DAYLIGHT, SUNLIGHT & OVERSHADOWING REPORT

FOR

138-140 Highgate Road, London, NW5 1PM

TURNER JOMAS & ASSOCIATES

Environmental & Civil Engineers & Transport Planners

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The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from whom it has been requested and that such information is accurate. Information obtained by SC has not been independently verified by SC, unless otherwise stated in the report.

The methodology adopted and the sources of information used by SC in providing its services are outlined in this report. The work described in this report was undertaken in **February 2018** and is based on the conditions encountered and the information available during the said period of time. The scope of this report and the services are accordingly factually limited by these circumstances.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

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1. EXECUTIVE SUMMARY

This report demonstrates the impact of the proposed development **on the surrounding buildings and amenity areas/gardens/open spaces**.

The results of the assessment show that in terms of:

¬ Daylight, this report demonstrates that the requisite VSC levels on each of the selected surfaces in case of the proposed development are unaffectedly received, hence the proposed development positively meets the VSC criteria.

BRE criteria is met: ☑

¬ Sunlight, this report demonstrates that the required duration of sunlight availability on all the selected surfaces of the surrounding buildings is achieved, thereby will not be affected by the proposed development.

BRE criteria is met: ☑

¬ Overshadowing, the existing amenity areas (i.e. A1, located at north-west of the proposed development; A2 at south east and A3 at north-east) will not be adversely affected by the proposed development.

BRE criteria is met: ☑

2. INTRODUCTION

This report has been prepared to support the planning application for the proposed development at **138-140 Highgate Road, London, NW5 1PM**. The proposed development comprises a total of three floors including lower ground floor, ground floor and upper ground floor.

The report assesses the daylight, sunlight and overshadowing effect of the proposed development on the surrounding buildings. The assessment is undertaken in accordance with ***"BRE 209 Digest: Site Layout Planning for Daylight and Sunlight – A Guide to Good Practice".***

The existing & proposed drawings (in AutoCAD format) of the project were provided by **Roni** on the **19th March 2018** and have been used in preparing this report. Please note that the elevations of few surrounding buildings have not been provided to carry out this assessment. Also, no information for the same buildings was found on the relevant planning portal. Hence, the size and location of the assessed windows have been assumed based on the provided pictures and Google/Bing map.

No.	Document Name	Format	Received Date
1	0067_140 Highgate Road_Planning_080318	dwg	19-02-2018
2	0067_140 Highgate Road_3d Model	dwg	19-02-2018
3	0067_Planning Application Drawings	pdf	19-02-2018
4	1061 - Highgate Road_Scaled and Rotated_Jan 2018	dwg	19-02-2018

Table 1 Document list used for assessment

The study has been undertaken by constructing a 3D IES model of the existing site, the proposed site and the surrounding buildings. This model analyses the daylight, sunlight and overshadowing impact of the new development on the affected buildings. All images used in this report are technical 3D models created using 2D AutoCAD Drawings (floor plans, sections and elevations) and is not 3D visualisation images.

3. PLANNING POLICY

Where the proposed development has the potential to negatively impact the existing levels of daylight or sunlight on neighbouring properties, a daylight and sunlight assessment must accompany the planning application.

The daylight and sunlight assessment include the necessary information to meet the criteria outlined in Building Research Establishment report **BRE 209: Site layout planning for daylight and sunlight (Second Edition 2011)**

It is important to note that the BRE report stresses that the document is provided for guidance purposes only and it is not intended to be interpreted as a strict and rigid set of rules. It also recommends that it may be appropriate to adopt a flexible approach and alternative target values in dealing with *"special circumstances"* for example *"in a historic city centre, or in an area with modern high-rise buildings, a higher degree of obstruction may be unavoidable if new developments are to match the height and proportions of existing buildings".* This is amplified by the following extracts from the introduction (p1, para. 6) and Section 2.2:

"The advice given here is not mandatory and this document 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 because natural lighting is only one of many factors in site layout design". (p1, para. 1.6)

"In special circumstances the Developer or Planning Authority may wish to use different target values". (p1, para. 1.6)

"Note that numerical values given here are purely advisory. Different criteria may be used, based upon the requirements for daylight in an area viewed against other site layout constraints. Another important issue is whether the existing building is itself a good neighbour, standing a reasonable distance from the boundary and taking no more than its fair share of light". (p7 para. 2.2.3)

The examples given in the report can be applied to any part of the country: suburban, urban and rural areas. The inflexible application of the target values given in the report may make reaching the BRE criteria difficult in a tight, urban environment where there is unlikely to be the same expectation of daylight and sunlight amenity as in a suburban or rural environment.

4. ASSESSMENT METHODOLOGY

4.1. General

When assessing any potential effects on the surrounding properties, the BRE guidelines suggest that only those windows that have a reasonable expectation of daylight or sunlight need be assessed. In particular the BRE guidelines at paragraph 2.2.2 state:

"The guidelines given here are intended for use for 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 analysed. The guidelines may also be applied to any existing non-domestic buildings where the occupants have a reasonable expectation of daylight; this would normally include schools, hospitals, hotels and hostels, small workshops and some offices."

Further to the above statement, it is considered that the vast majority of commercial properties do not have a reasonable expectation of daylight or sunlight. This is because they are generally designed to rely on electric lighting rather than natural daylight or sunlight.

This report assesses the potential impact of the proposed development in relation to daylight, sunlight and overshadowing on the surrounding building at 138-140 Highgate Road, London, NW5 1PM. Specifically, it takes into consideration the possible effect and influence that the new development would have on the property and on the amenity area.

Seventeen (S1-S17) are selected to conduct the study for both: to determine the amount of Vertical Sky Component (daylight levels) available on the surfaces and the duration for which the sunlight is being received by the surfaces. All the surfaces are selected in accordance with the guidelines provided in the document "Site layout planning for daylight and sunlight". For the locations of the selected surfaces, please refer section 7.4.2 in Appendix.

Three existing amenity areas (open gardens) are identified at north-west, south east and north-east of the proposed development for the overshadowing study. Section 7.4.2.in Appendix shows the location of the same.

The IES Virtual Environment modelling software utilised for the compilation of this report has been accredited by CIBSE and acknowledged by the BRE as a suitable software tool for undertaking daylight, sunlight and overshadowing assessments in accordance with the BRE Good Practice guidelines. The specific IES software modules utilised for this assessment are the following:

- ☐ ModelIT: enables you to create a 3D "Virtual Environment" model without CAD data, or alternatively allows you to create a 3D model from 2D CAD data. Interfaces with AutoCAD and Google Sketchup.

- ☐ Radiance: is a detailed 3D simulation tool designed to predict daylight and electric light levels, and the appearance of a space prior to construction. Vertical Sky Components (VSC) and Average Daylight Factors (ADF) can be simulated using Radiance.

- ☐ SunCast: produces visual, graphical and numerical information that can be used to explain to colleagues, clients and planning authorities how the sun impacts on and inside the building, and on the site.

If a property is considered to have a reasonable expectation of daylight or sunlight the following methodology to assess the impacts has been used.

4.2. BRE Digest 209: "Site layout planning for daylight and sunlight"

This section provides a brief description of the calculating methods for the daylight, sunlight and overshadowing to gardens and open spaces criteria presented in BRE Digest 209.

4.2.1. Daylight

The BRE guidelines *"Site layout planning for daylight and sunlight"* set out methods for assessing the daylight within section 2.

Vertical Sky Component (VSC)

The VSC method measures the amount of light available on the outside plane at the centre of a window, as a ratio (expressed as a percentage) of the amount of total unobstructed sky visible following the introduction of visible barriers such as buildings. The BRE guidelines at paragraph 2.2.6 and 2.2.7 state:

"Any reduction in the total amount of skylight can be calculated by finding the VSC at the centre of each main window." and "If the VSC, with the new development in place, is both less than 27% and less than 0.8 times its former value, occupants of the existing building will notice the reduction in the amount of skylight."

In the assessment, the reduction between existing and proposed situations is expressed as a percentage, where a change in daylight levels above 20% equates to a figure of less than 0.8 times its former value. Assessment points that do not meet the above criteria require further considerations to show the level of impact likely to be incurred.

No Sky Line (NSL)

The No Sky Line method of assessment is a test to indicate how good the distribution of daylight is in a room, taking into account external obstructions and divide those areas of the working plane that can receive direct skylight and those that cannot.

The BRE guidelines suggest that the daylight distribution test is carried out to existing surrounding properties when the internal room arrangements are known. To assess the impact of any reduction the BRE guidelines at paragraph 2.2.9 state:

"If, following construction of a new development, the no sky line moves so that the area of the existing room, which does receive direct skylight, is reduced to less than 0.8 times its former value this will be noticeable to the occupants, and more of the room will appear poorly lit."

4.2.2. Sunlight

The BRE guidelines "*Site layout planning for daylight and sunlight"* recommend that access to sunlight is assessed with a development proposal. Potential impacts on available sunlight were assessed using the BRE's Annual Probable Sunlight Hours (APSH) method. This method involves the forecasting of sunlight availability throughout the year and in the winter months, for the main window of each habitable room that faces within 90° of due south. The buildings surrounding the site that do not contain windows that face within 90° of due south has been excluded from the sunlight assessment.

The sunlight criteria given within the BRE guidelines have been used as a basis to assess the potential impacts of the development:

"A window may be adversely affected if a point at the centre of the window receives in the year less than 25% of the Annual Probable Sunlight Hours (APSH) including at least 5% of the APSH during the winter months (21st October to 21st March)".

Assessment points that do not meet the above criteria require further considerations to show the level of impact likely to be incurred. To provide a concise and comprehensive indicative analysis, the closest surfaces within the surrounding properties were analysed for both daylight and sunlight.

4.2.3. Overshadowing to gardens and open spaces

The BRE guidelines *"Site layout planning for daylight and sunlight"* provide sunlight availability criteria for open spaces. In particular it gives guidance for calculating any areas of open space that may be in permanent shadow on 21st March.

In summary the BRE document states:

"It is suggested that, for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21st March. If as a result of new development, an existing garden or amenity area does not meet these guidelines, and the area which can receive two hours of sun on 21st March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable".

For this assessment the IES "Virtual Environment" SunCast software package has been used. A 3D model of the proposed and surrounding buildings was first modelled and the sunlight-tracking feature within the software used to view the shadow results. The study illustrated the extent of the shadow on one key date:

- March 21 (Spring Equinox)

4.2.4 Criteria for assessing daylight, sunlight and overshadowing effects

The table 2 is a summary of the criteria to assess daylight, sunlight and overshadowing impacts as per the BRE 209 guidance. Based on that, Syntegra classifies the magnitude of effect according to the ratio.

Magnitude of effect	Criteria		
Beneficial	An improvement ratio > 1.3 of the baseline value		
Negligible	Daylight A VSC of 27% or above in the proposed scenario with adequate daylight distribution Or A reduction ratio <1.0 and ≥ 0.8 of the baseline value	Sunlight An APSH of 25%, of which 5% are in the winter months Or A reduction ratio <1.0 and ≥ 0.8 of the baseline value	Overshadowing 50% of any amenity areas receiving at least 2 hours of direct sunlight on 21st March Or A reduction ratio <1.0 and ≥ 0.8 of the baseline value
Minor adverse	A reduction ratio <0.8 and ≥ 0.7 of the baseline value		
Moderate adverse	A reduction ratio <0.7 and ≥ 0.6 of the baseline value		
Major adverse	A reduction ratio <0.6 of the baseline value		

Table 2 Criteria for assessing daylight, sunlight and overshadowing effects

5. ASSESSMENT

5.1. Daylight

The detailed daylight results and Waldram Diagrams are presented in section 7.5 in Appendix. The images shown in this section illustrates the amount of Vertical Sky Component (daylight levels) achieved by each of the selected surfaces, as well as shows the difference between the results of existing and proposed case.

A summary of results is displayed in the table 3 below:

Daylight assessment (Surrounding buildings)				
Building Target surface	**VSC (existing) >27%**	**VSC (proposed) >27%**	**Ratio**	**Result**
S1 – Coach House, Chetwynd Rd. - SW Elevation - GF	39.12	38.95	1.00	Negligible
S2 – Coach House, Chetwynd Rd. - SW Elevation - GF	39.02	38.50	0.99	Negligible
S3 – Grove End Lodge, College Lane - SW Elevation - GF	38.56	36.42	0.94	Negligible
S4 – Grove End Lodge, College Lane - SW Elevation - GF	38.72	36.06	0.93	Negligible
S5 – Denyer House, Highgate Rd. - SW Elevation - GF	38.20	30.63	0.80	Negligible
S6 - Denyer House, Highgate Rd. - SW Elevation - GF	37.99	30.48	0.80	Negligible
S7 – Denyer House, Highgate Rd. - SW Elevation - GF	36.02	28.77	0.80	Negligible
S8 – Denyer House, Highgate Rd. - SW Elevation - GF	38.40	31.12	0.81	Negligible
S9 – Denyer House, Highgate Rd. - SW Elevation - GF	38.45	32.14	0.84	Negligible
S10 – Denyer House, Highgate Rd. - SW Elevation - GF	38.52	33.45	0.87	Negligible
S11 – Denyer House, Highgate Rd. - SW Elevation - GF	38.58	34.82	0.90	Negligible
S12 – Denyer House, Highgate Rd. - SW Elevation - GF	38.63	35.84	0.93	Negligible
S13 – Denyer House, Highgate Rd. - SW Elevation - GF	38.68	36.64	0.95	Negligible
S14 – Denyer House, Highgate Rd. - SW Elevation - GF	38.72	37.25	0.96	Negligible
S15 – Denyer House, Highgate Rd. - SW Elevation - GF	38.76	37.67	0.97	Negligible
S16 – Denyer House, Highgate Rd. - SW Elevation - GF	38.79	37.98	0.98	Negligible
S17 – Denyer House, Highgate Rd. - SW Elevation - GF	38.83	38.22	0.98	Negligible

Table 3 Daylight results (the location of surfaces can be found in section 7.5)

As shown in the table above, the requisite VSC levels on each of the selected surfaces are unaffectedly received in case of the proposed development, hence the proposed development positively meets the VSC criteria.

✓ **The slight loss in the VSC levels for the surfaces with negligible impact is not a concern as the VSC levels achieved in the case of proposed development are either above 27% or more than 0.8 times their former values. This reveals that adequate amount of VSC levels are attained.**

→ **In terms of VSC, the proposed scheme is considered acceptable.**

It should be noted that the values provided in the BRE 209 are for guidance purposes only.

5.2. Sunlight

Where necessary (as defined in the Assessment Methodology section of this report) the Annual Probable Sunlight Hours (APSH) tests are undertaken with the results and Waldram diagrams presented in section 7.6 in the appendix.

The table below indicates the amount of time during which the sunlight is expected to be received by the selected surfaces. The study is done for both the existing and proposed case scenarios.

A summary of results is displayed in the table below:

Sunlight assessment (Surrounding buildings)						
Building Target surface	Total APSH >25%		Winter APSH >5%		Ratio Annual	Result
	Existing	Proposed	Existing	Proposed		
S1 – Coach House, Chetwynd Rd. - SW Elevation - GF	66	66	24	24	1.00	Negligible
S2 – Coach House, Chetwynd Rd. - SW Elevation - GF	66	66	24	24	1.00	Negligible
S3 – Grove End Lodge, College Lane - SW Elevation - GF	68	67	24	23	0.99	Negligible
S4 – Grove End Lodge, College Lane - SW Elevation - GF	68	67	24	23	0.99	Negligible
S5 – Denyer House, Highgate Rd. - SW Elevation - GF	67	57	24	16	0.85	Negligible
S6 - Denyer House, Highgate Rd. - SW Elevation - GF	64	53	23	15	0.83	Negligible
S7 – Denyer House, Highgate Rd. - SW Elevation - GF	56	45	19	11	0.80	Negligible

Sunlight assessment (Surrounding buildings)						
Building Target surface	Total APSH >25%		Winter APSH >5%		Ratio Annual	Result
	Existing	Proposed	Existing	Proposed		
S8 – Denyer House, Highgate Rd. - SW Elevation - GF	69	59	25	18	0.86	Negligible
S9 – Denyer House, Highgate Rd. - SW Elevation - GF	69	60	25	19	0.87	Negligible
S10 – Denyer House, Highgate Rd. - SW Elevation - GF	69	61	25	21	0.88	Negligible
S11 – Denyer House, Highgate Rd. - SW Elevation - GF	69	63	25	23	0.91	Negligible
S12 – Denyer House, Highgate Rd. - SW Elevation - GF	69	64	25	23	0.93	Negligible
S13 – Denyer House, Highgate Rd. - SW Elevation - GF	69	66	25	25	0.96	Negligible
S14 – Denyer House, Highgate Rd. - SW Elevation - GF	69	66	25	25	0.96	Negligible
S15 – Denyer House, Highgate Rd. - SW Elevation - GF	69	67	25	25	0.97	Negligible
S16 – Denyer House, Highgate Rd. - SW Elevation - GF	69	67	25	25	0.97	Negligible
S17 – Denyer House, Highgate Rd. - SW Elevation - GF	69	68	25	25	0.99	Negligible

Table 4 Sunlight results (the location of surfaces can be found in section 7.6

The above analysis reveals that the required duration of sunlight availability on all the selected surfaces of the surrounding buildings is achieved, thereby will not be affected by the proposed development.

✓ **The slight loss in the APSH values for the surfaces with negligible impact is not a concern as the total APSH values being received by the surfaces in the case of proposed development is either >25%, of which more than 5% is in winter months or more than 0.8 times their former values, meaning satisfactory amount of sunlight is achieved.**

→ **In terms of sunlight the proposed scheme is considered acceptable.**

It should be noted that the values provided in the BRE 209 are for guidance purposes only.

5.3. Overshadowing to gardens and open spaces

The following results represent the cumulative overshadowing impacts of the proposed development. As identified from the AutoCAD drawings and/or site plan**, tree existing amenity areas (open gardens) located on the west side of the Armada House (for location on the site plan, please refer section 7.4.2).** In accordance with the BRE guidelines, overshadowing is assessed during times of the day where the sun's altitude is above 10º (from 7:30am to 5:00pm).

"It is suggested that, for it to appear adequately sunlit throughout the year, at least half of a garden or amenity area should receive at least two hours of sunlight on 21st March. If as a result of new development, an existing garden or amenity area does not meet these guidelines, and the area which can receive two hours of sun on 21st March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable".

The pictures showing the overshadowing impact are indicated in section 7.8 of the Appendix.

A summary of results is displayed in the table below:

Overshadowing assessment from 7.30am to 5.00pm % of area receiving sunlight on 21st March				
Amenity area	**Existing (%)**	**Proposed (%)**	**Ratio**	**Result**
A1 – Open Garden at Highgate Road	72.71	71.75	0.99	Negligible
A2 – Open Garden at Highgate Road	78.58	78.48	1.00	Negligible
A3 – Open Garden at Highgate Road	52.09	42.08	0.81	Negligible

Table 5 Overshadowing results (the location of surfaces can be found in section 7.7)

As shown in the table above, all the amenity areas (A-A3) are unaffected by the proposed development.

- ✓ **The slight loss in sunlight for the amenity areas with negligible impact is not a concern as the sunlight being received by 50% of the amenity areas is either for more than 2 hours on 21st March or a ratio (existing/proposed building) of more than 0.8 is attained. This reveals that reasonable amount of sunlight is achieved. Please refer section 7.7 in appendix to see the hourly overshadowing data for 21st March.**

  → **In terms of sunlight the proposed scheme is considered acceptable.**

It should be noted that the values provided in the BRE 209 are for guidance purposes only.

6. CONCLUSION

6.1. Daylight

This report demonstrates that the requisite VSC levels on each of the selected surfaces in case of the proposed development are unaffectedly received, hence the proposed development positively meets the VSC criteria.

BRE criteria is met: ☑

6.2. Sunlight

This report demonstrates that the required duration of sunlight availability on all the selected surfaces of the surrounding buildings is achieved, thereby will not be affected by the proposed development.

BRE criteria is met: ☑

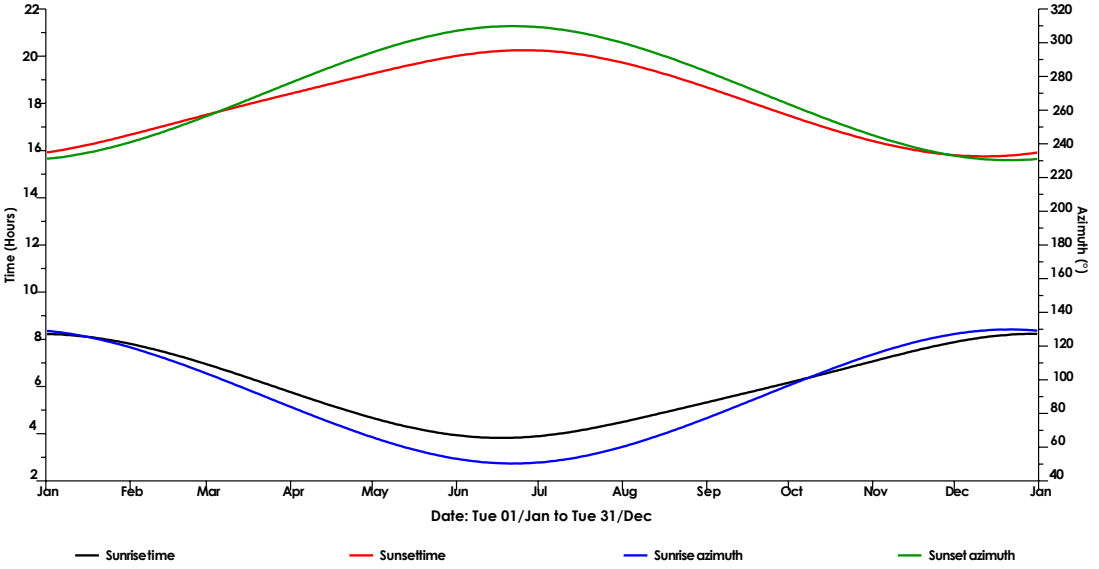
6.3. Overshadowing

This report demonstrates that the existing amenity areas (i.e. A1, located at north-west of the proposed development; A2 at south east and A3 at north-east will not be adversely affected by the proposed development.

