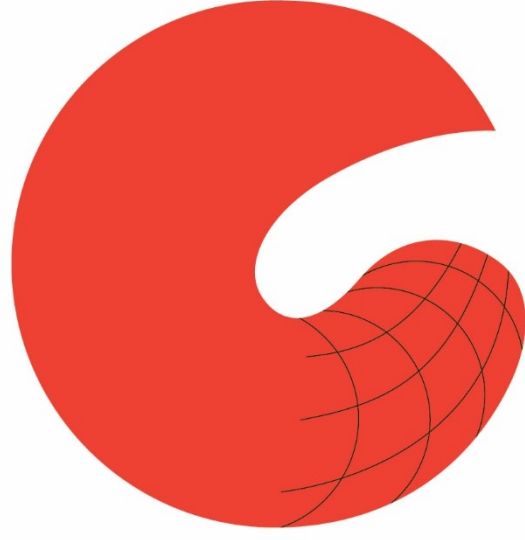




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400 THAMES VALLEY PARK DRIVE – ROOF EXTENSION, EARLEY
Daylight & Sunlight Assessment

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Reference: MB/VL/P24-3203/02

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Registration of Amendments

Revision and Date	Amendment Details	Revision Prepared By	Revision Approved By

EXECUTIVE SUMMARY

This report assesses the level of daylight and sunlight provision for the proposed new development located at 400 Thames Valley Park Drive – Roof Extension, Earley, in the Wokingham Borough Council and examines the proposed development's impact on the neighbouring properties and amenity areas.

The development is a permitted development which involves construction of two additional storeys above the existing commercial building for residential use.

This assessment has been undertaken following the guidance given in the Building Research Establishment's (BRE) Publication 'Site Layout Planning for Daylight and Sunlight', 2022 Edition. It calculates the Vertical Sky Component (VSC), Illuminance Levels (Lux) and Annual Probable Sunlight Hours (APSH) for the proposed units and reviews these values in line with BRE guidance. For the existing buildings in the vicinity of the site, the assessment determines the overall reduction in VSC for the relevant windows within the dwellings, which will be experienced following the construction of the proposed extension. It also assesses the APSH for existing living spaces.

It has been established that there are no specific daylight criteria for commercial buildings, therefore the neighbouring non-residential buildings have been excluded from this assessment.

Results for the proposed development

The assessment finds that all of relevant spaces meet the BRE guidance for the recommended level of daylight in new developments.

An assessment of access to sunlight has also been carried out for all living rooms with windows facing within 90 degrees of south. The results confirm that the modelled spaces have achieved the recommended values for average annual and winter sunlight exposure.

Results for existing spaces

There are two buildings close to the proposed development: Oracle 540 and Sanofi UK. Both are commercial buildings. It has been established that there are no specific daylight criteria for commercial buildings; therefore, the neighbouring non-residential buildings can be excluded from this assessment.

Amenity areas

It is concluded that there are no external amenity areas that would be impacted on by the proposed development.

Conclusion

It is concluded that the proposed development will have a satisfactory level of daylight and sunlight in all new spaces and will have a no significant impact on the internal day and sun-light levels in the neighbouring buildings. There is no significant impact caused by the proposed development on the existing buildings.

1.0 INTRODUCTION

- 1.1 Create Consulting Engineers Ltd has been commissioned by TVP Investments Limited to conduct a Daylight & Sunlight Assessment in support of a permitted development. The application for development will be submitted under Class (AA) for "*Construction of additional floors on an existing commercial building.*" This application pertains to the proposed construction of two additional storeys above the existing commercial building at Thames Valley Park, 400 Thames Valley Park Dr, Earley, Reading RG6 1PT, within the Wokingham Borough. This report evaluates the impact of the development proposals on the availability of daylight and sunlight for the proposed dwellings and neighbouring residences surrounding the block. It also provides a comparison with the current existing site conditions.

Site Description and Location

- 1.2 The site is located in the Wokingham Borough, and the proposed development is intended to be carried out at 400 Thames Valley Park Drive – Roof Extension, Earley. Please refer to the Site Location and plans below for details (Figures 1.1 and 1.2).



Figure 1.1: Proposed site boundary and surrounding buildings (source: Google Earth)

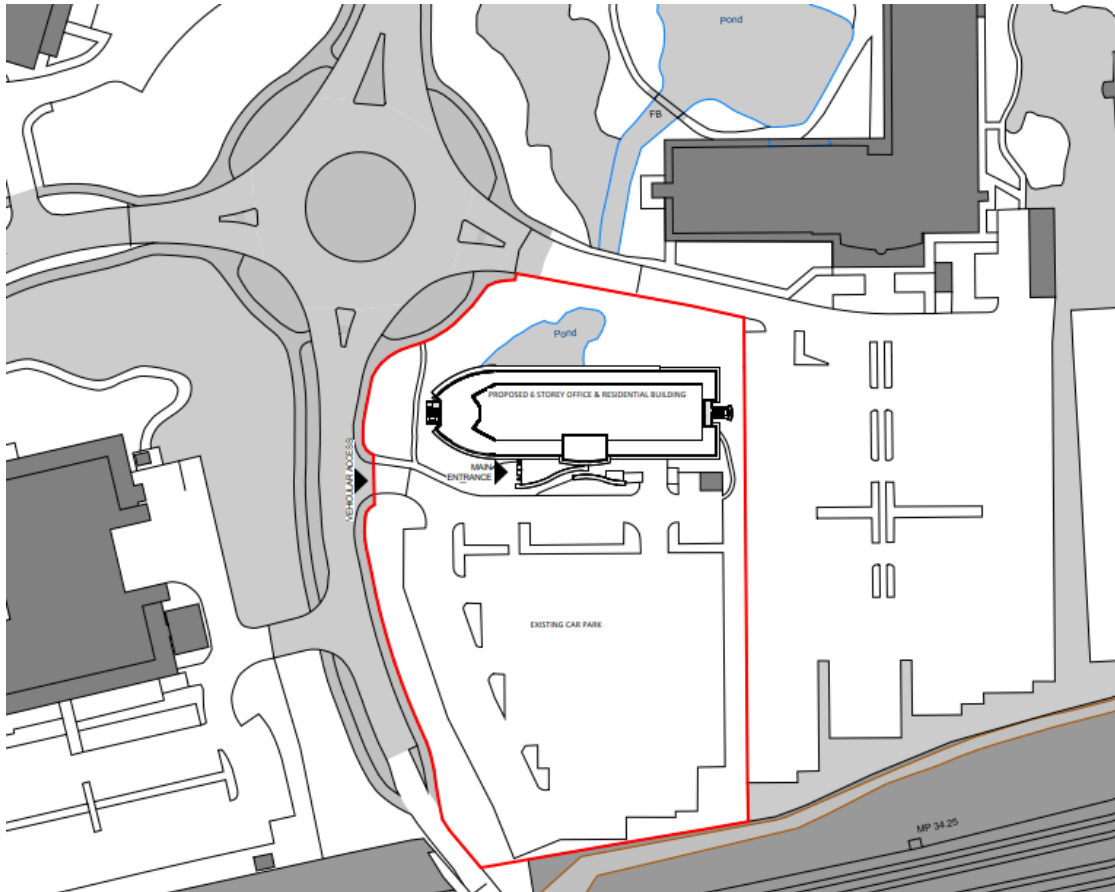


Figure 1.2: Proposed site plan (source: Rohacs Architects)

- 1.3 The site (400 Thames Valley Park Drive) is a commercial building located to the west of Oracle Parkway.

Assessed Spaces

- 1.4 Following the BRE guidance, the following spaces must be included in the assessment:
- For the daylight study – All living rooms, kitchens, bedrooms, and studies in the new proposal and in the neighbouring properties, on affected elevations;
 - For the sunlight study - all living rooms facing within 90 degrees of due south, located in the proposed development and in the surrounding dwellings (where floor layout is known);
 - For the over-shading study – all private gardens and communal sitting areas potentially overshadowed by the proposed development.

