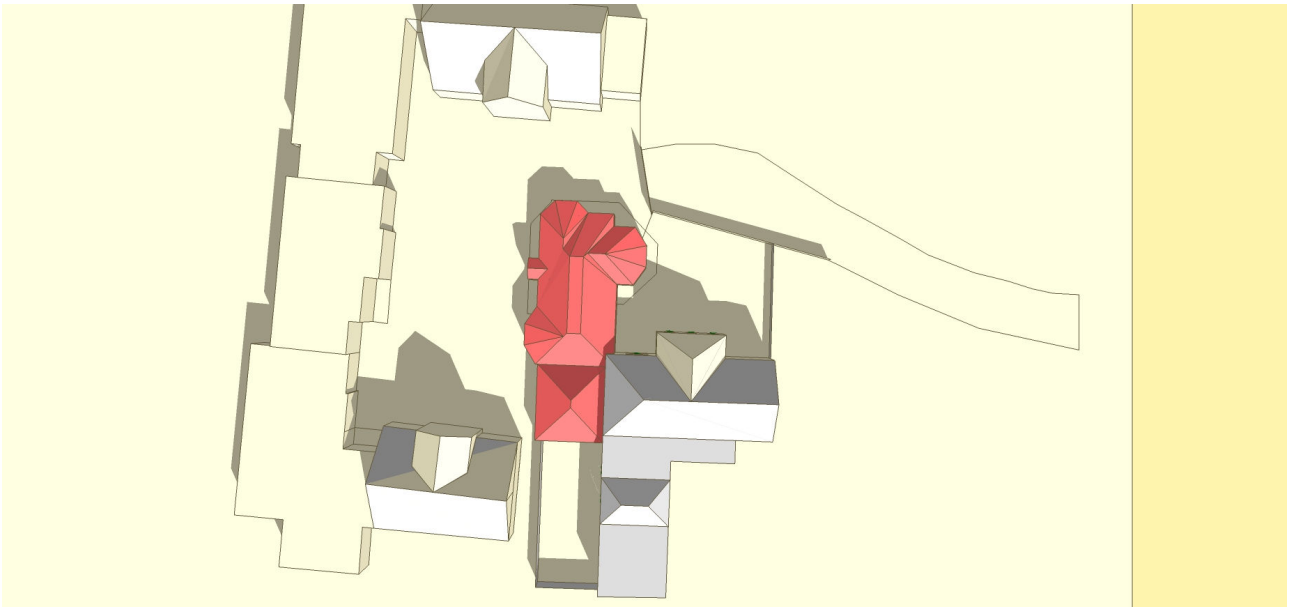
Proposed Site Layout – 21st March – 0900 hrs

Existing Site Layout – 21st March – 1000 hrs

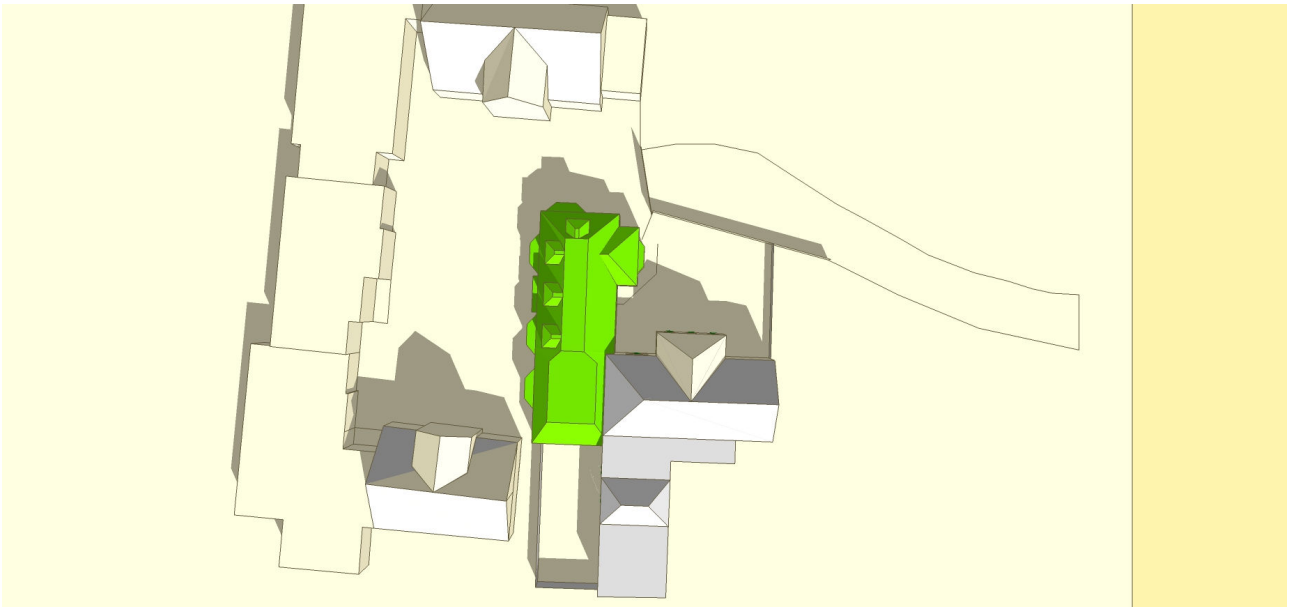
Proposed Site Layout – 21st March – 1000 hrs



