FUTURE
PLANNING AND DEVELOPMENT

Addison Estate, 702 Field End Road, Ruislip, HA4 0QP

DAYLIGHT & SUNLIGHT ASSESSMENT

9 residential units and 1630sqm of B8 self-storage

February 2023

Document Issue Register

1.0 Issue to client

1.1 Amenity analysis updated

Contents

1 Introduction

1.1 This report details a Daylight & Sunlight Assessment for the proposed development at Addison Estate, 702 Field End Road, Ruislip, HA4 0QP. The proposal entails 1630sqm of B8 self-storage (to replace existing industrial floorspace) and 9no. new residential units.

1.2 The existing site comprises industrial floorspace over two stories, surrounded by hardstanding used for car parking.

1.3 The proposed development has been designed with consideration to the existing neighbouring properties, and as such the proposed buildings have been aligned to allow natural light corridors to neighbouring habitable windows and amenity spaces.

1.4 The purpose of this report is to perform a daylight and sunlight assessment for the habitable rooms of the surrounding residential properties, and to compare with guidance provided by the BRE (BR209: Site Layout Planning for Daylight and Sunlight 2022).

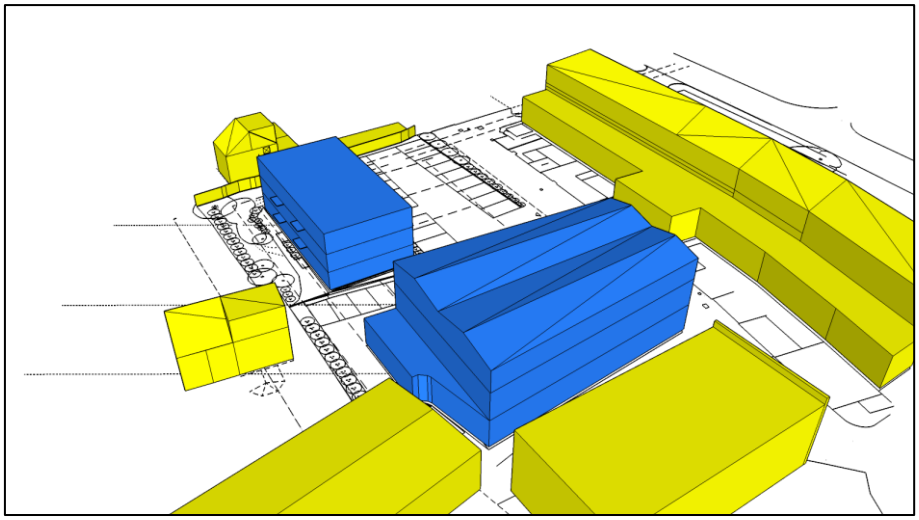

Figure 1: Proposed development (blue), 3D daylight model

2 Executive Summary

2.1 There are two components of natural light which need to be considered when assessing the impact of a proposed development on the surrounding residential properties, being the level of daylight and the annual sunlight hours. The annual sunlight test applies to living room windows facing within 90 degrees of due south.

2.2 In terms of daylight levels to a window, the BRE recommends a Vertical Sky Component (VSC) of 27%, or not less than 0.8 times its former level.

2.3 The results of the daylight assessment indicate that all the assessed neighbouring windows would retain a VSC of 27% or not less than 0.8 times their former level.

2.4 The results of the sunlight exposure analysis indicate that the assessed amenity spaces will achieve the minimum sunlight exposure (2hrs >50% area on 21 March).

2.5 The values of daylight levels and annual sunlight hours are thus considered to be acceptable for all neighbouring properties, according to the BRE guidance.

2.6 The Daylight Factor (DF) has been assessed for the habitable zones within the proposed development, with the assessed zones meeting the minimum DF levels.

Figure 2: Site (red), aerial view (source: Google Earth)

3 Planning Policies and Guidance

3.1 BRE Document 209 – Site Layout Planning for Daylight and Sunlight

3.2 The introduction to the BRE document 209: *Site Layout Planning for Daylight and Sunlight: A Guide to Good Practice –3rd edition (Paul Littlefair, 2022)* states:

> *"The guide is intended for building designers and their clients, consultants and planning officials. The advice given here is not mandatory and the guide should not be seen as an instrument of planning policy; it's aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design. In special circumstances the developer or Planning Authority may wish to use different target values. 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."*

3.3 National Planning Policy Framework 2021

3.4 Furthermore, the National Planning Policy Framework 2021 states that:

> *"Local planning authorities should refuse applications which they consider fail to make efficient use of land, taking into account the policies in this Framework. In this context, when considering applications for housing, authorities should take a flexible approach in applying policies or guidance relating to daylight and sunlight, where they would otherwise inhibit making efficient use of a site (as long as the resulting scheme would provide acceptable living standards)."*

4 Methodology

4.1 Measurement of Daylight

4.2 The BRE guide describes three methods for assessing daylight. The second and third methods (NSC and ADF) require knowledge of the internal layout of the property being assessed, whilst the first method is determined solely on the external skyline obstructions. In this instance it is appropriate to assess the neighbouring properties based on the first method (VSC). The VSC methodology is defined as:

4.3 *"Ratio of that part of illuminance, at a point on given vertical plane, that is received directly from a CIE Standard Overcast Sky, to illuminate on a horizontal plane due to an unobstructed hemisphere of this sky."*

4.4 The VSC for a completely unobstructed CIE Standard Overcast Sky is 39.6%. The BRE guideline VSC for an existing window in a habitable room is 27%, or not less than 0.8 times its former value. This figure has been derived from a low-density suburban housing model. The BRE advises that these values are:

4.5 *"..purely advisory and different targets may be used based on the special requirements of the proposed development or its location."*

4.6 If a proposed development will fall beneath a 25° angle taken from the centre of the lowest window at an existing property, then no further assessment will be required. Furthermore, if the centre of a main window of the next door property lies on the extension side of a 45° line drawn in plan and elevation, then the extension may well cause a significant reduction in the skylight received by the window.

4.7 Measurement of Daylight

4.8 The sunlight to a given window can be quantified using the Annual Probable Sunlight Hours (APSH) method. The unobstructed total in London (latitude 51.5°N) and southern England equates to 1486 hours. An indicator is provided in the BRE guide which is overlaid with 100 spots, each representing approximately 15 hours. Each spot which is uncovered by an obstruction can thus be counted to provide a single percentage of total APSH.

4.9 A more accurate estimation of the annual sunlight hours can be determined through numerical simulation, using a 3D model of the site including any surrounding obstructions. The sunlighting analysis has been performed using the 'Suncast' software module within the IES Virtual Environment.

4.10 The guideline criteria for assessing annual sunlight at a reference point (centre of window) of the main living room of an existing building is that it should receive 25% of APSH including at least 5% of APSH in winter and not less than 0.8 times its former value.

4.11 According to the BRE guidance, it is not always necessary to do a full calculation to check sunlight potential. The guideline above is met if the following is true:

- If the distance of each part of the new development from the existing window is three or more times its height above the centre of the existing window (obstructions within 90° of due north of the existing window need not count here);
- The window wall faces within 90° of due south and no obstruction, measured in the section perpendicular to the window wall, subtends an angle of more than 25° to the horizontal (again, obstructions within 90° of due north of the existing window need not be counted);
- The window wall faces within 20° of due south and the reference point has a VSC of 27% or more.

5 Daylight & Sunlight Analysis (Neighbouring Properties)

5.1 The surrounding properties which have been assessed include the following:

1. 181 Royal Crescent
2. Properties r/o Field End Road
3. 128 Jubilee Drive

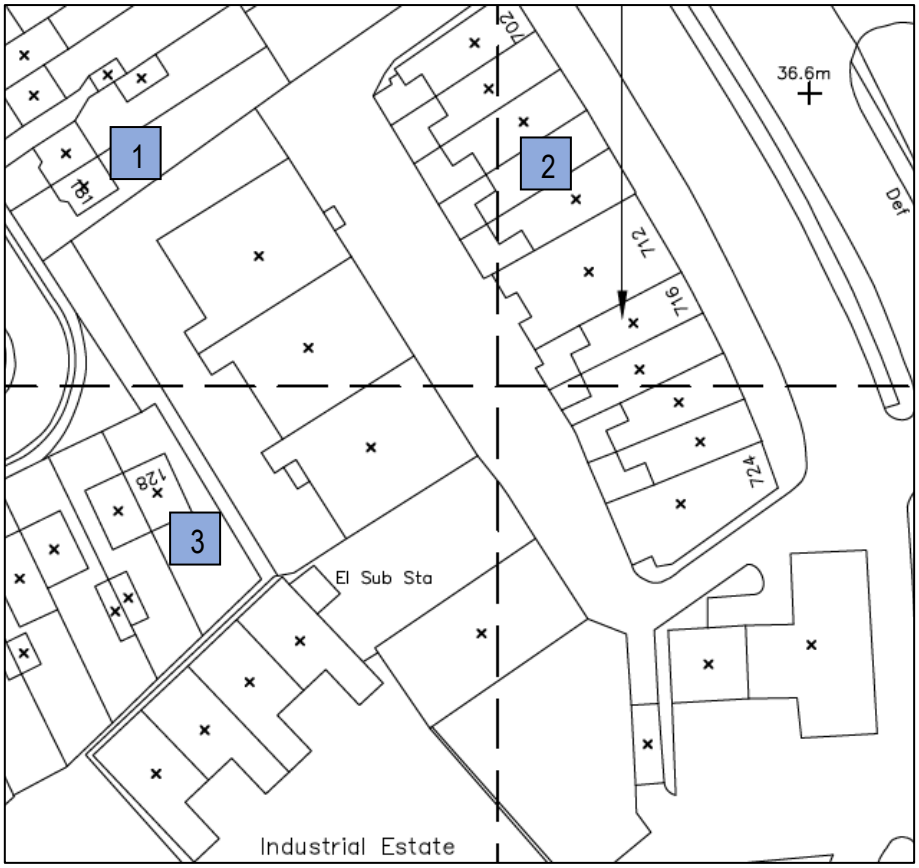

Figure 3: Location Plan – surrounding properties

5.2 181 Royal Crescent

5.3 The property is shown below (1st floor south-east facing side window serving a bedroom has been assessed), along with the 3D model indicating window IDs:

Figure 4: 181 Royal Crescent

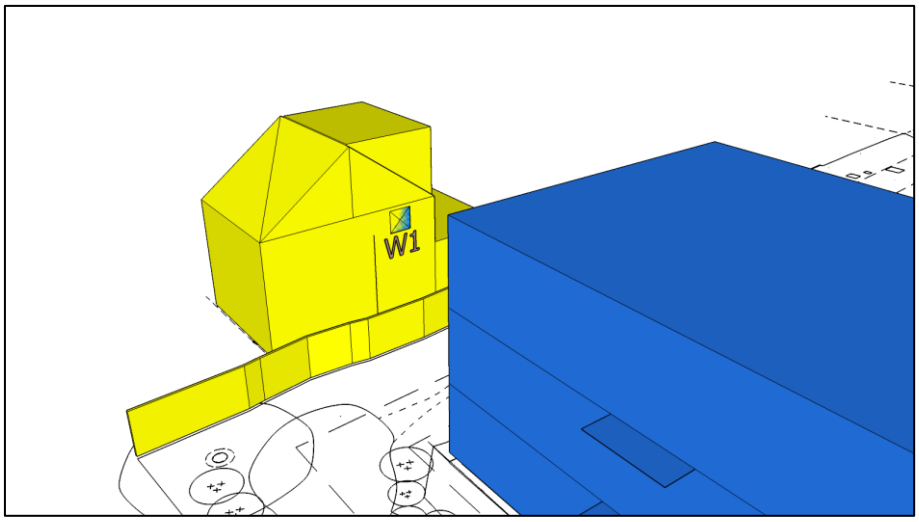

Figure 5: 3D Model – Window W1

5.4 Properties r/o Field End Road

5.5 The properties are shown below (1st floor residential above ground floor retail), along with the 3D model indicating that the proposed development would remain below a 25-degree line from the 1st floor windows:

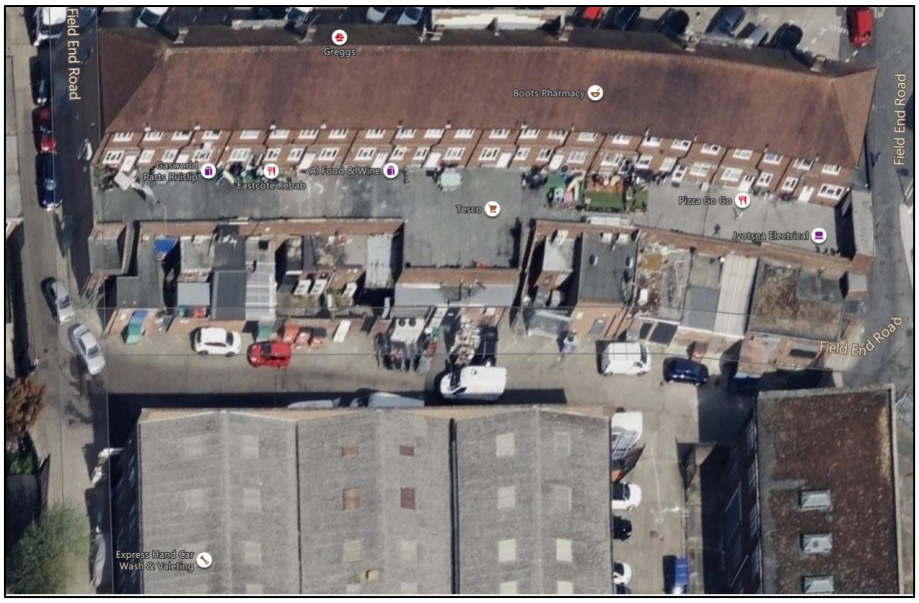

Figure 6: Properties r/o Field End Road

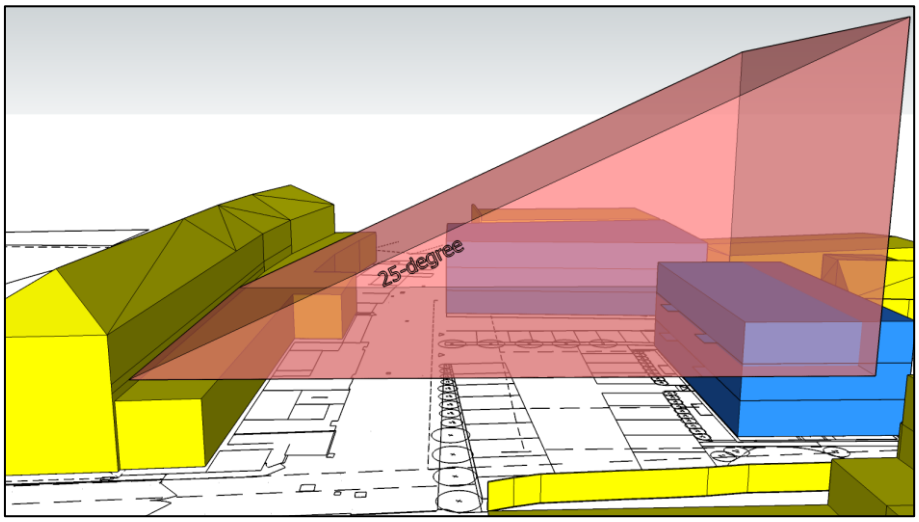

Figure 7: 3D Model – Properties r/o Field End Road (proposed development: blue)

5.6 128 Jubilee Drive

5.7 The property is shown below (semi-detached house), along with the 3D model indicating that the proposed development would remain below a 45-degree plane in elevation from the front windows (side windows serve a staircase).

Figure 8: 128 Jubilee Drive

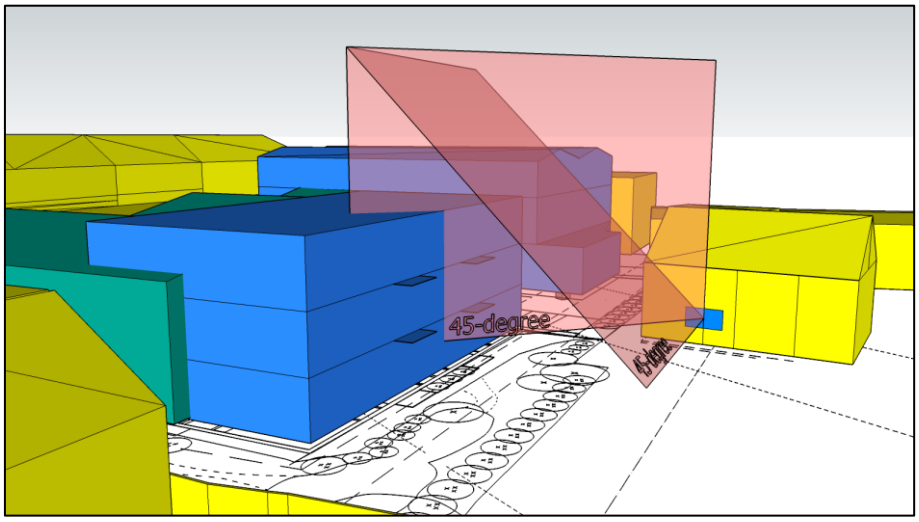

Figure 9: 3D Model – 128 Jubilee Drive (45-degree plane in plan & elevation)

5.8 Results of Daylight Analysis

5.9 The assessment has been undertaken for the neighbouring residential windows according to the BRE guidance.

5.10 Where the proposed development has been demonstrated to fall beneath a 25° angle taken from the centre of the lowest residential window at an existing property facing the proposed development (or 45° in plan or elevation from an adjacent property), then no further assessment is required.

5.11 For the remaining windows, a Vertical Sky Component (VSC) assessment criteria of 27% is usually adopted, however the BRE advises that in certain situations, lower values can be acceptable. For example, if the existing VSC is below 27%, then the target VSC would be not less than 0.8 times its former value.

5.12 The results of the daylight assessment (Appendix 1) indicate that all of the assessed windows would retain a VSC of above 27% or not less than 0.8 times their former value. Thus the reduction in daylight levels to these windows would not be noticeable according to the BRE guidance.

5.13 Thus the impact of the proposed extension on neighbouring daylight levels would be considered to be acceptable according to the BRE guidance.

5.14 The results of the daylight (VSC) assessment are presented in Appendix 1.

5.15 Results of Sunlight Analysis

5.16 No neighbouring windows which face within 90 degrees of due south serve living rooms, therefore annual probable sunlight hours (APSH) analysis has not been necessary according to the BRE guidance (window W1 serves a bedroom).

5.17 181 Royal Crescent has had sunlight exposure analysis undertaken on the rear amenity space. The BRE guidance states that at least half of the amenity area should receive at least 2 hours of sunlight on 21st March.

5.18 The results of the sunlight exposure analysis indicates that the assessed amenity spaces achieve the minimum sunlight exposure (2 hours on 21st March) for at least 50% of the area, following the proposed development. The images in Appendix 2

depict the sunlight exposure on 21 March (shaded squares receive at least 2 hrs sunlight).

5.19 Shadow diagrams have been presented in Appendix 3 for the existing and proposed scenarios.

6 Daylight Factor Analysis (Proposed Development)

6.1 The proposed development includes residential accommodation over three storeys. The units comprise open plan living/kitchen/dining (LKD) areas, with either one, two or three bedrooms. The focus of the Daylight Factor analysis will be a selection of units, comprising one, two or three bedrooms on ground, first and second floor.

6.2 The Daylight Factor (DF) is a measure of the percentage of horizontal diffuse illumination outdoors (daylight) received within an internal environment. The British Standard 'Daylight in buildings' (BS EN 17037) recommends a minimum DF in London/surrounds (to be achieved over at least 50% of the assessment grid) of:

- 0.7% for bedrooms;
- 1.1% for living rooms; and
- 1.4% for kitchens.

6.3 The results of the DF analysis for the assessed ground, first and second floor zones indicate that the habitable area (working plane) would meet the minimum target DF levels advised by the BRE document 209 and The British Standard 'Daylight in buildings' (BS EN 17037). The following reflectances have been assigned to the internal surfaces of the daylight model:

Internal Element:	Reflectance	Transmittance
Wall / Ceiling (white)	0.80	N/A
External Window	0.07	0.65
Floor	0.40	N/A

6.4 The DF calculation results for the assessed zones are shown below:

Floor	Room name	Area (m2)	Area > threshold (m2)	Area > threshold (%)	Average illumination (%)
G	01 BED1	8.656	8.656	100	3.12
G	01 BED2	11.08	6.656	60.1	1.28
G	01 BED3	9.429	7.976	84.6	1.58

G	01 LKD	28.288	14.346	50.7	2.02
F	02 BED1	6.003	6.003	100	2.15
F	02 BED2	5.39	5.39	100	2.19
F	02 LKD	29.992	20.332	67.8	2.51
S	04 BED	7.025	7.025	100	2.57
S	04 LKD	24.119	14.673	60.8	2.4

6.5 The following images depict a visual representation of the daylight factor achieved throughout the assessed zones (images generated through the FlucsDL package within the IES-Virtual Environment). The full Daylight Factor results are presented in Appendix 4.

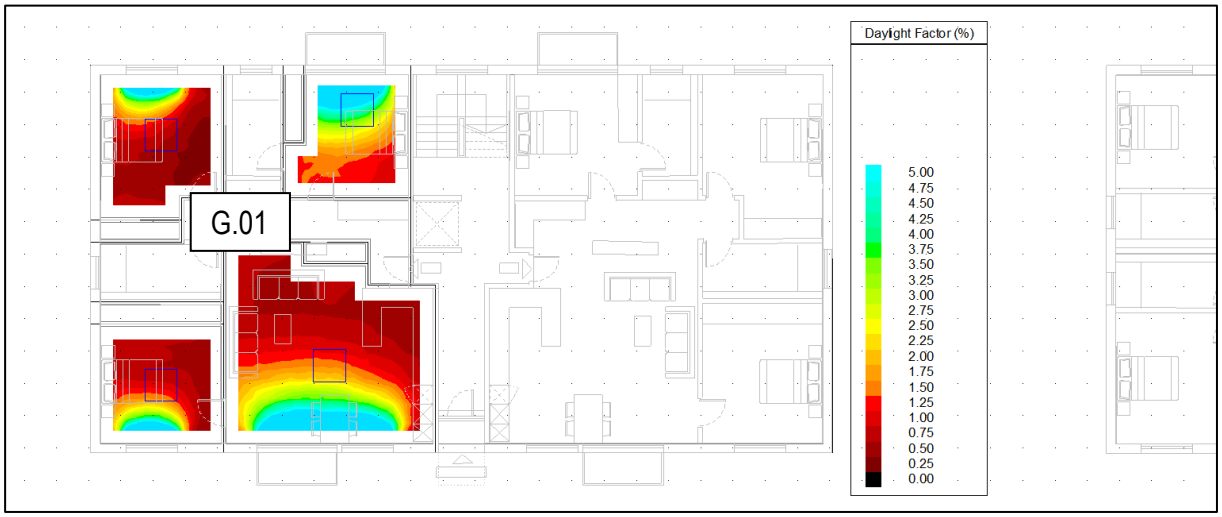

Figure 10: FlucsDL Daylight Factor Levels – Ground Floor

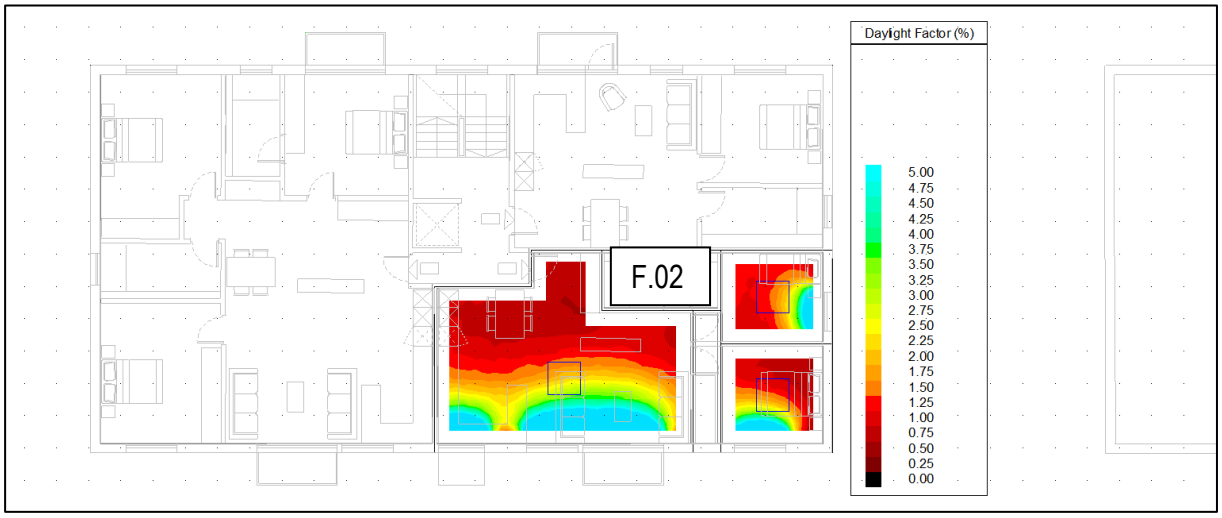

Figure 11: FlucsDL Daylight Factor Levels – First Floor

Figure 12: FlucsDL Daylight Factor Levels – Second Floor

7 Conclusion

7.1 This report has detailed a Daylight & Sunlight Assessment for the proposed development at Addison Estate, 702 Field End Road, Ruislip, HA4 0QP. The proposal entails 1630sqm of B8 self-storage (to replace existing industrial floorspace) and 9no. new residential units.

7.2 The existing site comprises industrial floorspace over two stories, surrounded by hardstanding used for car parking.

7.3 The proposed development has been designed with consideration to the existing neighbouring properties, and as such the proposed buildings have been aligned to allow natural light corridors to neighbouring habitable windows and amenity spaces.