Policy Context

Wokingham Borough Core Strategy - Aspirations and Spatial Issues for the Borough

2.68 Overall, taking account of these issues, the aspirations and spatial issues that therefore need to be addressed by the Core Strategy are (in no order of priority):

- i) Delivers sustainable development by providing an acceptable balance of housing and employment including the provision of a full range of services accessible to people;*
- ii) Promotes sustainable use and disposal of resources while mitigating and adapting to climate change;*
- iii) Delivers housing in locations that meet the needs of the community;*
- iv) Supports a sequential approach to new mixed use development locations based primarily on larger scale (SDL) consisting of accessible, high quality, well designed development. The SDL will be supported by Development Briefs to ensure delivery of the essential community facilities and infrastructure required;*
- v) Delivers affordable housing that meets identified local needs;*
- vi) Promotes a transport system that enables access to services by a variety of modes;*
- vii) Protects the character of the borough by maintaining/improving the built/natural environment while mitigating the effect of new development on the environment;*
- viii) Maintains the distinct and separate identity of the borough's settlements;*
- ix) Maintains and enhances all the infrastructure, including roads, railways, schools, healthcare and open space provision through new development, taking account of the health and well being of residents;*
- x) Supports the renaissance of Wokingham and other town centres;*
- xi) Limits development in those areas at most risk of flooding and pollution;*
- xii) Protects the most important areas for biodiversity, landscape and heritage from development;*
- xiii) Maintains and enhances the borough's knowledge and skills base;*
- xiv) Ensures good design which is in keeping with the area*
- xv) Where national and regional policies allow, takes account of the public's views following consultation and engagement.*

- 1.5 This document confirms that the BRE guidance on assessing the level of daylight and sunlight in new and existing buildings should be followed.
- 1.6 The Validation Checklist issued for minor and major developments also states that where the proposed development may have a potentially adverse effect on the daylight and/or sunlight enjoyed by adjoining properties a Daylight/Sunlight Assessment is required to be submitted with the application for permitted development.

- 1.7 This application will be submitted under Class AA for ‘construction of additional floors on an existing commercial building’. As part of the submission, it is required that the following relevant conditions are met:

For the class AA application, the regulations require:

“Where any development under Class AA is proposed, development is permitted subject to the condition that before beginning the development, the developer must apply to the local planning authority for prior approval of the authority as to—

f) the provision of adequate natural light in all habitable rooms of the new dwellinghouses.

g) impact on the amenity of the existing building and neighbouring premises including overlooking, privacy and the loss of light;”

2.0 CALCULATION METHODOLOGY

Guidance and Software Used

- 2.1 The provision of daylight access has been assessed based upon the guidance and methodologies detailed in the Building Research Establishment's (BRE) Guide 'Site Layout and Planning for Daylight and Sunlight – a Good Practice Guide', 2022 Edition.
- 2.2 The assessment model was produced using IES VE version 2022.2.0.0, a full dynamic simulation modelling software capable of performing a variety of environment simulations for large and complex buildings. IES VE can produce accurate predictions of several lighting parameters through its SunCast and RadianceIES modules.

25 Degree Line Check

- 2.3 The 25 degree line check is an initial quick test to determine if a new development will impact upon the amount of daylight received by the surrounding buildings, as well as assessing whether the surrounding buildings will impact upon the amount of daylight received within the proposed development.
- 2.4 The 25 degree line check consists of drawing a line in a sectional view from the highest obstructing point to the centre of the assessed window. If the angle of this line exceeds 25° from the perpendicular, then the amount of daylight received by the window is likely to be affected.
- 2.5 For areas identified as failing the 25 degree line check, the BRE guide presents two additional methods for more in-depth daylight analysis. These are the Vertical Sky Component (VSC) and Average Daylight Factors (ADF).

45 Degree Line Check

- 2.6 The 45 degree line check is applicable to extensions or new parts of the development where part of the building is perpendicular to the potentially affected windows. It involves drawing a line on elevation at an angle of 45 degrees away from the near top corner of the perpendicular extension and drawing another line on the plan, also at 45 degrees angle, back towards the window wall from the end of the extension.
- 2.7 The 45 degree line check is not applicable for this site as the main parts of the proposed building are not perpendicular to any of the existing residential buildings.

Vertical Sky Component (VSC)

- 2.8 The Vertical Sky Component is a measure of the amount of skylight incident on a vertical plane. It is most commonly applied to the light incident at the centre of a window, and in this sense is a measure of the potential for good day light. The VSC is calculated by taking the ratio of the skylight incident at a point to the unobstructed skylight available at that same point on a horizontal plane. For a uniform sky, the maximum value is 50% (since the point is on a vertical plane, clearly only half the hemisphere can contribute). For a CIE sky, which for the purposes of the daylight & sunlight study is a standard overcast sky, the maximum value is 39.6%. VSC calculations have been undertaken using computer-based simulation.

Illuminance Check

- 2.9 The illuminance recommendations are based around the illuminances that would be met or exceeded over half of the room, over half of daylight hours over the year. BS EN 17037 gives a range of recommendations for high, medium and minimum daylight provision. The National Annex A also gives minimum values for housing in living rooms, kitchens and bedrooms. These are minimum recommended values for locations where a predominantly daylight appearance is not achievable, e.g., where external obstructions are present.

Sunlight Analysis

- 2.10 The measure of sunlight that a given window may expect over a year period is known as the Annual Probable Sunlight Hours (APSH) and expressed as a percentage. Due to the sun's path across our sky, north facing windows are able to receive direct sunlight on only a small number of occasions per year and windows facing east or west will typically only receive sunlight in the morning or evening. Therefore, BRE guidance states that only windows with an orientation 90° of south need be assessed.
- 2.11 Sunlight access and overshadowing impact have been determined using a 3D computer simulation of the proposed development and a sun path calculation tool to determine the difference in direct solar exposure between the existing and proposed developments.

Limitations and Assumptions

- 2.12 The following assumptions and limitations have been made within this assessment:
- Location and sizes of openings to the assessed neighbouring dwellings at Ray Court and Stanmore House are based on street view photographs and the site topographical survey provided by the client as well as historic drawings and sales documents available online.
 - Ground topography has been simplified based on the site topographical survey drawing prepared by Rohacs Architects, dated December 2023.

-
- Reflectance and transmittance values for all glazing as well as for external walls, balconies, internal walls and ceilings are based on information acquired from the IES Construction Database and to align with the BRE recommendations.

3.0 DAYLIGHT (VSC)

- 3.1 The assessment of Daylight has been undertaken using Vertical Sky Component (VSC).
- 3.2 The VSC calculation has been assessed against the guidance given in the BRE publication 'Site Layout Planning for Daylight and Sunlight'. The VSC check is used to assess the daylight access to a vertical surface such as a window. VSC calculations produce a value between 0 and 40%.
- 3.3 If the calculated VSC for a window is greater than 27% then the window is considered to receive enough skylight. If the VSC for the buildings surrounding the proposed development, is both less than 27% and less than 0.8 times its former value ('existing' case), occupants of the existing building will notice the reduction in the amount of skylight.
- 3.4 Comments by the Greater London Authority (GLA), in the context of a planning appeal, are also noted:

"It should, nevertheless, be noted that the 27% VSC target value is derived from a low-density suburban housing model. The independent daylight and sunlight review states that in an inner-city urban environment, VSC values more than 20% should be considered as reasonably good, and that VSC in the mid-teens should be acceptable. However, where the VSC value falls below 10% (to be in single figures), the availability of direct light from the sky will be poor."

Source: Greater London Authority, representation hearing report D&P/3067/03 – Appendix 1, 18/11/2013

- 3.5 VSC check should be carried out for all 'main windows' which are defined as openings serving living rooms, dining rooms, studies, kitchens and bedrooms. Windows to bathrooms, toilets, storerooms and circulation do not have to be analysed.
- 3.6 VSC checks have been undertaken for all of the openings to main rooms within the proposed development and relevant openings in existing neighbouring buildings.
- 3.7 It should be noted that the VSC check measures the illuminance of a surface, as opposed to the level of light that is transmitted through an opening. Subsequently, the precise geometric dimensions of any window or surface assessed are less important than its relative position to any obstructions.

Results of the calculations for the proposed development

- 3.8 The numerical results of the VSC calculations for all the assessed windows calculated for the proposed development are detailed in Appendix A. The results confirm that the majority of windows pass the VSC check. Please refer to figures below for visual representation of VSC check results.

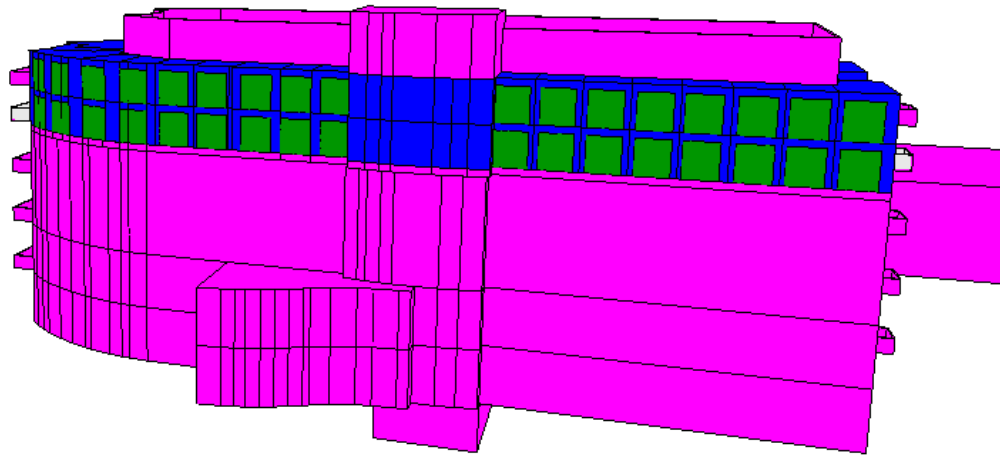


Figure 3.1: Visual representation of VSC results for the proposed building – south elevation; green areas indicate a passing window (extracted from IES Radiance)

