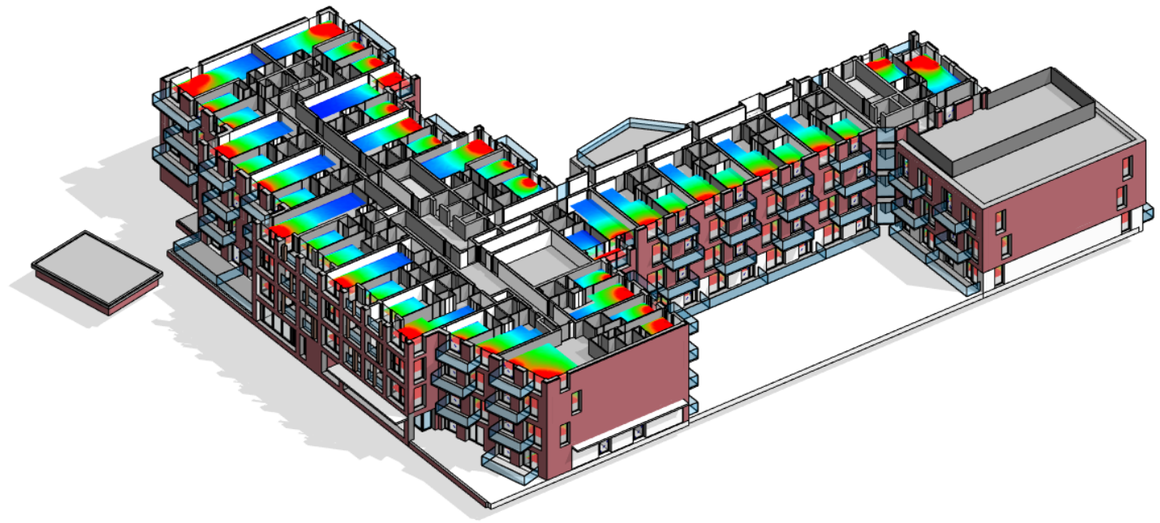
Stradbrook Road SHD

Blackrock



Daylight & Sunlight Report

IN2 Project No. D2144

07/07/2022

Revision History

Date	Revision	Description
07/07/2022	00	Issued for Planning

Registered Office: Unit E, Mount Pleasant Business Park, Upper Mount Pleasant Avenue, Dublin 6

Company Registration No.: 466565

Table of Contents

1.0 Executive Summary

This report compiles the daylight and sunlight analysis as undertaken by IN2 Engineering Design Partnership for the Proposed development at Stradbrook Road, Blackrock.

The report summarises the analysis undertaken, and conclusions determined for the proposed arrangements.

The report has been prepared as a desktop exercise with 3D massing and survey information provided by others. No site visits took place as information provided included all relevant required information and our understanding is that any survey information or 3D models provided were carried out by relevant suitably qualified professionals.

Various software programs were utilised in the analysis of the proposed development. These included:

- Radiance Lighting Software
- TAS by EDSL

Section 3.0 introduces the various Guidelines and Standards utilised throughout the Daylight / Sunlight analysis undertaken. The specific methodology for each topic (as relevant) is detailed in the relevant section in the body of this report as identified.

Analysis Type	**Relevance**	**Assessment Methodology**	**Compliance Guidelines Targets**	**Reference section of this report**
Daylight	Proposed Development	Spatial Daylight Autonomy	BRE 209	Section 6.0 – Internal Spatial Daylight Autonomy
Daylight	Existing Neighbouring Buildings	Vertical Sky Component	BRE 209	Section 5.0 – Impact on Neighbouring Buildings
Sunlight	Proposed Development	Sunlight Exposure	BRE 209	Section 7.0 – Exposure to Sunlight
Sunlight	Existing Neighbouring Buildings	Annual Probable Sunlight Hours	BRE 209	Section 5.0 – Impact on Neighbouring Buildings
Sunlight	Proposed Development Amenity Spaces	Sunlight Hours	BRE 209	Section 4.0 – Site Sunlighting and Shading

1.0 Executive Summary (Cont'd)

Section 4.0 illustrates the results from the amenity sunlight analysis as undertaken based on the BRE best practice for the proposed amenities areas. The proposed amenity space was found to receive excellent overall sunlight availability. The results demonstrate each of the amenity spaces easily achieve compliance with the BRE guidance of over 50% of amenity space across the site receiving two hours or more of sunlight on 21st March. The BRE guide also recommends assessment of impact to neighbouring amenity, as the proposed building is situated to the north of the house and private gardens on Windsor Park, their private amenities cannot be impacted for sunlight availability.

The impact of the proposed development on neighbouring buildings was assessed in Section 5.0. The neighbouring buildings were assessed for both VSC, a measure of potential daylight, and Annual Probable Daylight Hours, a measure of direct sunlight. The VSC assessment determined that there would be no negative impact as a result of the proposed development. The Annual Probable Sunlight hours and Winter Sunlight Hours assessments determine the annual sunlight impact on a window and the winter sunlight impact through a quantitative assessment. The APSH assessment determined that there would be no negative impact to neighbouring dwellings as a result of the proposed development. In addition to the quantitative assessment carried out as per the BRE guide, shadow diagrams have also been provided in appendix B. These images are provided for information as they are subjective, please refer to quantifiable metrics contained in the relevant sections for determination of impact on neighbours.

The internal daylight analysis, as detailed in section 6.0, has been undertaken for all levels for Spatial Daylight Autonomy (SDA) – a climate-based means of assessing natural light performance accounting for both direct (sunlit) and diffuse light. The analysis determined a very high compliance rate of **98%** of rooms achieved prescribed SDA targets. Section 6.0 includes full results demonstrating how this overall compliance was determined.

The 'Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities 2020 (see section 3.0 Standards and Guidelines) advise that "*Where an applicant cannot fully meet all of the requirements of the daylight provisions above(...BR 209…), this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment",* therefore section 6.0 identifies these spaces and provides compensatory solutions.

By way of further information, a full Average Daylight Factor (ADF) assessment has also been provided in Appendix A. It should be noted that ADF has now been superseded as the metric for assessing internal daylight. The new BRE BR 209, 2022 edition (see section 3.0) prescribes analysis utilising Medium Daylight Factor or Spatial Daylight Autonomy (see section 4.0 for definitions). Compensatory measures have been provided for the current assessment metrics, SDA, as included in section 6.0 and not the superseded ADF metric.