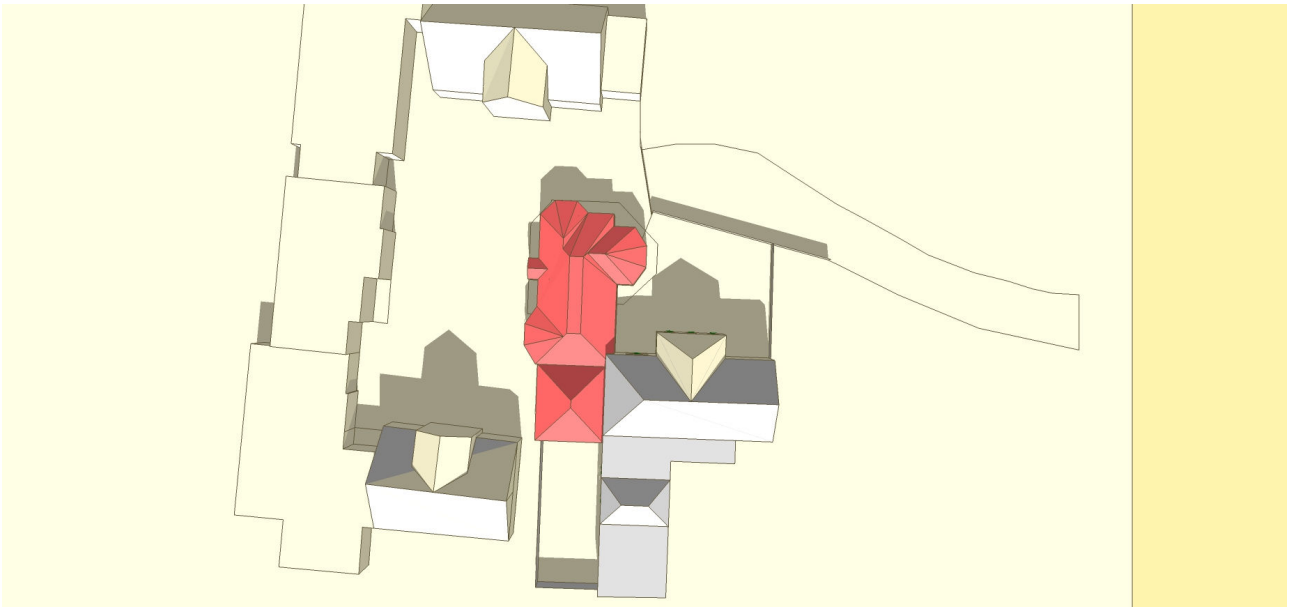
Existing Site Layout – 21st March – 1100 hrs