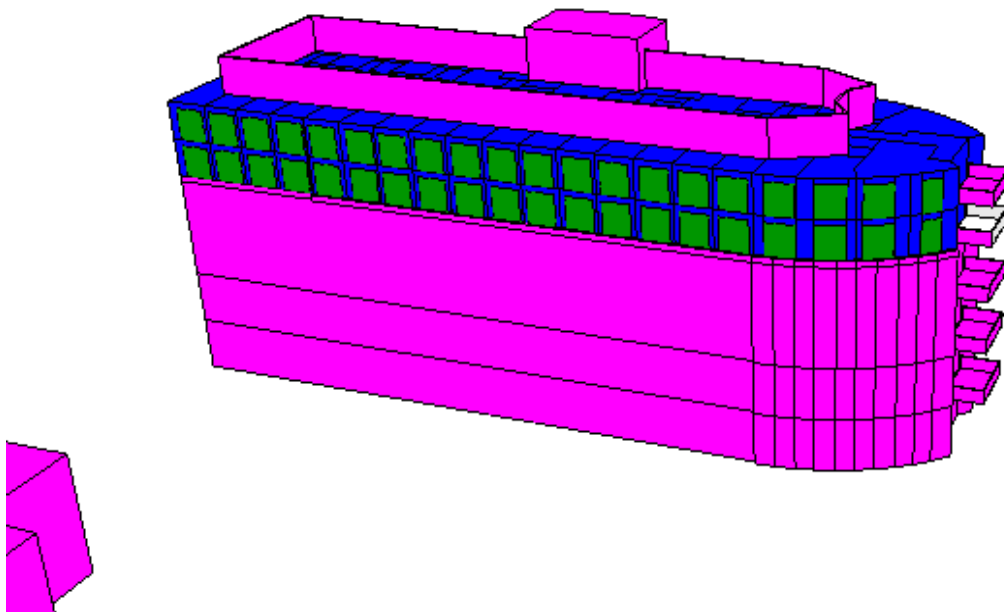


Figure 3.2: Visual representation of VSC results for the proposed building – north elevation; green areas indicate a passing window (extracted from IES Radiance)

Total Assessed Windows:	80		
VSC Pass	80	100%	100%
VSC Marginal Fail (Pass2: VSC>15)	0	0%	
VSC Fail	0		

Table 3.1: VSC Results for Proposed Development

- 3.9 The overall scheme will attain an exceptionally high level of daylight compliance, as all 80 windows evaluated for VSC (100%) meet the BRE Guidelines.

Results of the calculations for existing dwellings

- 3.10 Two buildings, Oracle 540 and Sanofi UK, are situated near the proposed development. Both are commercial buildings. Since there are no specific daylight criteria established for commercial buildings, the neighbouring non-residential buildings can be excluded from this assessment.

4.0 ILLUMINANCE METHOD

- 4.1 Illuminance is a measure of the amount of light falling on a surface, usually measured in lux.
- 4.2 Illuminance method involves using climatic data for the location of the site to calculate the illuminance from daylight at each point on an assessment grid on the reference plane at an at least hourly interval for a typical year.
- 4.3 For compliance with the BRE standard (and BS EN 17037) a daylight space should achieve the minimum level of recommendation. This is shown in the table 4.1 below.

Level of recommendation	Target illuminance Et (lx) for 50% of assessment grid	Target illuminance Et (lx) for 95% of assessment grid
Minimum	300	100
Medium	500	300
High	750	500

Table 4.1: Illuminance targets

- 4.4 Additionally, according to the UK National Annex, the illuminance recommendations for daylight provision in UK dwellings is as below:

Room type	Target illuminance Et (lx) for 50% of assessment grid
Bedroom	100
Living room	150
Kitchen	200

Table 4.2: Illuminance targets for UK dwellings according to UK National Annex

- 4.5 Where the room is designed to serve as kitchen, dining and living area, the higher kitchen target might be difficult to achieve due to the room's depth. In such circumstances the recommended illuminance value for living rooms would be more appropriate, as it usually is the predominant space use.
- 4.6 The illuminance check for the proposed development has not been carried out because all habitual rooms receive a good amount of daylight, and no window has a VSC<15. Therefore, no illuminance check was conducted.

5.0 SUNLIGHT ANALYSIS (APSH)

- 5.1 Sunlight is direct light from the sun, as opposed to diffused light which is measured through the daylight factor method.

Access to Sunlight (APSH)

- 5.2 The BRE guidance requires that access to sunlight be considered and that sunlight availability be maximised without overheating the space. The guidance recommends that where practical, at least one window to a main living room faces within 90 degrees of south and should receive at least 25% of annual probable sunlight hours including at least 5% of Annual Probable Sunlight Hours (ASPH) between 21st September and 21st March, where possible.
- 5.3 Consequently, to assess the loss of sunlight to an existing building, it is recommended that **all main living rooms** of dwellings should be checked **if they have a window facing within 90 degrees of due south**. The BRE guidance states that the check for those windows should meet the following criteria:
- Receive at least 25% of APSH, including at least 5% of APSH in winter months between September 21st and March 21st; failing this, the openings should:
 - Receive at least 80% of its former sunlight hours both annually and during the winter months and;
 - Have a reduction in sunlight received over the whole year of less than 4% of APSH.
- 5.4 If the above criteria are met, the change in the sunlight levels received by the existing building will not be adversely affected.
- 5.5 The IES VE SunCast module has been used to calculate the annual probable sunlight hours (APSH) for the existing site and the proposed development.
- 5.6 The analysis of the site location plan confirms that the windows located in the following buildings should be assessed for level of sunlight received:
- 400 Thames Valley Park Drive (Proposed Development) –The windows on the south, east, and west elevations of the development, serving living rooms, have been assessed.

Results for the Proposed Development

- 5.7 The results show that all windows in kitchen/living rooms orientated within 90 degrees due south pass the above criteria. Detailed results of APSH calculations for the identified windows are shown in Appendix B.
- 5.8 The results show that 100% of the assessed windows within 90° of due south in the proposed development meet the sunlight criteria.
- 5.9 To determine whether an adequate amount of sunlight is achieved within a room, the following criteria need to be met: at least one main window wall should face within 90° of due south. Additionally, at least one window should receive a minimum of 25% of annual probable sunlight hours, including at least 5% during the winter months between September 21st and March 21st. All the windows within 90° of due south of living rooms meet the above criteria. Therefore, the rooms should be receiving an adequate amount of sunlight. With this information, it can be concluded that the proposed development receives an adequate amount of sunlight.
- 5.10 Regarding sunlight (APSH), the scheme will achieve a very high level of BRE compliance, as all the windows within 90° of due south in the proposed development meet the sunlight criteria.

Results for Neighbouring Buildings

- 5.11 Two buildings, Oracle 540 and Sanofi UK, are situated near the proposed development. Both are commercial buildings. Since there are no specific daylight criteria established for commercial buildings, the neighbouring non-residential buildings can be excluded from this assessment.

Over-shading of Gardens and Open Spaces

- 5.12 According to the BRE guide, the availability of sunlight should also be checked for all open spaces “where it will be required”. It suggests that assessments should include:
- Main, back gardens of a house;
 - Parks and playing fields;
 - Sitting out areas, such as those in public squares;
 - Other areas e.g., children’s playgrounds, paddling pools, fountains etc.
- 5.13 Following the above recommendations and the review of the outdoor spaces surrounding the proposed development and the adjacent plots, it has been concluded that the only relevant outdoor space in close vicinity to the proposed development is the sitting out areas of the Oracle 540, located to the east, and Sanofi UK, located to the south of the proposal.
- 5.14 The BRE guide further recommends that *"as a check (...) at least half of the amenity areas listed above should receive at least two hours of sunlight on 21 March."*
- 5.15 Based on the hourly images for the spring equinox, it is clear that the shade created by the proposed development does not affect the assessed area. Please refer to Appendix C for the shading images.

6.0 CONCLUSION

- 6.1 This assessment has been undertaken following the guidance given in the Building Research Establishment's (BRE) Publication 'Site Layout Planning for Daylight and Sunlight'.
- 6.2 The assessment indicates that all the habitual spaces in the proposed development meet the recommended values for VSC and APSH. The results demonstrate that the proposal will ensure that all new flats receive an adequate level of daylight and sunlight.
- 6.3 The neighbouring amenity areas have been assessed to determine the level of sunlight received by the external spaces. It has been found that areas of relevance will not be affected by the proposed development.
- 6.4 It is concluded that the proposed development will have a no significant impact on the neighbouring buildings.