7.4 In terms of daylight levels to a window, the BRE recommends a Vertical Sky Component (VSC) of 27%, or not less than 0.8 times its former level.

7.5 The results of the daylight assessment indicate that all the assessed neighbouring windows would retain a VSC of 27% or not less than 0.8 times their former level.

7.6 The results of the sunlight exposure analysis indicate that the assessed amenity spaces will achieve the minimum sunlight exposure (2hrs >50% area on 21 March).

7.7 The values of daylight levels and annual sunlight hours are thus considered to be acceptable for all neighbouring properties, according to the BRE guidance.

7.8 The Daylight Factor (DF) has been assessed for the habitable zones within the proposed development, with the assessed zones meeting the minimum DF levels.

8 Appendix 1: VSC Results

Win ID	Address	Existing VSC (%)	Proposed VSC (%)	Ratio	Degree of impact
W1*	1st Floor, 181 Royal Crescent	36.16	31.05	0.86	Negligible

**W1 may have been converted to a bathroom following a 2014 planning application*

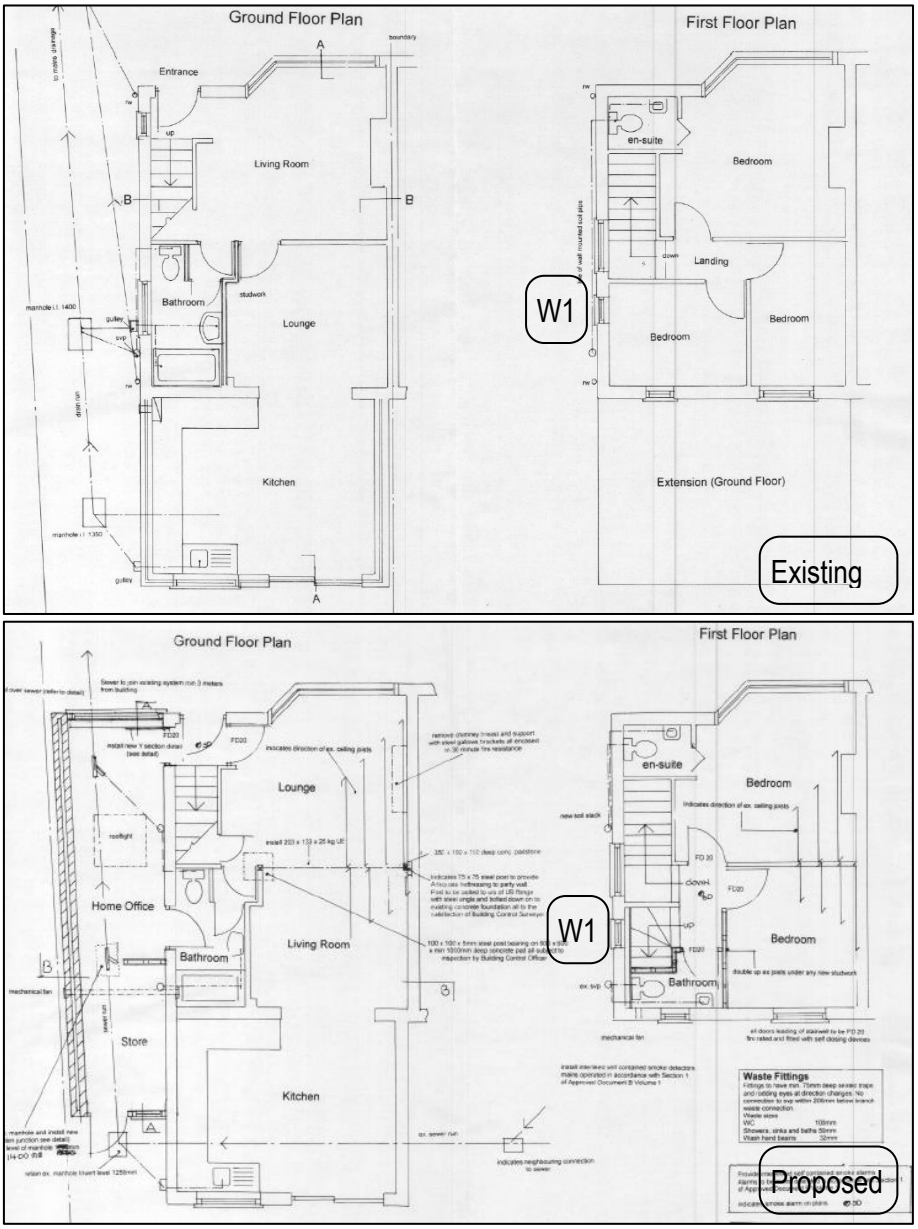

Figure 13: Window W1, Existing & Proposed (App Ref: 57831/APP/2014/2682)

9 Appendix 2: Sunlight (Amenity) Analysis

The assessed rear amenity spaces will achieve the minimum sunlight exposure (2 hours on 21st March) for at least 50% of the area (shaded squares receive at least 2 hrs sunlight):

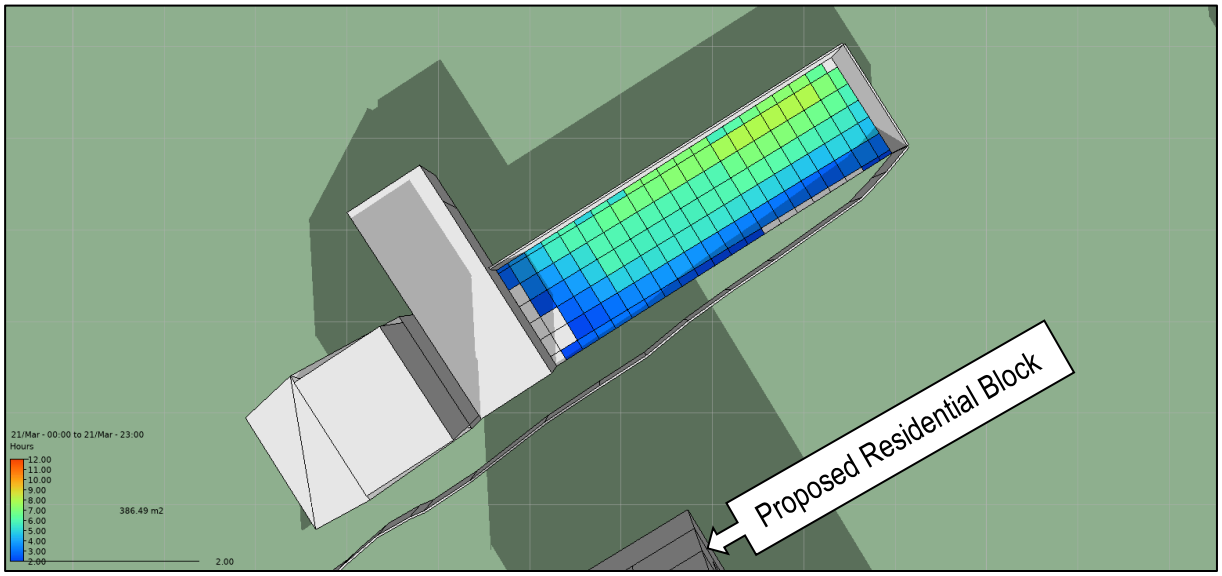

Figure 14: Sunlight amenity analysis, 21 March, 181 Royal Crescent (top view)

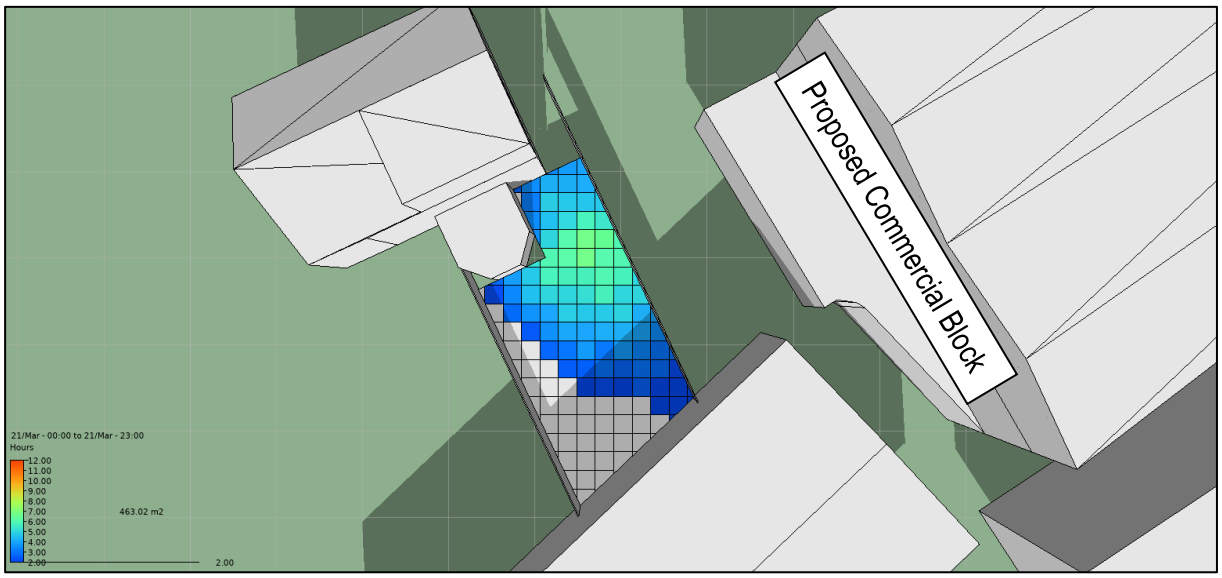

Figure 15: Sunlight amenity analysis, 21 March, 128 Jubilee Drive (top view)

10 Appendix 3: Shadow Diagrams

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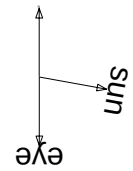