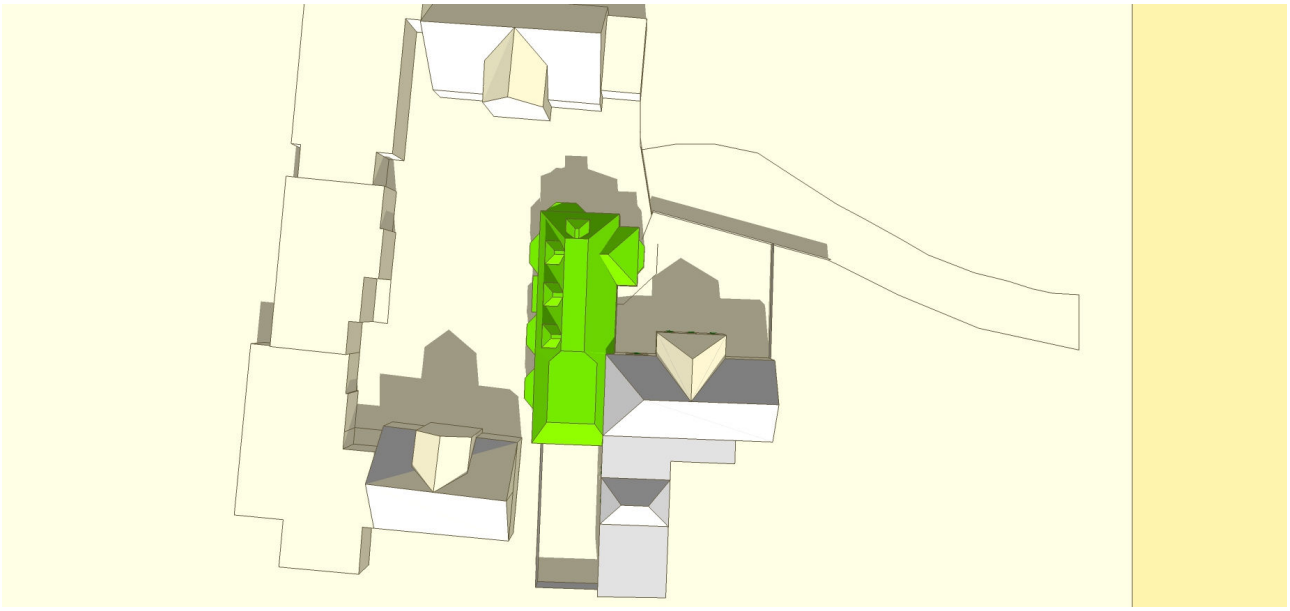
Proposed Site Layout – 21st March – 1100 hrs



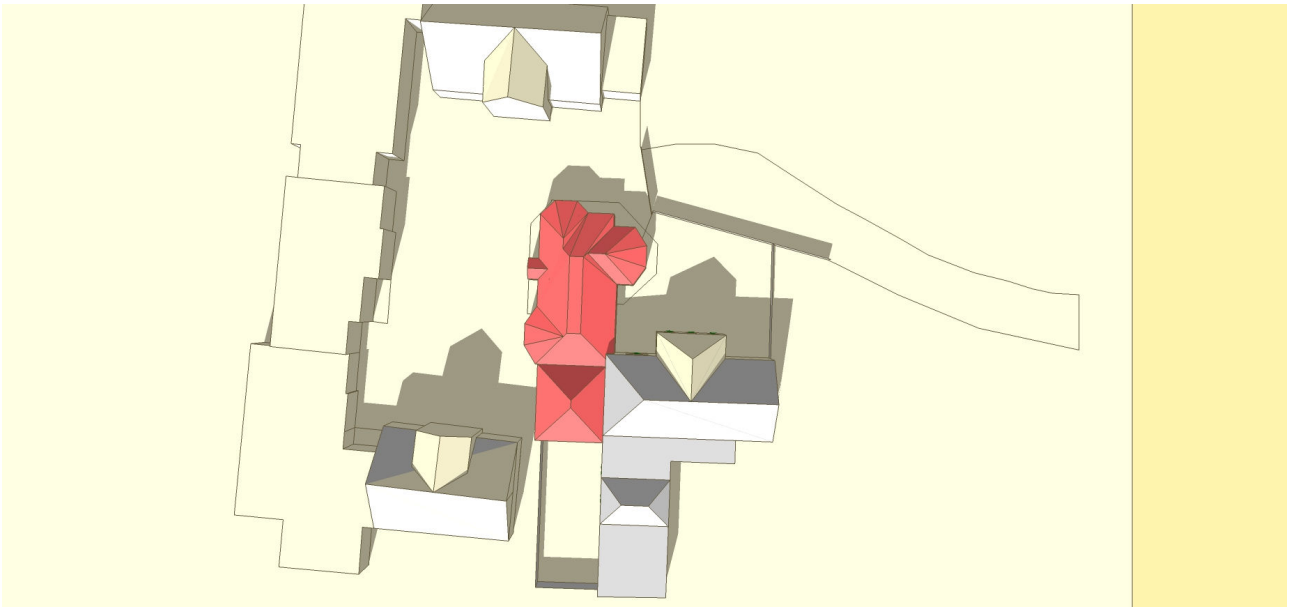
Existing Site Layout – 21st March – 1200 hrs