7.0 DISCLAIMER

- 7.1 Create Consulting Engineers Ltd disclaims any responsibility to the Client, TVP Investment Ltd and others in respect of any matters outside the scope of this report.
- 7.2 The copyright of this report is vested in Create Consulting Engineers Ltd. The Client, TVP Investment Ltd or their appointed representatives, may copy the report for purposes in connection with the development described herein. It shall not be copied by any other party or used for any other purposes without the written consent of Create Consulting Engineers Ltd.
- 7.3 Create Consulting Engineers Ltd accepts no responsibility whatsoever to other parties to whom this report, or any part thereof, is made known. Any such other parties rely upon the report at their own risk.

APPENDICES

APPENDIX A

VS

C data

Num	Zone	Surface	Opening	VSC	Status	Location Description
1	3F00000C	6	0	40.04	Pass	
2	3F00000C	7	0	39.8	Pass	
3	3F00000D	5	0	39.94	Pass	
4	3F000011	4	0	39.94	Pass	
5	3F000024	3	0	39.66	Pass	
6	3F000028	2	0	39.88	Pass	
7	3F00002B	2	0	39.86	Pass	
8	3F00002D	4	0	39.69	Pass	
9	3F00002F	4	0	39.99	Pass	
10	3F000030	5	0	39.99	Pass	
11	3F000034	4	0	39.91	Pass	
12	3F000037	3	0	39.91	Pass	
13	3F000039	4	0	40.02	Pass	
14	3F00003C	3	0	40.02	Pass	
15	3F00003D	6	0	39.58	Pass	
16	3F000041	4	0	35.22	Pass	
17	3F000050	2	0	39.46	Pass	
18	3F000052	2	0	34.83	Pass	
19	3F000055	4	0	39.82	Pass	
20	3F000055	5	0	39.99	Pass	
21	3F000055	7	0	40.08	Pass	
22	3F000055	8	0	40.19	Pass	
23	ST00000A	2	0	39.92	Pass	
24	ST00000B	5	0	39.9	Pass	
25	ST00000B	8	0	39.94	Pass	
26	ST00000D	3	0	39.93	Pass	
27	ST00000E	2	0	39.89	Pass	
28	3F000001	5	0	39.84	Pass	
29	3F000002	4	0	39.95	Pass	
30	3F000003	3	0	40.02	Pass	
31	3F000004	4	0	40	Pass	
32	3F000005	3	0	39.79	Pass	
33	3F000006	4	0	39.86	Pass	
34	3F000009	5	0	39.84	Pass	
35	3F000012	4	0	39.75	Pass	
36	3F000042	5	0	39.99	Pass	
37	3F000043	4	0	39.79	Pass	
38	3F000044	7	0	39.79	Pass	
39	3F000045	4	0	39.87	Pass	
40	4F000003	6	0	39.8	Pass	
41	4F000003	7	0	39.97	Pass	
42	4F000004	5	0	40.02	Pass	
43	4F000008	4	0	40.01	Pass	
44	4F00001A	3	0	39.76	Pass	
45	4F00001E	2	0	39.87	Pass	
46	4F000021	2	0	39.86	Pass	
47	4F000022	4	0	39.66	Pass	
48	4F000024	4	0	40.06	Pass	
49	4F000025	5	0	40.01	Pass	

Num	Zone	Surface	Opening	VSC	Status	Location Description
50	4F000029	4	0	39.97	Pass	
51	4F00002C	3	0	39.97	Pass	
52	4F00002E	4	0	40.08	Pass	
53	4F000031	3	0	40.08	Pass	
54	4F000032	6	0	39.48	Pass	
55	4F000036	4	0	35.4	Pass	
56	4F000039	2	0	39.59	Pass	
57	4F00003B	2	0	34.81	Pass	
58	4F00003D	4	0	39.94	Pass	
59	4F00003D	5	0	39.57	Pass	
60	4F00003D	7	0	39.92	Pass	
61	4F00003D	8	0	39.39	Pass	
62	4F00003E	2	0	40.01	Pass	
63	4F00003F	5	0	39.98	Pass	
64	4F00003F	8	0	39.91	Pass	
65	4F000042	3	0	40.04	Pass	
66	4F000043	2	0	39.86	Pass	
67	4F000044	5	0	39.91	Pass	
68	4F000048	4	0	39.98	Pass	
69	4F000049	3	0	39.98	Pass	
70	4F00004A	4	0	39.93	Pass	
71	4F00004B	3	0	39.92	Pass	
72	4F00004C	4	0	39.85	Pass	
73	4F00004D	5	0	39.85	Pass	
74	4F00004E	4	0	39.83	Pass	
75	4F00004F	5	0	39.82	Pass	
76	4F000050	4	0	39.85	Pass	
77	4F000051	7	0	39.84	Pass	
78	4F000052	4	0	39.68	Pass	
79	4F000054	4	0	39.74	Pass	
80	4F000055	4	0	39.9	Pass	

Total Assessed Windows:	80		
VSC Pass	80	100%	100.0%
VSC Marginal Fail (Pass2: VSC>15)	0	0%	
VSC Fail	0		0.0%