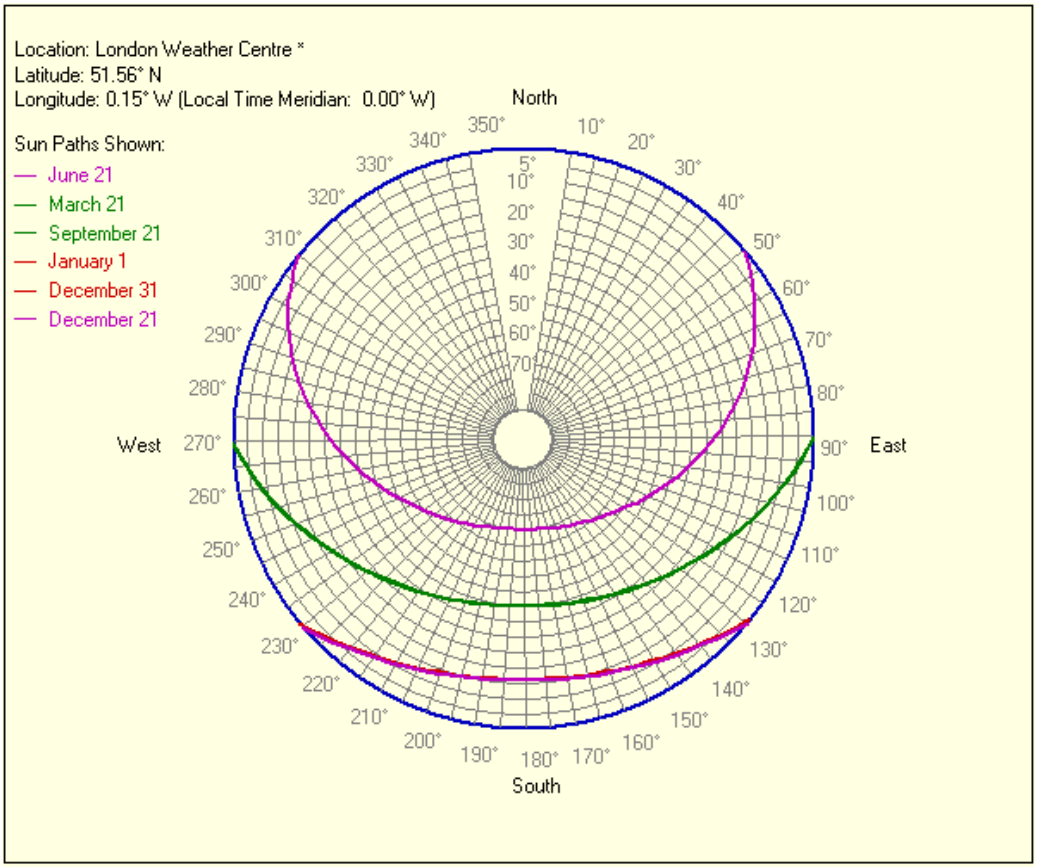
BRE criteria is met: ☑

7. APPENDIX

7.1. Sunrise and sunset time

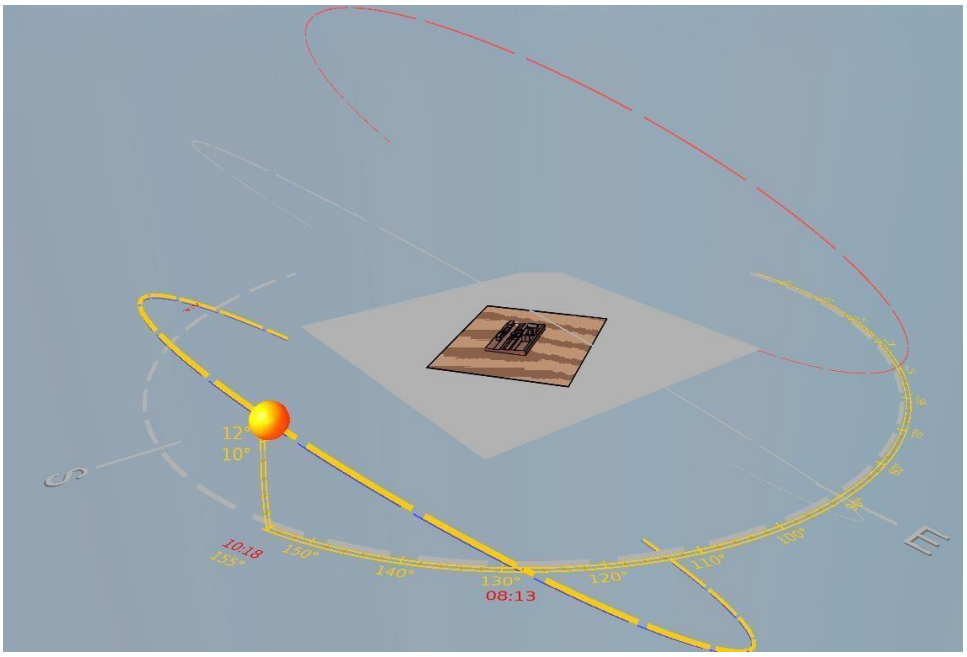


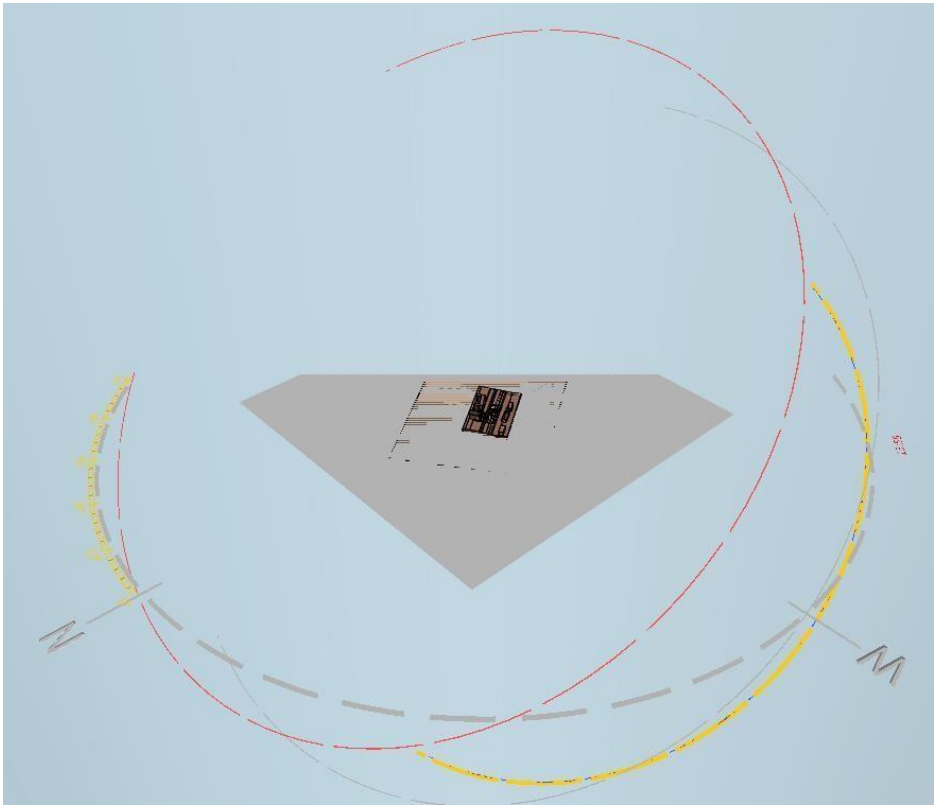
7.2. Sun path Diagram



7.3. Sun path Diagram with Solstice and Equinox

- The red line represents the sun's path during June.
- The yellow line represents the sun's path during March/September.
- The blue line represents the sun's path during December.

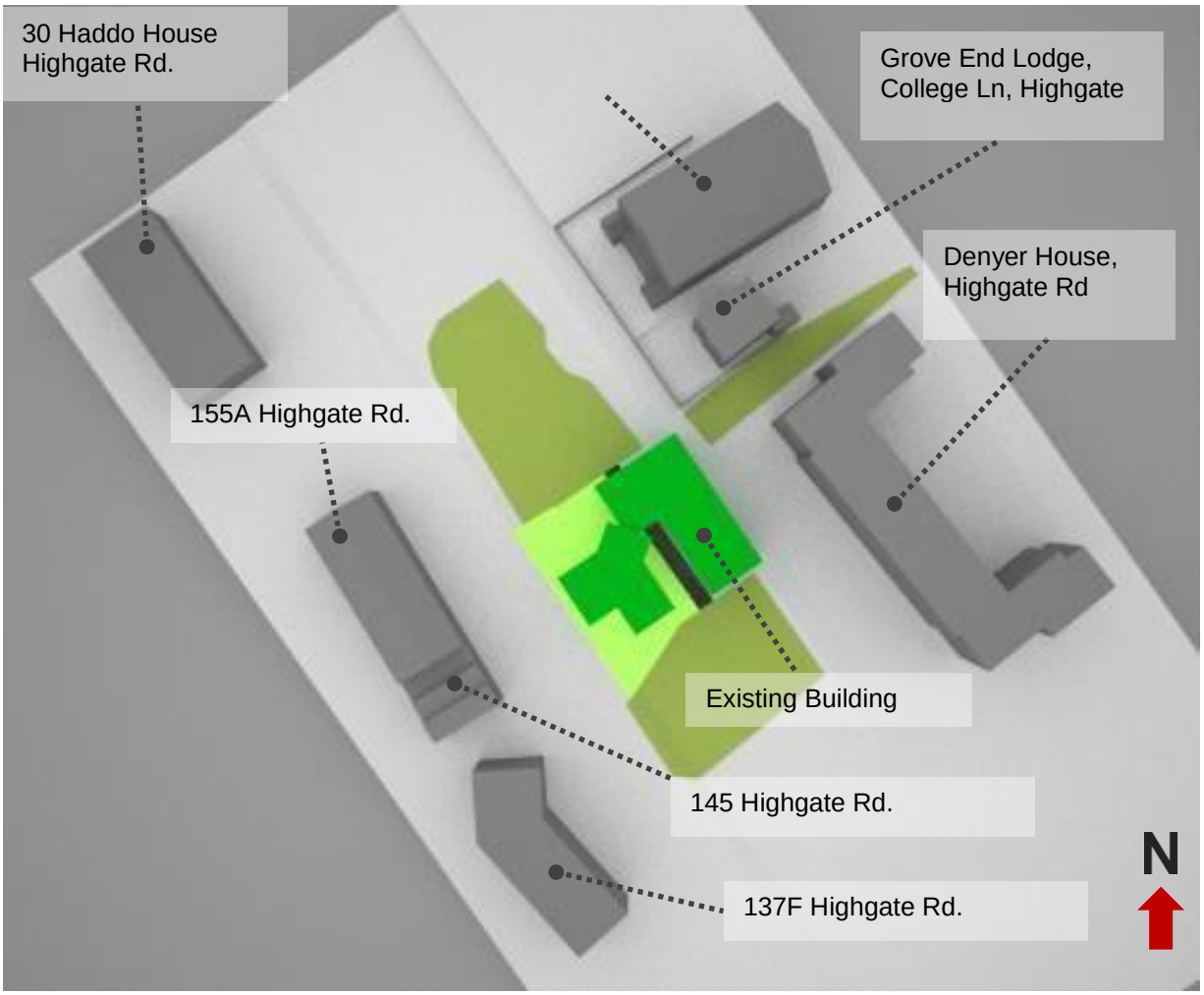




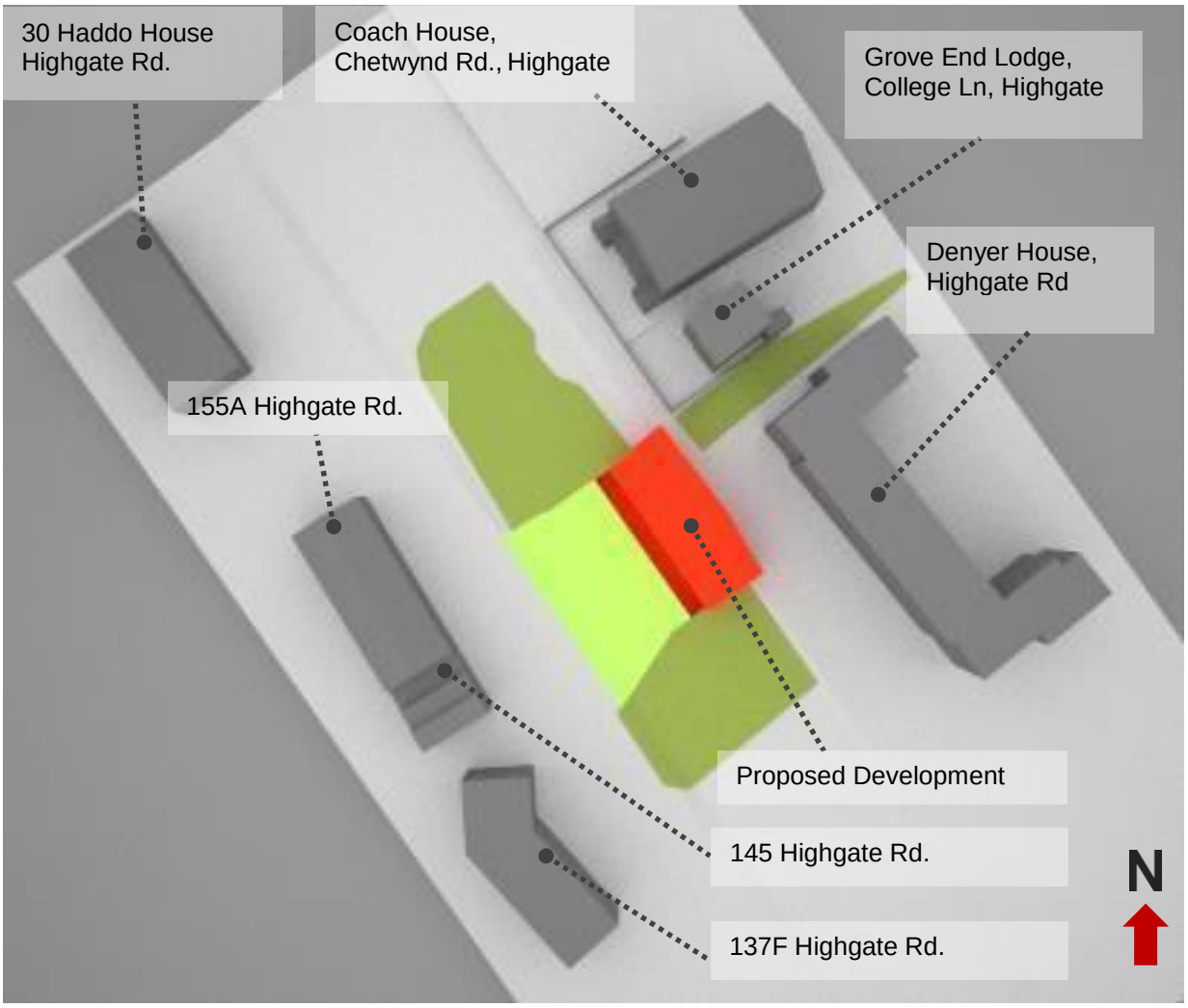
7.4. Site plan and location

Location	138-140 Highgate Road, Highgate, London NW5 1PB
Latitude (°)	51.56 N
Longitude (°)	0.14 W

7.4.1 Site Plans

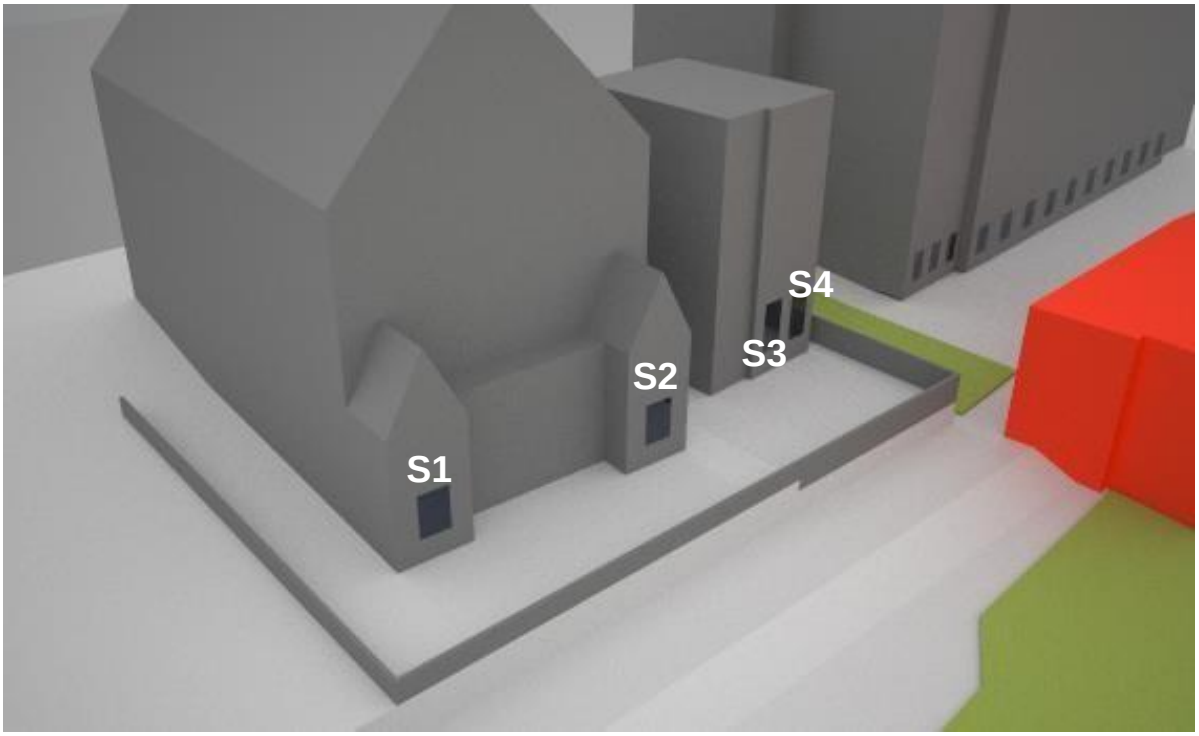


Existing site layout

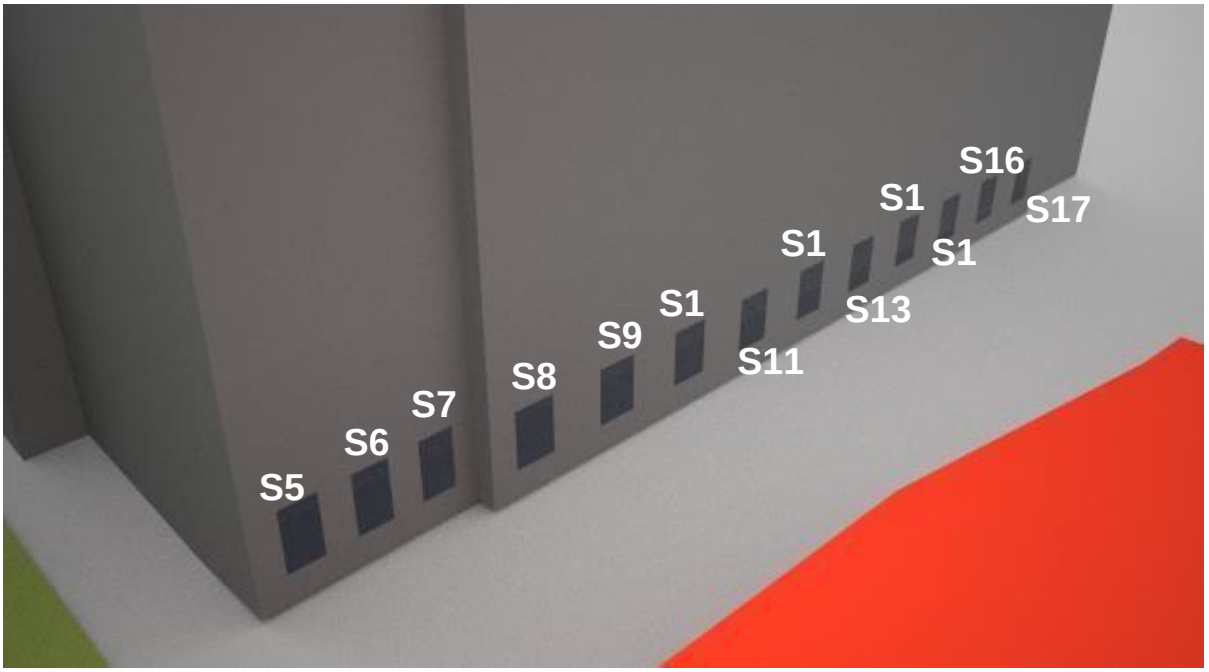


Proposed site layout

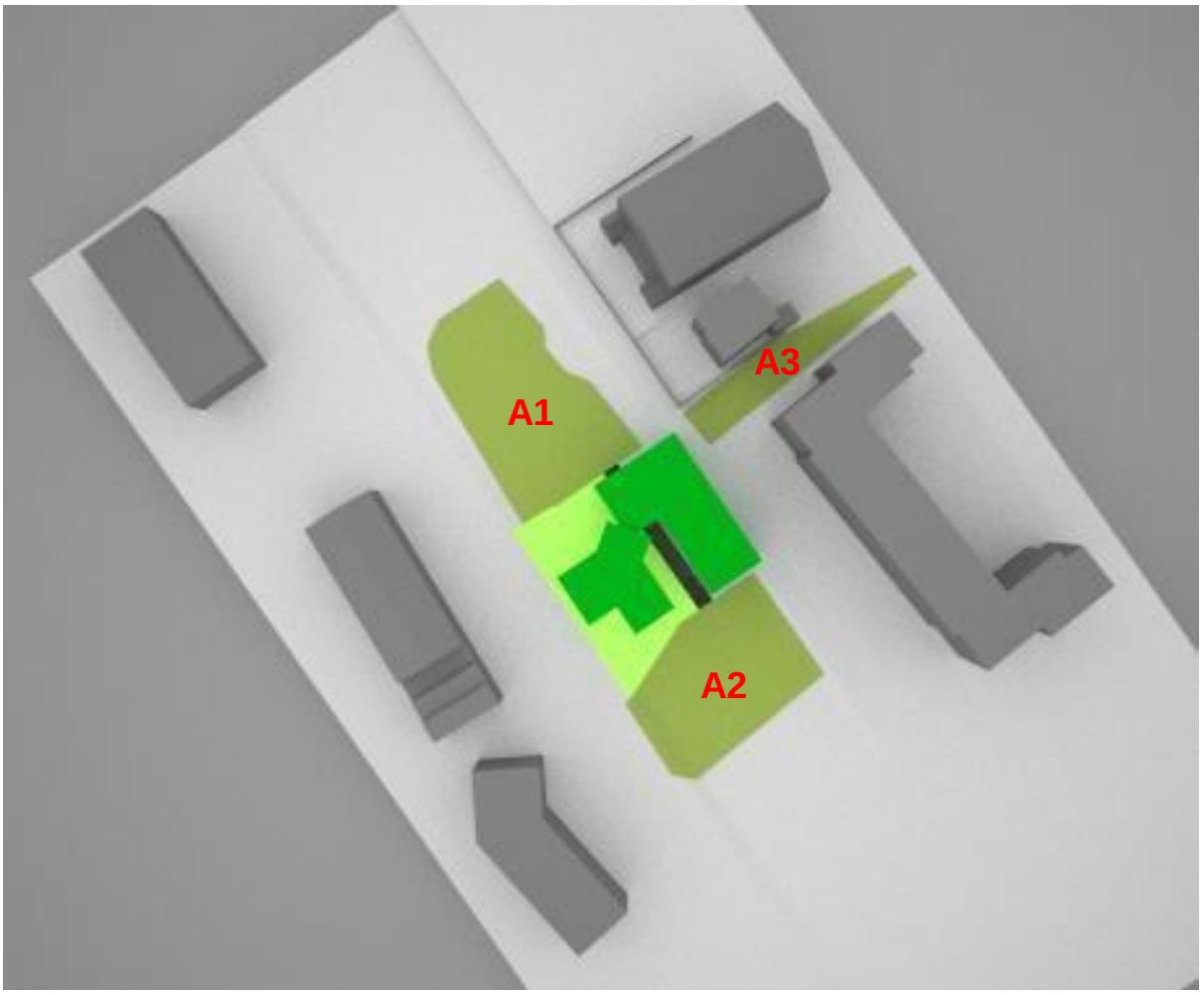
7.4.2 Location of Assessed Surfaces and Amenities



Coach House, Chetwynd Rd. and Grove End Lodge, College Lane. (South West Elevation)

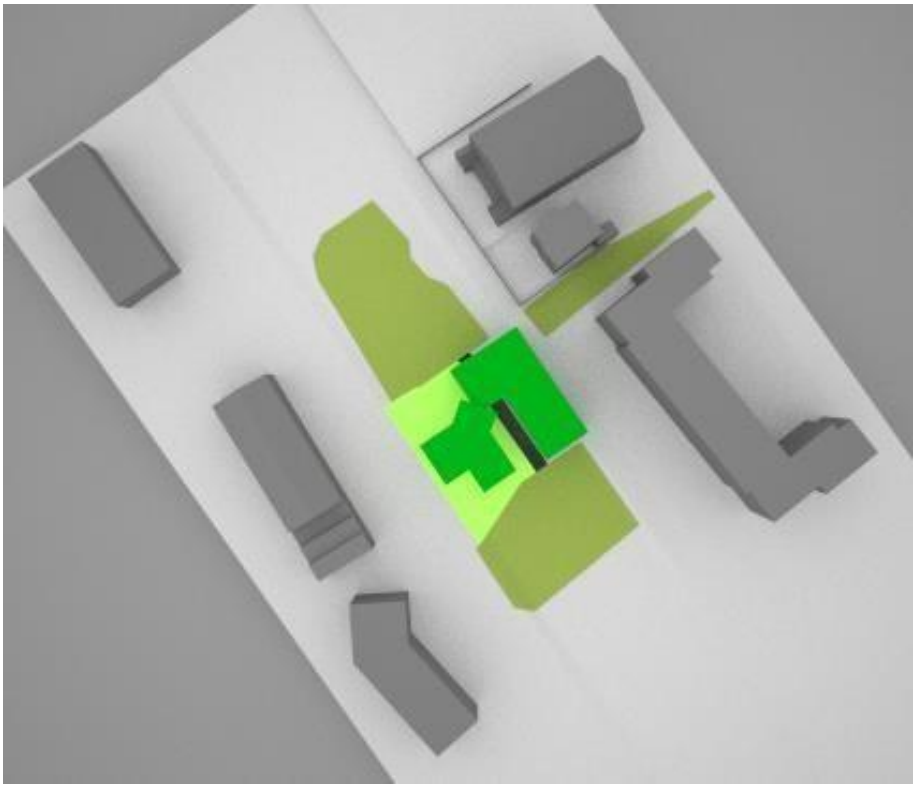


Denver House, Highgate Rd. (South West Elevation)

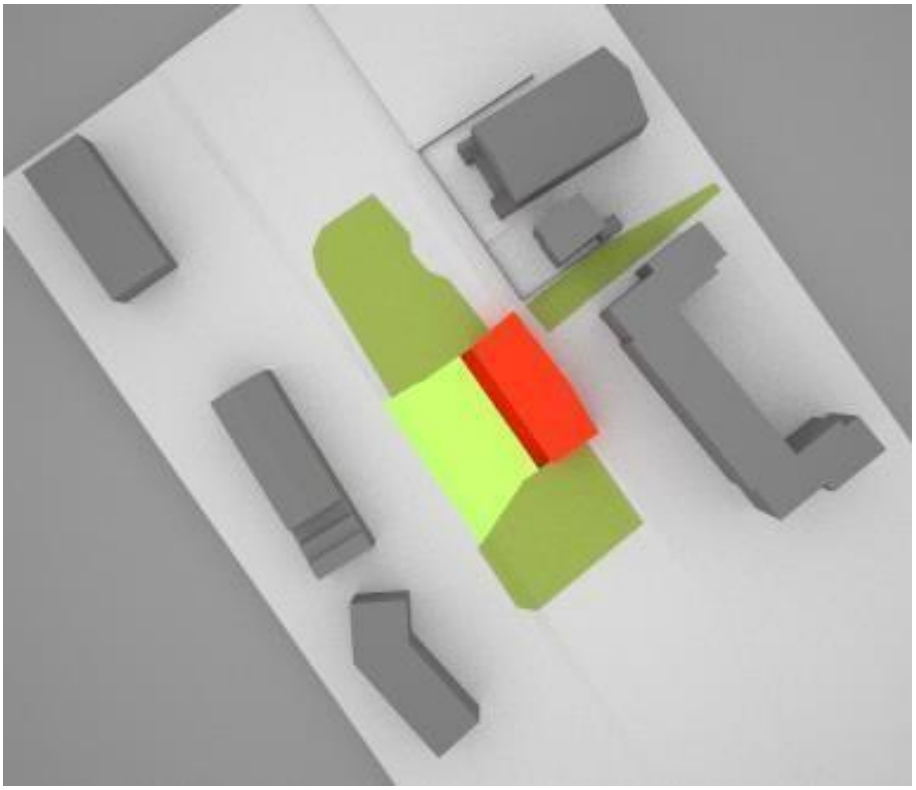


A1 – Open Garden at Highgate Rd.