Section 8.0 includes the results for exposure to sunlight. Exposure to sunlight in the new metric, as defined in BR 209 2022 edition, for assessing sunlight availability to a dwelling. The guide notes that "*Where groups of dwellings are planned, site layout design should aim to maximise the number of dwellings with a main living room that meets the … recommendations."* The proposed development achieves a high compliance rate with 92% of units meeting or exceeding the minimum recommendations. The 9 units that did not achieve the sunlight recommendations were all compliant with the daylight recommendations. There was no space found to be deficient for both daylight and sunlight.

In summary, this report confirms that best practice Sunlight and Daylight availability have been ensured for the proposed Stradbrook development, with minimal impact on the existing neighbouring environment.

2.0 Development Description

The proposed mixed-use development at a site of some 0.4813 ha on Stradbrook Road, Mountashton, Blackrock, Co. Dublin will comprise: the demolition of the existing Stradbrook House and adjoining surface car park, and the construction of: 108 No. Build-to-Rent residential senior living apartments (83 No. 1-bed apartments and 25 No. 2-bed apartments), with balconies / winter gardens provided for all units, across 2 No. blocks ranging between 3 to 7-storeys over basement with set back at sixth-floor level. The proposal also includes for 148 No. secure bicycle parking spaces, 55 No. underground car parking spaces, a two-way vehicular and cyclist entrance ramp, and bin storage, circulation areas and associated plant at basement level; a self-contained office unit, a residential staff management suite, resident's facilities, residents' communal amenity rooms, and residents' communal open space, as well as 13 No. surface car parking spaces (incl. 1 No. accessible commercial car parking space and 12 No. car parking spaces for use by the adjoining creche (incl. 1 No. accessible)), 24 No. secure cycle spaces within separate bike store, separate bin store for office use, 30 No. short-term bicycle parking spaces, and 3 No. ESB substations at ground floor level; additional communal amenity rooms at first, second and third floor levels; roof gardens / terraces at third, fourth and sixth-floor levels; green roofs; and PV panels on third, fourth and sixth-floor roof-level; amendments to existing boundary wall to provide new vehicular and pedestrian entrances; provision of security gates; and associated site landscaping, boundary treatments, lighting and servicing, and all associated works above and below ground.

3.0 Standards and Guidelines

The following standards and guidance documents have been consulted when compiling this report to ensure compliance with the various Daylight and Sunlight requirements as applicable and relevant:

a) Sustainable Urban Housing: Design Standards for New Apartments (December 2020) (the **"2020 Apartment Guidelines").** These are guidelines issued under section 28 of the 2000 Planning and Development Act (as amended).

b) The Building Research Establishment's (BRE) Site Layout Planning for Daylight and Sunlight: A guide to good practice (BRE 209) 3rd edition/ 2022 edition, (the **"BRE Guide").**

c) British Standard BS EN 17037:2018 – Daylight in Buildings (the "**2018 British EN Standard**").

d) Irish Standard IS EN 17037:2018 (the "**2018 Irish EN Standard**").

EN 17037:2018, which was approved by the CEN on 29 July 2018 has been adopted in the UK as BS EN 17037:2018, and in Ireland as IS EN 17037:2018.The texts of the 2018 British Standard and the 2018 Irish Standard are the same, with one exception. The exception is that the 2018 British Standard contains an additional "National Annex" which specifically sets out requirements within dwellings, to ensure some similarity to the now superseded 2008 British Standard.

The 2020 Apartment Guidelines state:

"[6.5] The provision of acceptable levels of natural light in new apartment developments is an important planning consideration as it contributes to the liveability and amenity enjoyed by apartment residents. In assessing development proposals, planning authorities must however weigh up the overall quality of the design and layout of the scheme and the measures proposed to maximise daylight provision with the location of the site and the need to ensure an appropriate scale of urban residential development.

[6.6] Planning authorities should have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition) or BS 8206-2:2008 – 'Lighting for Buildings – Part 2: Code of Practice for Daylighting' when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision.

[6.7] Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specific. This may arise due to a design constraints associated with the site or location and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution."

It can be noted from this section that the 2020 Apartment Guidelines refer to the BRE Guide (published in 2011) and to the 2008 British Standard. They do not take into account the 2018 British Standard and/or the 2018 Irish Standard. As the BRE Guide has been updated from the 2nd Edition to the 3rd, the 2022 edition will therefore provide the basis for the assessments detailed within this report.

The BRE Guide

The BRE Guide describes its purpose in the following terms in the "Summary" section (v):

> *"This guide gives advice on site layout planning to achieve good sunlighting and daylighting, both within buildings and in the open spaces between them. It is intended to be used in conjunction with the interior daylight recommendations for new buildings in the British Standard Daylight in buildings, BS EN 17037. It contains guidance on site layout to provide good natural lighting within a new development; safeguarding of daylight and sunlight within existing buildings nearby; and the protection of daylighting of adjoining land for future development."*

The BRE Guide also notes that:

> *"1.6 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; its aim is to help rather than constrain the designer. Although it gives numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design (see Section 5). 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. Alternatively, where natural light is of special importance, less obstruction and hence more sunlight and daylight may be deemed necessary. The calculation methods in Appendices A and B are entirely flexible in this respect. Appendix F gives advice on how to develop a consistent set of target values for skylight under such circumstances."*

> *"1.7 The guidance here is intended for use in the United Kingdom and in the Republic of Ireland, though recommendations in the Irish Standard IS EN 17037 may vary from those in BS EN 17037. Many of the principles outlined will apply to other temperate climates. More specific guidance for other locations and climate types is given in BRE Report Environmental site layout planning."*

Therefore, if the situation arises where the targets identified within the Guide are not achieved, these should be highlighted and either justified in the context of the development / site or where relevant and applicable, compensatory measures will be proposed. In the context of this report, any deviations from the Guide's recommendations have therefore been identified, with an approach throughout to ensure that good quality daylight/sunlight in achieved through analysis and design improvements as far as practicable and viable as detailed in the report as relevant.

The main sections in the guide that the assessments within this report will reference (as applicable) are:

1. Light from the Sky (Daylight).

    1.1. New Development – Within appendix C of the guide, the targets for internal daylight are provided for both optional methodologies, Climate Based Daylight Analysis (CBDM) with targets provided for Lux levels as determined through Spatial Daylight Autonomy (SDA), and Daylight Sky analysis with targets provided for Medium Daylight Factor (MDF), please refer to methodology section for detailed explanation of the methods utilised in this report.

    1.2. Existing Buildings – The guide sets a quantitative assessment method for determining the impact of new developments on light from the sky (VSC) on existing neighbouring buildings.