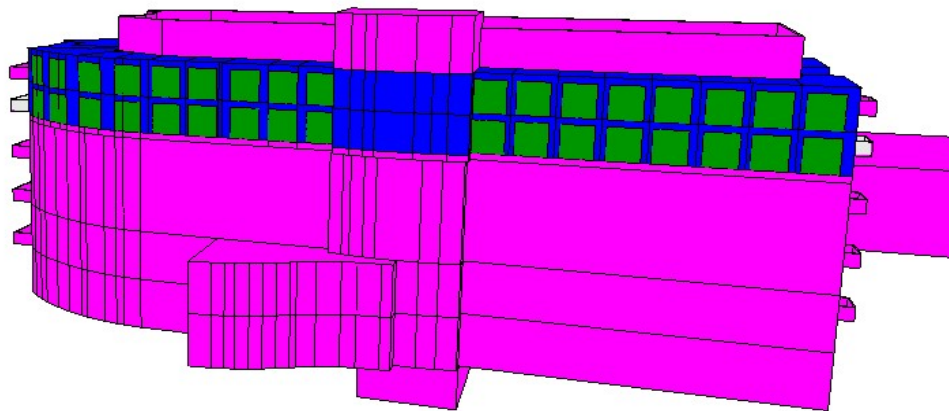


Fig 01: South Elevation

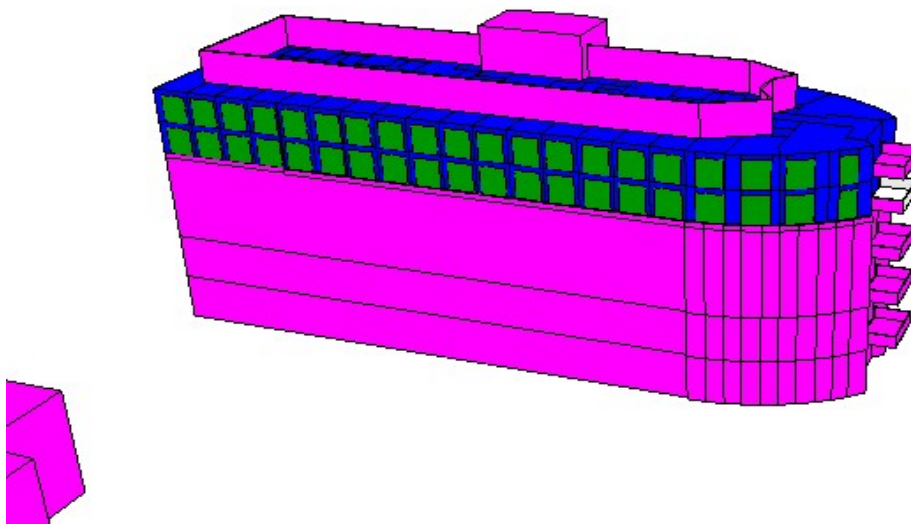


Fig 01: North Elevation

APPENDIX B

Opening	Zone	Surface	Area	Azimuth	Annual	Winter	Location Description
1	3F00000C	6	3.76	90	81.94	38.19	
2	3F00000C	7	1.77	90	81.25	38.19	
3	3F00000D	5	5.63	90	79.02	38.19	
4	3F000011	4	5.63	90	78.47	38.19	
5	3F000024	3	5.63	90	20.14	0	North Elevation
6	3F000028	2	5.63	90	20.14	0	
7	3F00002B	2	5.63	90	20.14	0	
8	3F00002D	4	5.63	90	20.14	0	
9	3F00002F	4	5.63	90	79.86	38.19	
10	3F000030	5	5.63	90	79.86	38.19	
11	3F000034	4	5.63	90	79.22	38.19	
12	3F000037	3	5.63	90	79.17	38.19	
13	3F000039	4	5.63	90	78.74	38.19	
14	3F00003C	3	5.63	90	78.04	38.19	
15	3F00003D	6	5.63	90	75.49	38.02	
16	3F000041	4	5.63	90	60.91	31.26	
17	3F000050	2	5.5	90	74.71	37.5	
18	3F000052	2	5.5	90	59.93	30.93	
19	3F000055	4	2.5	90	72.35	32.64	
20	3F000055	5	2.5	90	75.41	34.03	
21	3F000055	7	3.38	90	77.08	35.42	
22	3F000055	8	2.24	90	78.47	36.11	
23	ST00000A	2	5.62	90	80.56	37.5	
24	ST00000B	5	3.91	90	24.39	4.23	North Elevation
25	ST00000B	8	5.63	90	22.22	2.78	
26	ST00000D	3	5.62	90	19.44	0.69	
27	ST00000E	2	5.63	90	18.06	0	
28	3F000001	5	5.63	90	20.14	0	
29	3F000002	4	5.63	90	20.14	0	
30	3F000003	3	5.63	90	20.14	0	
31	3F000004	4	5.63	90	20.14	0	
32	3F000005	3	5.63	90	20.14	0	
33	3F000006	4	5.63	90	20.14	0	
34	3F000009	5	5.63	90	20.14	0	
35	3F000012	4	5.63	90	20.14	0	
36	3F000042	5	5.63	90	20.14	0	
37	3F000043	4	5.63	90	20.14	0	
38	3F000044	7	5.63	90	20.14	0	
39	3F000045	4	5.63	90	20.14	0	
40	4F000003	6	3.76	90	81.94	38.19	
41	4F000003	7	1.77	90	81.25	38.19	
42	4F000004	5	5.63	90	79.04	38.19	
43	4F000008	4	5.63	90	78.47	38.19	
44	4F00001A	3	5.63	90	20.14	0	North Elevation
45	4F00001E	2	5.63	90	20.14	0	
46	4F000021	2	5.63	90	20.14	0	
47	4F000022	4	5.63	90	20.14	0	
48	4F000024	4	5.63	90	79.86	38.19	
49	4F000025	5	5.63	90	79.86	38.19	
50	4F000029	4	5.63	90	79.71	38.19	
51	4F00002C	3	5.63	90	79.25	38.19	

Opening	Zone	Surface	Area	Azimuth	Annual	Winter	Location Description
52	4F00002E	4	5.63	90	78.74	38.19	
53	4F000031	3	5.63	90	78.12	38.19	
54	4F000032	6	5.63	90	75.49	38.02	
55	4F000036	4	5.63	90	60.91	31.26	
56	4F000039	2	5.5	90	74.71	37.5	
57	4F00003B	2	5.5	90	59.93	30.93	
58	4F00003D	4	2.5	90	72.35	32.64	
59	4F00003D	5	2.5	90	75.41	34.03	
60	4F00003D	7	3.38	90	77.08	35.42	
61	4F00003D	8	2.24	90	78.47	36.11	
62	4F00003E	2	5.62	90	80.56	37.5	
63	4F00003F	5	3.91	90	25.13	4.3	North Elevation
64	4F00003F	8	5.63	90	22.22	2.78	
65	4F000042	3	5.62	90	19.44	0.69	
66	4F000043	2	5.63	90	18.06	0	
67	4F000044	5	5.63	90	20.14	0	
68	4F000048	4	5.63	90	20.14	0	
69	4F000049	3	5.63	90	20.14	0	
70	4F00004A	4	5.63	90	20.14	0	
71	4F00004B	3	5.63	90	20.14	0	
72	4F00004C	4	5.63	90	20.14	0	
73	4F00004D	5	5.63	90	20.14	0	
74	4F00004E	4	5.63	90	20.14	0	
75	4F00004F	5	5.63	90	20.14	0	
76	4F000050	4	5.63	90	20.14	0	
77	4F000051	7	5.63	90	20.14	0	
78	4F000052	4	5.63	90	20.14	0	
79	4F000054	4	5.63	90	77.11	38.19	
80	4F000055	4	5.63	90	77.36	38.19	

APPENDIX C

400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 06:00

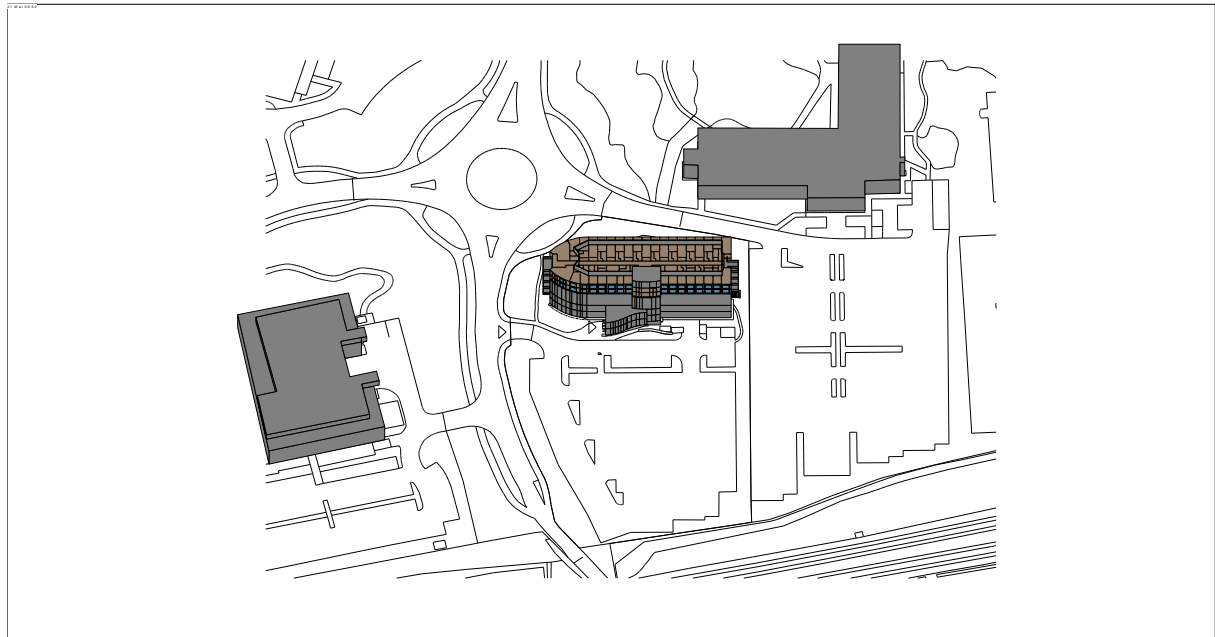
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun is not up

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 07:00

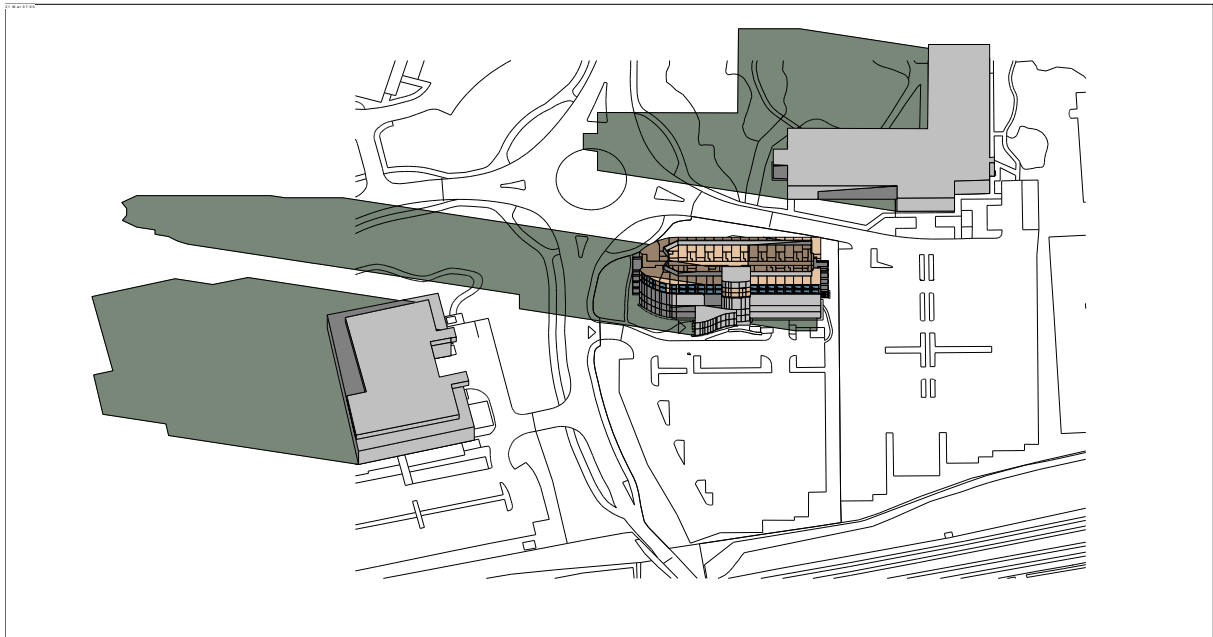
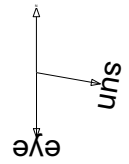
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 99.98 alt = 7.85