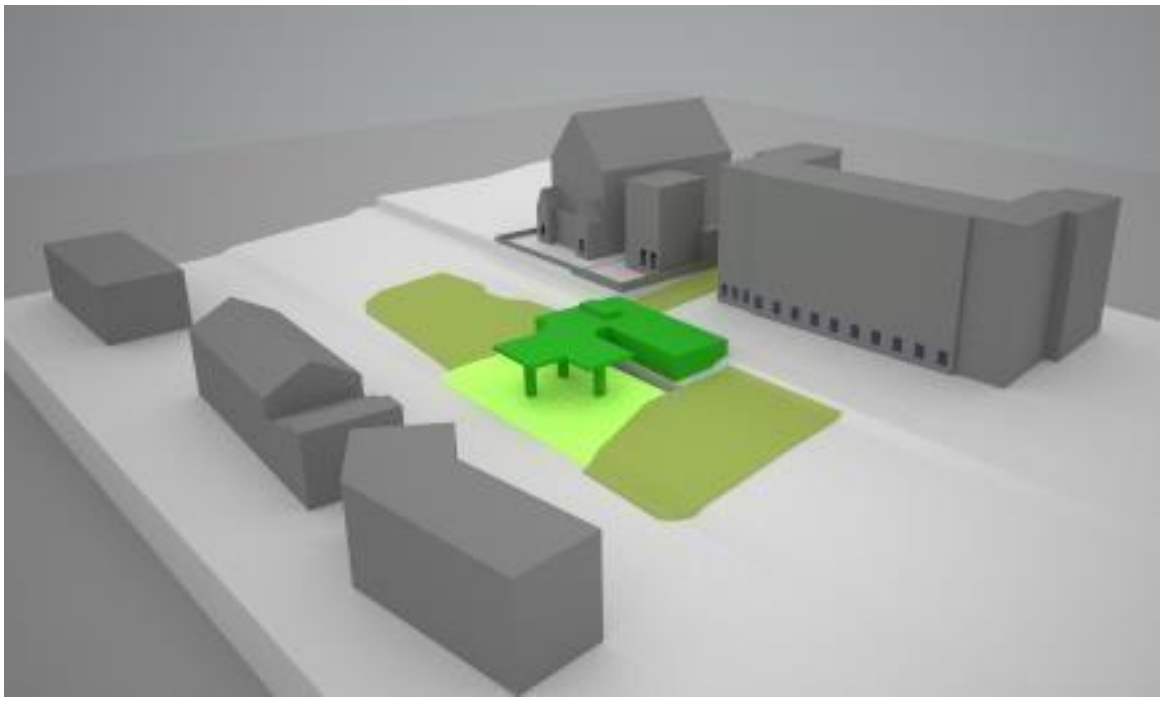
7.4.3 Model Images



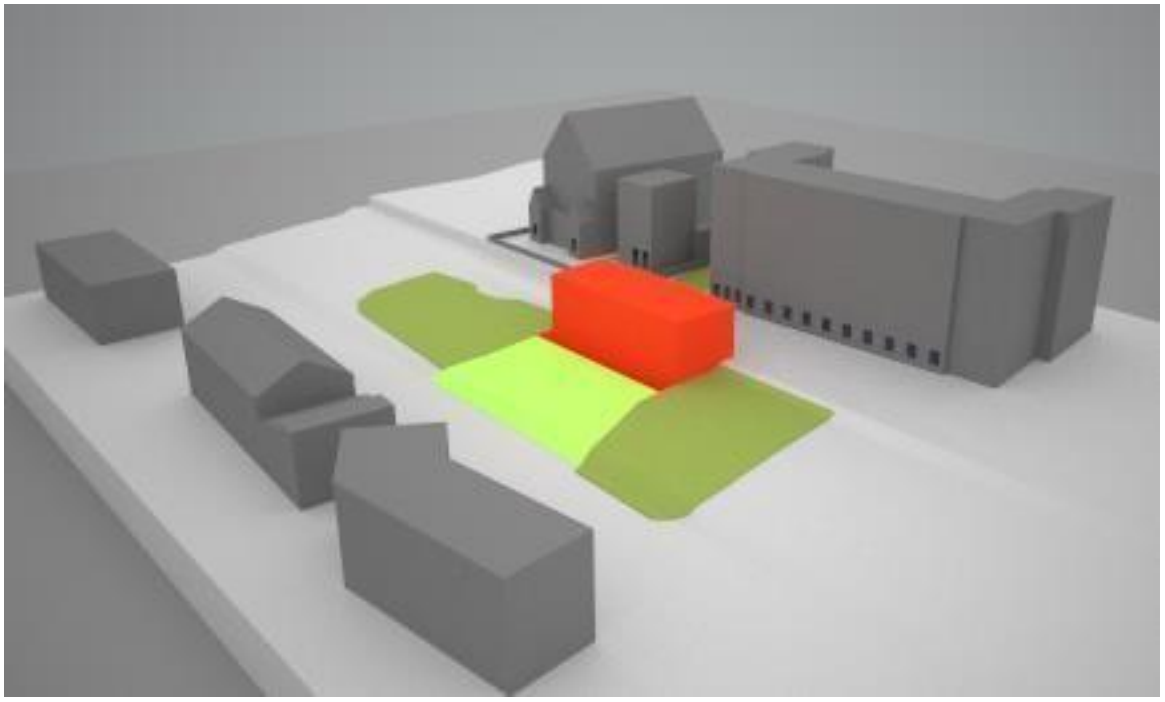
Existing Case – Top View



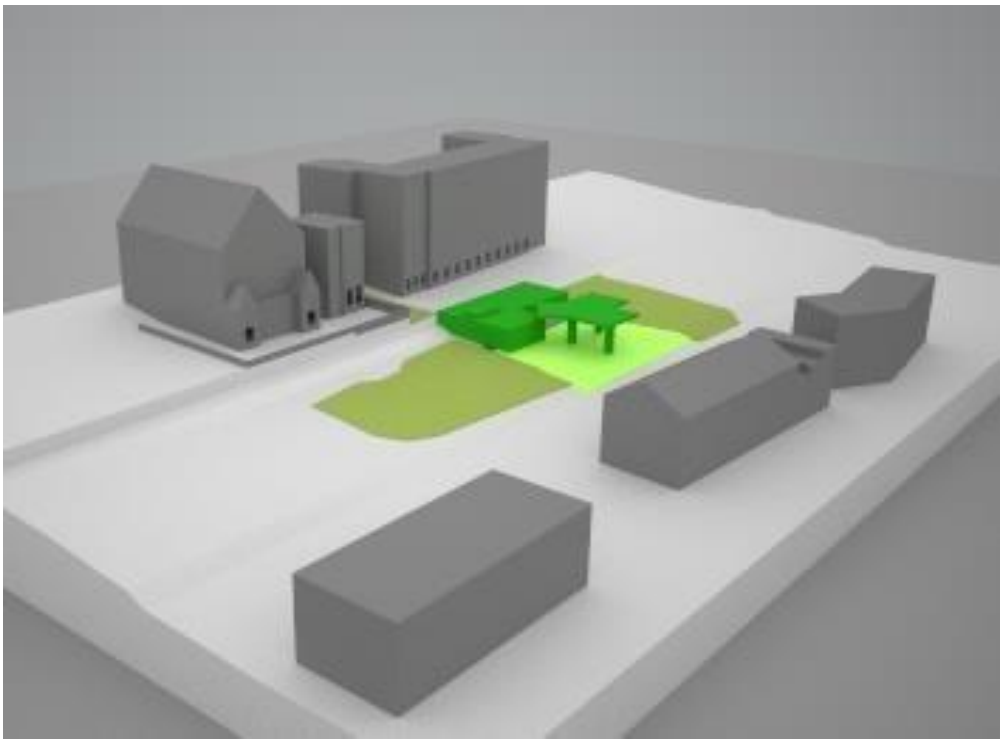
Proposed Case – Top View



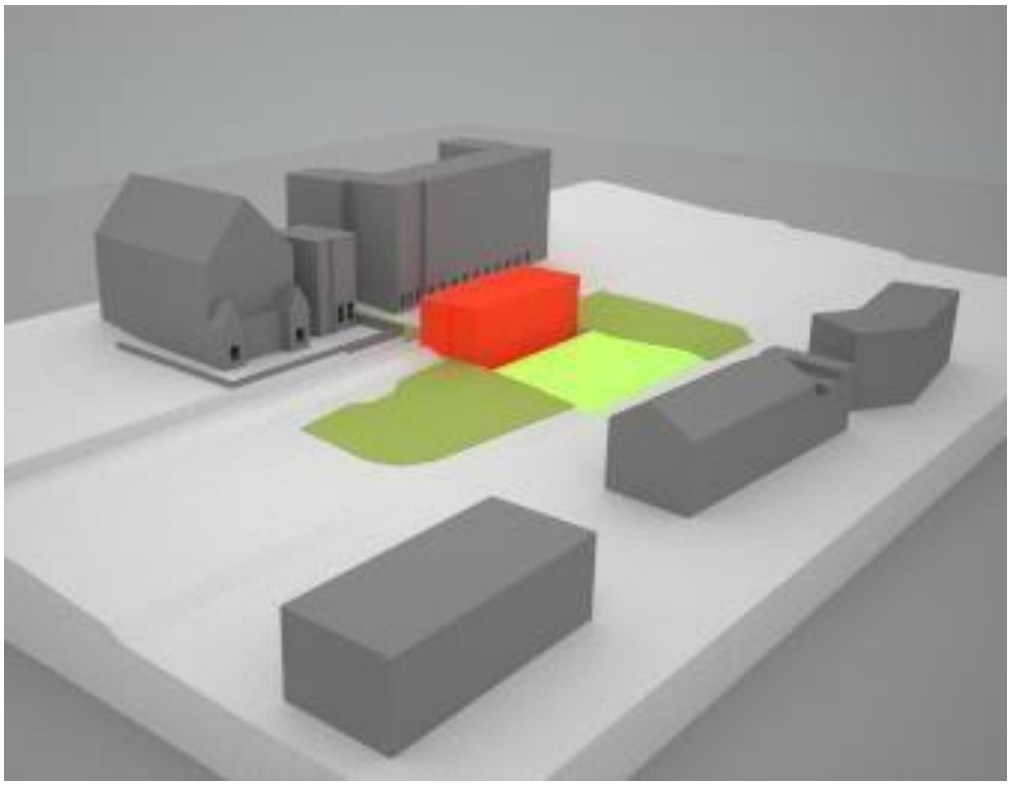
Existing Case – South East View



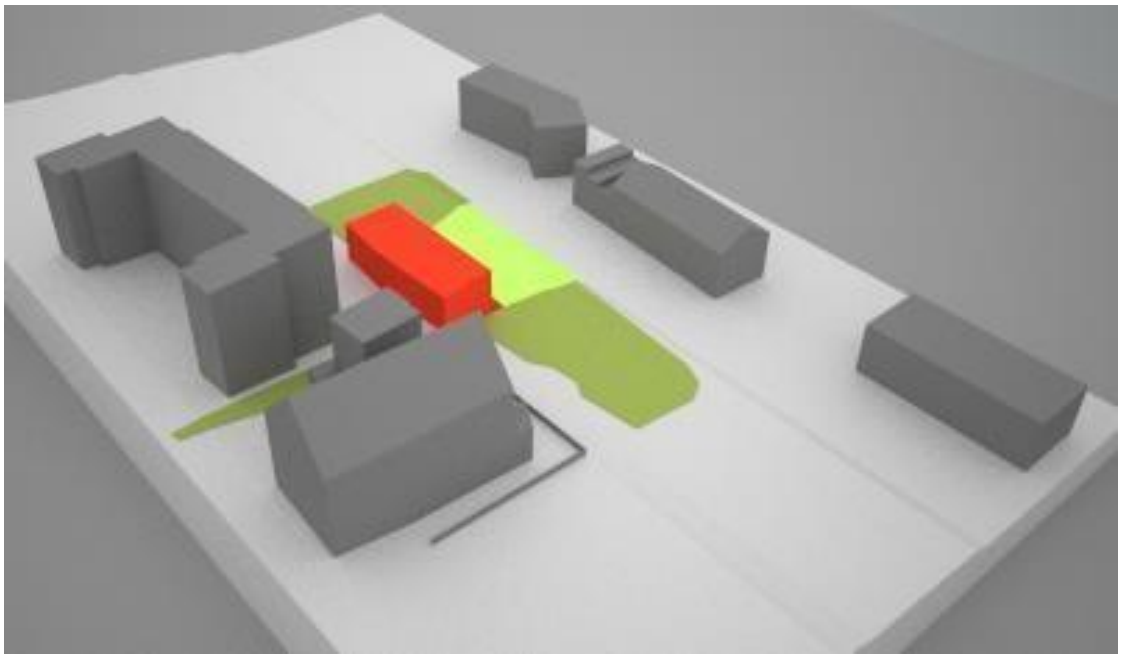
Proposed Case – South East View



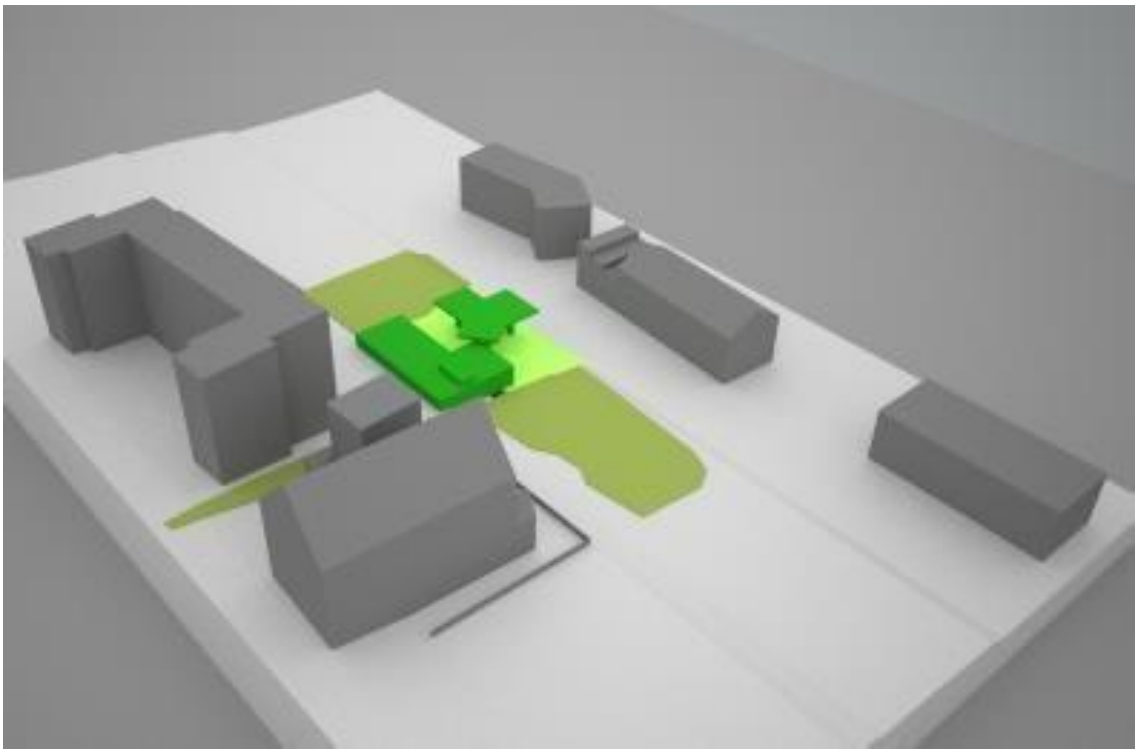
Existing Building – North West View



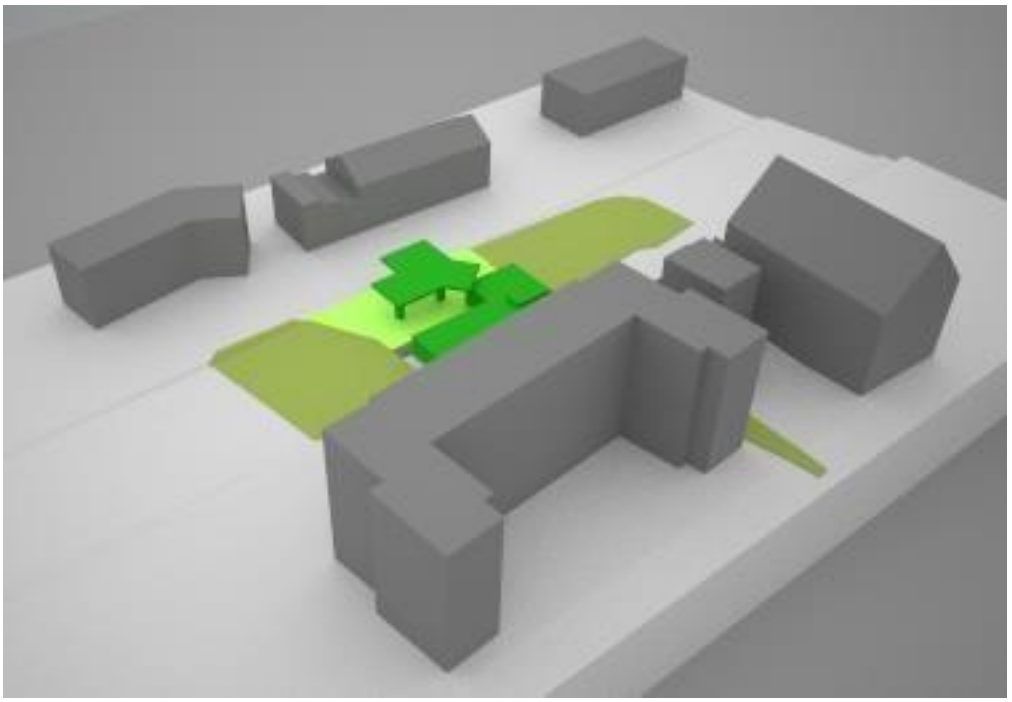
Proposed Building – North West View



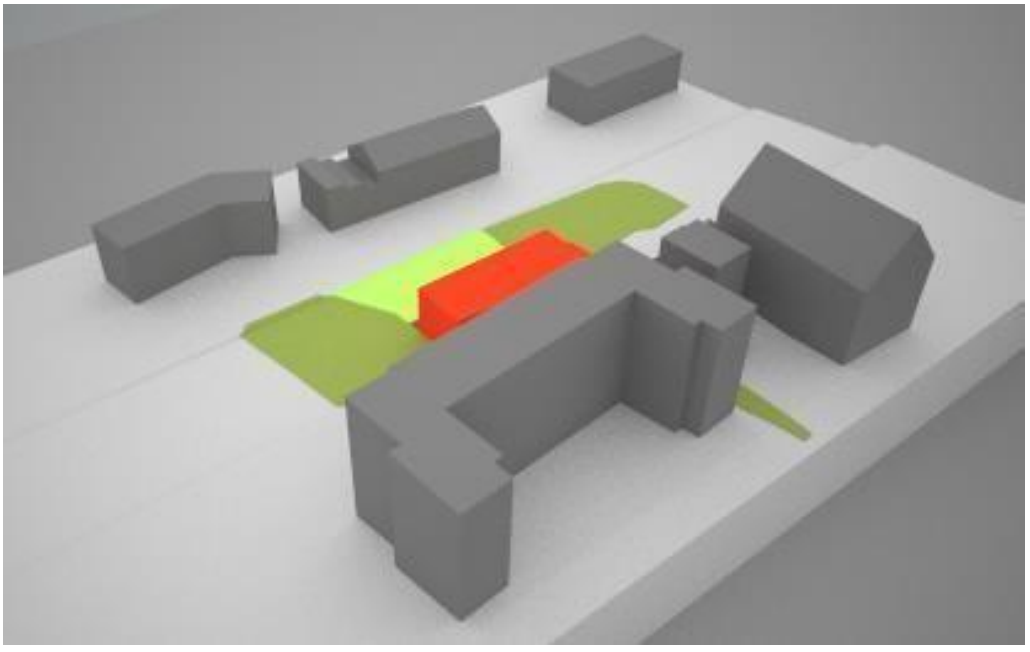
Existing Case – North East View



Proposed Case – North East View



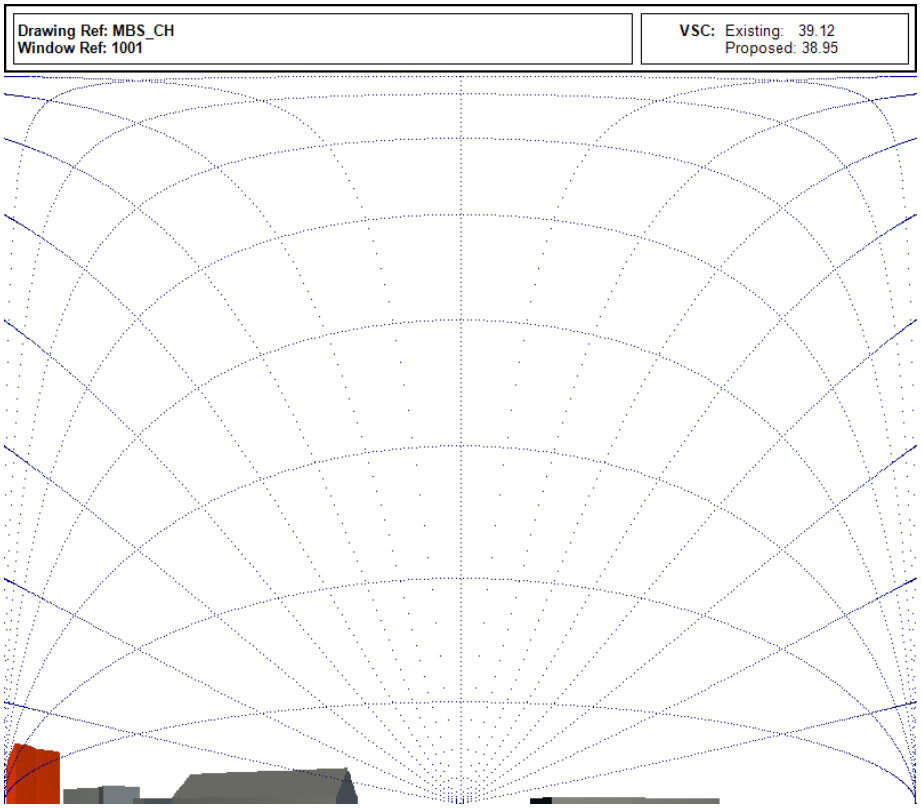
Existing Case – South West View



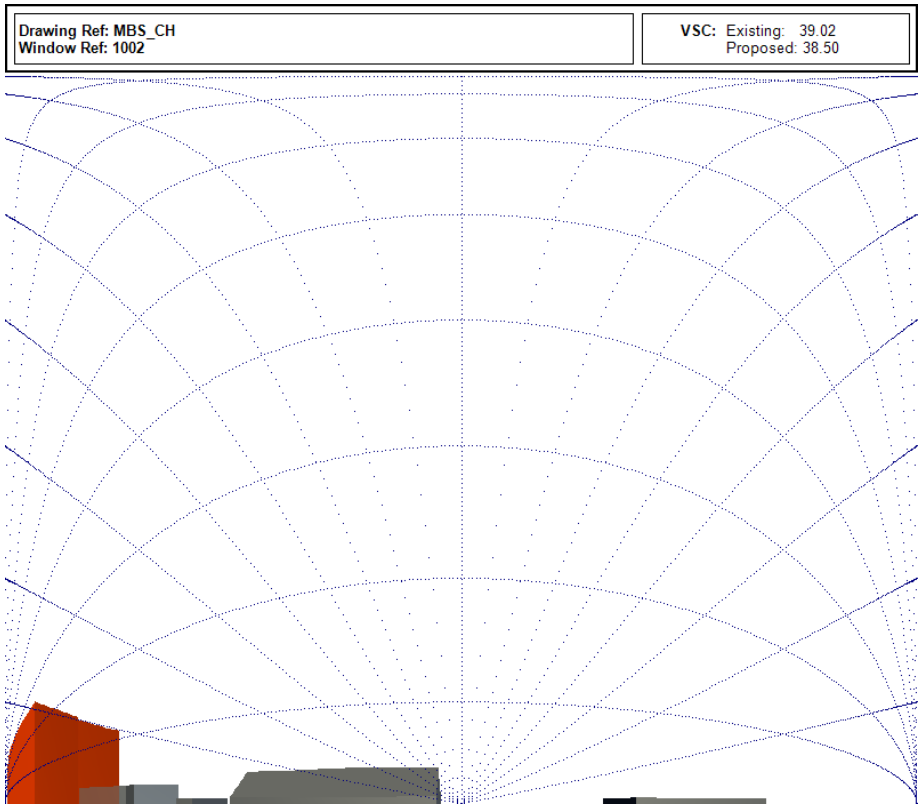
Proposed Case – South West View

7.5. Daylight results

S1 – Coach House, Chetwynd Rd. - SW Elevation - GF

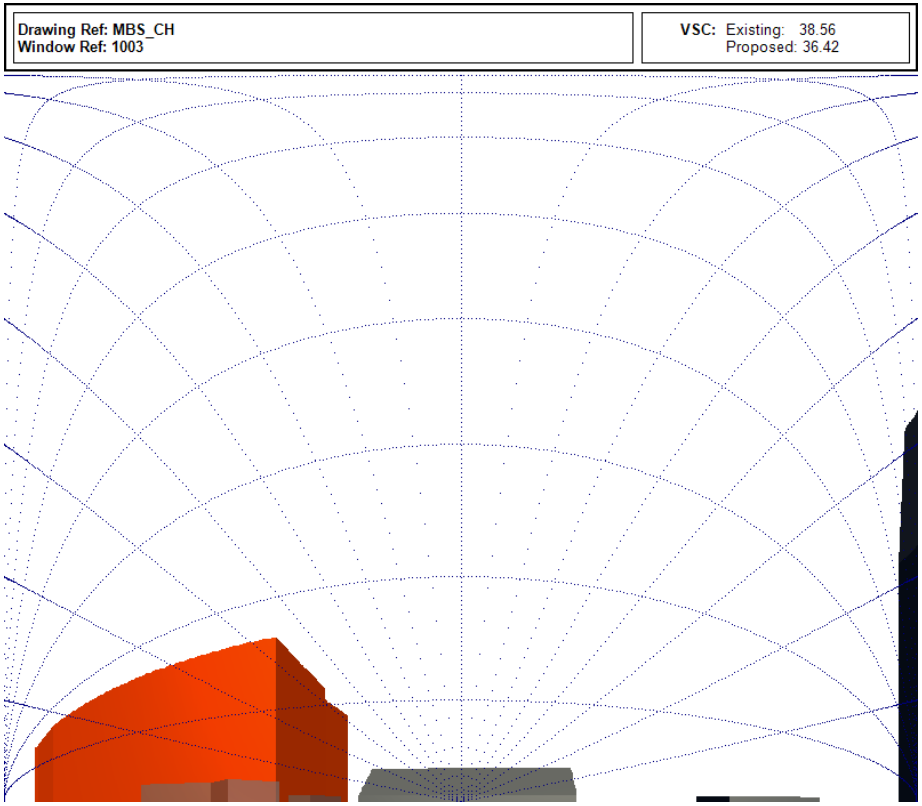


S2 – Coach House, Chetwynd Rd. - SW Elevation - GF

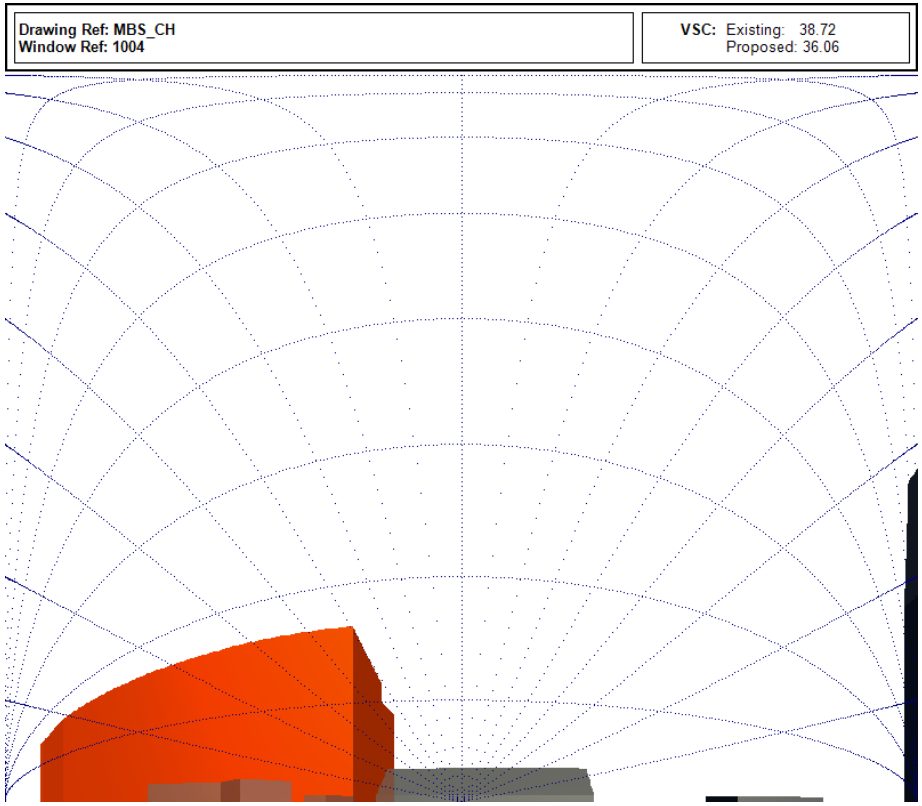


- The green contour represents the existing building.
- The red contour represents the proposed building.