2. Sunlighting – *Based on site location, longitude and latitude, and solar azimuths. i.e. buildings south of a site will not be impacted for sunlight in the northern hemisphere.*

    2.1. New Development – The guide sets a quantitative method for determining sunlight to a habitable room within a dwelling.

    2.2. Existing Buildings – The guide sets a quantitative assessment method for determining the impact of new developments on sunlight, annual probable sunlight hours (APSH) and winter probable sunlight hours (WPSH), on existing neighbouring buildings.

    2.3. Gardens and open spaces – The amenity criteria set out is used for both proposed new amenity and the impact on existing neighbouring amenities.

The specific methodology for each topic (as relevant) is detailed in the relevant section in the body of this report.

The 2018 British and Irish Versions of the EN Standards

The EN 17037:2018 standard—which is the basis of both the 2018 British EN Standard and the 2018 Irish EN Standard considers a metric based on **median** daylight, in order to ensure both extent and a degree of uniformity of daylight.

> *"A space is considered to provide adequate daylight if a target illuminance level is achieved across a fraction of the reference plane within a space for at least half of the daylight hours."*

EN 17037:2018 also address other aspects in addition to daylight - including glare and quality of view, which are not addressed in the context of this report.

The National Annex

As is noted above, the 2018 British Standard includes a "National Annex", containing "Further recommendations and data for daylight provision in the UK and Channel Islands". This is referenced further in the appendix of this report. As there is no equivalent in the 2018 Irish Standard, the 2018 British Standard National Annex will be referenced, which states:

> *"NA.1 Introduction: The UK committee supports the recommendations for daylight in buildings given in BS EN 17037:2018; however, it is the opinion of the UK committee that the recommendations for daylight provision in a space (see Clause A.2) may not be achievable for some buildings, particularly dwellings. The UK committee believes this could be the case for dwellings with basement rooms or those with significant external obstructions (for example, dwellings situated in a dense urban area or with tall trees outside), or for existing buildings being refurbished or converted into dwellings. This National Annex therefore provides the UK committee's guidance on minimum daylight provision in all UK dwellings."*

NA.2 addresses minimum daylight provision in UK dwellings. It contains a table, in which target illuminance, ET (lx), levels are recommended for different room types. These are: bedroom at 100 lx; living room at 150 lx; and kitchen at 200 lx, which may be compared to EN 17037's recommendation of 300 lux (irrespective of room application). The commentary is as follows:

> *"Even if a predominantly daylit appearance is not achievable for a room in a UK dwelling, the UK committee recommends that the target illuminance values given in Table NA.1 are exceeded over at least 50% of the points on a reference plane 0.85 m above the floor, for at least half of the daylight hours."*

4.0 Glossary

Working Plane

The working plane is the notional plane where visual tasks, and on which predicted light levels would normally be undertaken. For a residential assessment, the working plane is defined by BR209 at 850mm above floor level.

Daylight Factor

The Daylight Factor (DF) is the ratio of the illuminance at a point on a working plane in a room, due to the combination of light received directly and indirectly from a sky, over the illuminance on an external horizontal plane based on an unobstructed sky. Daylight factor, as defined here, excludes the contribution of direct sunlight. The sky utilised for ADF and MDF assessments, as defined below, is the (theoretical) CIE Overcast Sky, which is unidirectional, therefore a north facing window is assumed to receive the same light as south etc.

Average Daylight Factor

Average Daylight Factor, also referred to as ADF, is a measure of daylight availability to a room based on the average values of multiple calculation points at the working plane within a space. ADF was utilised in BS.8206-2 standard, inferred also in BR.209, where it is used for daylight assessment of proposed developments (with impact on existing utilising VSC/ NSL as defined below).

Median Daylight Factor

Median Daylight Factor, also referred to as MDF, is a measure of daylight availability to a room based on the median daylight value, i.e., the value that is achieved for at least 50% of the space (50% of the calculation points on the working plane). MDF is calculated for compliance with EN 17037 Method 1.

Climate Based Daylight Assessment

Climate based daylight assessments, also referred to as CBD, involves the use of a detailed daylight calculation methods where hourly (or sub-hourly) internal daylight illuminance values for a typical year are computed using hourly (or sub-hourly) sky and sun conditions derived from climate data appropriate to the site. Unlike the DF methodology, CBD assessments are therefore orientation dependent: i.e. a south facing window would be expected to receive more daylight than north facing etc.

This calculation method determines daylight provision directly from simulated illuminance values on the working plane with results determined in lux (a measure of light). CBD is calculated for compliance with EN 17037 method 2.

Sunlight Exposure

Sunlight exposure is assessed on a window of at least one habitable room (preferably a living room) for the number of hours of direct sunlight exposure on the 21st March.

Probable Sunlight Hours

Annual probable sunlight hours and winter probable sunlight hours, also referred to as APSH and WPSH, are used for the assessment of impact on neighbouring buildings by a proposed development. APSH and WPSH are a measure of probable direct sunlight to a window or surface and therefore are only relevant to windows within 90 degrees of south for buildings in the northern hemisphere. Therefore, any window with a northerly aspect (i.e. orientated between North and East and North and West) is therefore not assessed within the methodology.

Vertical Sky Component

Vertical Sky Component, also referred to as VSC, is used for the assessment of impact on neighbouring buildings by a proposed development with respect to daylight availability. VSC is a measure of the percentage of illuminance that a point can receive from the CIE Overcast Sky as percentage of that received at unobstructed horizontal locations. In simple terms, how much of the sky that can be seen for a given point. VSC assessments do not included reflected light. VSC is calculated for compliance with BR209 as detailed below.

Amenity Sunlight

Amenity sunlight is a measure of direct daylight received on an area over the duration of 21st March based on the sun's solar position for a geographical location. As the 21st March is the solar equinox, the sun is at its mid-point of travel position through the year, therefore representing an average condition throughout the year of how well sunlit an amenity space will be. It may be noted that in the Northern Hemisphere, the sun rises due east and sets due west. Amenity sunlight is calculated for compliance with BR209 as detailed below.

5.0 Site Sunlighting and Shading

5.1 Methodology

The BRE Site Layout Planning for Daylight and Sunlight Design Guide 209 provides guidance with regards to sunlighting and shading to external amenity spaces within proposed developments.