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 08:00

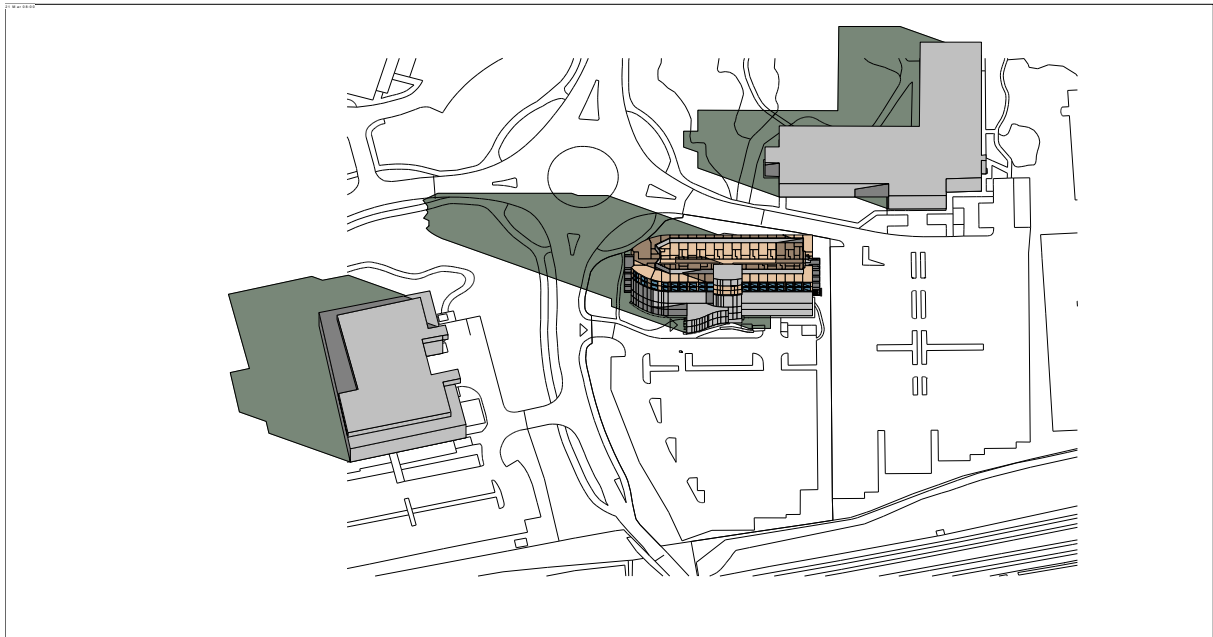
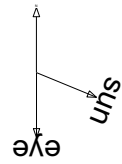
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 112.30 alt = 16.81

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 09:00

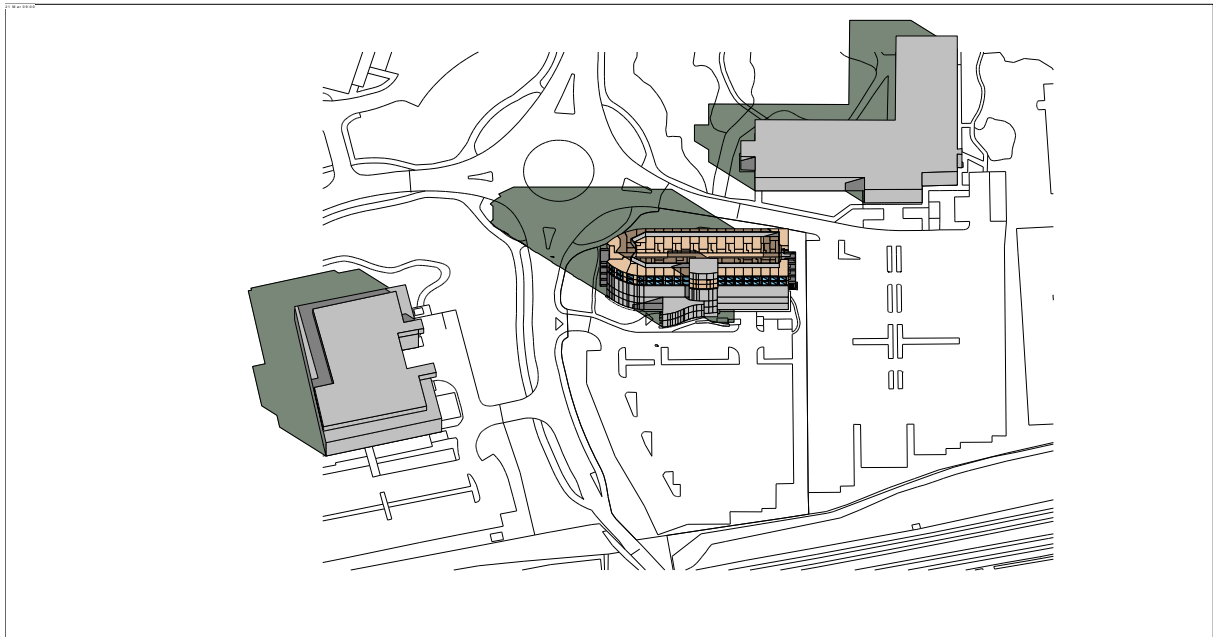
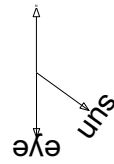
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 125.80 alt = 24.96

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 10:00

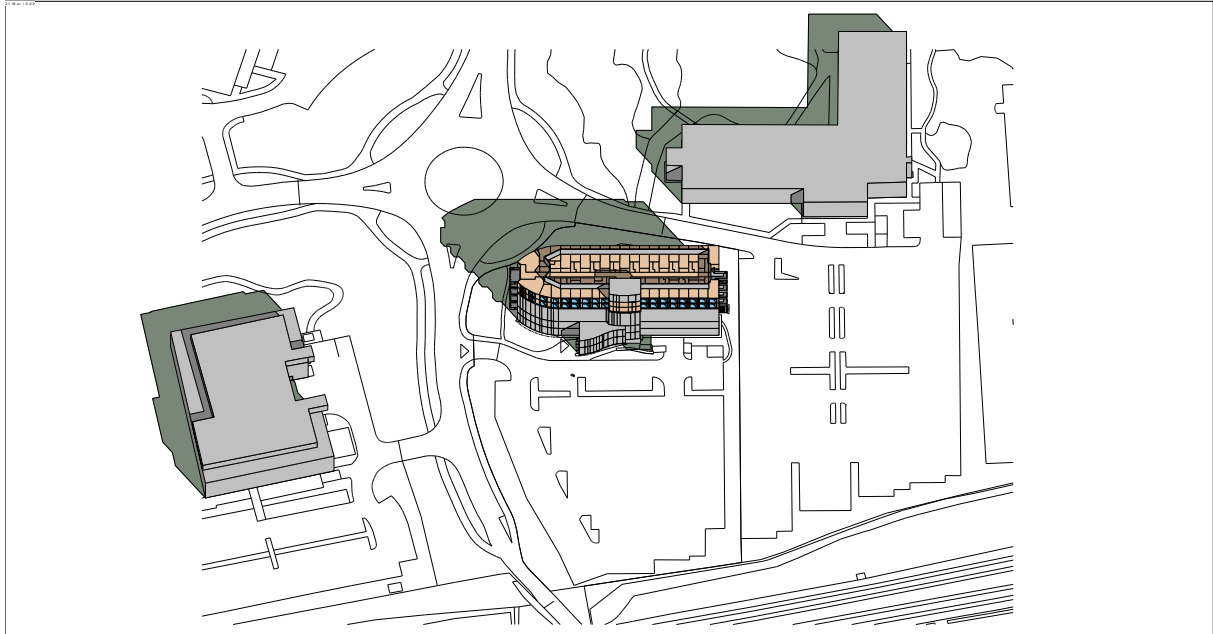
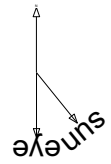
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 141.03 alt = 31.75