- The grey contour represents the surrounding buildings.

S3 – Grove End Lodge, College Lane - SW Elevation - GF

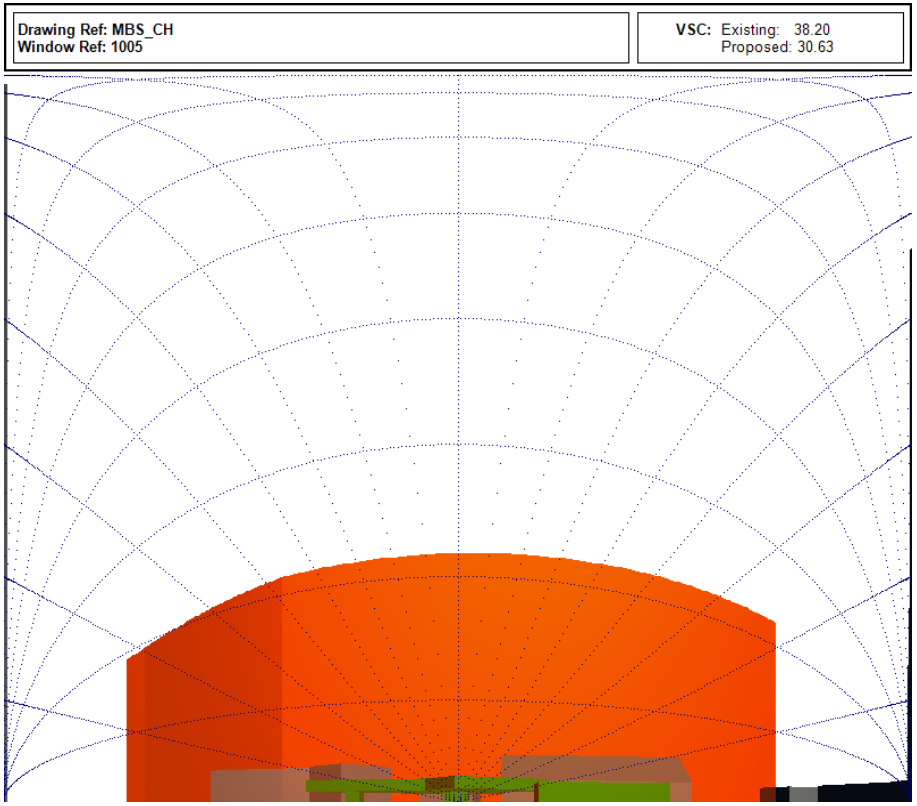


S4 – Grove End Lodge, College Lane - SW Elevation - GF

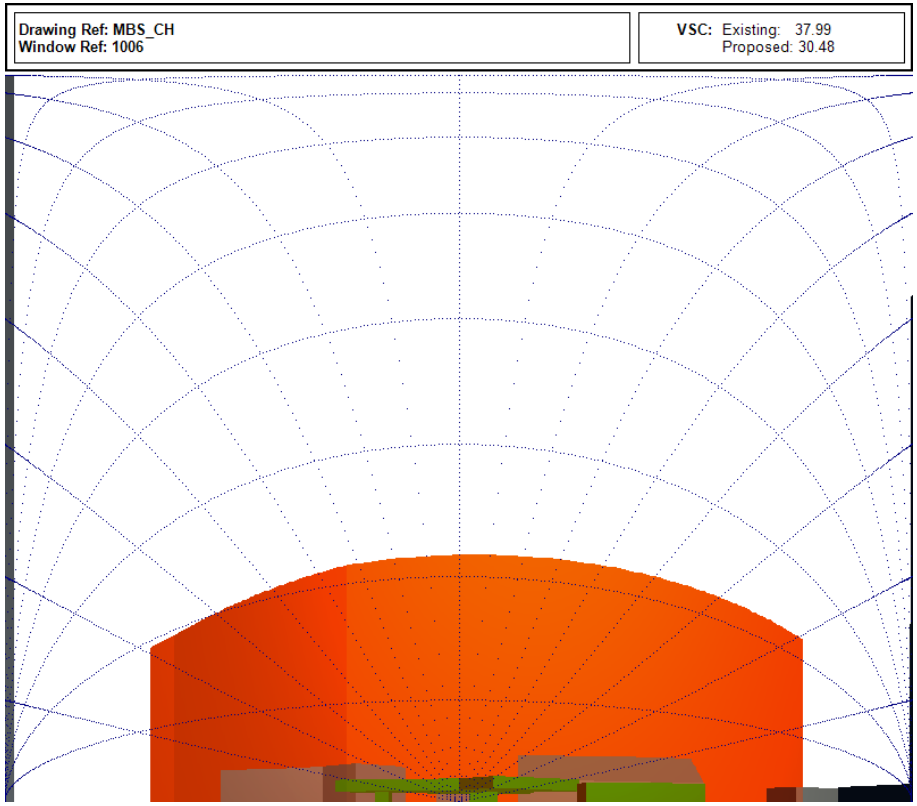


- The green contour represents the existing building.
- The red contour represents the proposed building.
- The grey contour represents the surrounding buildings.

S5 – Denyer House, Highgate Rd. - SW Elevation - GF

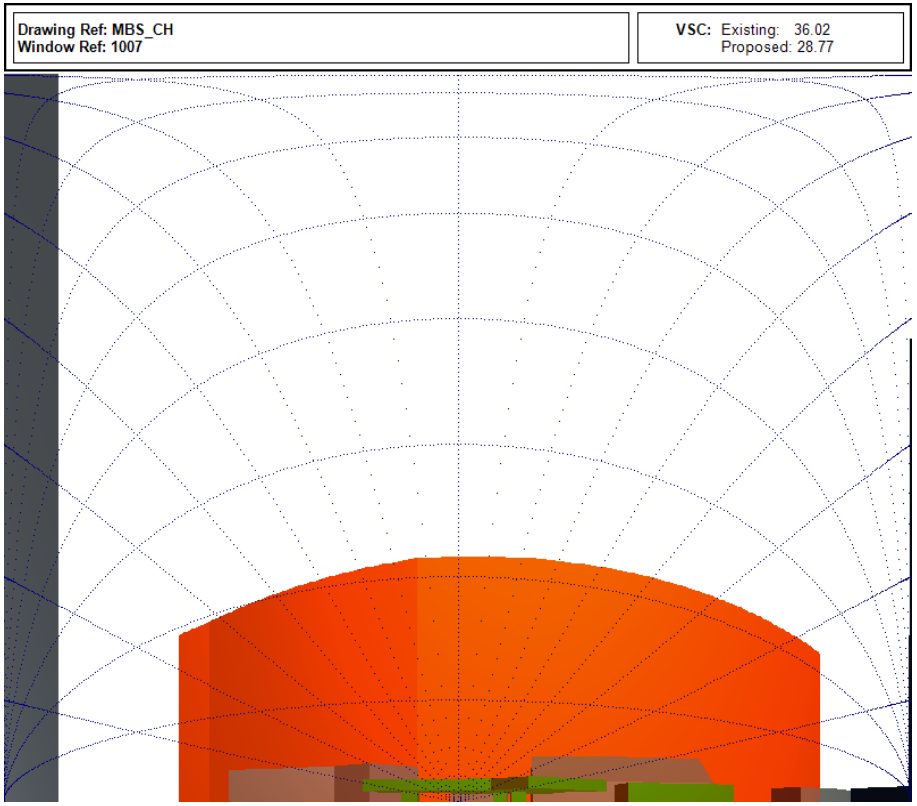


S6 - Denyer House, Highgate Rd. - SW Elevation - GF

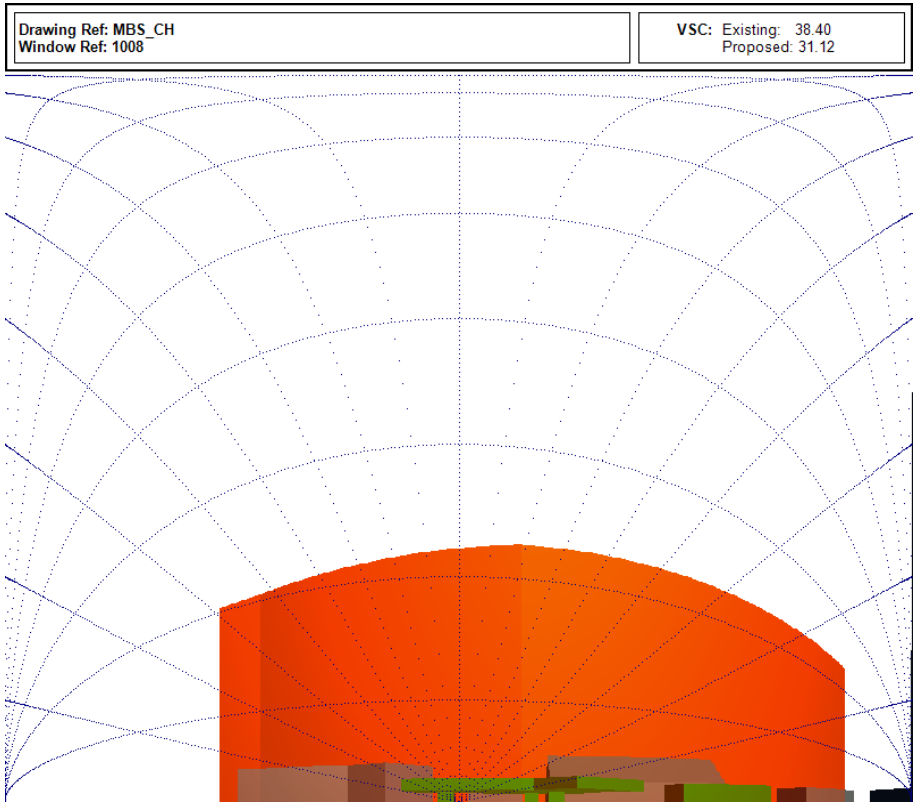


- The green contour represents the existing building.
- The red contour represents the proposed building.
- The grey contour represents the surrounding buildings.

S7 – Denyer House, Highgate Rd. - SW Elevation - GF

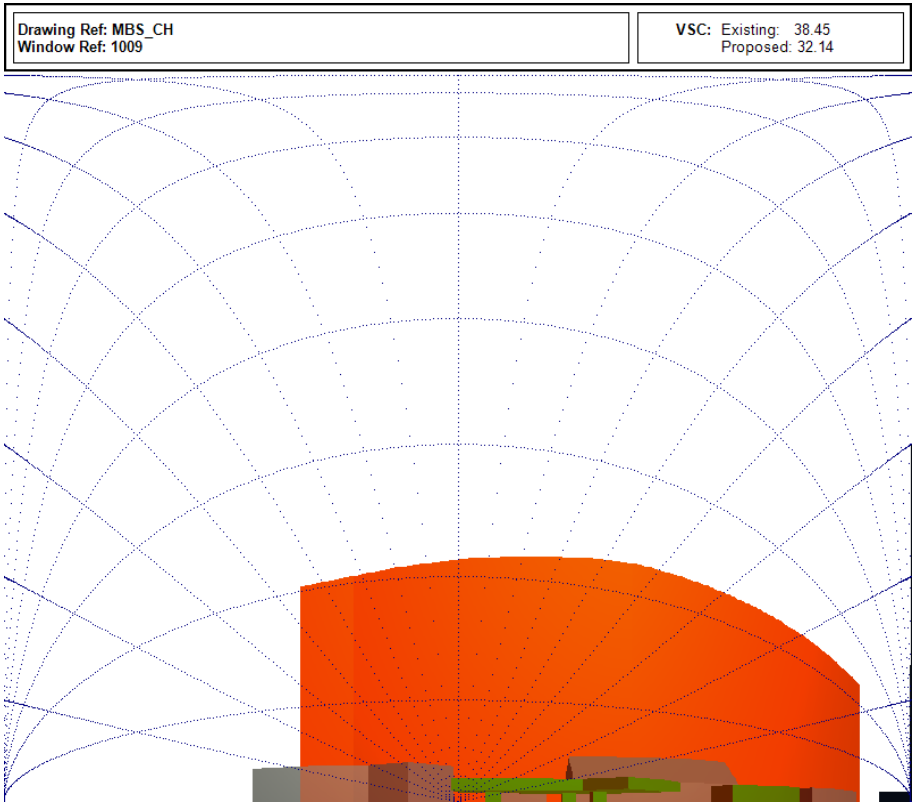


S8 – Denyer House, Highgate Rd. - SW Elevation - GF

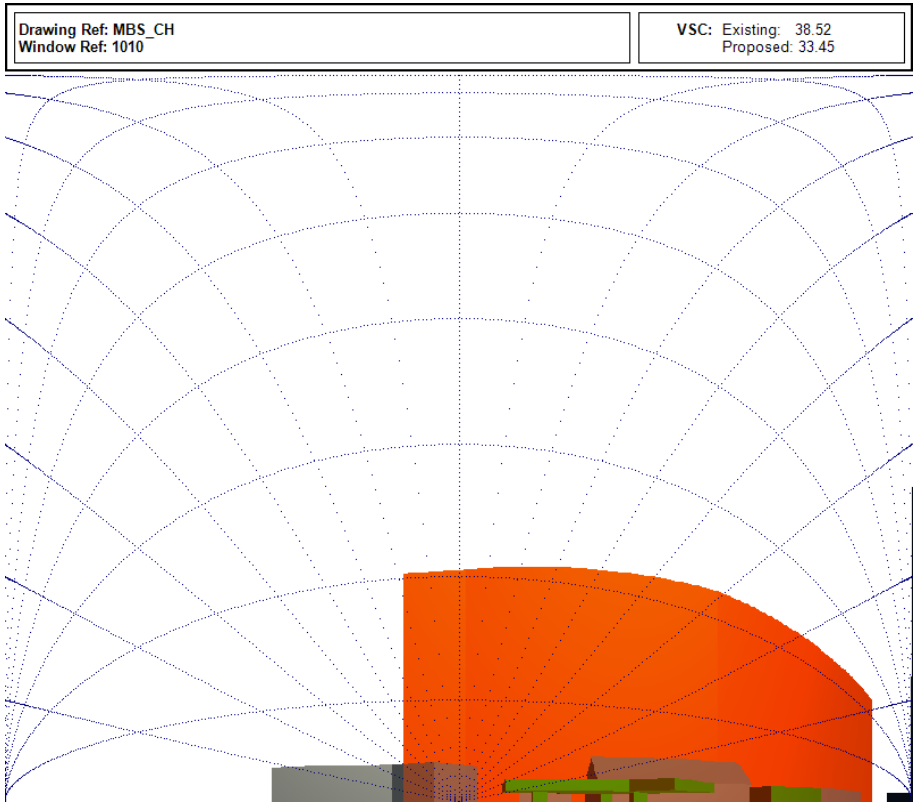


- The green contour represents the existing building.
- The red contour represents the proposed building.
- The grey contour represents the surrounding buildings.