The guidance recommends:

> *"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".*

And,

> *"If as a result of new development an existing garden or amenity area does not meet the above, and the area which can receive two hours of sun on 21 March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable. If a detailed calculation cannot be carried out, it is recommended that the centre of the area should receive at least two hours of sunlight on 21 March".*

The methodology assesses sunlight performance at the Equinox, as this is the mid solar position throughout the year (as illustrated in Figure 5.1.1), with compliance indicative of spaces that will receive adequate sunlight and appealing useful spaces, including that the following attributes will be achieved as identified in BRE.209:

- Provide attractive sunlit views (all year)
- Make Outdoor Activities like sitting out and children's play more pleasant (mainly warmer months).
- Encourage plant growth (mainly spring and summer).
- Dry out the ground, reducing moss and slime (mainly in colder months).

An example analysis of Amenity Spaces is indicated in Figure 5.1.1. In this sample development, the main amenity space is located to the North of a building block which provides some degree of overshadowing (dark green contours).

Results for the proposed development are detailed in Figure 5.1.2, demonstrating each of the amenity spaces easily achieve compliance with the BRE guidance of over 50% of amenity receiving two hours or more of sunlight on 21st March.

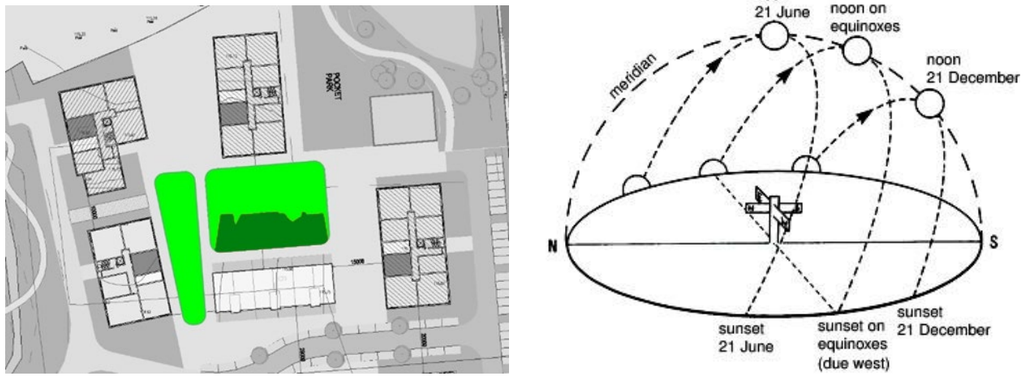


Fig 5.1.1 – Example Amenity Spaces

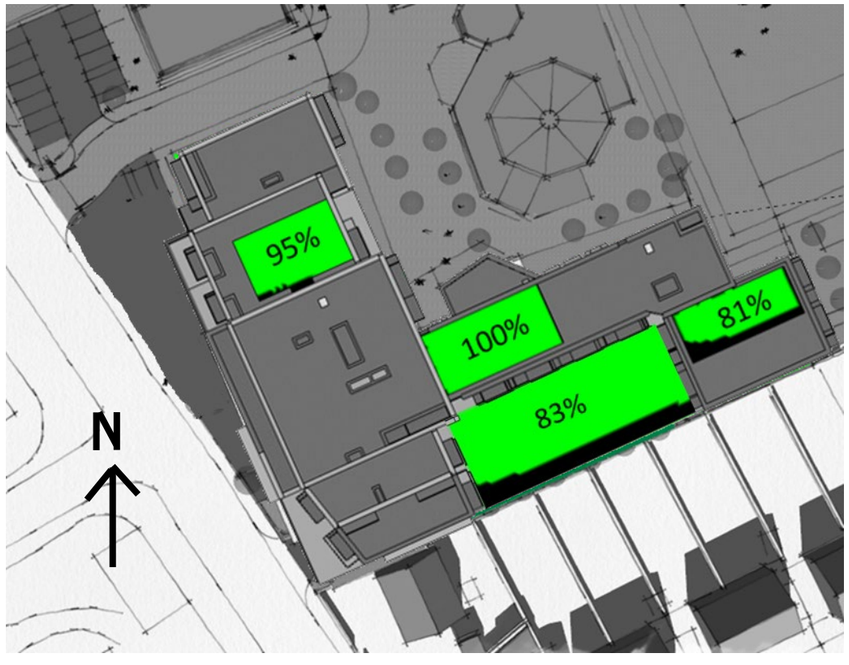


Fig 5.1.2 –Sunlight Availity to Amenity Spaces for Proposed Development

6.0 Impact on Neighbouring Buildings

6.1 Guidance

As set out within the introduction, the impact on existing buildings has been assessed utilising quantitative assessment method as detailed in the BRE publication “Site Layout Planning for Daylight and Sunlight – A guide to good Practice (2022 Edition)”

BRE Guidelines state:

Light from the Sky

> *“If any part of a new building or extension, measured in a vertical section perpendicular to a main window wall of an existing building, from the centre of the lowest window, subtends an angle of more than 25° to the horizontal, then the diffuse daylighting of the existing building may be adversely affected. This will be the case if either:*
>
> - *The VSC (Vertical Sky Component) measured at the centre of an existing main window is less than 27%, and less than 0.8 times its former value.”*

The analysis is based on measuring the VSC at the existing main windows. As per the BRE Guide, main windows included, living rooms, kitchens, and bedrooms. Existing windows with VSC above 27% after proposed development are considered to still receive good daylight availability and therefore not adversely affected.

Sunlighting

> *“If a living room of an existing dwelling has a main window facing within 90° of due south, and any part of a new development subtends an angle of more than 25° to the horizontal measured from the centre of the window in a vertical section perpendicular to the window, then the sunlighting of the existing dwelling may be adversely affected. This will be the case if the centre of the window:*
>
> - *receives less than 25% of annual probable sunlight hours, or less than 5% of annual probable sunlight hours between 21 September and 21 March and*
> - *receives less than 0.8 times its former sunlight hours during either period and*
> - *has a reduction in sunlight received over the whole year greater than 4% of annual probable sunlight hours.”*