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 11:00

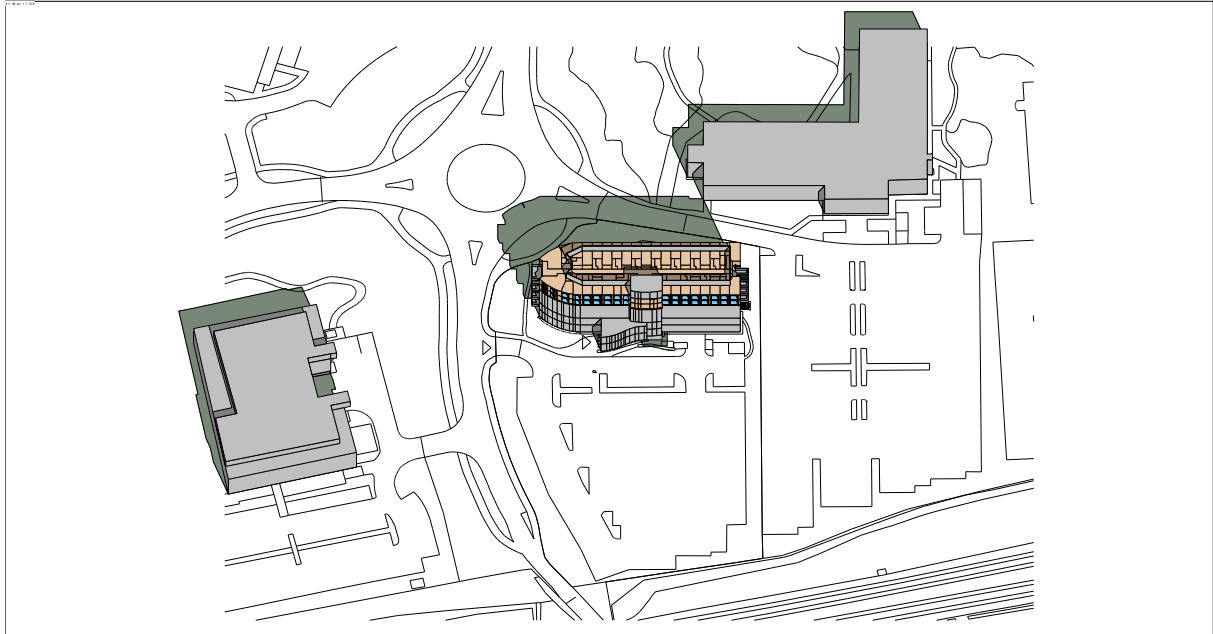
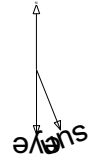
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 158.25 alt = 36.47

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 12:00

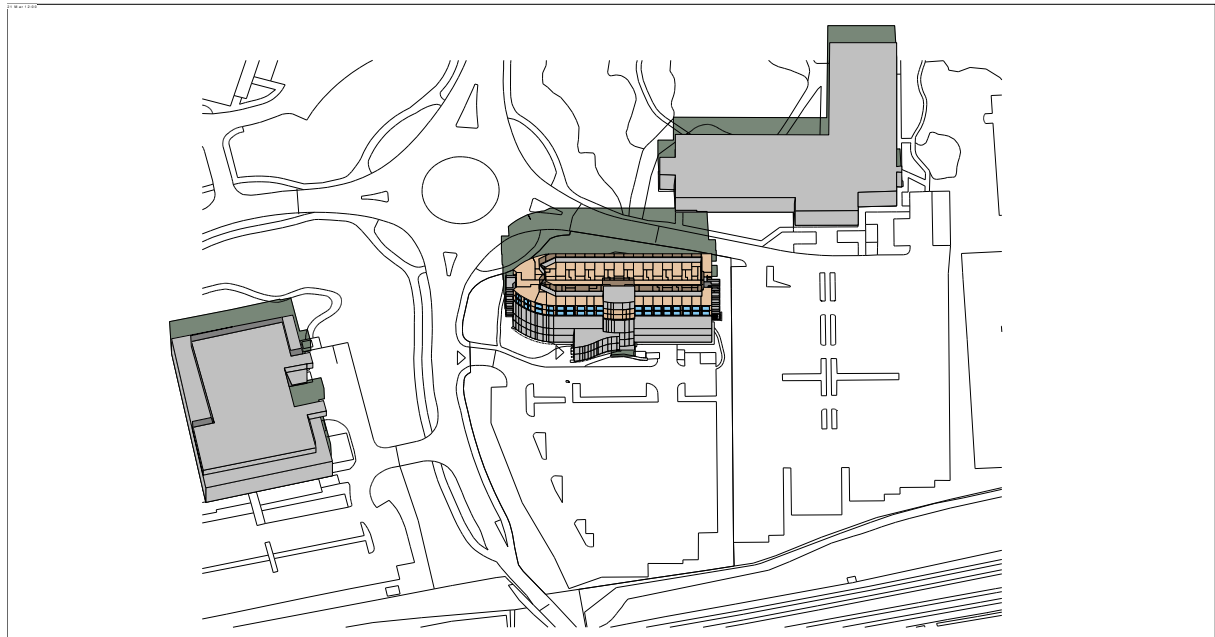
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 177.02 alt = 38.48

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 13:00

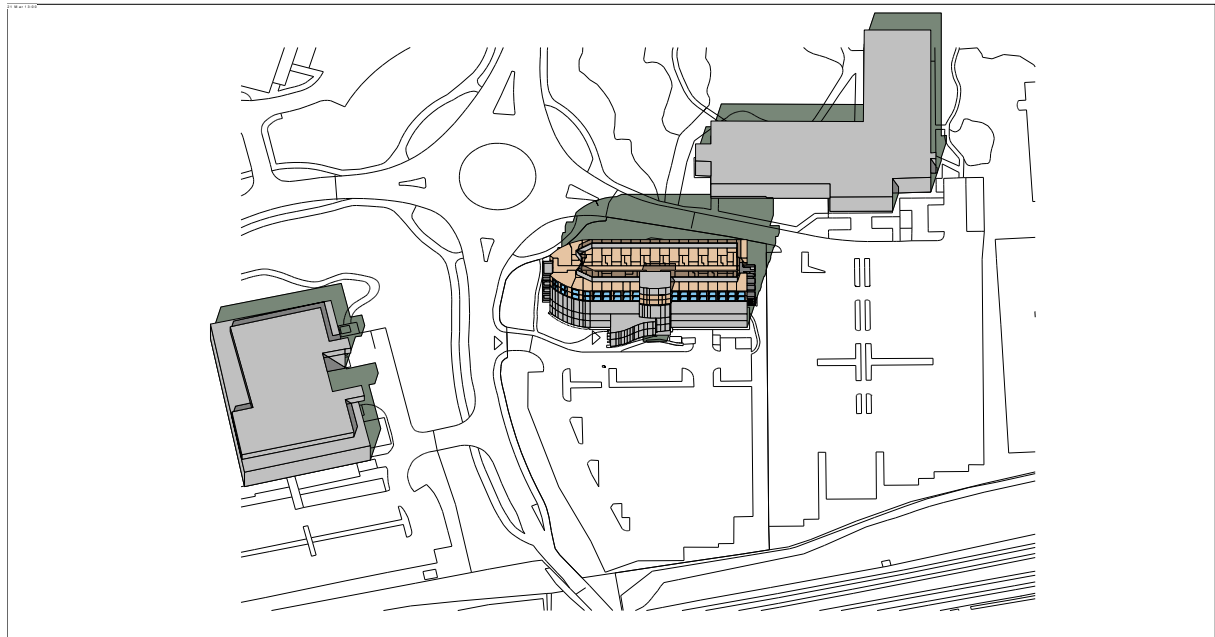
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 196.03 alt = 37.42

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 14:00

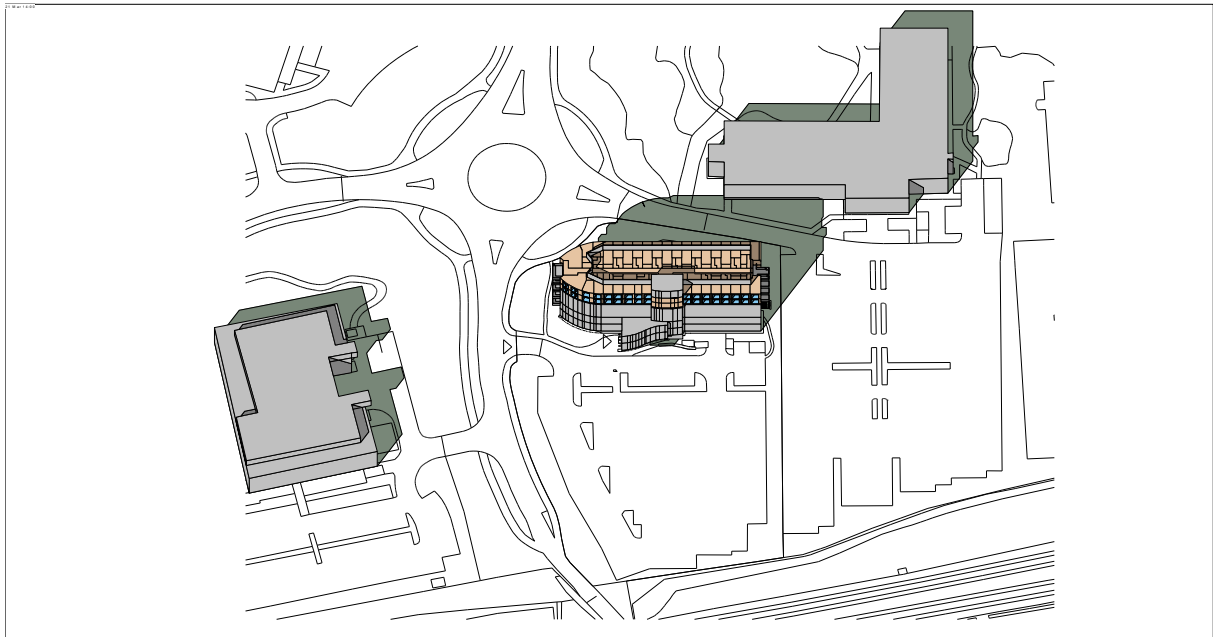
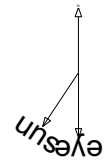
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 213.82 alt = 33.47