S9 – Denyer House, Highgate Rd. - SW Elevation - GF

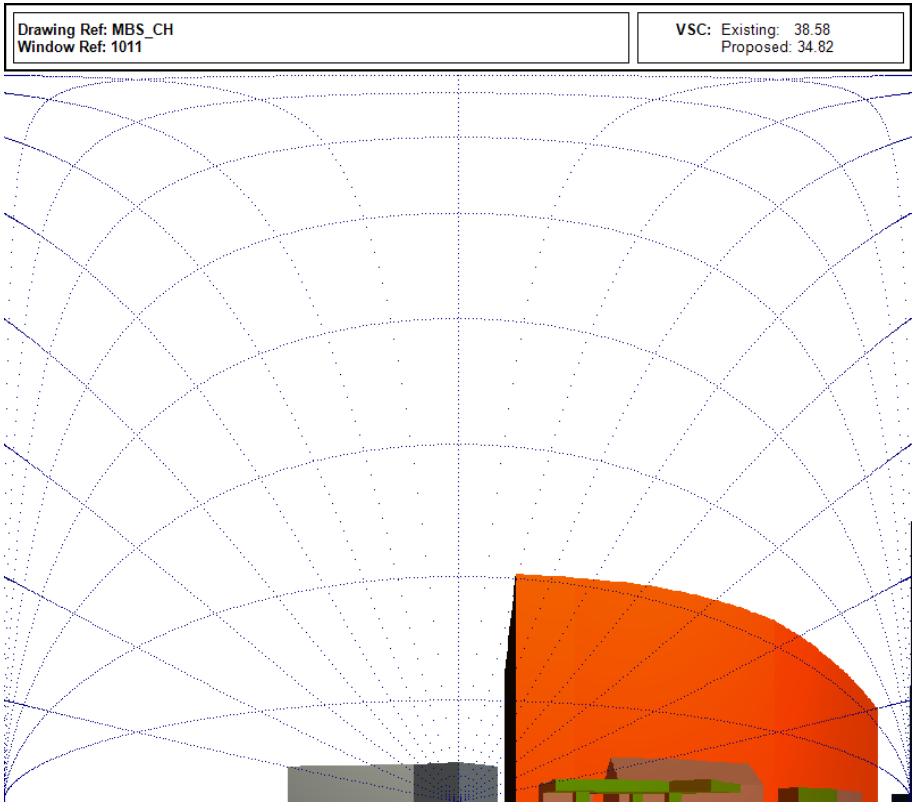


S10 - Denyer House, Highgate Rd. - SW Elevation - GF

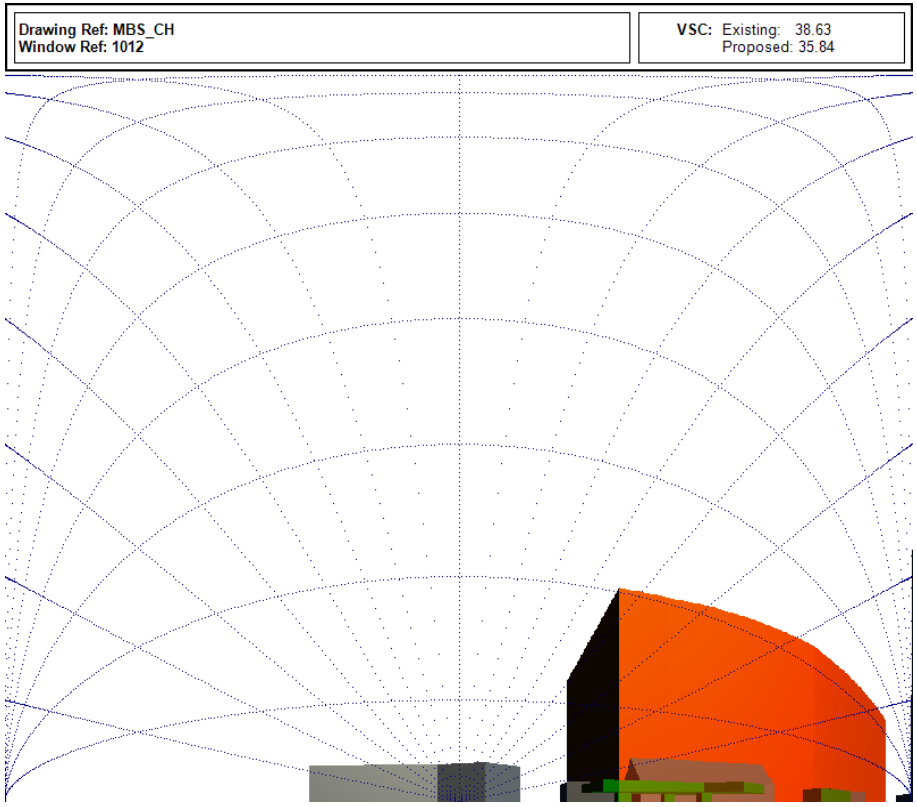


- The green contour represents the existing building.
- The red contour represents the proposed building.
- The grey contour represents the surrounding buildings.

S11 - Denyer House, Highgate Rd. - SW Elevation - GF

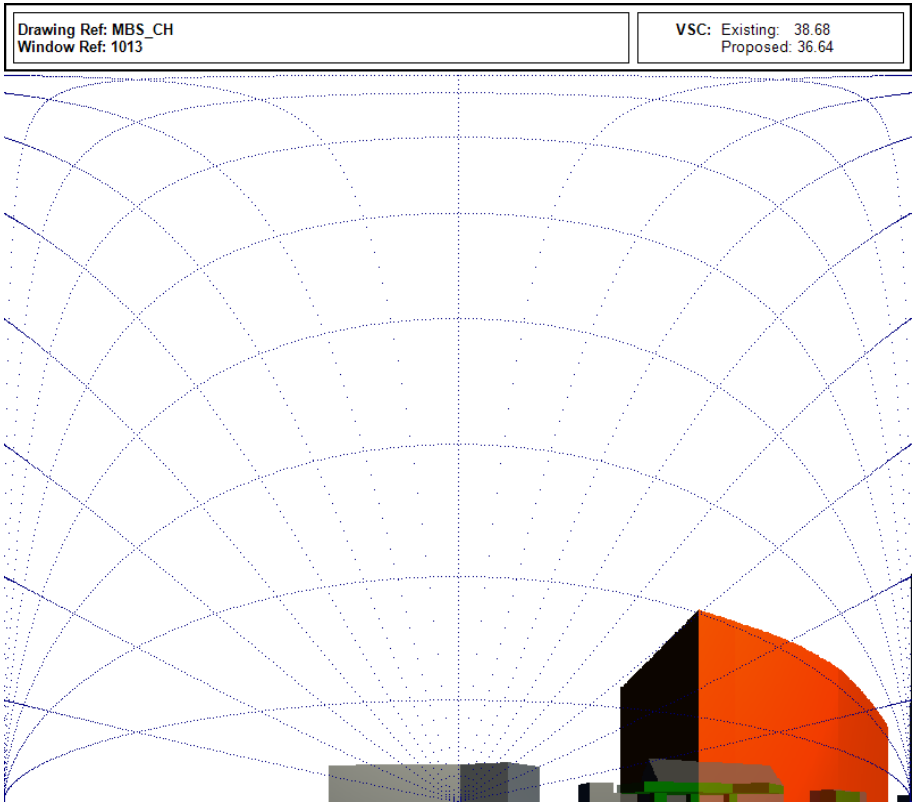


S12 - Denyer House, Highgate Rd. - SW Elevation - GF

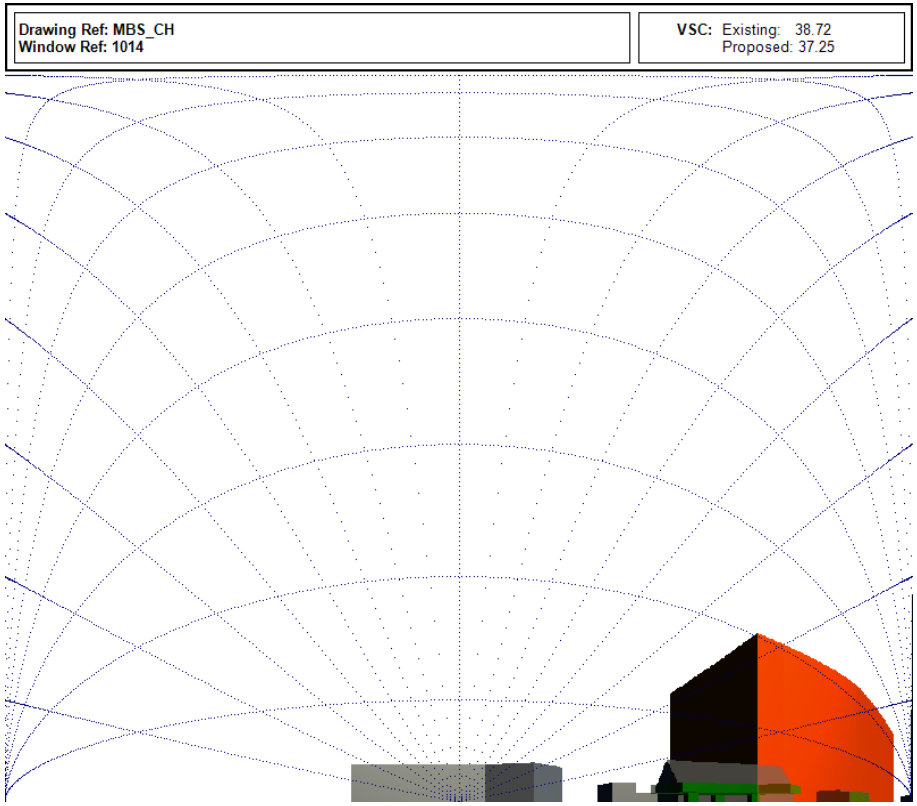


- The green contour represents the existing building.
- The red contour represents the proposed building.
- The grey contour represents the surrounding buildings.

S13 - Denyer House, Highgate Rd. - SW Elevation - GF

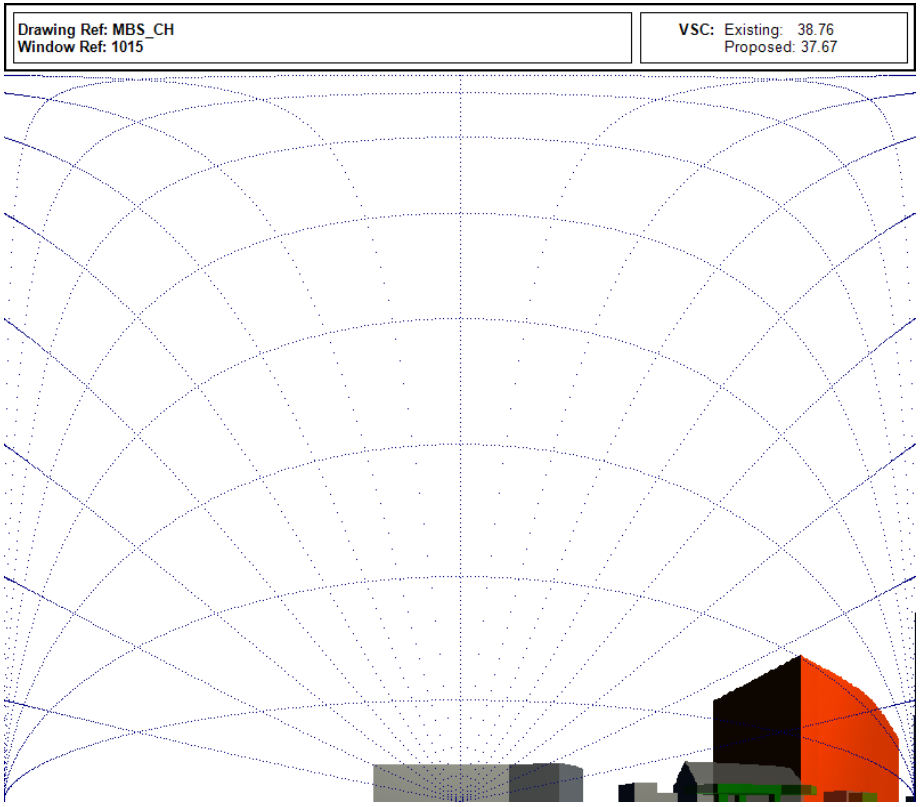


S14 - Denyer House, Highgate Rd. - SW Elevation - GF

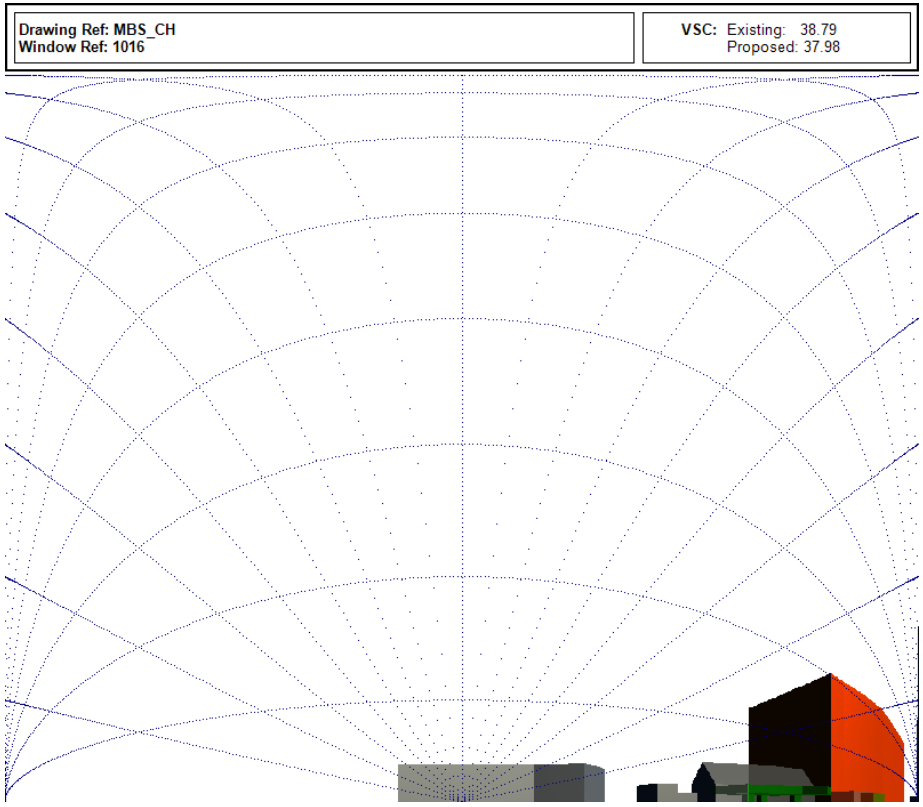


- The green contour represents the existing building.
- The red contour represents the proposed building.
- The grey contour represents the surrounding buildings.

S15 - Denyer House, Highgate Rd. - SW Elevation - GF

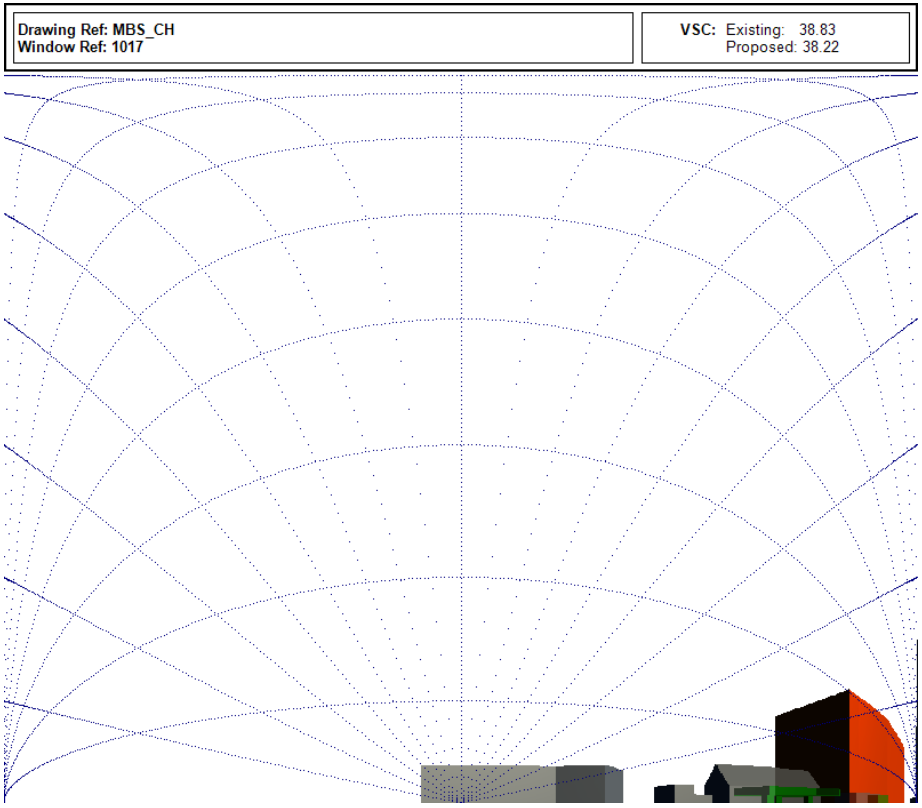


S16 - Denyer House, Highgate Rd. - SW Elevation - GF



- The green contour represents the existing building.
- The red contour represents the proposed building.
- The grey contour represents the surrounding buildings.

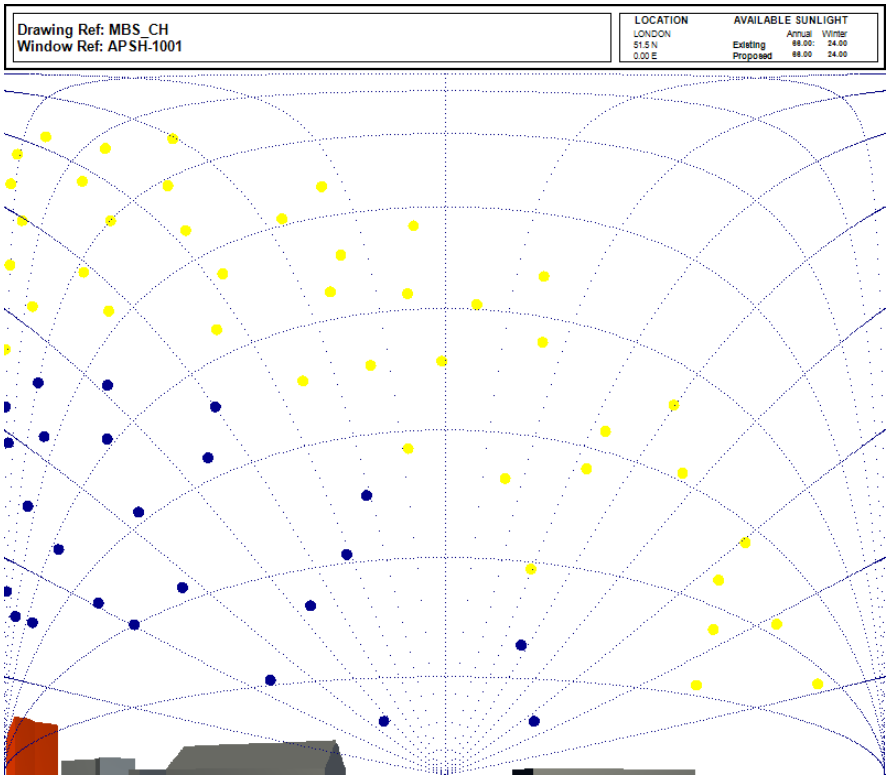
S17 - Denyer House, Highgate Rd. - SW Elevation - GF



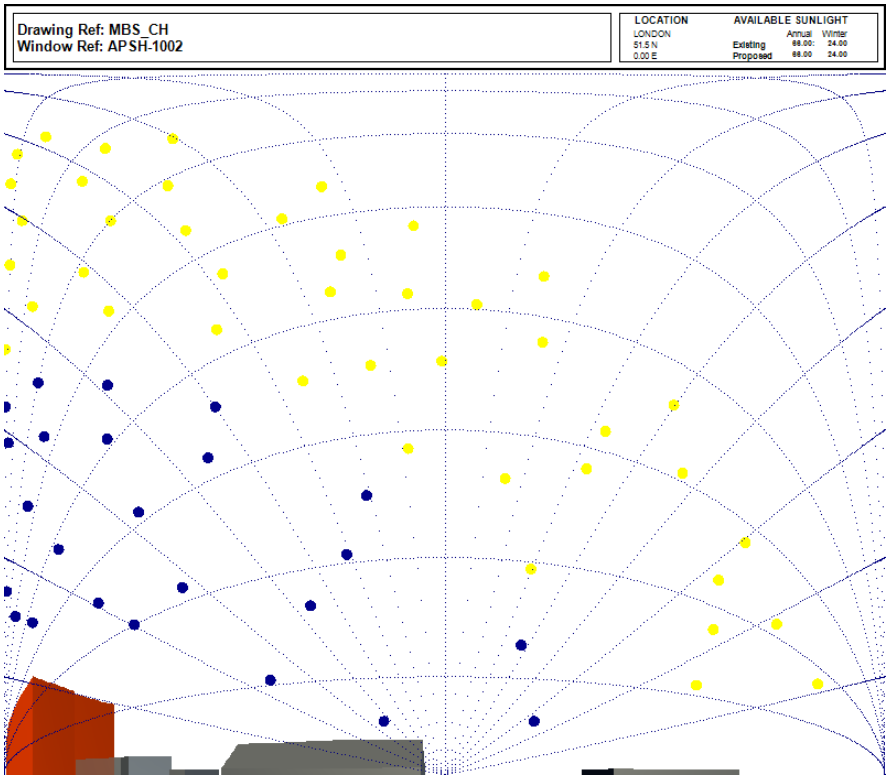
- The green contour represents the existing building.
- The red contour represents the proposed building.
- The grey contour represents the surrounding buildings.