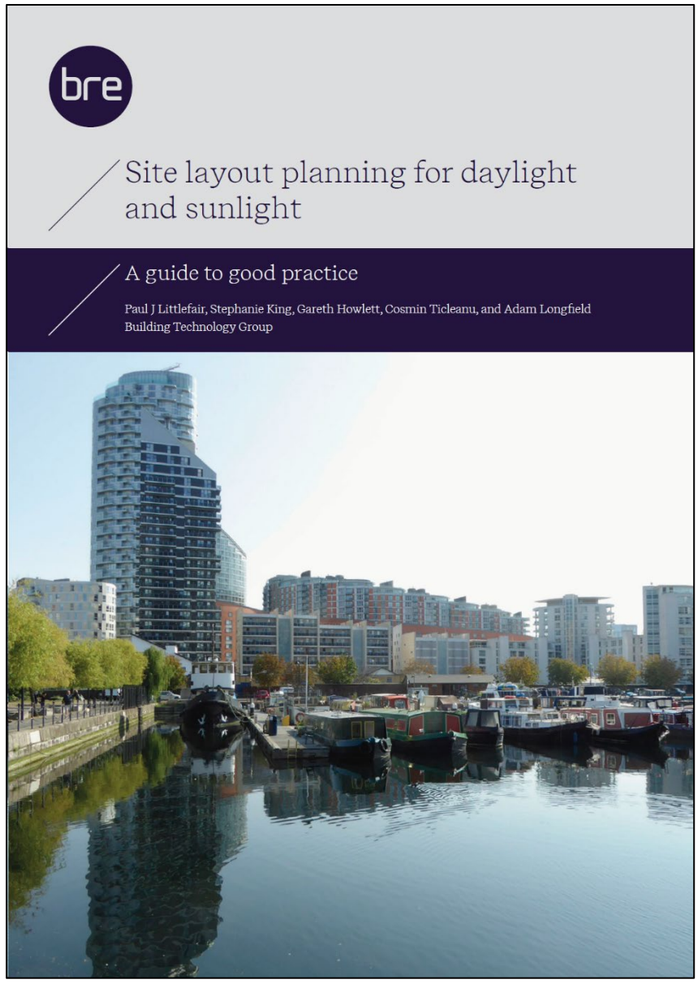


Fig 6.1.1 – BRE publication “Site Layout Planning for Daylight and Sunlight – A guide to good practice (Third Edition)

6.2 Methodology

The analysis looks to assess main windows, main living rooms and conservatories. For annual sunlight hours and winter sunlit hours, windows within 90° of south are assessed.

The analysis was carried out on existing neighbouring residential buildings that could be impacted by the proposed development, namely Windsor Park, Rockford Manor, and Wynberg House, as identified in Fig 6.2.1 below.

Analysis was undertaken by calculating sunlight availability pre and post-development for indicative window locations on the façade of each dwelling.

Fig 6.2.1 – Google Maps images of relevant buildings

6.3 3D Model of Proposed Development

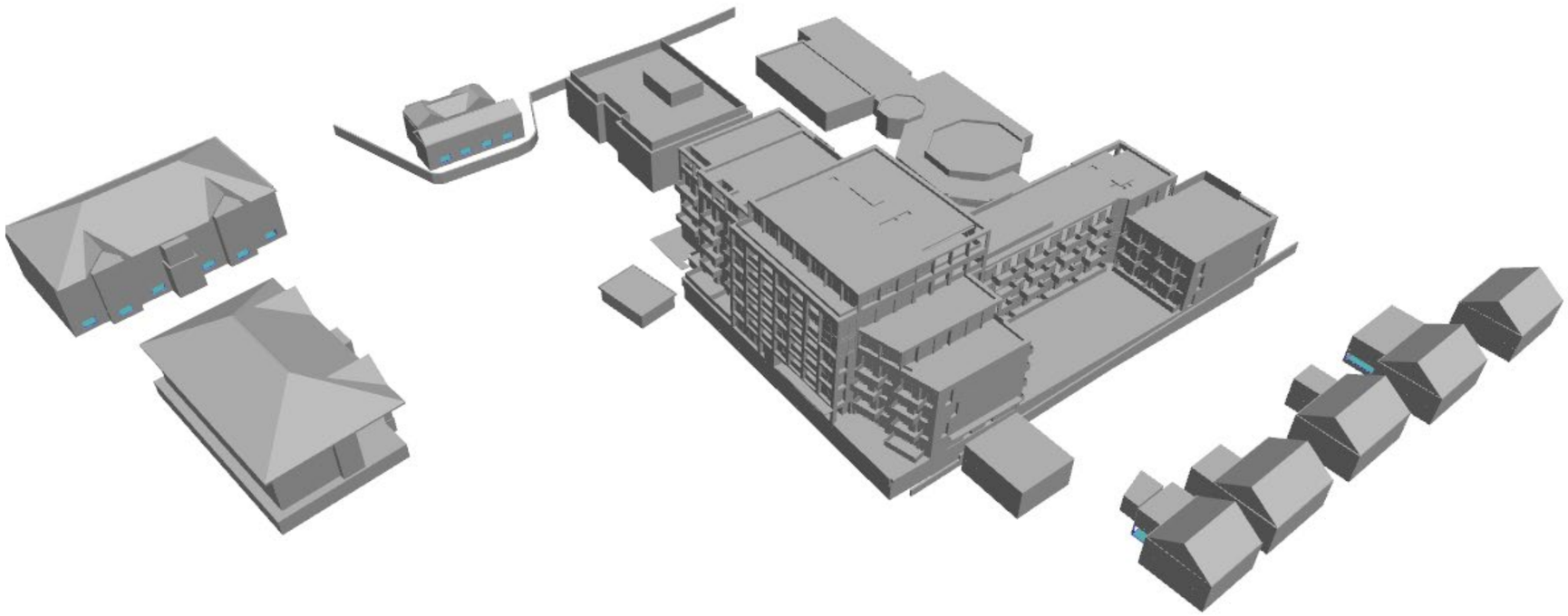


Fig 6.3.1– 3D Model of Proposed Development and existing Neighbouring Buildings

6.4 Daylight Results – Vertical Sky Component (VSC)

A proposed development could potentially have a negative effect on the level of daylight that a neighbouring property receives, if the obstructing building is large in relation to their distance from the existing dwelling. To ensure a neighbouring property is not adversely affected, the Vertical Sky Component (also referred to as VSC) is calculated and assessed. VSC can be defined as the amount of skylight that falls on a vertical wall or window. Results for VSC under proposed development vs. existing conditions, measured at the centre of each window. VSC results indicated by green, yellow, and red dots, with green indicating a pass result, yellow indicating a minor impact and red a major impact. There is predicted to be no impact on daylight availability to neighbouring buildings analysed.