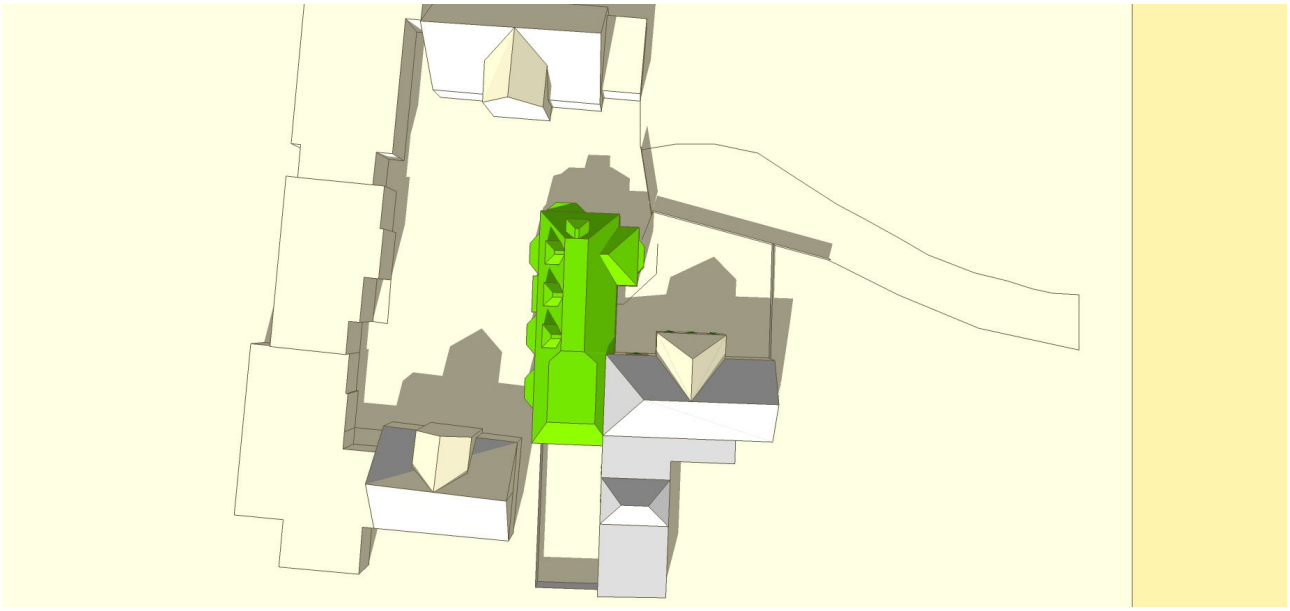
Proposed Site Layout – 21st March – 1200 hrs