7.6. Sunlight results

S1 – Coach House, Chetwynd Rd. - SW Elevation - GF

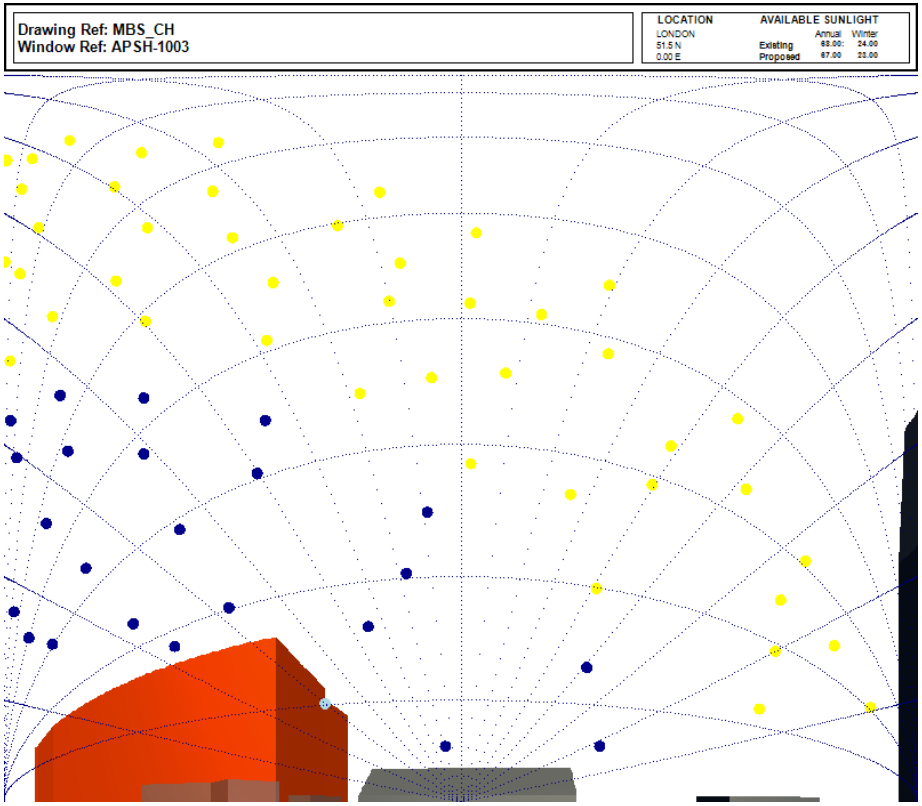


S2 – Coach House, Chetwynd Rd. - SW Elevation - GF

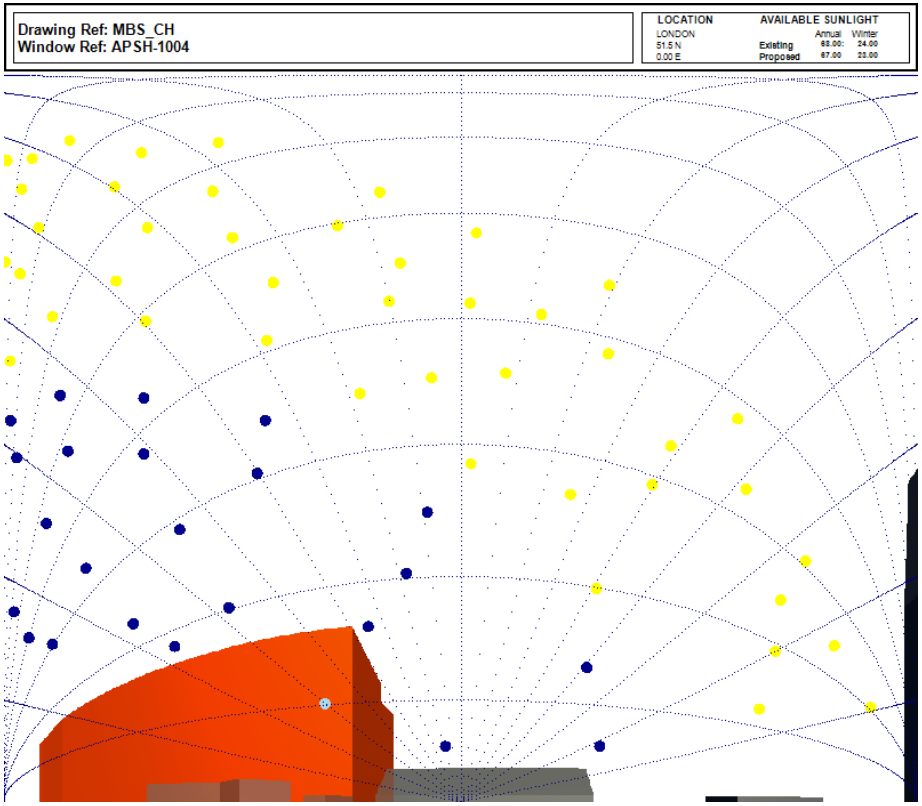


- The green and red contour represents existing and proposed building.
- The grey contour represents the surrounding buildings.
- The yellow dot represents the available sunlight during the summer months (Summer).
- The blue dot represents the available sunlight during the winter months (Winter).
- The sum of the yellow and blue dots gives the available sunlight for the whole year (Annual).
- The white dot represents the sunlight blocked by buildings.

S3 – Grove End Lodge, College Lane - SW Elevation - GF

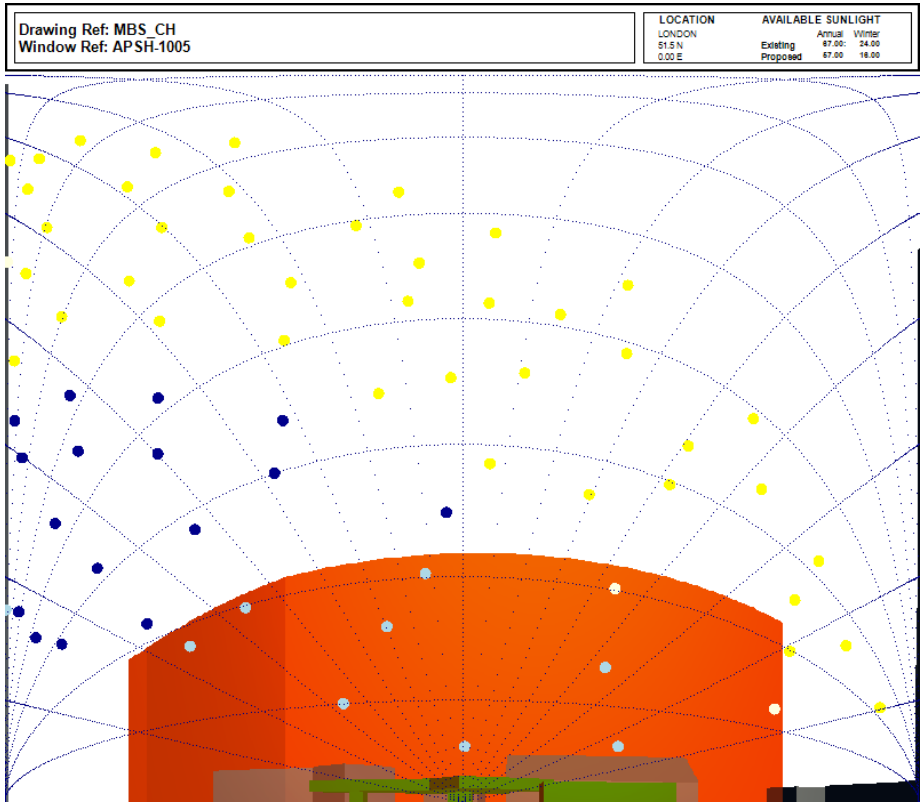


S4 – Grove End Lodge, College Lane - SW Elevation - GF

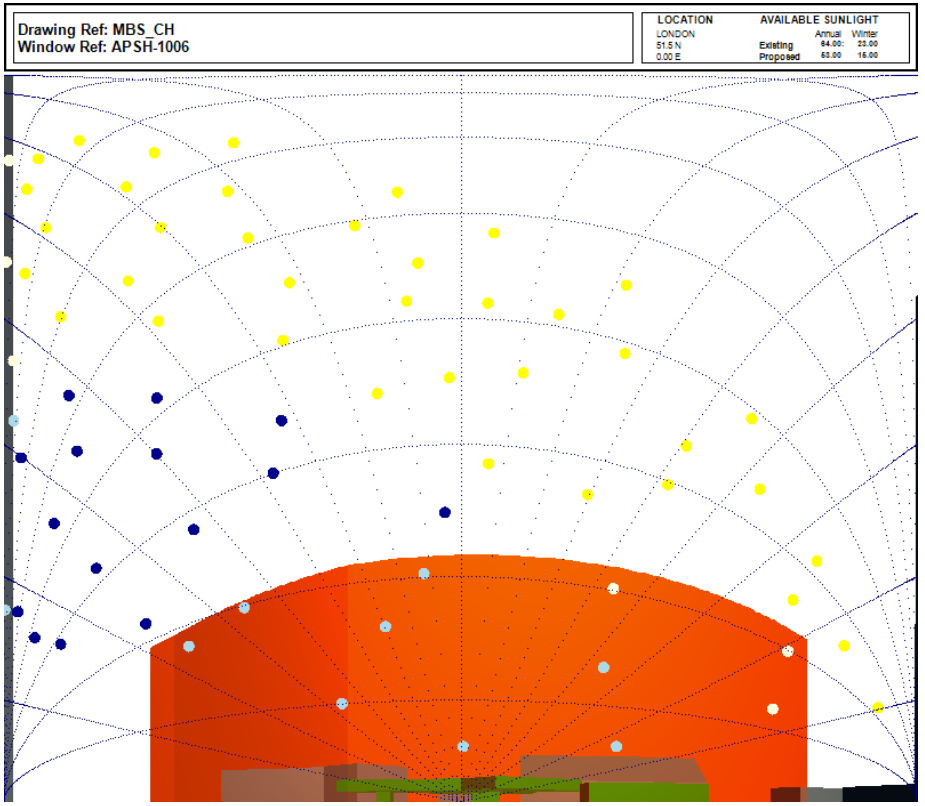


- The green and red contour represents existing and proposed building.
- The grey contour represents the surrounding buildings.
- The yellow dot represents the available sunlight during the summer months (Summer).
- The blue dot represents the available sunlight during the winter months (Winter).
- The sum of the yellow and blue dots gives the available sunlight for the whole year (Annual).
- The white dot represents the sunlight blocked by buildings.

S5 – Denyer House, Highgate Rd. - SW Elevation - GF

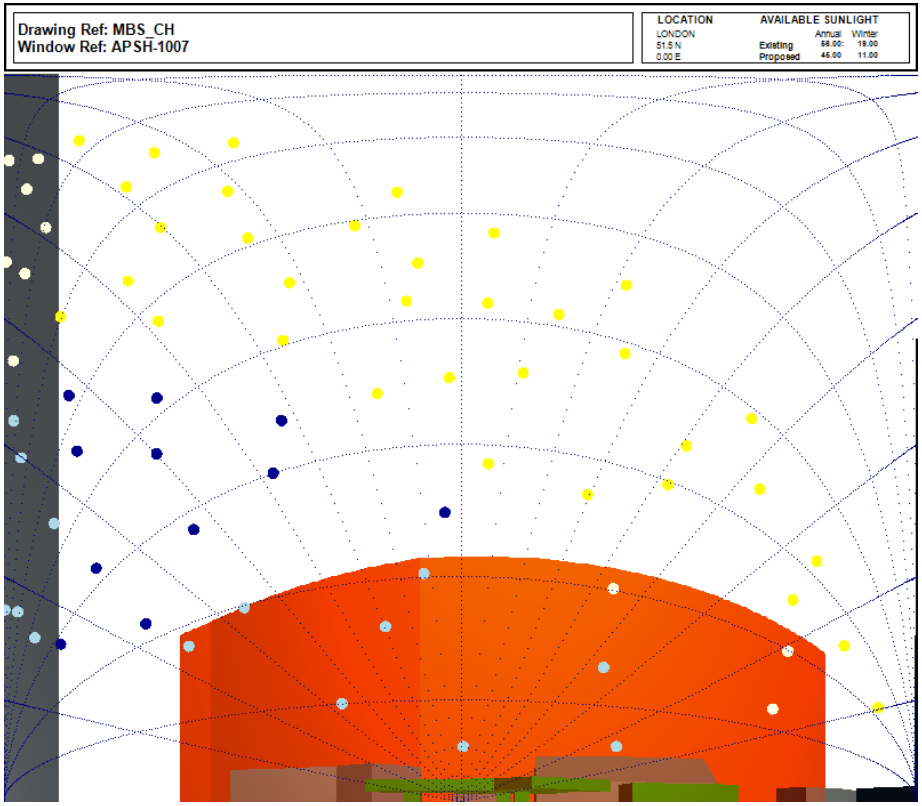


S6 - Denyer House, Highgate Rd. - SW Elevation - GF

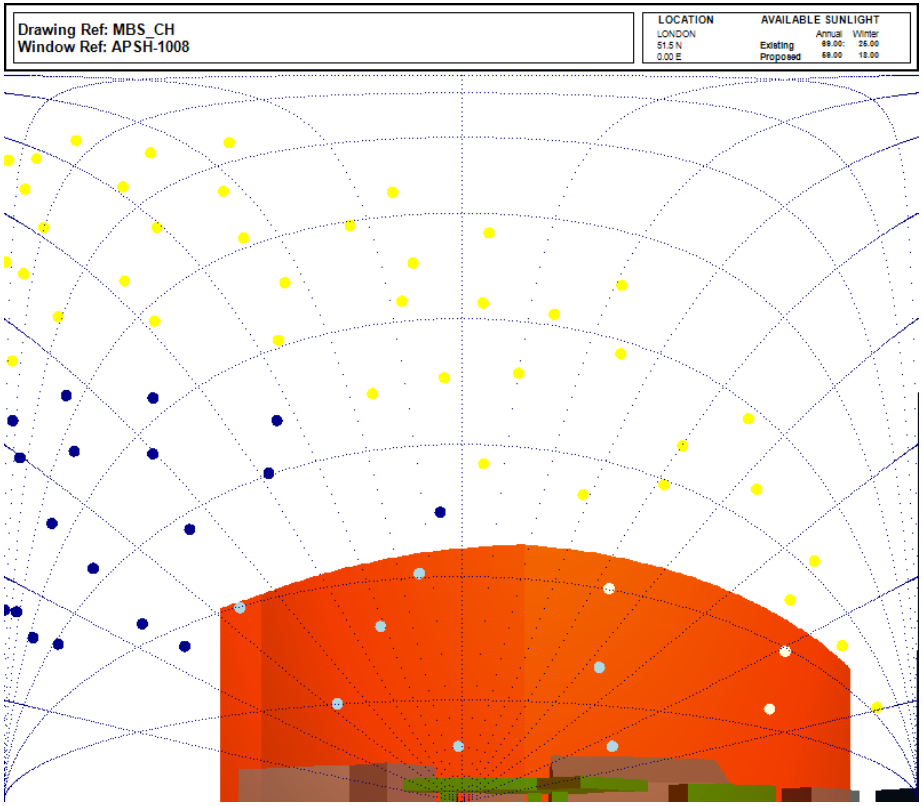


- The green and red contour represents existing and proposed building.
- The grey contour represents the surrounding buildings.
- The yellow dot represents the available sunlight during the summer months (Summer).
- The blue dot represents the available sunlight during the winter months (Winter).
- The sum of the yellow and blue dots gives the available sunlight for the whole year (Annual).
- The white dot represents the sunlight blocked by buildings.

S7 – Denyer House, Highgate Rd. - SW Elevation - GF

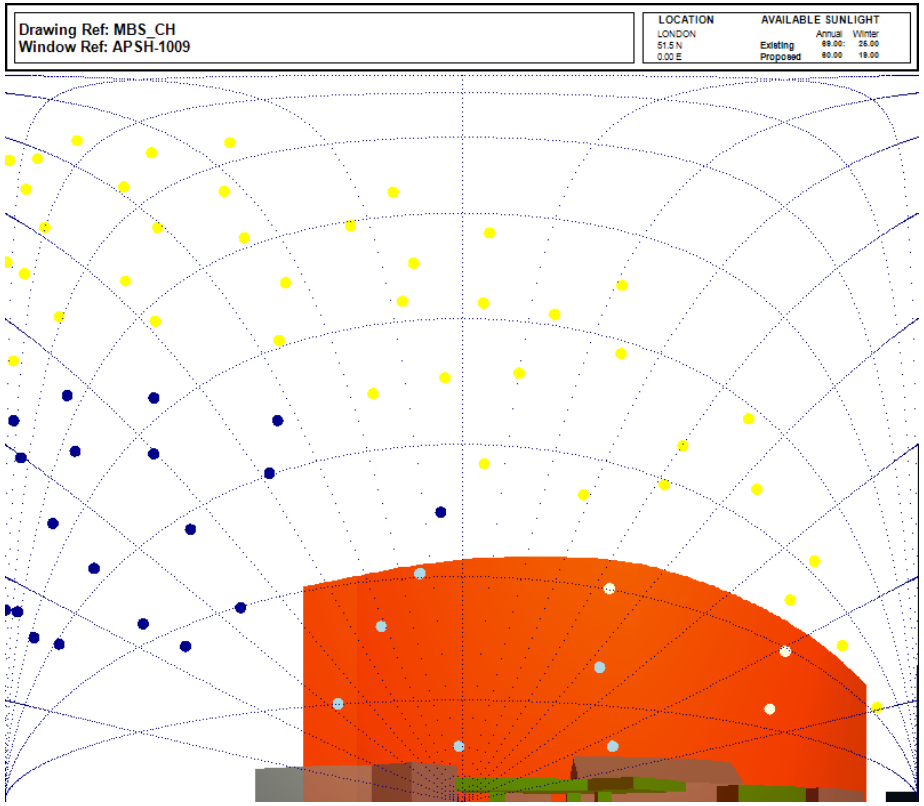


S8 – Denyer House, Highgate Rd. - SW Elevation - GF

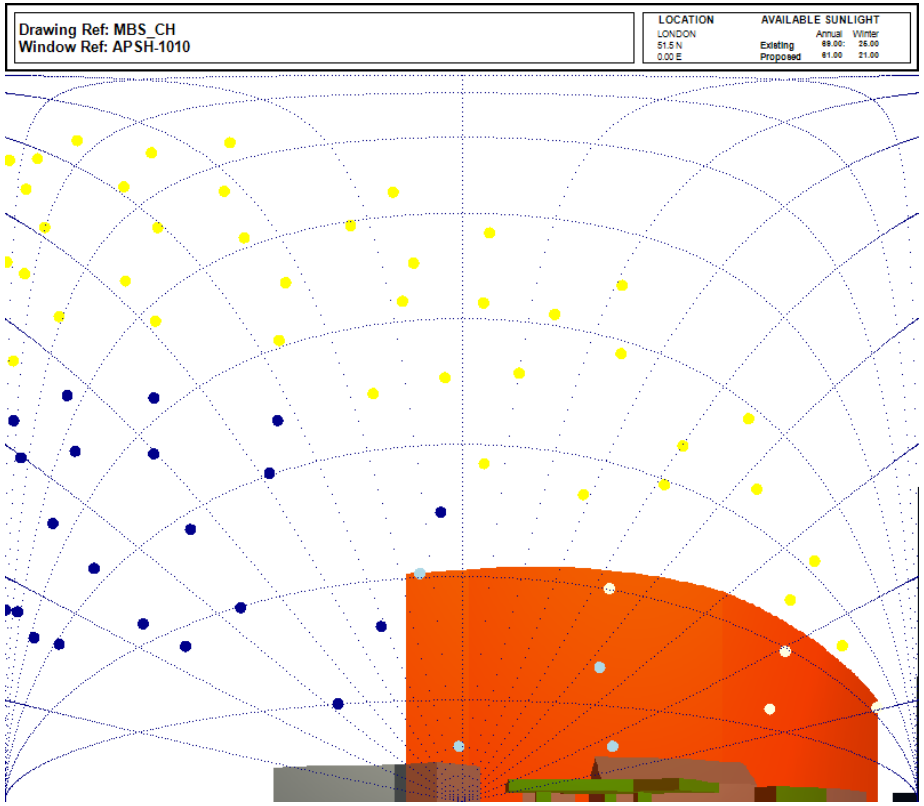


- The green and red contour represents existing and proposed building.
- The grey contour represents the surrounding buildings.
- The yellow dot represents the available sunlight during the summer months (Summer).
- The blue dot represents the available sunlight during the winter months (Winter).
- The sum of the yellow and blue dots gives the available sunlight for the whole year (Annual).
- The white dot represents the sunlight blocked by buildings.

S9 – Denyer House, Highgate Rd. - SW Elevation - GF



S10 - Denyer House, Highgate Rd. - SW Elevation - GF



- The green and red contour represents existing and proposed building.
- The grey contour represents the surrounding buildings.
- The yellow dot represents the available sunlight during the summer months (Summer).
- The blue dot represents the available sunlight during the winter months (Winter).
- The sum of the yellow and blue dots gives the available sunlight for the whole year (Annual).
- The white dot represents the sunlight blocked by buildings.

S11 - Denyer House, Highgate Rd. - SW Elevation - GF

S12 - Denyer House, Highgate Rd. - SW Elevation - GF

- The green and red contour represents existing and proposed building.
- The grey contour represents the surrounding buildings.
- The yellow dot represents the available sunlight during the summer months (Summer).
- The blue dot represents the available sunlight during the winter months (Winter).
- The sum of the yellow and blue dots gives the available sunlight for the whole year (Annual).
- The white dot represents the sunlight blocked by buildings.

S13 - Denyer House, Highgate Rd. - SW Elevation - GF

S14 - Denyer House, Highgate Rd. - SW Elevation - GF

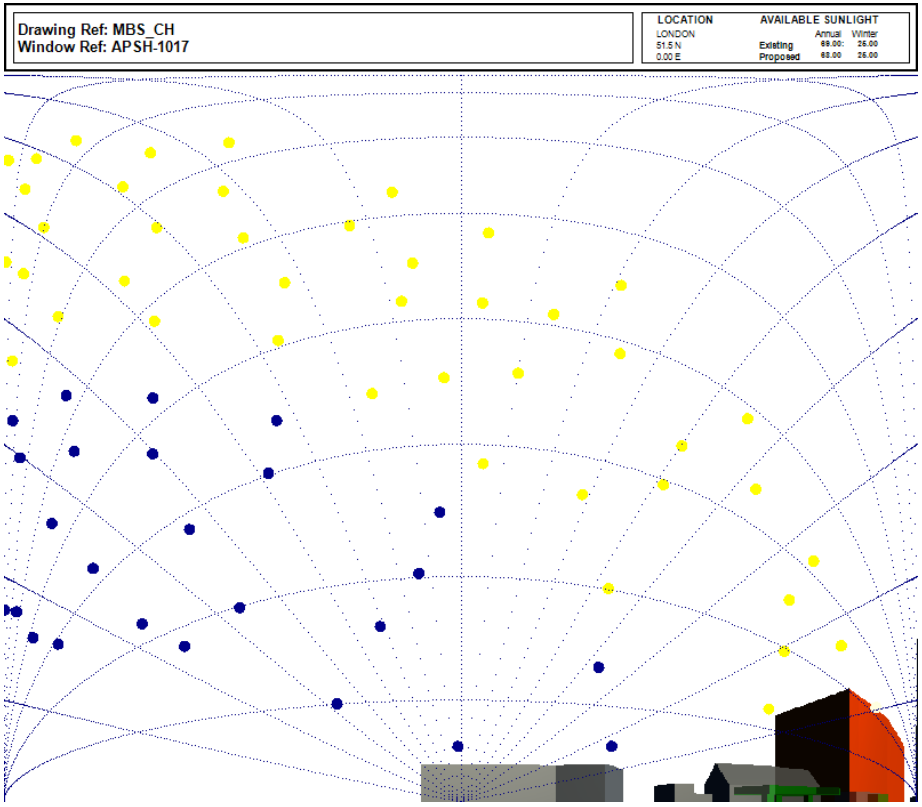
- The green and red contour represents existing and proposed building.
- The grey contour represents the surrounding buildings.
- The yellow dot represents the available sunlight during the summer months (Summer).
- The blue dot represents the available sunlight during the winter months (Winter).
- The sum of the yellow and blue dots gives the available sunlight for the whole year (Annual).
- The white dot represents the sunlight blocked by buildings.

S15 - Denyer House, Highgate Rd. - SW Elevation - GF

S16 - Denyer House, Highgate Rd. - SW Elevation - GF

- The green and red contour represents existing and proposed building.
- The grey contour represents the surrounding buildings.
- The yellow dot represents the available sunlight during the summer months (Summer).
- The blue dot represents the available sunlight during the winter months (Winter).
- The sum of the yellow and blue dots gives the available sunlight for the whole year (Annual).
- The white dot represents the sunlight blocked by buildings.

S17 - Denyer House, Highgate Rd. - SW Elevation - GF



- The green and red contour represents existing and proposed building.
- The grey contour represents the surrounding buildings.
- The yellow dot represents the available sunlight during the summer months (Summer).
- The blue dot represents the available sunlight during the winter months (Winter).
- The sum of the yellow and blue dots gives the available sunlight for the whole year (Annual).
- The white dot represents the sunlight blocked by buildings.

7.7. Overshadowing results (21st March)

The results presented below are expressed as a area percentage receiving direct sunlight on 21st March.