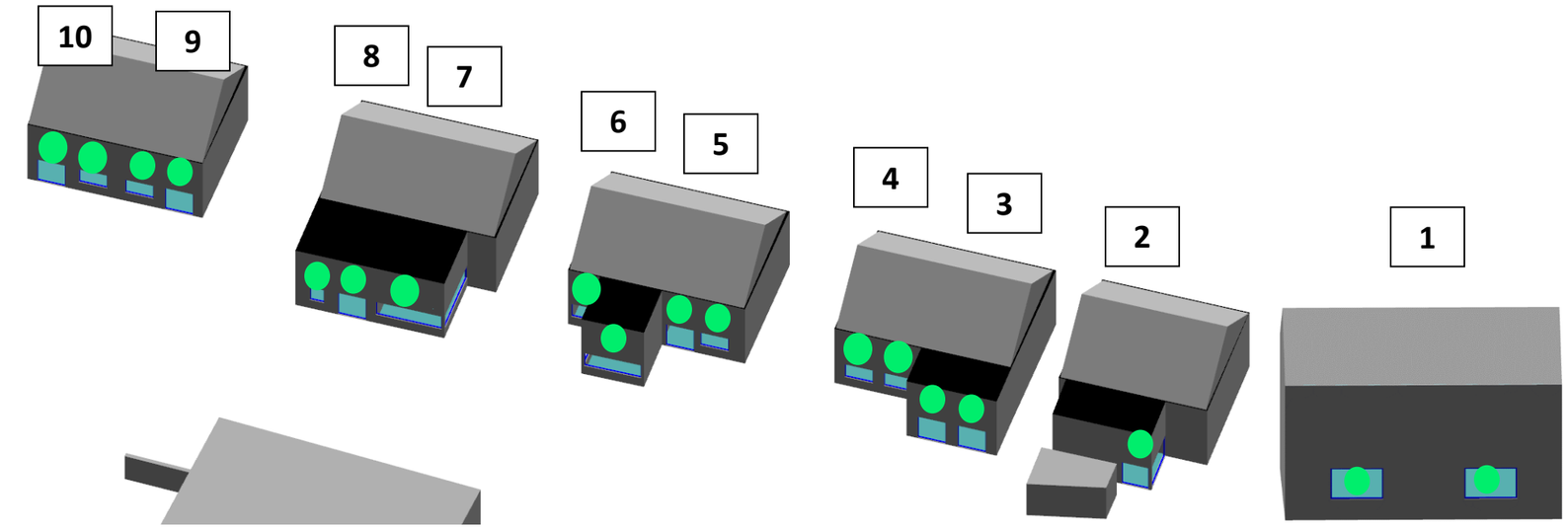


Fig 6.4.1– Windsor Park

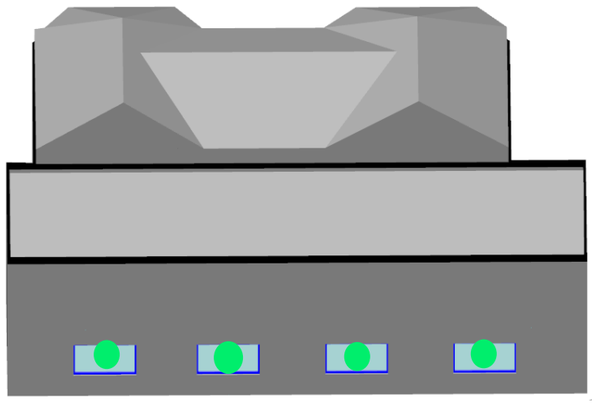


Fig 6.4.2– Wynberg House

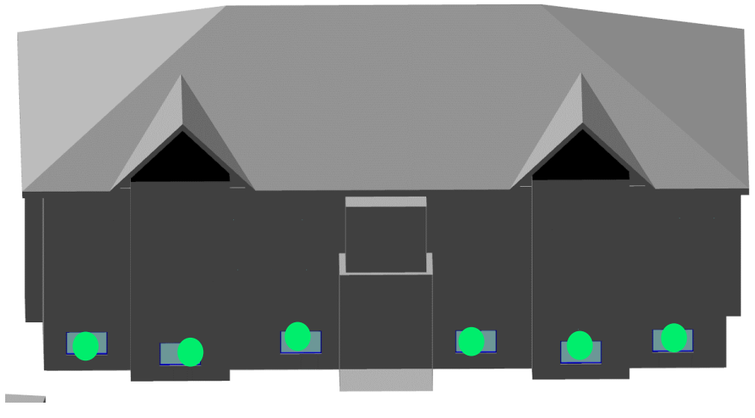


Fig 6.4.3– Rockford Manor

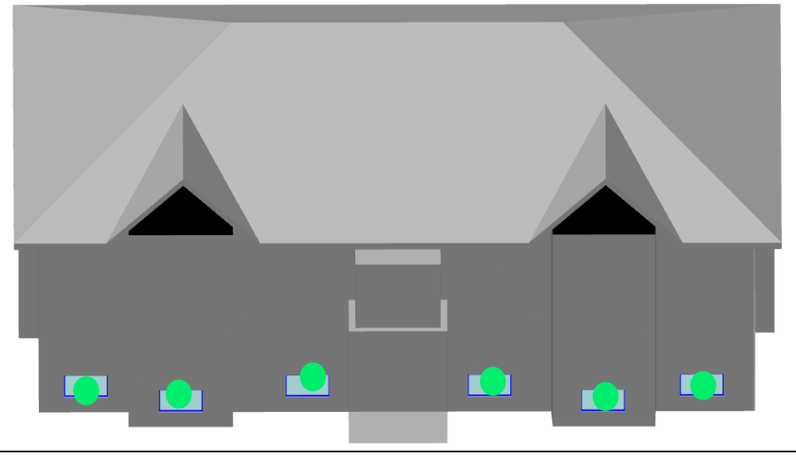


Fig 6.4.4– Rockford Manor

6.5 Daylight Results - VSC

Room Ref	Window Ref Ex	VSC Existing (%)	VSC Proposed (%)	Proposed/Existing		Criterion 1 VSC Proposed < 27%	Criterion 2 Ann or Win <80% of Baseline	OVERALL COMPLIANCE
Windsor Park 1	W1	35.1	29.7	0.85		Yes	Yes	Pass
Windsor Park 1	W2	35.5	31.7	0.90		Yes	Yes	Pass
Windsor Park 2	W3	25.3	22.4	0.89		No	Yes	Pass
Windsor Park 2	W4	28.1	27.9	1.00		Yes	Yes	Pass
Windsor Park 3	W5	35.4	28.2	0.80		Yes	Yes	Pass
Windsor Park 3	W6	36.1	28.8	0.80		Yes	Yes	Pass
Windsor Park 4	W7	27.8	22.6	0.82		No	Yes	Pass
Windsor Park 4	W8	34.4	27.6	0.81		Yes	Yes	Pass
Windsor Park 5	W9	32.6	26.4	0.81		No	Yes	Pass
Windsor Park 5	W10	24.9	20.0	0.8		No	Yes	Pass
Windsor Park 6	W11	37.1	29.4	0.80		Yes	Yes	Pass
Windsor Park 6	W12	26.6	25.5	0.96		No	Yes	Pass
Windsor Park 6	W13	24.0	20.2	0.85		No	Yes	Pass
Windsor Park 7	W14	25.3	23.0	0.9		No	Yes	Pass
Windsor Park 7	W15	37.4	31.0	0.83		Yes	Yes	Pass
Windsor Park 8	W16	37.5	31.9	0.85		Yes	Yes	Pass
Windsor Park 8	W17	37.2	32.0	0.87		Yes	Yes	Pass
Windsor Park 9	W18	37.4	35.4	0.95		Yes	Yes	Pass
Windsor Park 9	W19	37.4	35.2	0.95		Yes	Yes	Pass
Windsor Park 10	W20	37.6	35.9	0.96		Yes	Yes	Pass
Windsor Park 10	W21	38.1	36.5	0.96		Yes	Yes	Pass
Wynberg House 1	W22	32.9	31.7	0.97		Yes	Yes	Pass
Wynberg House 1	W23	32.7	31.7	0.97		Yes	Yes	Pass
Wynberg House 1	W24	32.0	31.0	0.97		Yes	Yes	Pass
Wynberg House 1	W25	31.2	30.1	0.97		Yes	Yes	Pass
Rockford Manor 1	W26	33.6	32.2	0.96		Yes	Yes	Pass
Rockford Manor 1	W27	35.8	34.4	0.97		Yes	Yes	Pass
Rockford Manor 1	W28	26.7	24.5	0.92		No	Yes	Pass
Rockford Manor 1	W29	27.0	26.2	0.97		No	Yes	Pass
Rockford Manor 1	W30	36.2	33.4	0.93		Yes	Yes	Pass
Rockford Manor 1	W31	34.6	31.6	0.92		Yes	Yes	Pass
Rockford Manor 2	W32	32.8	31.8	0.97		Yes	Yes	Pass
Rockford Manor 2	W33	24.3	23.5	0.97		No	Yes	Pass
Rockford Manor 2	W34	23.6	23.7	1.01		No	Yes	Pass

6.6 Sunlight Results – Annual Probable Sunlight Hours (APSH)

A proposed development could potentially have a negative effect on the level of sunlight that a neighbouring property receives, if the obstructing building is within the sun path for the existing dwelling, i.e. an existing dwelling to the north of a proposed site. To ensure a neighbouring property is not adversely affected, the annual probable sunlight hours (APSH) is calculated and assessed. The Annual Probable Sunlight Hours (APSH) is used to assess the quantity of sunlight at a given location. Results for APSH under proposed development vs. existing conditions, measured at the centre of each window within 90deg of south. APSH results indicated by green, yellow, and red dots, with green indicating a pass result, yellow indicating a minor impact and red a major impact. There is predicted to be no impact on sunlight availability to neighbouring buildings analysed.