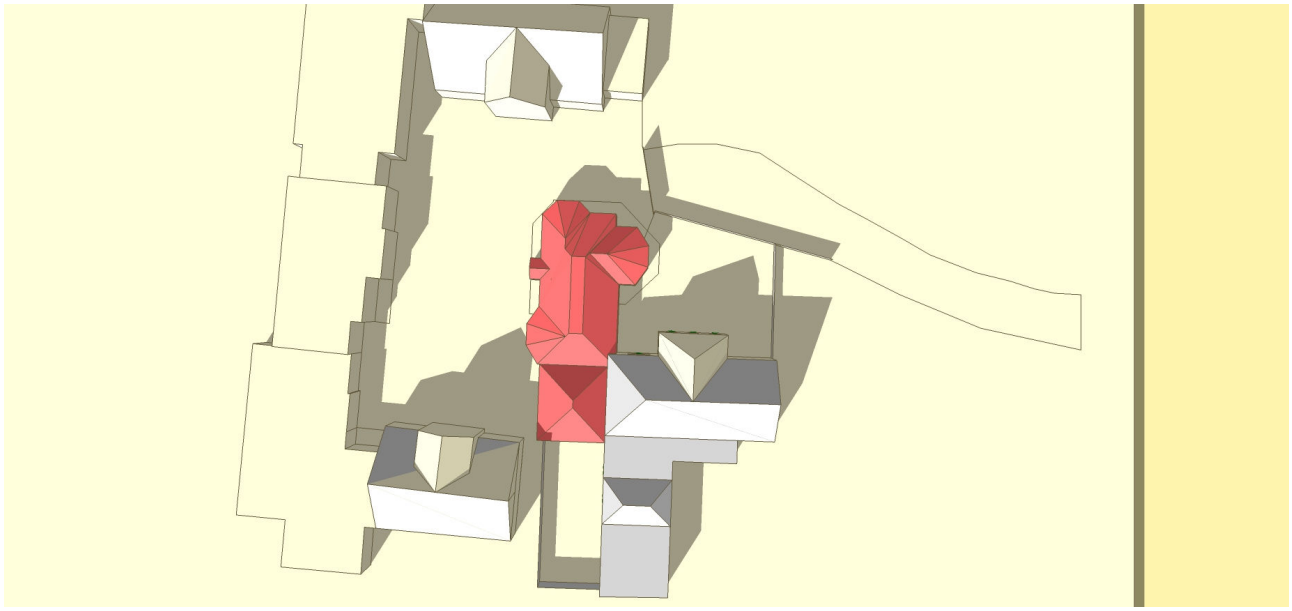
Existing Site Layout – 21st March – 1300 hrs



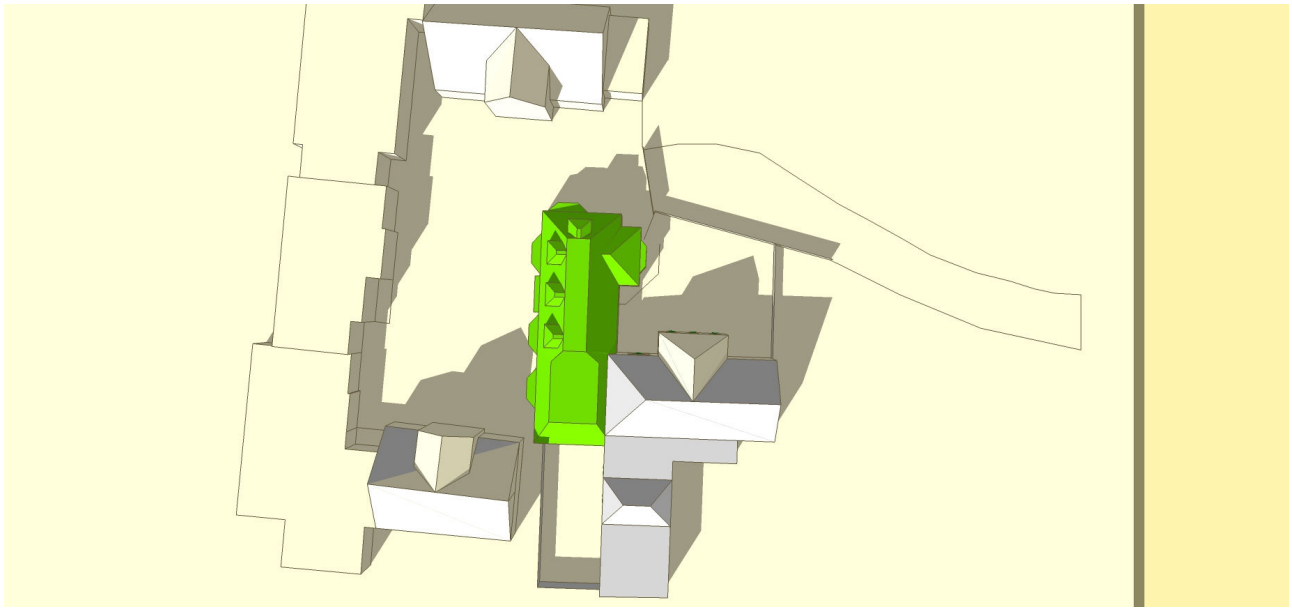
Proposed Site Layout – 21st March – 1300 hrs