Result for A1 - Open Garden at Highgate Road

Existing Case:

Month	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00
Jan						28.17	57.87	80.60	90.07	95.17	54.17	12.73	34.87				
Feb					2.63	58.03	77.13	89.80	95.43	97.03	98.37	70.70	42.23	59.73			
Mar				0.00	3.13	84.03	93.10	95.97	97.27	98.37	99.40	100.00	82.77	70.23	48.20		
Apr		0.00	0.00	0.00	74.07	94.77	96.70	97.77	98.63	99.50	100.00	100.00	100.00	94.70	70.70		
May		0.50	0.00	19.70	90.23	96.73	97.87	98.70	99.37	100.00	100.00	100.00	100.00	100.00	100.00	52.67	
Jun	0.00	5.53	0.97	32.70	91.77	97.23	98.20	98.93	99.57	100.00	100.00	100.00	100.00	100.00	100.00	97.90	94.23
Jul		1.83	0.00	11.70	86.43	96.57	97.77	98.63	99.27	99.93	100.00	100.00	100.00	100.00	100.00	68.27	
Aug			0.00	0.00	69.70	94.63	96.60	97.73	98.60	99.43	100.00	100.00	100.00	95.40	78.33	8.27	
Sep			0.00	0.00	38.43	87.10	94.43	96.37	97.60	98.67	99.67	100.00	79.57	63.10			
Oct				0.00	32.50	67.50	84.00	92.97	96.23	97.63	85.27	51.37	51.23				
Nov					15.77	39.57	68.83	84.80	92.30	80.50	28.33	20.97					
Dec						35.80	57.23	78.53	89.40	70.60	16.57	13.57					

Proposed Case:

Month	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00
Jan						52.60	91.80	96.27	97.97	98.77	54.80	12.97	34.90				
Feb					2.37	48.50	89.97	95.70	97.87	98.80	99.33	70.33	42.20	59.73			
Mar				0.00	0.00	76.87	91.00	95.77	97.97	98.93	99.50	99.90	82.70	70.17	48.20		
Apr		0.00	0.00	0.00	63.83	87.43	93.73	96.63	98.20	99.17	99.73	100.00	100.00	94.67	70.90		
May		0.50	0.00	19.70	80.97	90.73	94.97	97.23	98.40	99.30	99.90	100.00	100.00	100.00	100.00	53.20	
Jun	0.00	3.07	0.97	32.67	83.37	91.57	95.10	97.33	98.43	99.30	99.93	100.00	100.00	100.00	100.00	98.20	94.23
Jul		1.57	0.00	11.73	77.90	90.13	94.43	97.00	98.27	99.20	99.83	100.00	100.00	100.00	100.00	68.53	
Aug			0.00	0.00	60.60	86.83	93.43	96.50	98.10	99.13	99.70	100.00	100.00	95.37	78.43	8.27	
Sep			0.00	0.00	28.47	82.10	93.07	96.50	98.30	99.10	99.63	100.00	79.40	63.00			
Oct				0.00	12.63	76.60	93.77	97.10	98.40	99.10	85.23	50.73	51.23				
Nov					22.50	72.77	94.33	97.17	98.33	82.23	28.27	20.97					
Dec						68.30	93.83	96.83	98.17	73.57	17.33	13.53					

Overshadowing assessment % of the amenity area receiving direct sunlight on 21st March			
Existing	Proposed	Ratio	Result
72.71	71.75	0.99	Negligible

Result for A2 - Open Garden at Highgate Road

Existing Case:

Month	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00
Jan						100.00	99.97	99.98	99.98	82.17	52.03	18.50	0.00				
Feb					48.77	100.00	100.00	99.98	99.97	99.98	74.33	51.88	23.75	19.45			
Mar				42.77	100.00	100.00	100.00	99.98	99.98	99.98	100.00	79.55	55.82	49.38	15.55		
Apr		0.00	22.82	63.98	96.22	100.00	100.00	100.00	100.00	100.00	100.00	100.00	88.53	78.38	13.03		
May		0.63	15.95	71.97	91.47	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.93	91.32	63.82	5.93	
Jun	0.00	0.00	13.23	65.57	88.65	100.00	100.00	100.00	100.00	100.00	100.00	100.00	99.98	96.43	81.13	23.13	5.42
Jul		0.00	11.75	67.82	88.77	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	92.40	75.05	5.87	
Aug			20.97	55.82	95.27	100.00	100.00	100.00	100.00	100.00	100.00	100.00	90.95	79.50	20.82	1.78	
Sep			0.00	47.75	100.00	100.00	100.00	99.98	99.98	100.00	100.00	72.87	52.62	44.10			
Oct				0.00	100.00	100.00	99.98	99.97	99.97	87.53	61.88	35.95	12.83				
Nov					40.75	100.00	99.95	99.98	96.57	69.82	36.67	0.00					
Dec						100.00	99.90	99.95	99.80	72.97	37.17	0.05					

Proposed Case:

Month	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00
Jan						100.00	99.97	99.98	99.98	82.03	51.73	18.05	0.00				
Feb					48.63	100.00	100.00	99.98	99.97	99.98	74.02	51.60	23.35	19.45			
Mar				42.73	100.00	100.00	100.00	99.98	99.98	99.98	100.00	79.33	54.62	49.52	15.55		
Apr		0.00	22.85	64.03	96.28	100.00	100.00	100.00	100.00	100.00	100.00	99.53	86.00	77.95	22.10		
May		0.63	16.07	72.07	91.52	100.00	100.00	100.00	100.00	100.00	100.00	98.62	96.62	89.37	67.98	19.23	
Jun	0.00	0.00	13.35	65.67	88.72	100.00	100.00	100.00	100.00	100.00	100.00	98.43	96.35	93.65	83.05	36.95	6.35
Jul		0.00	11.80	67.92	88.82	100.00	100.00	100.00	100.00	100.00	100.00	98.93	96.90	90.00	77.83	23.18	
Aug			21.02	55.87	95.32	100.00	100.00	100.00	100.00	100.00	100.00	99.67	88.55	78.80	29.78	0.77	
Sep			0.00	47.73	100.00	100.00	99.97	99.98	99.98	100.00	100.00	72.65	50.97	44.03			
Oct				0.00	100.00	100.00	99.98	99.97	99.97	86.85	61.63	35.62	11.97				
Nov					40.10	100.00	99.95	99.98	96.52	69.65	36.48	0.00					
Dec						100.00	99.90	99.95	99.80	72.97	36.93	0.05					

Overshadowing assessment			
% of the amenity area receiving direct sunlight on 21st March			
Existing	Proposed	Ratio	Result
78.58	78.48	1.00	Negligible

Result for A3 - Open Garden at Highgate Road

Existing Case:

Month	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00
Jan						52.20	53.83	33.33	35.73	36.90	38.43	41.37	16.90				
Feb					40.23	39.23	66.23	68.33	54.23	41.43	48.00	74.27	85.73	0.00			
Mar				42.27	40.73	39.53	66.47	68.53	53.20	43.23	56.27	98.37	72.97	27.63	15.90		
Apr		0.00	46.97	43.33	41.37	39.93	62.77	68.67	48.30	46.93	82.73	99.77	45.13	25.73	12.20		
May		63.73	49.97	44.70	42.13	40.47	59.47	69.17	58.97	54.23	99.97	97.20	72.37	32.40	11.03	6.33	
Jun	0.00	72.93	52.57	45.83	42.77	40.87	57.17	69.70	69.83	60.90	99.97	96.70	73.40	61.63	13.87	6.00	3.00
Jul		41.97	51.53	45.37	42.50	40.73	56.30	69.63	63.33	51.87	99.97	99.03	75.00	59.30	14.03	6.83	
Aug			47.37	43.53	41.47	40.03	61.23	68.93	50.80	46.03	77.60	99.83	49.73	26.80	12.43	0.00	
Sep			0.00	41.83	40.40	42.13	68.77	67.77	44.90	45.90	61.73	97.70	47.03	22.43			
Oct				33.33	39.70	57.67	69.53	67.27	38.13	44.43	52.23	88.07	57.03				
Nov					39.40	66.07	33.30	33.97	36.13	37.13	38.53	59.17					
Dec						62.47	33.20	33.63	33.63	33.33	31.83	34.80					

Proposed Case:

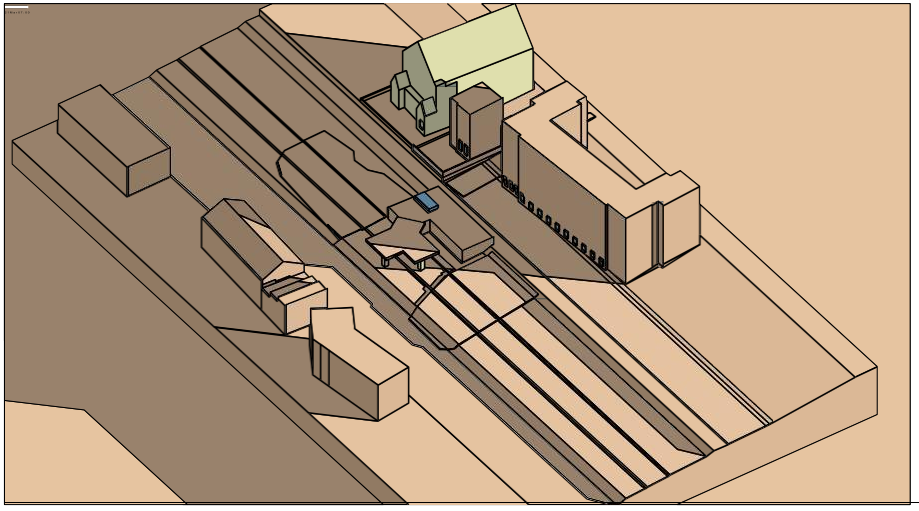
Month	04:00	05:00	06:00	07:00	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00
Jan						52.23	53.77	20.30	8.70	7.37	6.30	8.80	0.00				
Feb					40.23	39.23	66.10	63.43	38.73	16.53	17.57	42.37	49.83	0.00			
Mar				42.27	40.73	39.53	66.47	68.40	45.50	28.13	32.97	66.63	48.50	16.30	9.50		
Apr		0.00	46.97	43.33	41.33	39.93	62.83	68.67	45.40	38.20	67.70	79.53	26.93	17.93	8.47		
May		63.70	49.93	44.70	42.13	40.43	59.53	69.13	58.57	49.23	90.30	84.47	60.67	26.77	8.77	6.07	
Jun	0.00	72.87	52.57	45.80	42.77	40.87	57.23	69.70	69.50	57.33	92.40	86.37	63.47	56.20	11.93	5.83	3.00
Jul		41.93	51.50	45.33	42.50	40.70	56.37	69.63	63.10	47.60	91.23	86.67	63.00	52.30	11.40	6.37	
Aug			47.37	43.53	41.47	40.03	61.30	68.93	48.37	37.80	63.10	79.93	31.20	18.53	8.53	0.00	
Sep			0.00	41.83	40.40	42.17	68.80	65.73	35.40	28.97	36.27	66.63	25.67	12.57			
Oct				33.33	39.70	57.73	69.43	56.57	17.60	14.27	22.40	52.97	45.77				
Nov					39.40	66.07	30.50	14.47	4.57	6.30	5.73	28.10					
Dec						62.50	32.43	13.93	3.43	2.43	1.17	0.53					

Overshadowing assessment			
% of the amenity area receiving direct sunlight on 21st March			
Existing	Proposed	Ratio	Result
52.09	42.08	0.81	Negligible

7.8. SunCast Images

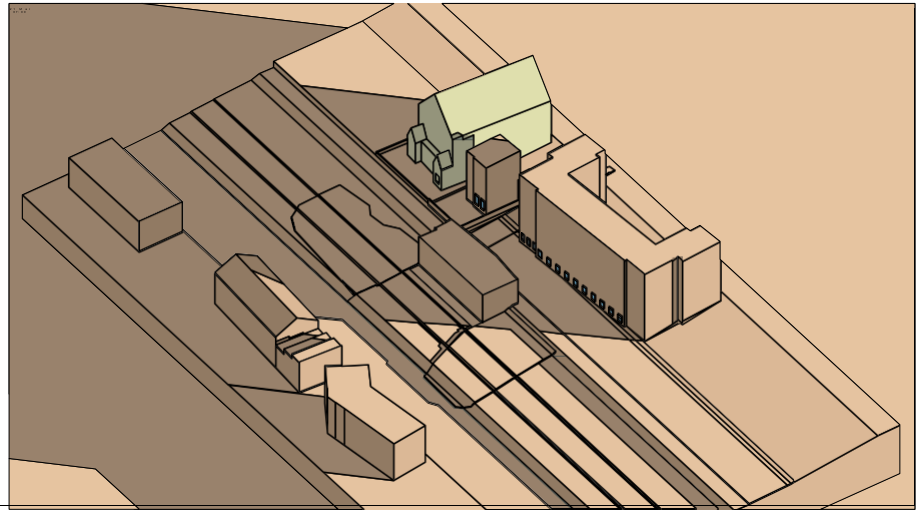
Suncast Image (21 March 07:00)

Suncast image:
View time = 21 Mar 07:00
Site Latitude= 51.56
Longitude diff.= -0.14
Model Bearing= 0.00
Sun: azi = 100.42 alt = 7.65
Eye: azi = 180.00 alt = 40.00



Existing

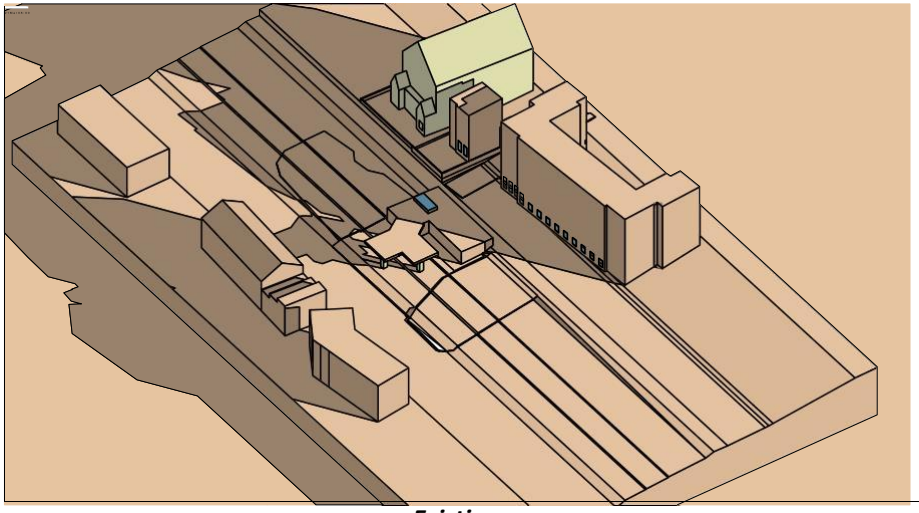
Suncast image:
View time = 21 Mar 07:00
Site Latitude =51.56
Longitude diff. =-0.14
Model Bearing =0.00
Sun: azi = 100.42 alt = 7.65
Eye: azi = 180.00 alt = 40.00



Proposed

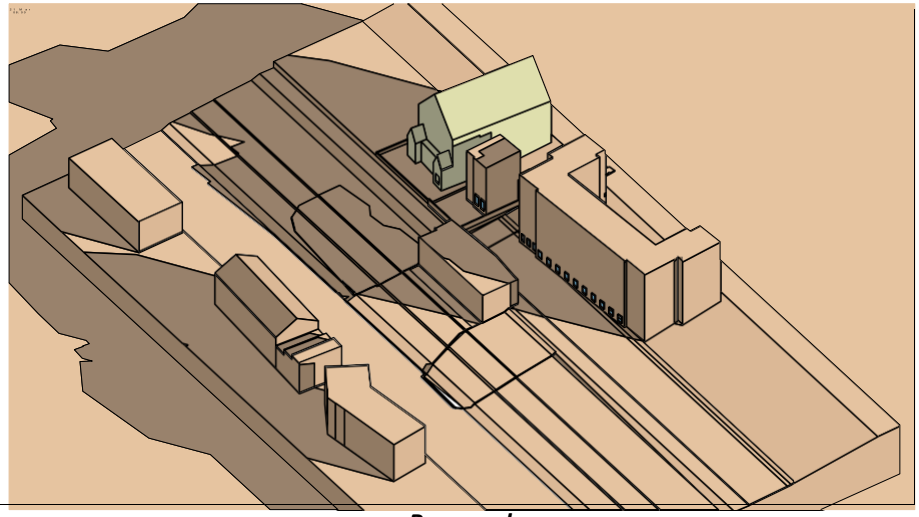
Suncast Image (21 March 08:00)

Suncast image:
View time = 21 Mar 08:00
Site Latitude= 51.56
Longitude diff.= -0.14
Model Bearing= 0.00
Sun: azi = 112.76 alt = 16.58
Eye: azi = 180.00 alt = 40.00



Existing

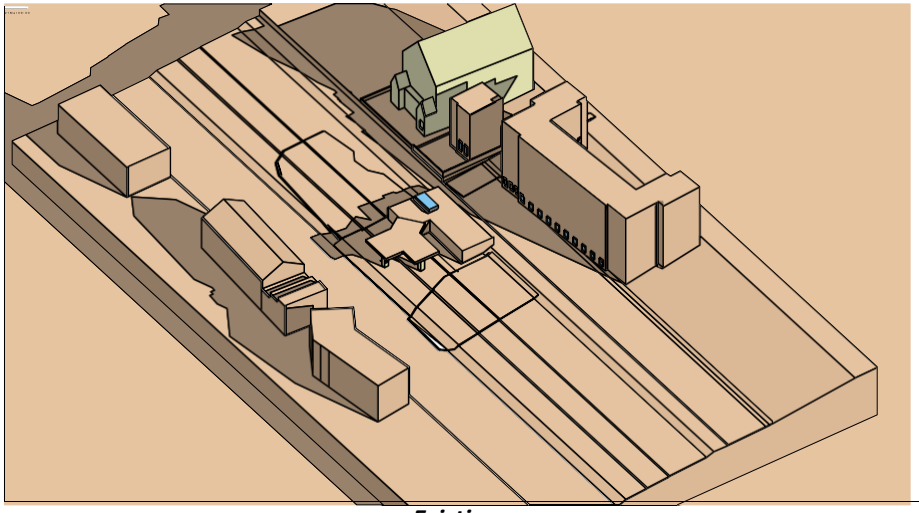
Suncast image:
View time = 21 Mar 08:00
Site Latitude =51.56
Longitude diff. =-0.14
Model Bearing =0.00
Sun: azi = 112.76 alt = 16.58
Eye: azi = 180.00 alt = 40.00



Proposed

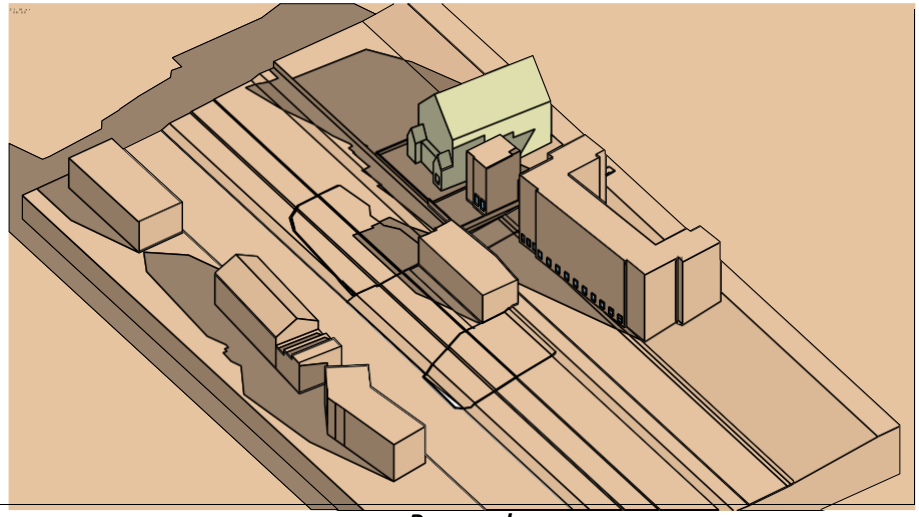
Suncast Image (21 March 09:00)

Suncast image:
View time = 21 Mar 09:00
Site Latitude= 51.56
Longitude diff.= -0.14
Model Bearing= 0.00
Sun: azi = 126.27 alt = 24.68
Eye: azi = 180.00 alt = 40.00



Existing

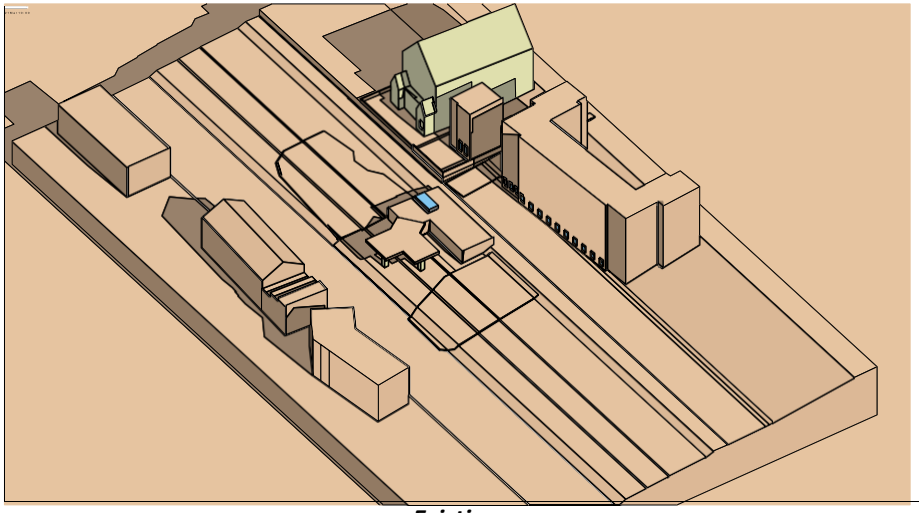
Suncast image:
View time = 21 Mar 09:00
Site Latitude = 51.56
Longitude diff. = -0.14
Model Bearing = 0.00
Sun: azi = 126.27 alt = 24.68
Eye: azi = 180.00 alt = 40.00



Proposed

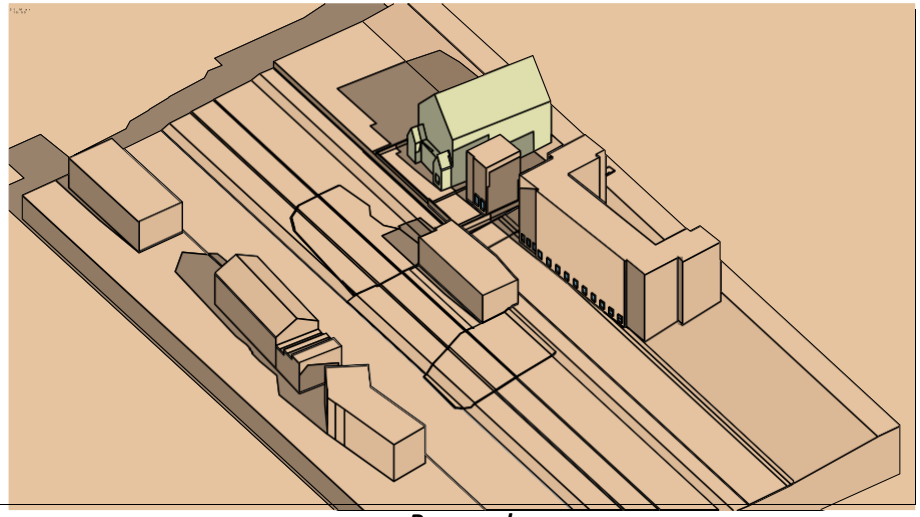
Suncase Image (21 March 10:00)

Suncast image:
View time = 21 Mar 10:00
Site Latitude= 51.56
Longitude diff.= -0.14
Model Bearing= 0.00
Sun: azi = 141.49 alt = 31.40
Eye: azi = 180.00 alt = 40.00



Existing

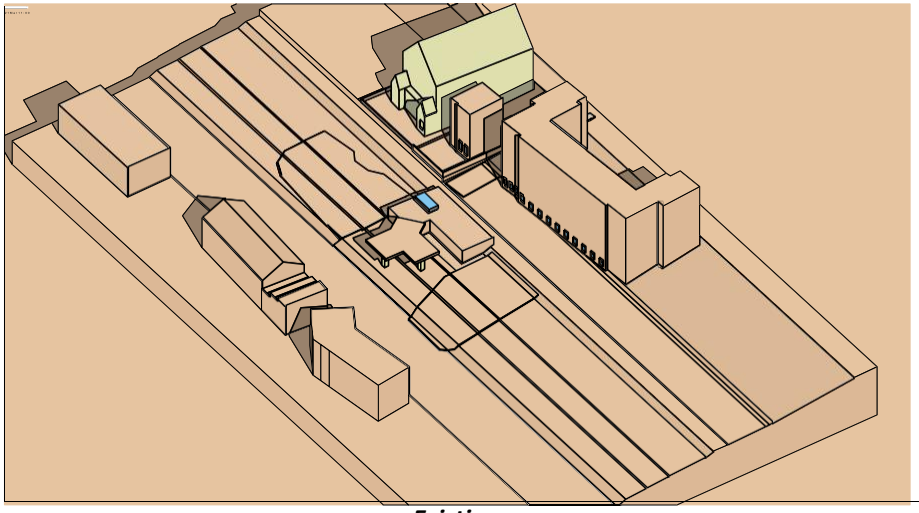
Suncast image:
View time = 21 Mar 10:00
Site Latitude = 51.56
Longitude diff. = -0.14
Model Bearing = 0.00
Sun: azi = 141.49 alt = 31.40
Eye: azi = 180.00 alt = 40.00