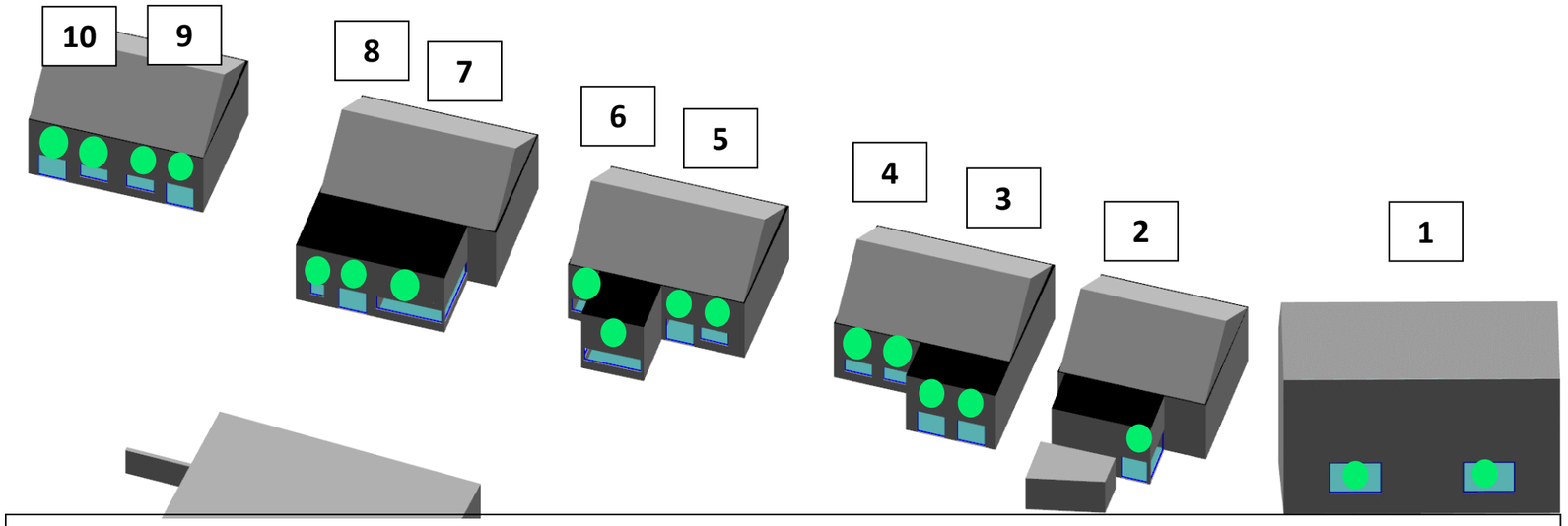


Fig 6.6.1– Windsor Park

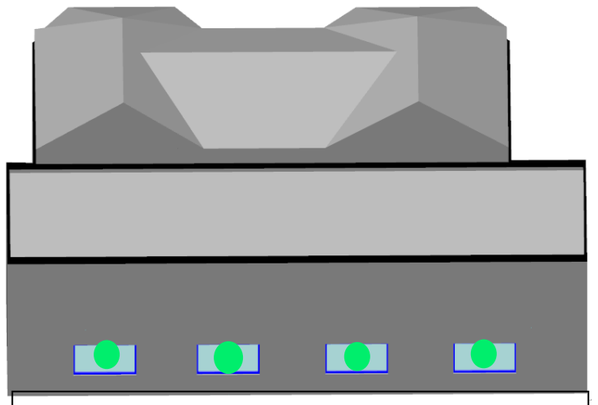


Fig 6.6.2– Wynberg House

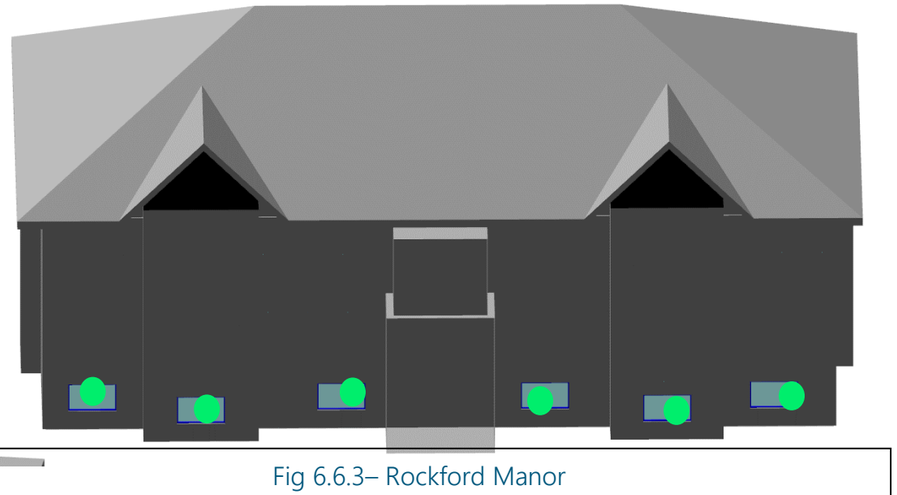


Fig 6.6.3– Rockford Manor

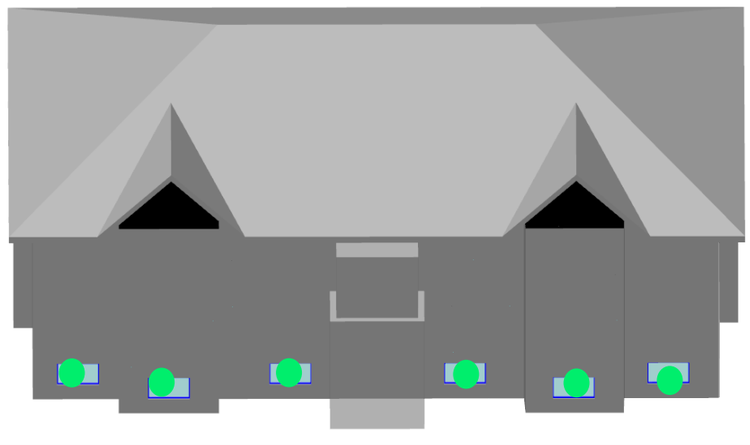


Fig 6.6.4– Rockford Manor

6.7 Sunlight Results - Annual Probable Sunlight Hours (APSH)

Floor Ref	Room Ref	Window Ref Ex		Annual Ex (%)	Annual Pr (%)	Pr/Ex	Winter Ex (%)	Winter Pr (%)	Winter Pr/Ex	Total Potential Annual Sunny Hours	Max Allowable Ann Reduction	Actual Ann Reduction		Criterion 1 Ann < 25% or Win <5%	Criterion 2 Ann or Win <80% of Ex	Criterion 3 Ann reduction > 4%	OVERALL COMPLIANCE
Ground Floor	Windsor Park 2	W6		27	27	1	3	3	1	1277	51	0		No	Yes	Yes	Pass
Ground Floor	Windsor Park 7	W28		33	33	1	1	1	1	1277	51	0		No	Yes	Yes	Pass
Ground Floor	Wynberg House 1	W9		75	73	0.97	25	23	0.91	1277	51	26		Yes	Yes	Yes	Pass
Ground Floor	Wynberg House 1	W10		74	72	0.97	25	23	0.92	1277	51	26		Yes	Yes	Yes	Pass
Ground Floor	Wynberg House 1	W11		72	69	0.96	25	23	0.9	1277	51	38		Yes	Yes	Yes	Pass
Ground Floor	Wynberg House 1	W12		70	68	0.97	25	23	0.91	1277	51	26		Yes	Yes	Yes	Pass
Ground Floor	Rockford Manor 2	W32		71	70	0.98	23	21	0.95	1277	51	13		Yes	Yes	Yes	Pass
Ground Floor	Rockford Manor 2	W33		40	39	0.96	10	9	0.91	1277	51	13		Yes	Yes	Yes	Pass
Ground Floor	Rockford Manor 2	W34		47	47	1	17	17	1.01	1277	51	0		Yes	Yes	Yes	Pass
Ground Floor	Rockford Manor 2	W35		72	71	0.98	21	20	0.98	1277	51	13		Yes	Yes	Yes	Pass
Ground Floor	Rockford Manor 2	W36		71	70	0.99	24	24	1	1277	51	13		Yes	Yes	Yes	Pass
Ground Floor	Rockford Manor 2	W37		68	65	0.97	23	21	0.93	1277	51	38		Yes	Yes	Yes	Pass

7.0 Daylight Analysis

7.1 Methodology