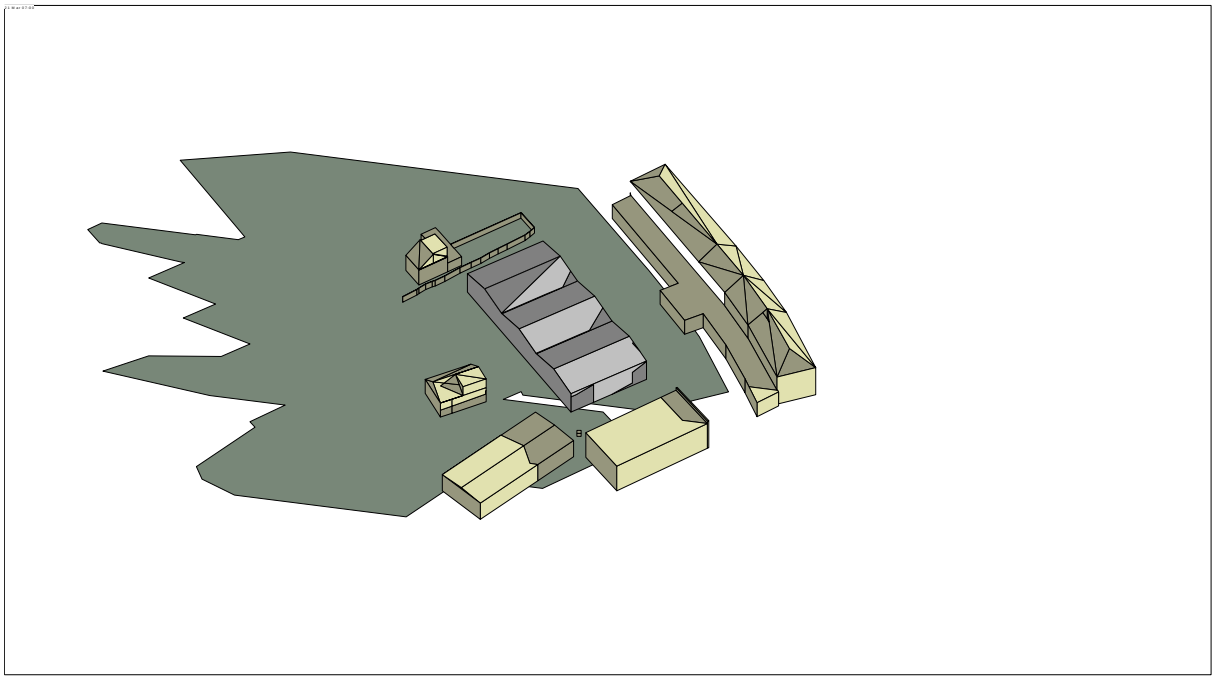

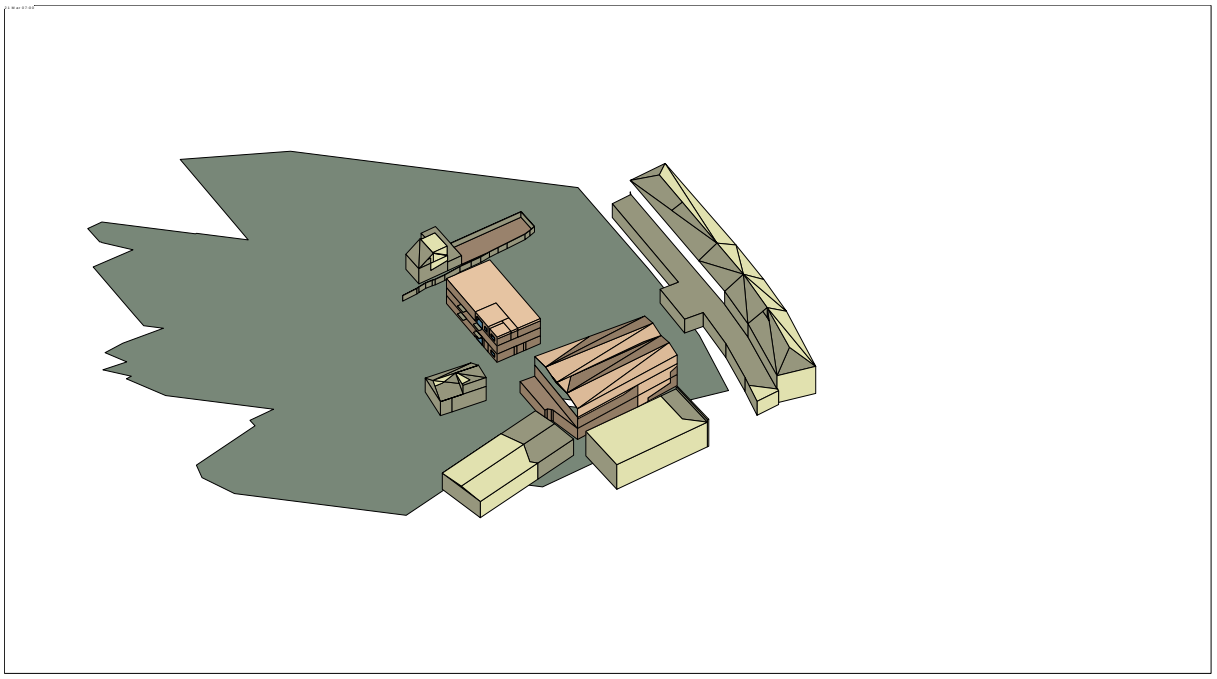

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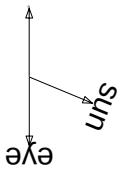

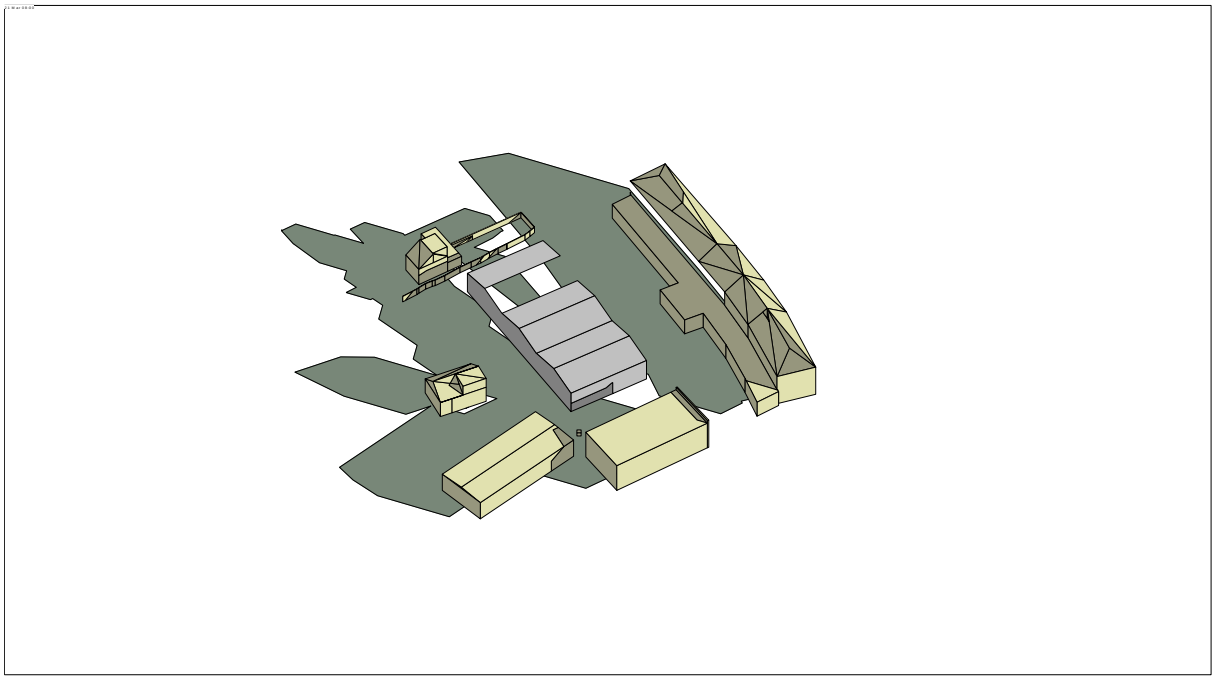

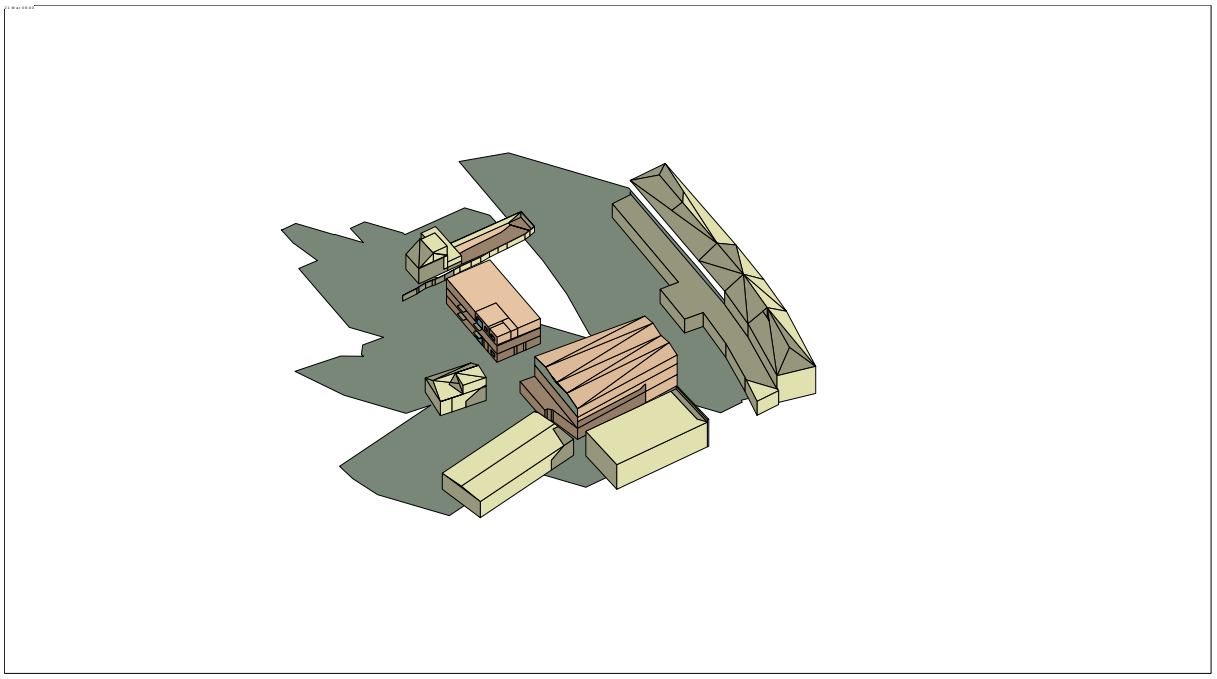

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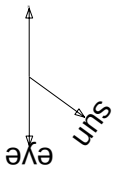

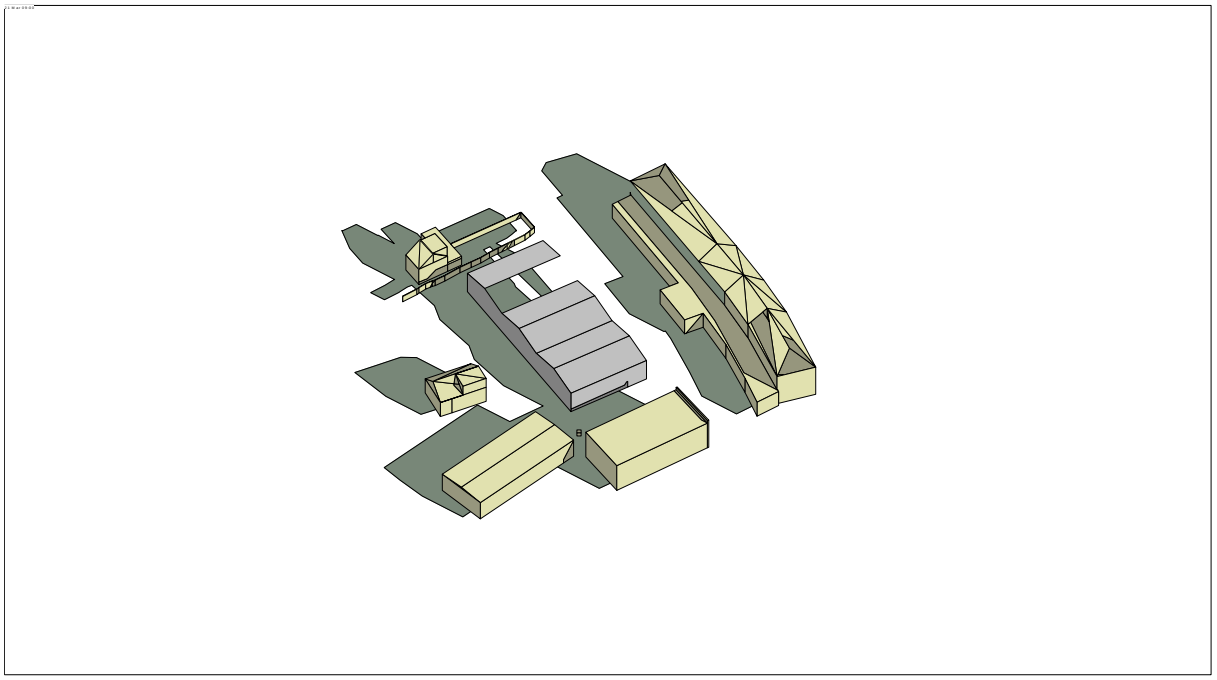

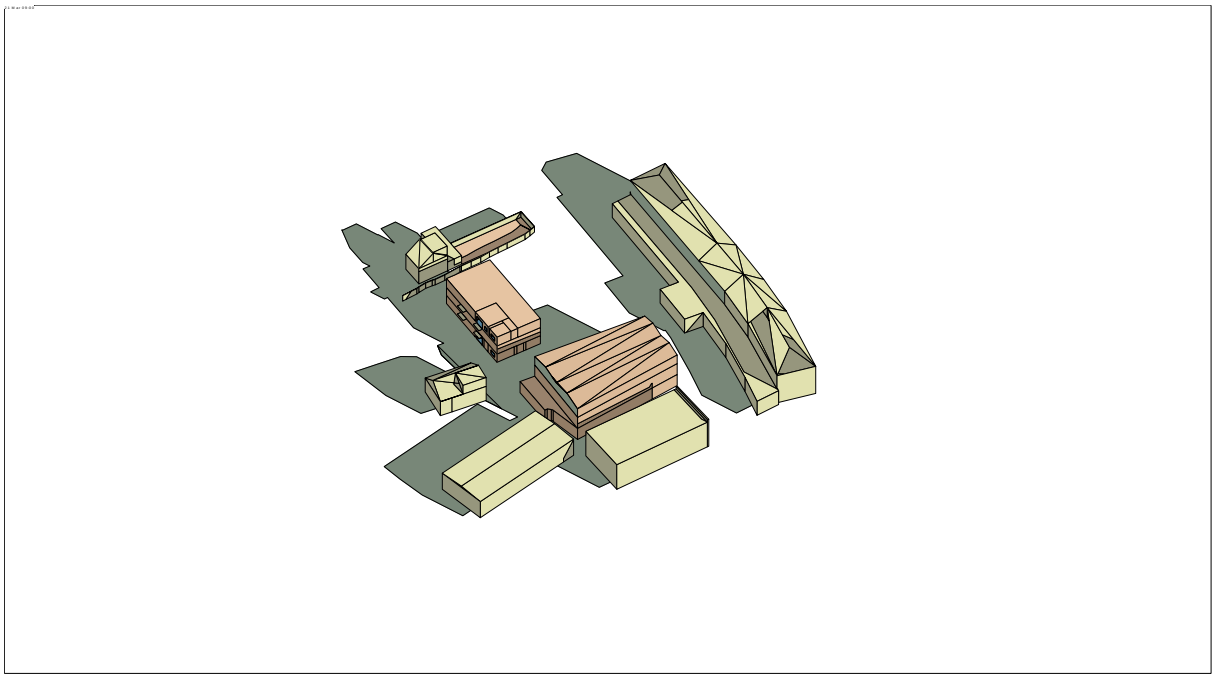

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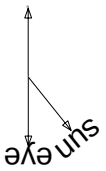