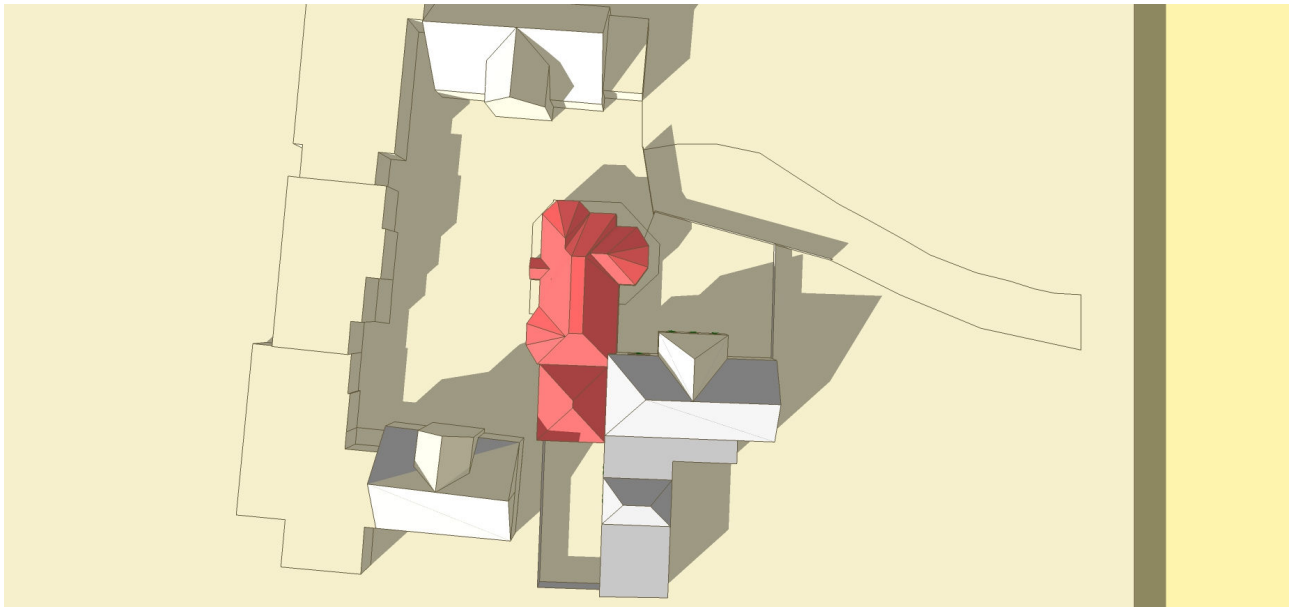
Existing Site Layout – 21st March – 1400 hrs



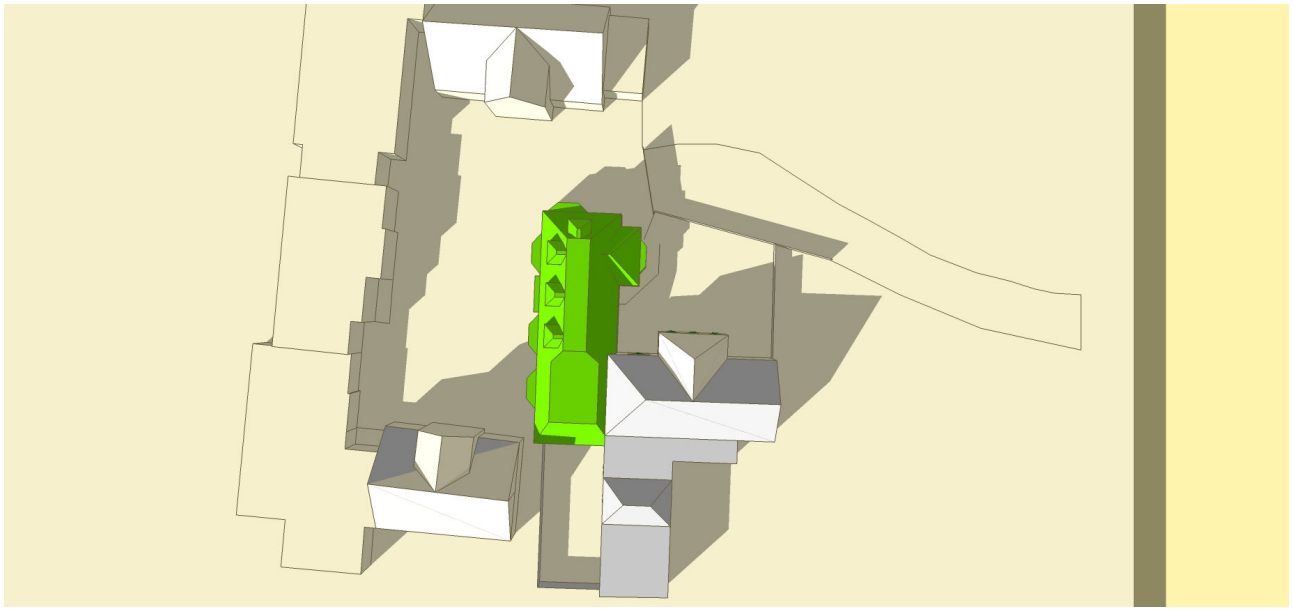
Proposed Site Layout – 21st March – 1400 hrs