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 15:00

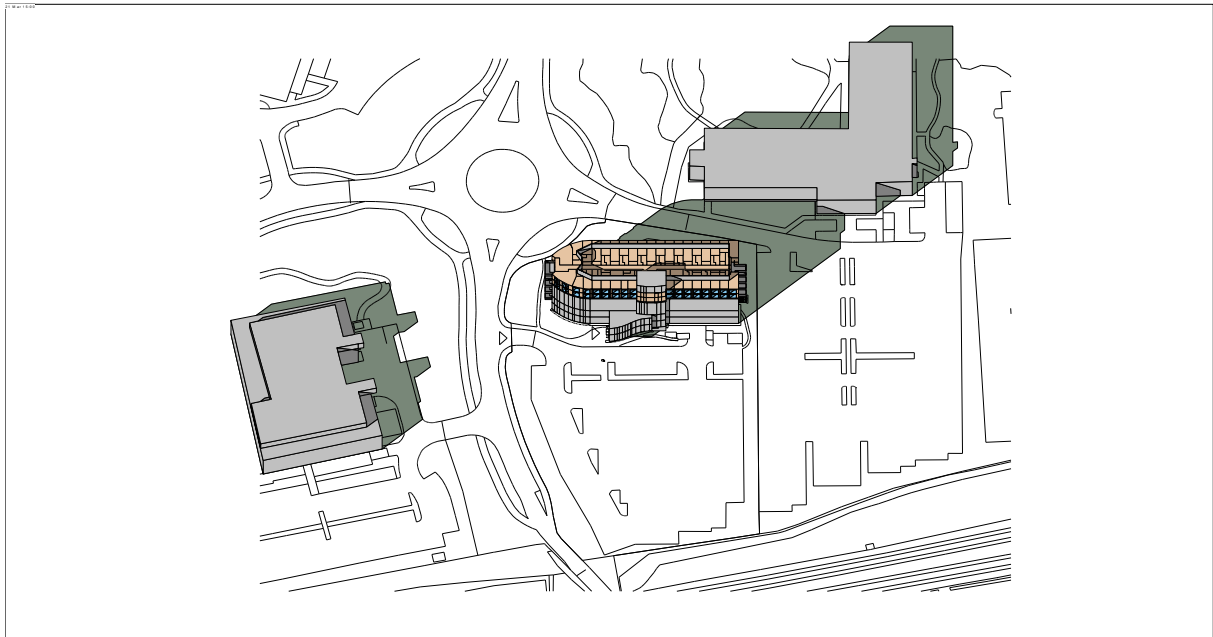
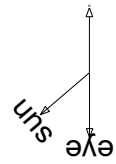
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 229.67 alt = 27.25

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 16:00

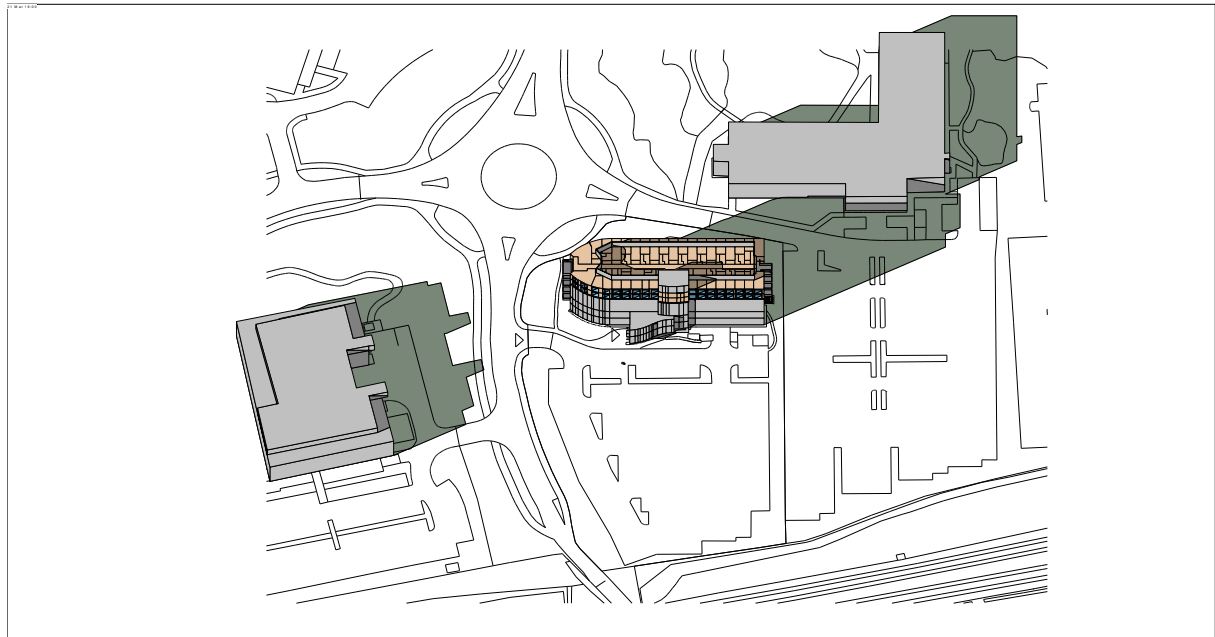
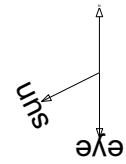
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 243.65 alt = 19.45

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 17:00

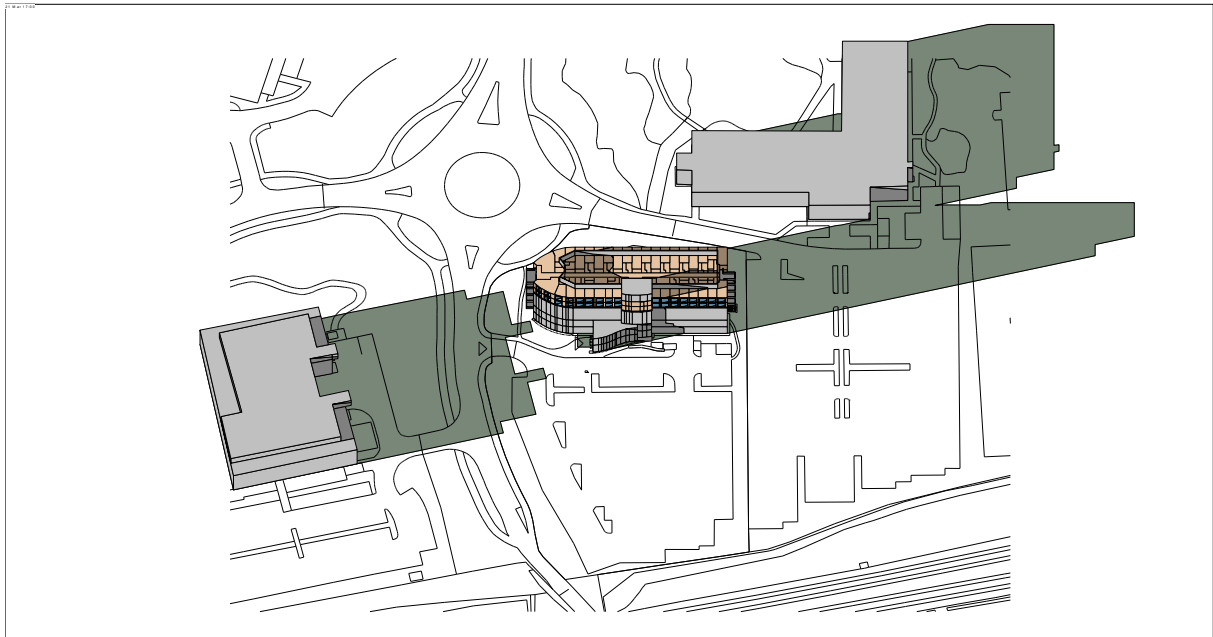
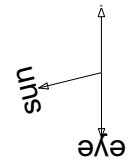
Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 256.28 alt = 10.69

Eye: azi = 180.00 alt = 60.00



400 Thames Valley Park Driver- Roof Extension

App C – Solar Shading Images

Suncast image:

View time = 21 Mar 18:00

Site Latitude = 51.48

Longitude diff. = -0.45

Model Bearing = 0.00

Sun: azi = 268.17 alt = 1.45

Eye: azi = 180.00 alt = 60.00