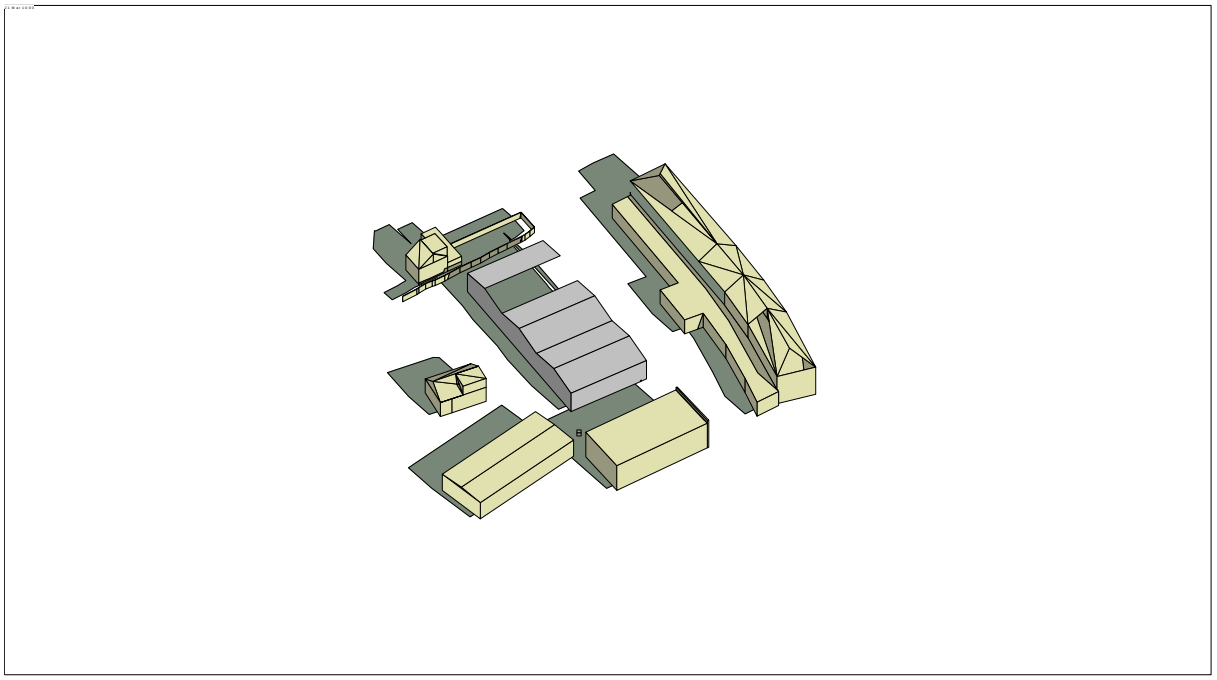

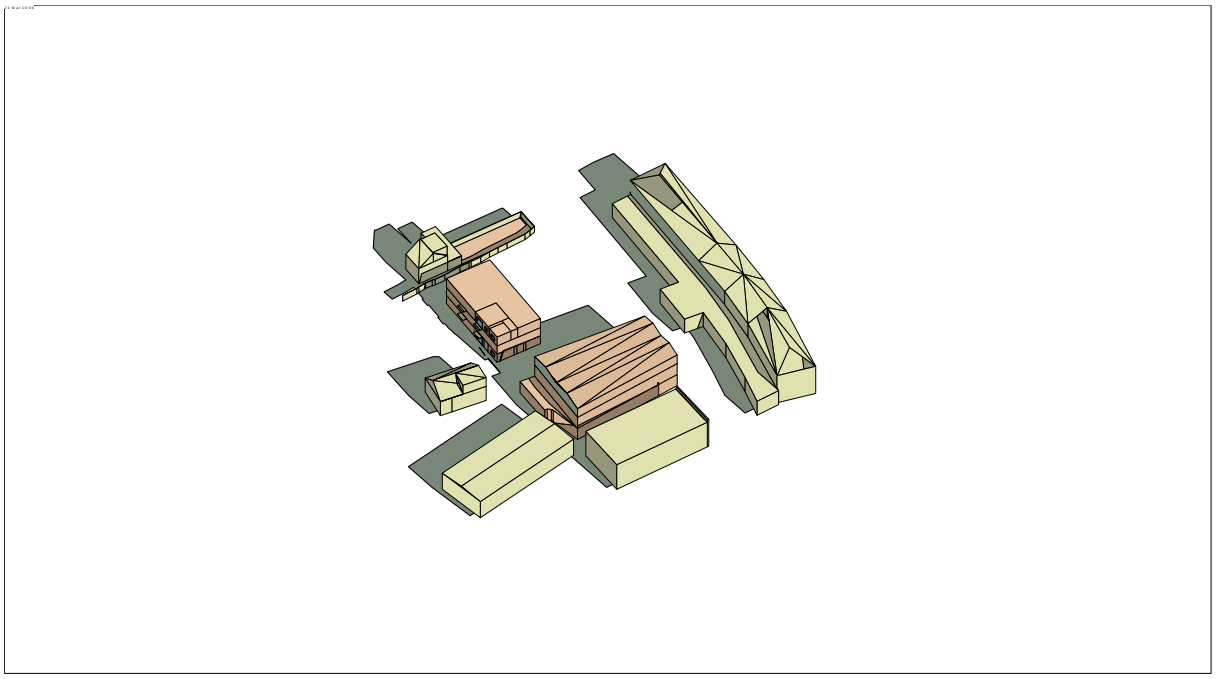

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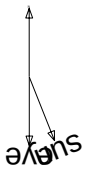

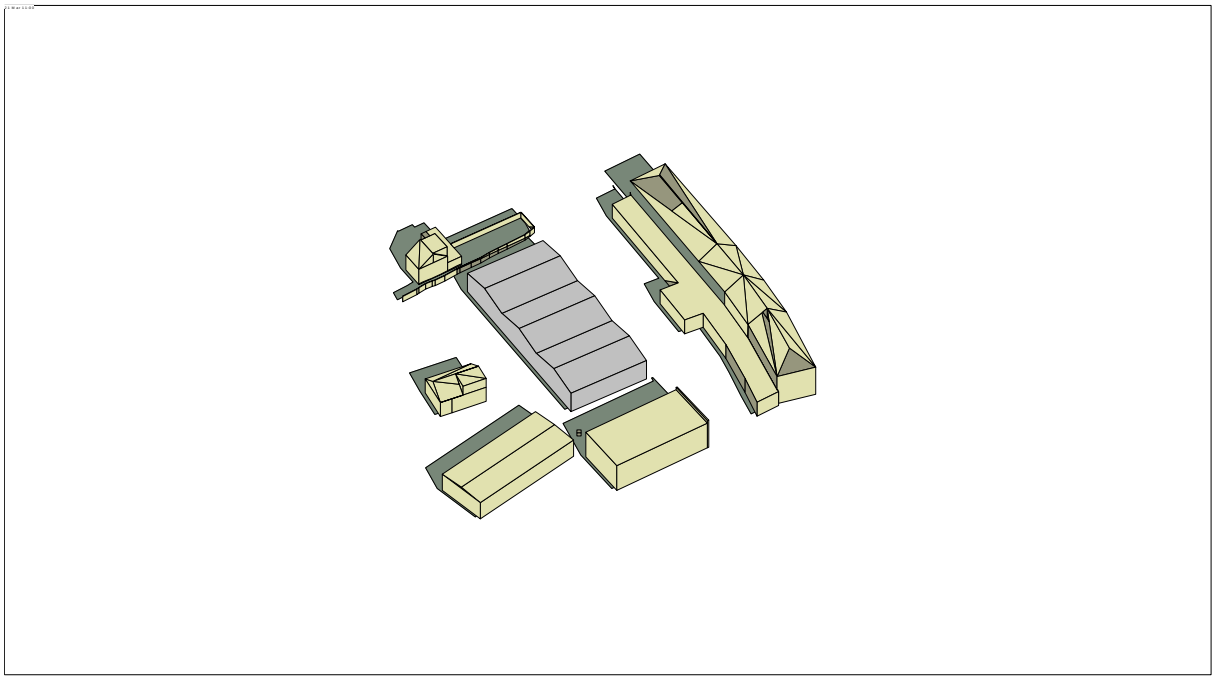

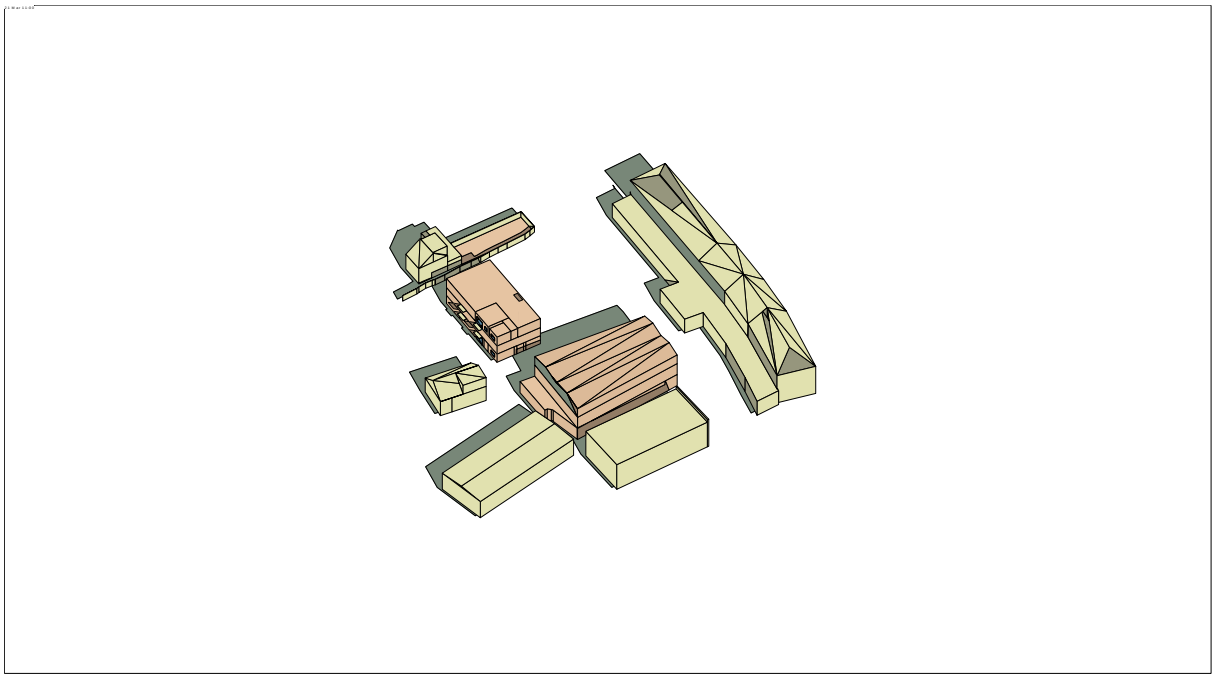

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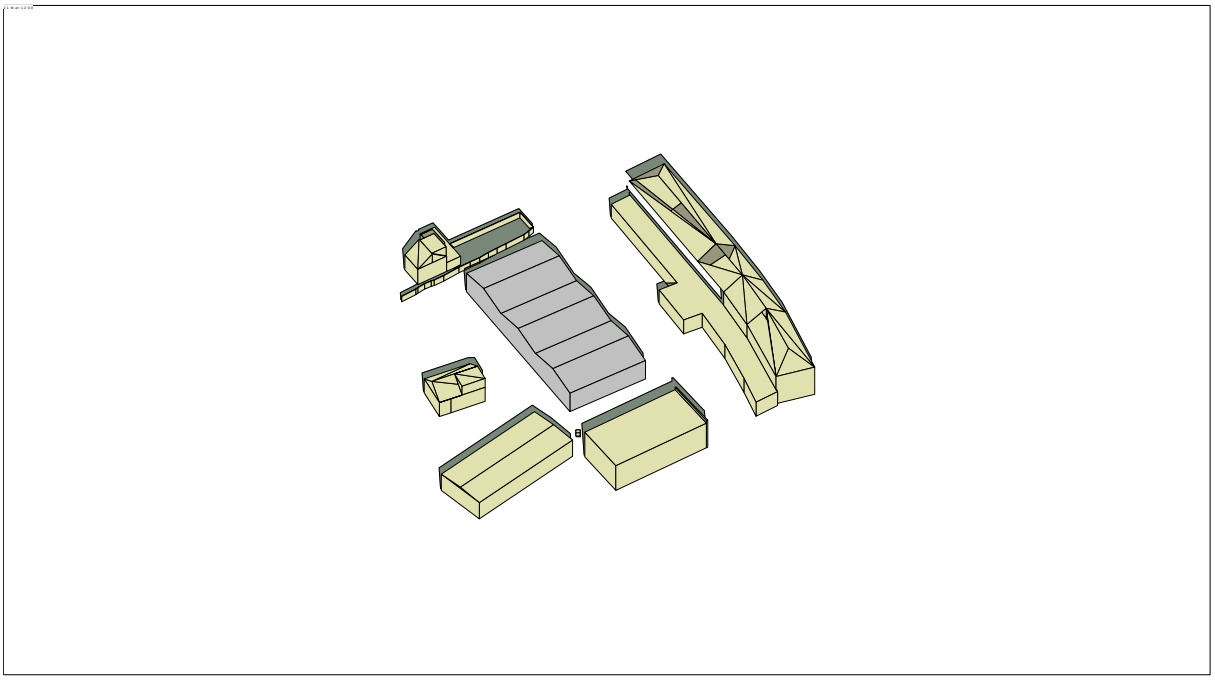