Existing Site Layout – 21st March – 1500 hrs



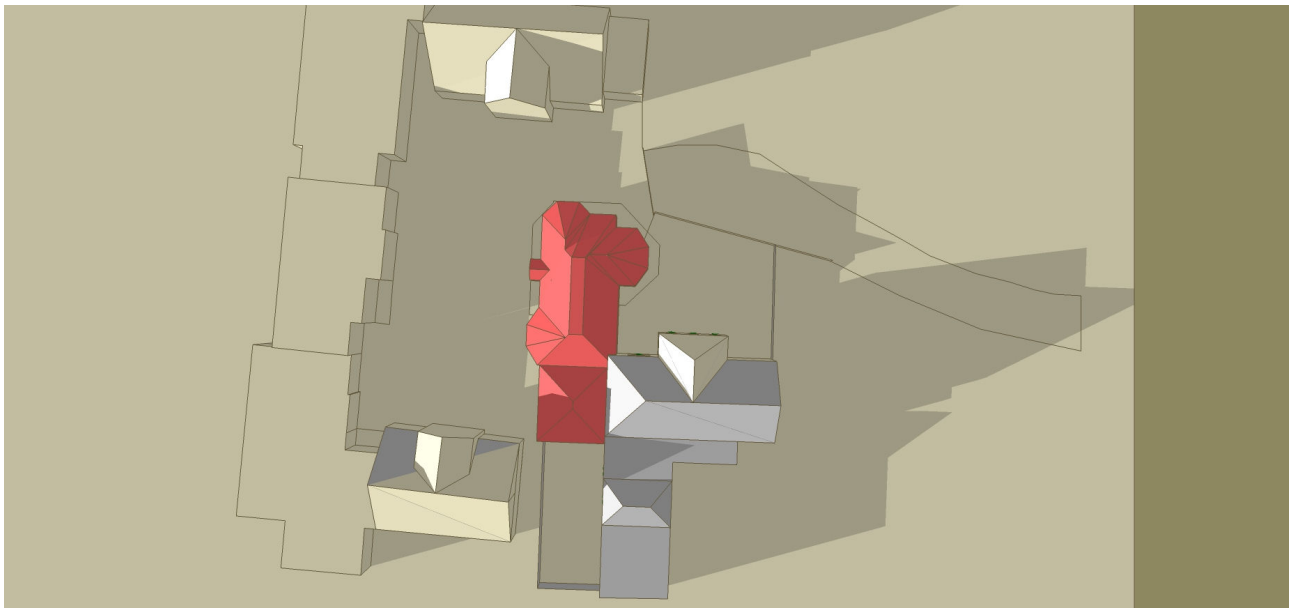
Proposed Site Layout – 21st March – 1500 hrs



Existing Site Layout – 21st March – 1600 hrs

Proposed Site Layout – 21st March – 1600 hrs

Existing Site Layout – 21st March – 1700 hrs



Proposed Site Layout – 21st March – 1700 hrs