Proposed

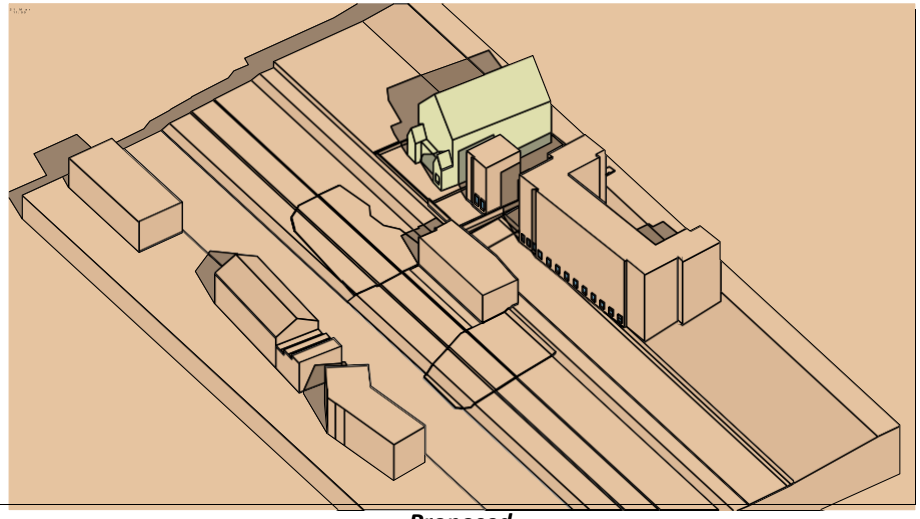
Suncase Image (21 March 11:00)

Suncast image:
View time = 21 Mar 11:00
Site Latitude= 51.56
Longitude diff.= -0.14
Model Bearing= 0.00
Sun: azi = 158.66 alt = 36.06
Eye: azi = 180.00 alt = 40.00



Existing

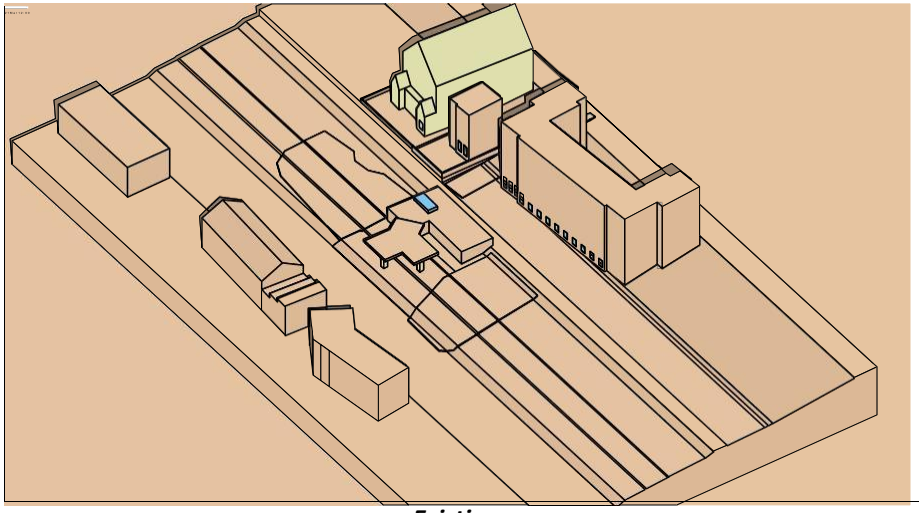
Suncast image:
View time = 21 Mar 11:00
Site Latitude =51.56
Longitude diff. =-0.14
Model Bearing =0.00
Sun: azi = 158.66 alt = 36.06
Eye: azi = 180.00 alt = 40.00



Proposed

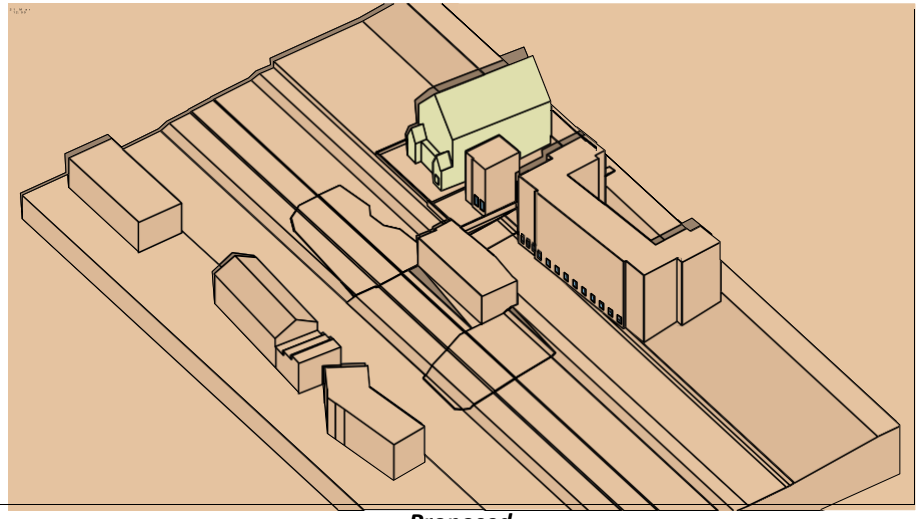
Suncast Image (21 March 12:00)

Suncast image:
View time = 21 Mar 12:00
Site Latitude= 51.56
Longitude diff.= -0.14
Model Bearing= 0.00
Sun: azi = 177.33 alt = 38.00
Eye: azi = 180.00 alt = 40.00



Existing

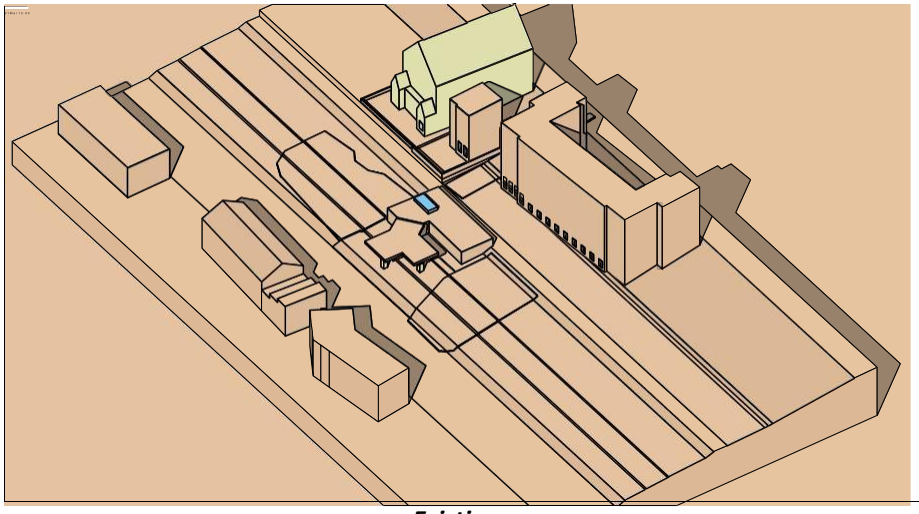
Suncast image:
View time = 21 Mar 12:00
Site Latitude =51.56
Longitude diff. =-0.14
Model Bearing =0.00
Sun: azi = 177.33 alt = 38.00
Eye: azi = 180.00 alt = 40.00



Proposed

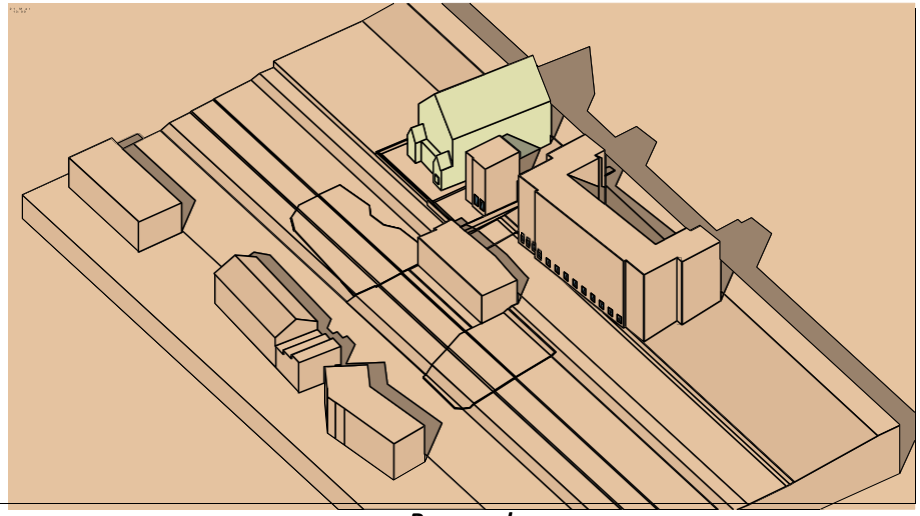
Suncast Image (21 March 13:00)

Suncast image:
View time = 21 Mar 13:00
Site Latitude= 51.56
Longitude diff.= -0.14
Model Bearing= 0.00
Sun: azi = 196.20 alt = 36.90
Eye: azi = 180.00 alt = 40.00



Existing

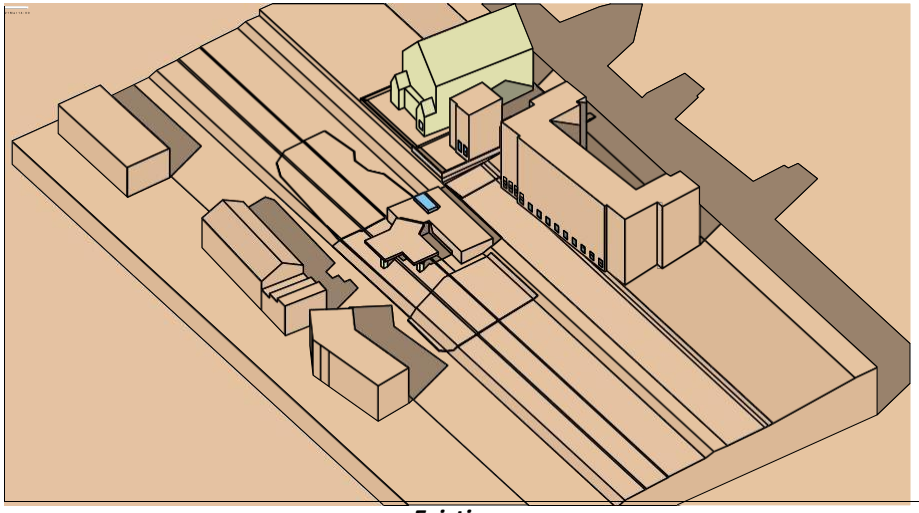
Suncast image:
View time = 21 Mar 13:00
Site Latitude =51.56
Longitude diff. =-0.14
Model Bearing =0.00
Sun: azi = 196.20 alt = 36.90
Eye: azi = 180.00 alt = 40.00



Proposed

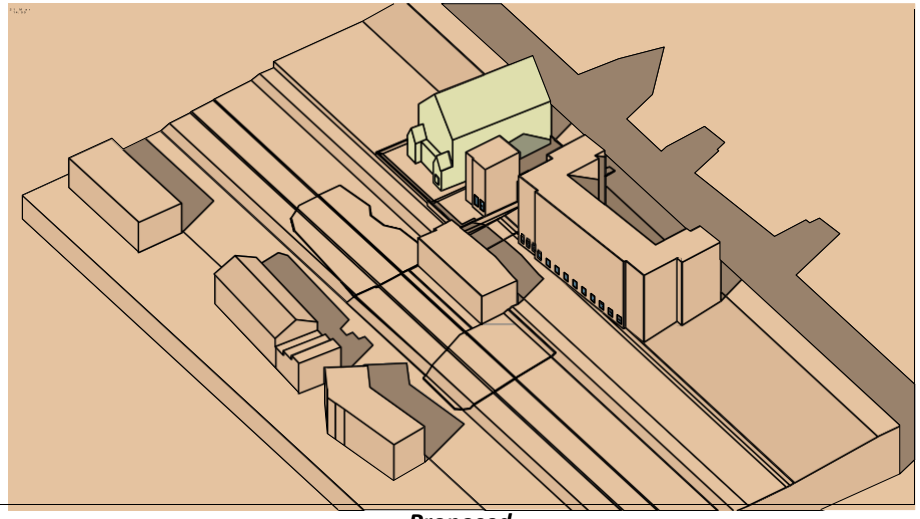
Suncast Images (21 March 14:00)

Suncast image:
View time = 21 Mar 14:00
Site Latitude= 51.56
Longitude diff.= -0.14
Model Bearing= 0.00
Sun: azi = 213.88 alt = 32.95
Eye: azi = 180.00 alt = 40.00



Existing

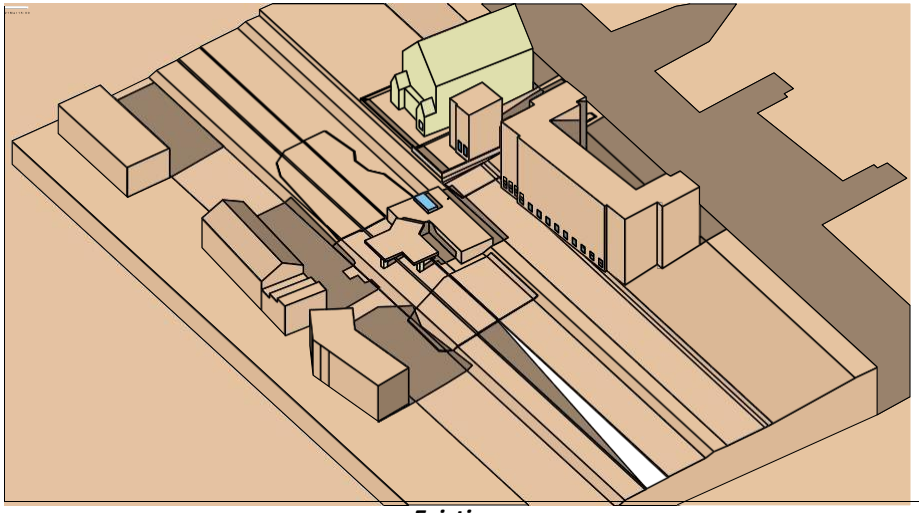
Suncast image:
View time = 21 Mar 14:00
Site Latitude =51.56
Longitude diff. =-0.14
Model Bearing =0.00
Sun: azi = 213.88 alt = 32.95
Eye: azi = 180.00 alt = 40.00



Proposed

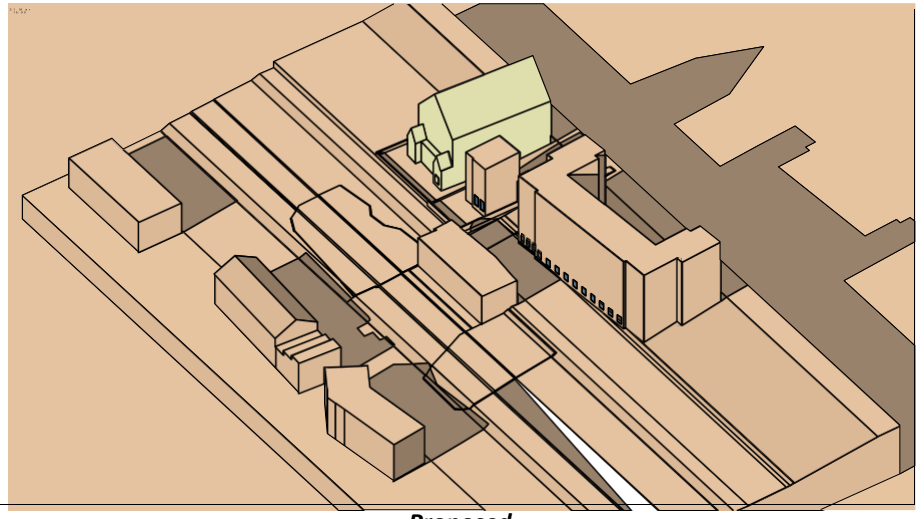
Suncast Images (21 March 15:00)

Suncast image:
View time = 21 Mar 15:00
Site Latitude= 51.56
Longitude diff.= -0.14
Model Bearing= 0.00
Sun: azi = 229.65 alt = 26.74
Eye: azi = 180.00 alt = 40.00



Existing

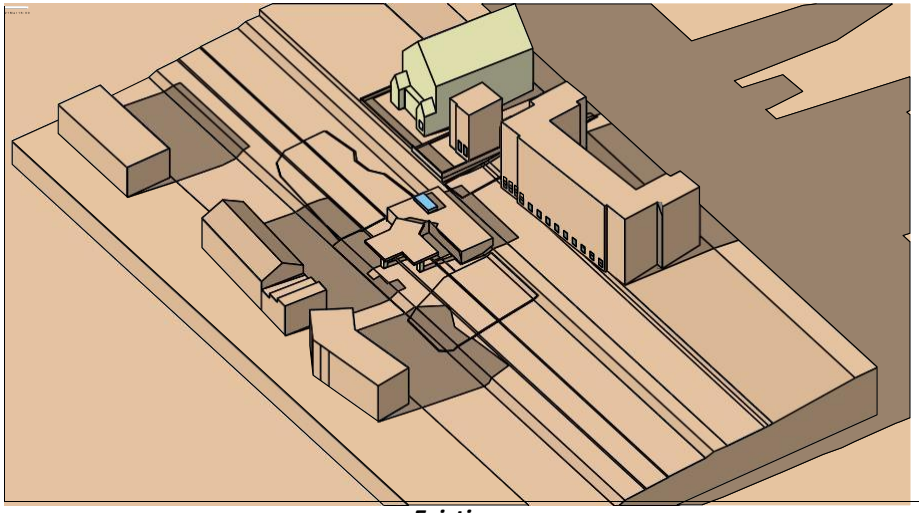
Suncast image:
View time = 21 Mar 15:00
Site Latitude =51.56
Longitude diff. =-0.14
Model Bearing =0.00
Sun: azi = 229.65 alt = 26.74
Eye: azi = 180.00 alt = 40.00



Proposed

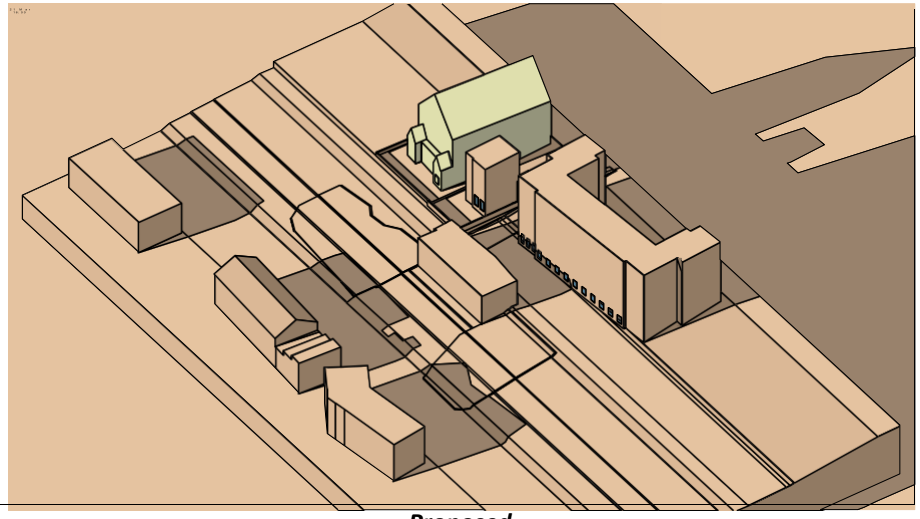
Suncast Images (21 March 16:00)

Suncast image:
View time = 21 Mar 16:00
Site Latitude= 51.56
Longitude diff.= -0.14
Model Bearing= 0.00
Sun: azi = 243.59 alt = 18.96
Eye: azi = 180.00 alt = 40.00



Existing

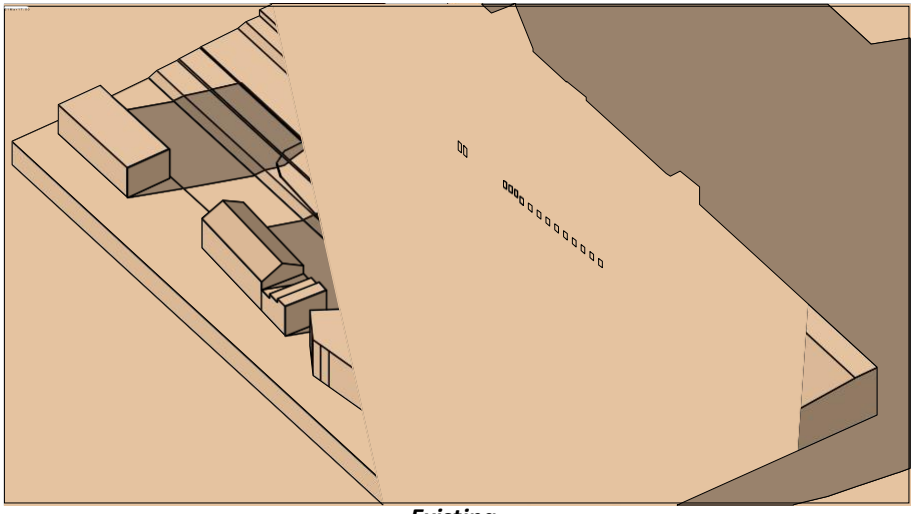
Suncast image:
View time = 21 Mar 16:00
Site Latitude =51.56
Longitude diff. =-0.14
Model Bearing =0.00
Sun: azi = 243.59 alt = 18.96
Eye: azi = 180.00 alt = 40.00



Proposed

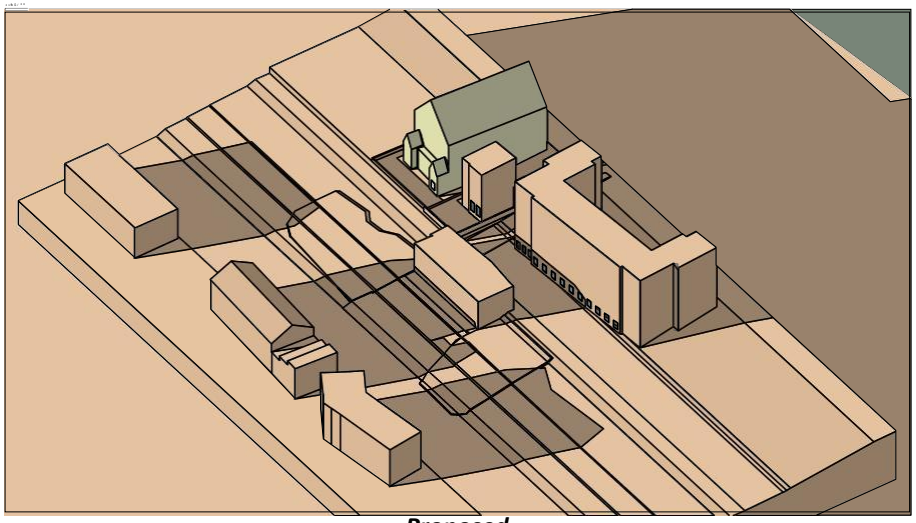
Suncast Images (21 March 17:00)

Suncast image:
View time = 21 Mar 17:00
Site Latitude = 51.56
Longitude diff. = -0.14
Model Bearing = 0.00
Sun: azi = 256.20 alt = 10.21
Eye: azi = 180.00 alt = 40.00



Existing

Suncast image:
View time = 21 Mar 17:00
Site Latitude = 51.56
Longitude diff. = -0.14
Model Bearing = 0.00
Sun: azi = 256.20 alt = 10.21
Eye: azi = 180.00 alt = 40.00



Proposed