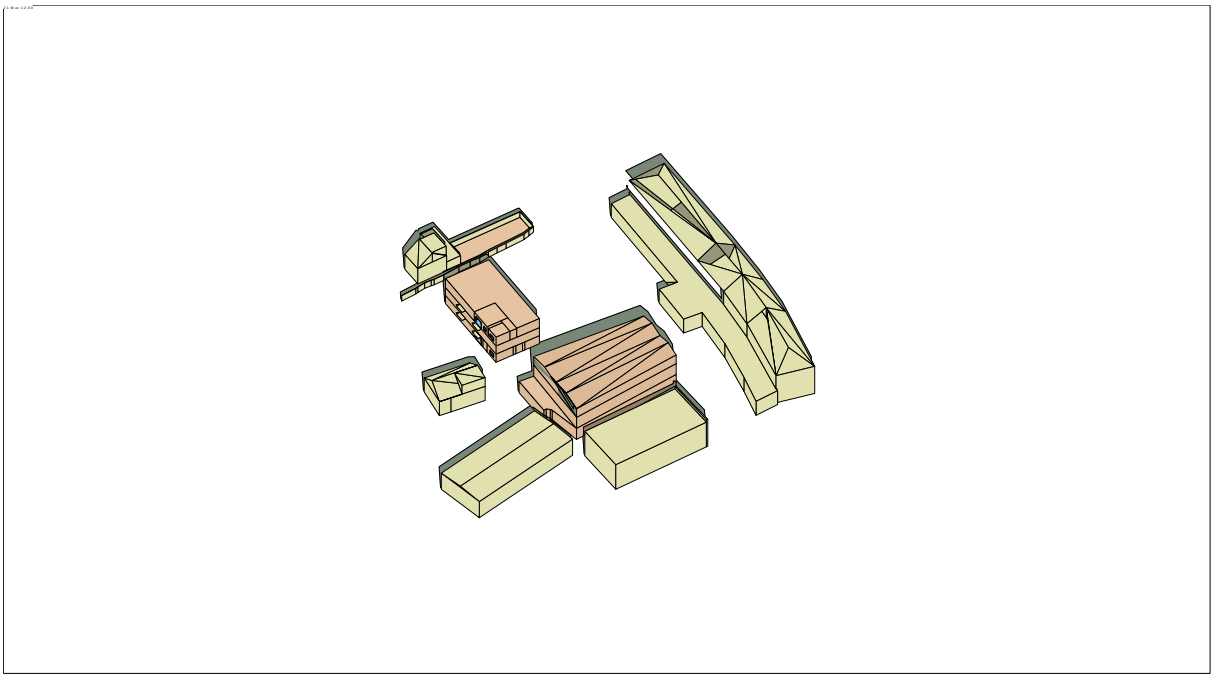

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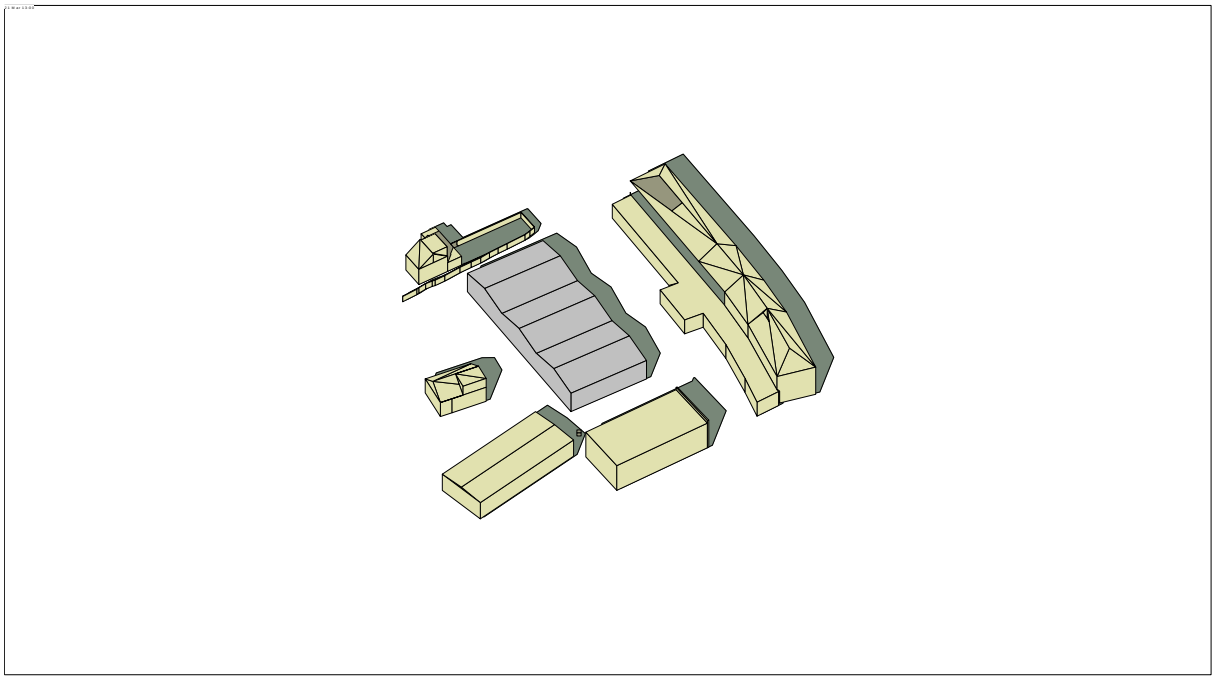

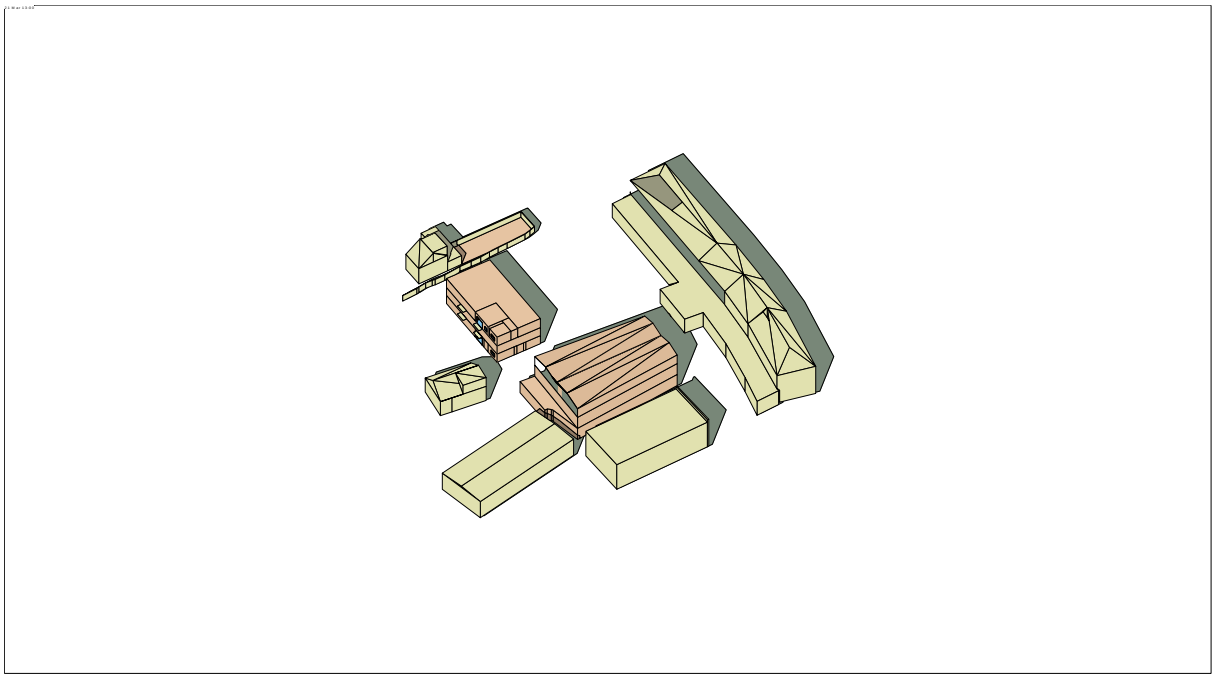

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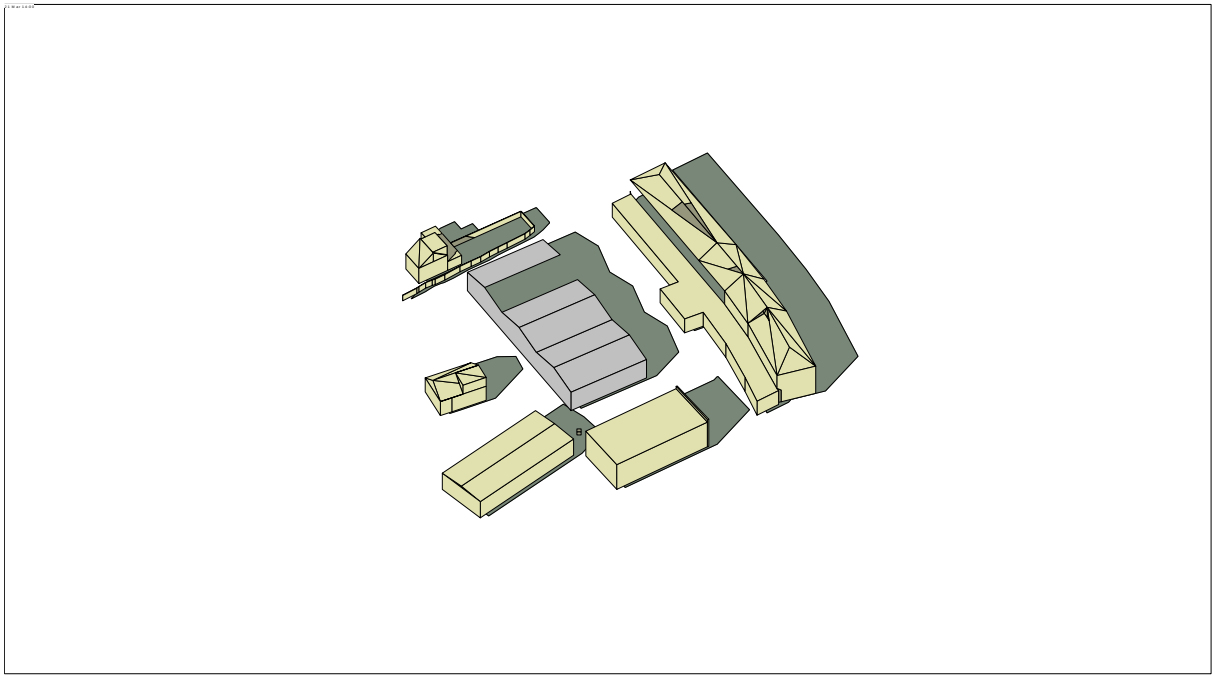
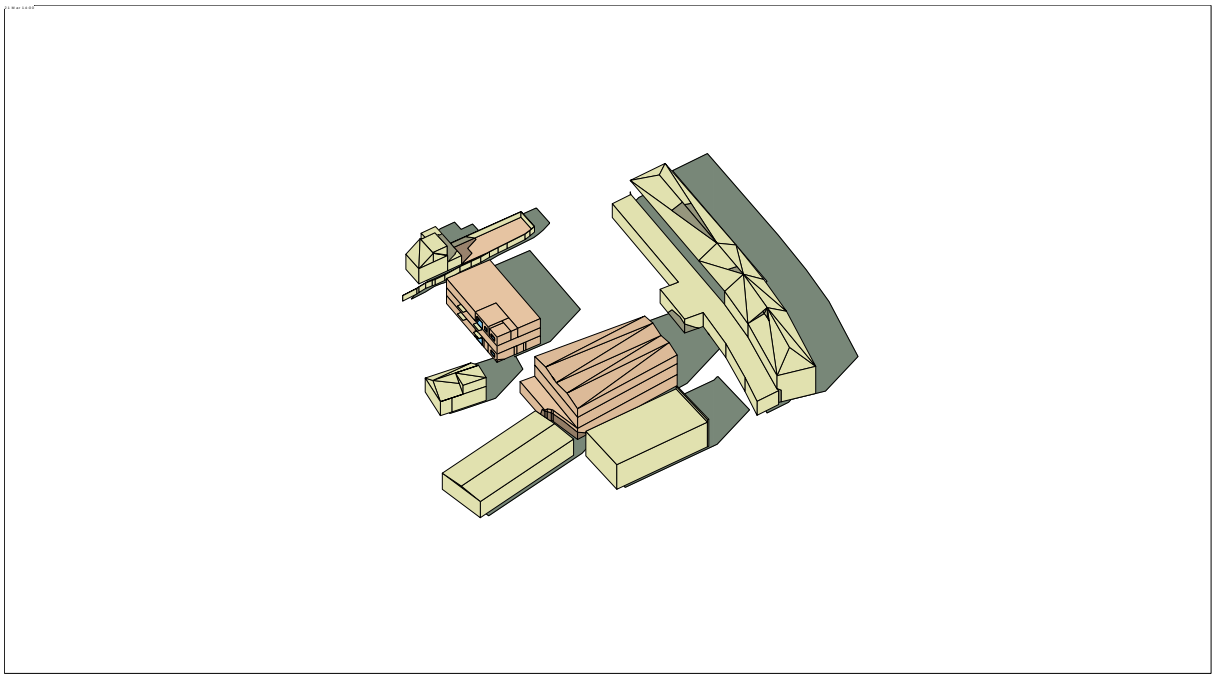
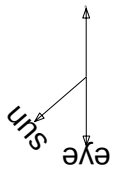
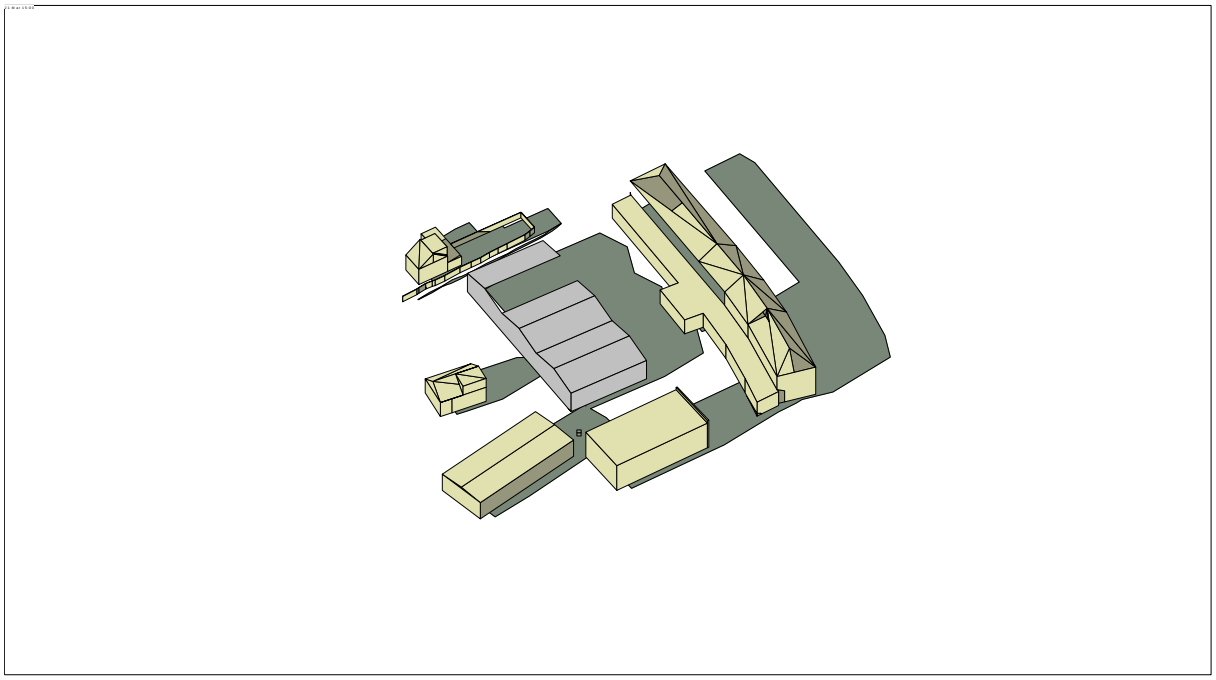
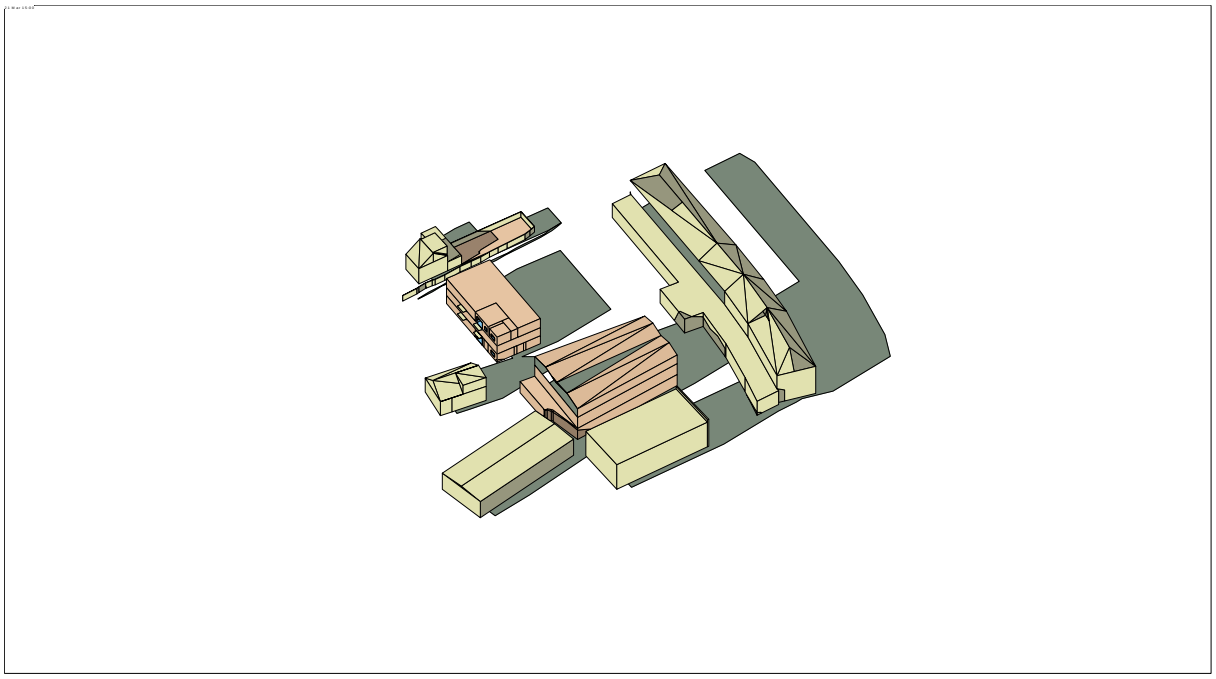




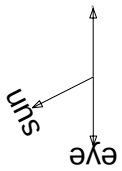
Suncast image:
View time = 21 Mar 15:00
Site Latitude = 51.48
Longitude diff. = -0.45
Model Bearing = 0.00
Sun: azi = 229.38 alt = 26.93
Eye: azi = 180.00 alt = 45.00

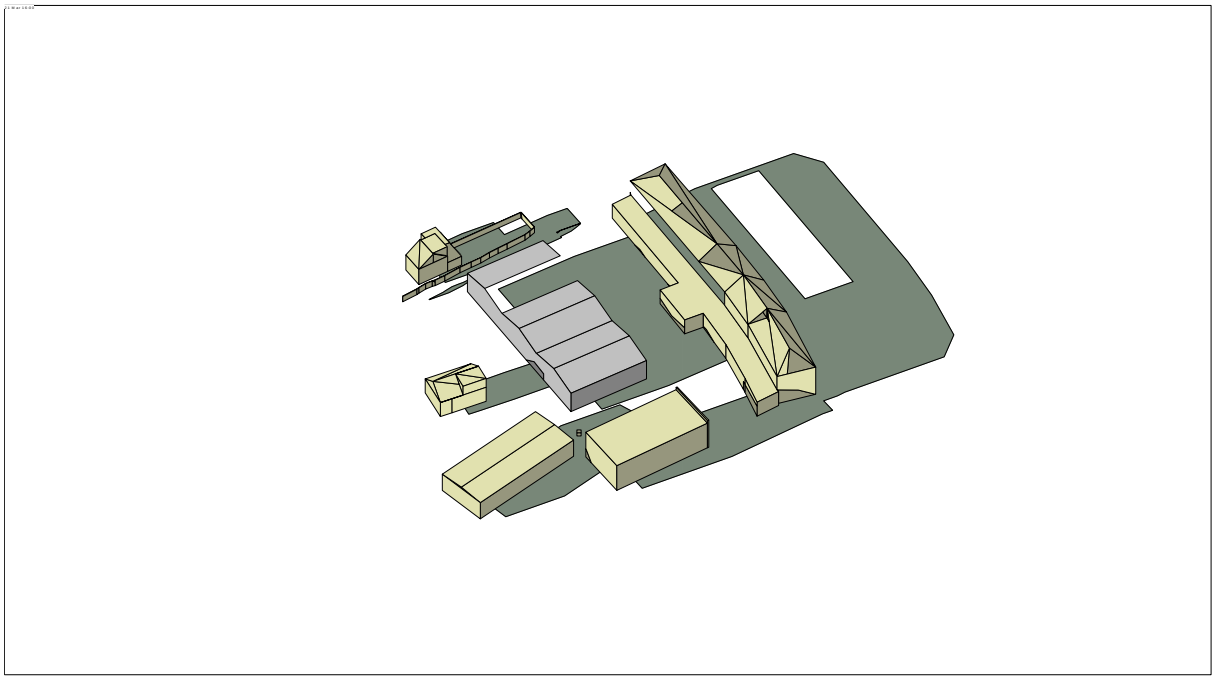


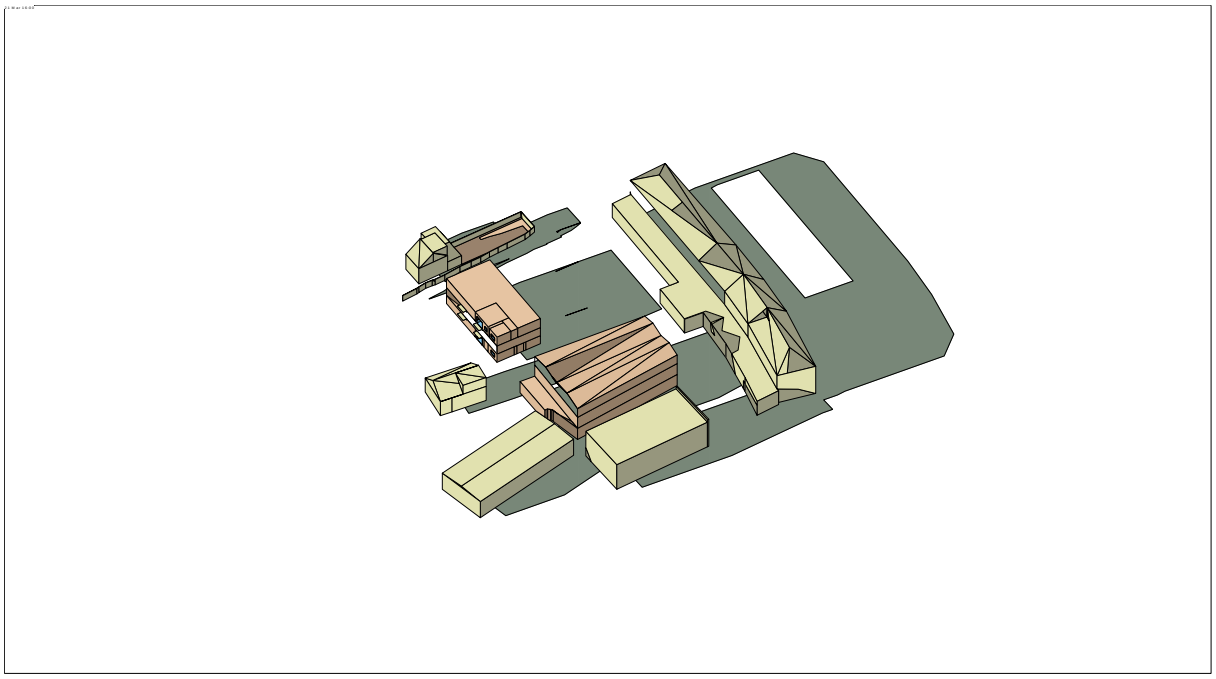




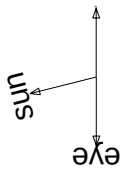
Suncast image:
View time = 21 Mar 16:00
Site Latitude = 51.48
Longitude diff. = -0.45
Model Bearing = 0.00
Sun: azi = 243.34 alt = 19.16
Eye: azi = 180.00 alt = 45.00

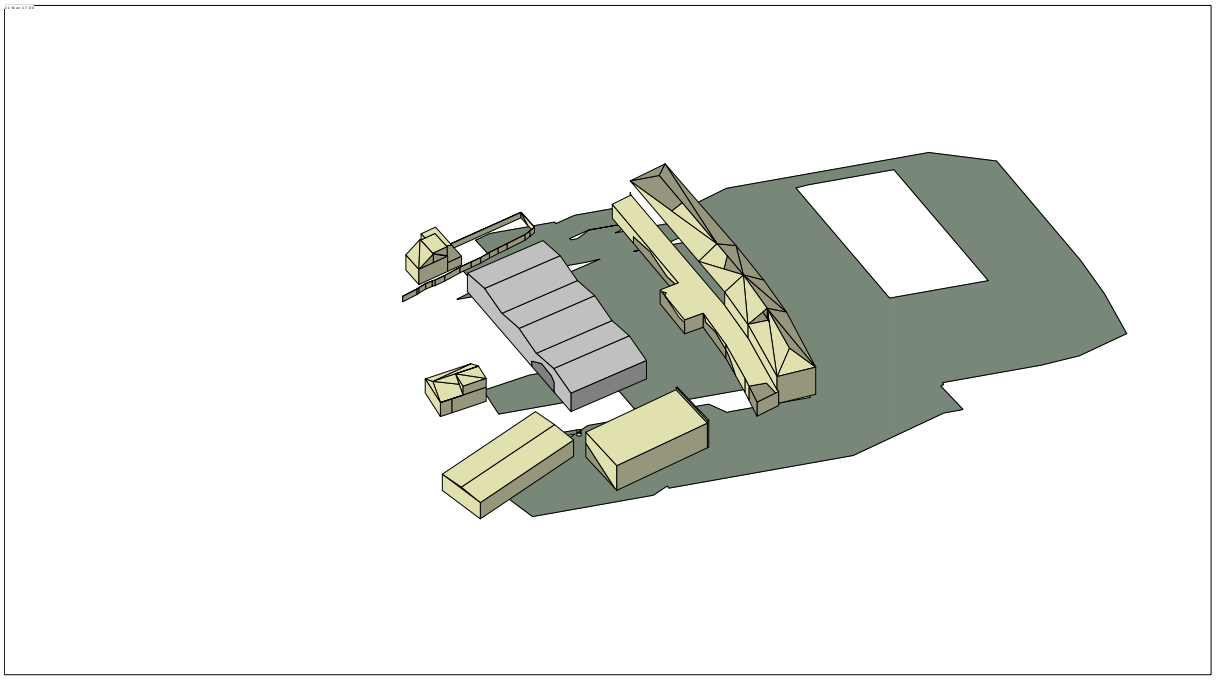


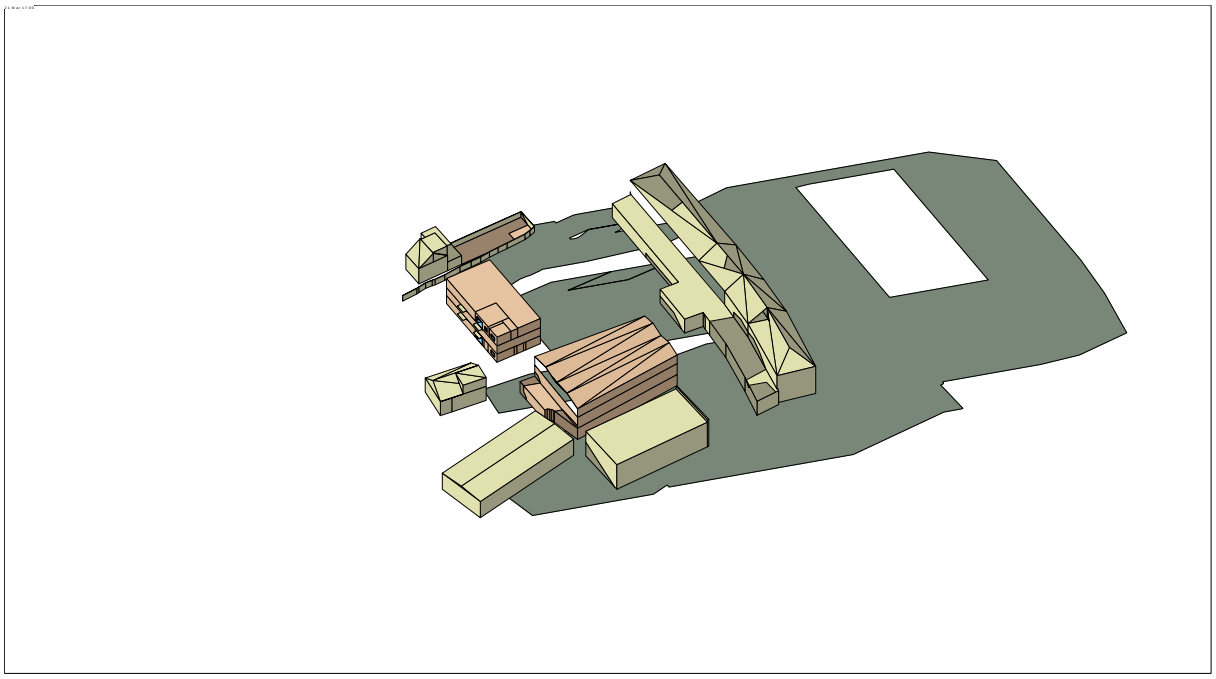




Suncast image:
View time = 21 Mar 17:00
Site Latitude = 51.48
Longitude diff. = -0.45
Model Bearing = 0.00
Sun: azi = 255.96 alt = 10.42
Eye: azi = 180.00 alt = 45.00







11 Appendix 4: Daylight Factor Results (Proposed Development)

Daylight Analysis

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Analysis Overview

Analysis Comparison (against previous assessment)

	Total	Comparison (with previous)
Daylight levels (lux)	253.820	**Same**
Percentage area above threshold (%)	87.6	**Same**

Analysis History

Date / Time	Area-weighted average daylight factor (%)	Area-weighted average illumination (lux)
20 Jan 2023 at 12:22	1.7	211.681
20 Jan 2023 at 12:23	1.8	219.818
23 Jan 2023 at 11:18	2.1	253.820
23 Jan 2023 at 11:18	2.1	254.186
23 Jan 2023 at 16:18	1.9	235.201
23 Jan 2023 at 16:34	1.9	238.026
23 Jan 2023 at 21:04	1.3	164.443
23 Jan 2023 at 21:08	2.0	238.455
24 Jan 2023 at 09:24	2.0	244.973
24 Jan 2023 at 11:05	1.5	149.605
24 Jan 2023 at 11:07	1.3	132.704
24 Jan 2023 at 11:14	2.0	246.566
24 Jan 2023 at 16:21	2.3	282.192
24 Jan 2023 at 16:22	2.1	253.820

Threshold Calculation

Building Results

Total floor area (m^2)	Total floor area above threshold (m^2)	Percentage floor area above threshold (%)	Area-weighted average daylight factor (%)	Area-weighted average illumination (lux)

Things to consider:

Increase amount of **glazing** (assess **trade-off** with energy consumption)

Total floor area (m^2)	Total floor area above threshold (m^2)	Percentage floor area above threshold (%)	Area-weighted average daylight factor (%)	Area-weighted average illumination (lux)
47.583	41.705	87.6	2.1	253.820

Evaluate size and shape of glass (glass **above** 2.3m (7'6") has **greater impact**)

Select a **glass type** with a different **visible transmittance** (Tvis)

Evaluate other daylighting metrics such as **glare**

Rooms included in the analysis

Room ID	Room name	Working plane	Floor area (m^2)	Floor area > threshold (m^2)	Percentage floor area > threshold (%)	Average illumination (%)
G0000004	G.01 BED2	0	11.080	6.656	**60.1**	1.28
G0000005	G.01 BED3	0	9.429	7.976	**84.6**	1.58
G0000008	G.01 BED1	0	8.656	8.656	**100.0**	3.12
F0000002	F.02 BED1	0	6.003	6.003	**100.0**	2.15
F0000004	F.02 BED2	0	5.390	5.390	**100.0**	2.19
S0000003	S.04 BED	0	7.025	7.025	**100.0**	2.57

Rooms not included in the analysis

Room ID	Room name	Reason
RM000001	181 Royal Crescent - Amenity	Not selected for inclusion in report
RM00001F	Room 001	Not selected for inclusion in report
G0000000	G.01 LKD	Not selected for inclusion in report
G0000001	G.01	Not selected for inclusion in report
G0000002	G.01	Not selected for inclusion in report
G0000003	G.01	Not selected for inclusion in report
G0000006	G.01	Not selected for inclusion in report
G0000007	G.01	Not selected for inclusion in report
RM000020	Room 003	Not selected for inclusion in report
F0000000	F.02 LKD	Not selected for inclusion in report
F0000001	F.02	Not selected for inclusion in report
F0000003	F.02	Not selected for inclusion in report

Room ID	Room name	Reason
RM000021	Room 002	Not selected for inclusion in report
S0000000	S.04 LKD	Not selected for inclusion in report
S0000001	S.04	Not selected for inclusion in report
S0000002	S.04	Not selected for inclusion in report
G0000009	G.01	Not selected for inclusion in report
G000000A	G.01	Not selected for inclusion in report
RM000002	Room 001	Not selected for inclusion in report
RM000003	Room 002	Not selected for inclusion in report
RM00001D	Room 003	Not selected for inclusion in report

Calculation Data

Location: London Heathrow, United Kingdom(51.48 N, 0.45 W)

Calculated: 26 Jan 2023 at 08:20
Sky Model: CIE Standard Overcast Sky
Working plane height: 0.850m
Grid Size: 0.200m
Illuminance Threshold (%): 0.70
Light Penetration:
With light penetration through internal windows

Daylight Analysis

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Analysis Overview

Analysis Comparison (against previous assessment)

	Total	Comparison (with previous)
Daylight levels (lux)	282.192	**Increased**
Percentage area above threshold (%)	59.9	**Increased**

Analysis History

Date / Time	Area-weighted average daylight factor (%)	Area-weighted average illumination (lux)
20 Jan 2023 at 12:22	1.7	211.681
20 Jan 2023 at 12:23	1.8	219.818
23 Jan 2023 at 11:18	2.1	253.820
23 Jan 2023 at 11:18	2.1	254.186
23 Jan 2023 at 16:18	1.9	235.201
23 Jan 2023 at 16:34	1.9	238.026
23 Jan 2023 at 21:04	1.3	164.443
23 Jan 2023 at 21:08	2.0	238.455
24 Jan 2023 at 09:24	2.0	244.973
24 Jan 2023 at 11:05	1.5	149.605
24 Jan 2023 at 11:07	1.3	132.704
24 Jan 2023 at 11:14	2.0	246.566

Threshold Calculation

Building Results

Total floor area (m^2)	Total floor area above threshold (m^2)	Percentage floor area above threshold (%)	Area-weighted average daylight factor (%)	Area-weighted average illumination (lux)
82.400	49.350	59.9	2.3	282.192

Rooms included in the analysis

Things to consider:

Increase amount of **glazing** (assess **trade-off** with energy consumption)

Evaluate size and shape of glass (glass **above** 2.3m

Room ID	Room name	Working plane	Floor area (m^2)	Floor area > threshold (m^2)	Percentage floor area > threshold (%)	Average illumination (%)
G0000000	G.01 LKD	0	28.288	14.346	**50.7**	2.02
F0000000	F.02 LKD	0	29.992	20.332	**67.8**	2.51
S0000000	S.04 LKD	0	24.119	14.673	**60.8**	2.40

(7'6") has **greater impact**)

Select a **glass type** with a different **visible transmittance** (Tvis)

Evaluate other daylighting metrics such as **glare**

Rooms not included in the analysis

Room ID	Room name	Reason
RM000001	181 Royal Crescent - Amenity	Not selected for inclusion in report
RM00001F	Room 001	Not selected for inclusion in report
G0000001	G.01	Not selected for inclusion in report
G0000002	G.01	Not selected for inclusion in report
G0000003	G.01	Not selected for inclusion in report
G0000004	G.01 BED2	Not selected for inclusion in report
G0000005	G.01 BED3	Not selected for inclusion in report
G0000006	G.01	Not selected for inclusion in report
G0000007	G.01	Not selected for inclusion in report
G0000008	G.01 BED1	Not selected for inclusion in report
RM000020	Room 003	Not selected for inclusion in report
F0000001	F.02	Not selected for inclusion in report
F0000002	F.02 BED1	Not selected for inclusion in report
F0000003	F.02	Not selected for inclusion in report
F0000004	F.02 BED2	Not selected for inclusion in report
RM000021	Room 002	Not selected for inclusion in report
S0000001	S.04	Not selected for inclusion in report
S0000002	S.04	Not selected for inclusion in report
S0000003	S.04 BED	Not selected for inclusion in report
G0000009	G.01	Not selected for inclusion in report
G000000A	G.01	Not selected for inclusion in report

Calculation Data

Location: London Heathrow, United Kingdom (51.48 N, 0.45 W)

Calculated:	24 Jan 2023 at 16:21
Sky Model:	CIE Standard Overcast Sky
Working plane height:	0.850m
Grid Size:	0.200m
Illuminance Threshold (%):	1.10

Light Penetration:
With light penetration through internal windows