Spatial Daylight Autonomy (SDA) is a climate-based daylight assessment methodology utilised in the BRE Guide, and as referenced in the Sustainable Urban Housing: Design Standards for New Apartments (December 2020). These guidelines and standards have been outlined in section 3.0.

The methodology utilises historic climate data (Dublin IWEC file 039690 was used for this assessment) predicting internal illumination due to natural light on an hour-by-hour basis, accounting for not only diffuse skylight (as solely assessed in ADF) but also the direct sunlight element. SDA results will differ for façade orientation, with those elevations with southerly aspect (correctly) being deemed to receive more daylight.

Fig 7.1.1 indicates overall compliance comparison, with green contours illustrating where daylight was predicted to achieve 100 Lux for bedrooms and 200 Lux for KLD's. Compliance for a room is then defined in the BRE Guide if at least 50% of the room achieves this target.

The daylighting models were calculated based on the following assumptions regarding transmittance and reflectance (as prescribed in the BRE Guide):

- Glazing Transmission = 68% with maintenance factor of 96%
- Ceilings: 80% reflectance
- Walls: 70% reflectance
- Floors: 40% reflectance

The daylight analysis accounted for all aspects that can potentially restrict natural light availability including any adjacent / opposing buildings, along with explicitly modelling Building Details as illustrated in Figure 7.1.2 such as balcony structures, window frames, reveal and cill depth etc. in accordance with the architectural design. As the window frames have been implicitly modelled there is no requirement to include framing factors as prescribed in the BRE Guide.

Daylight Factors for each space were then calculated for a working plane height of 0.85m on a 0.25 x 0.25m grid basis and a wall offset of 0.3m to enable a detailed calculation within each room, the medium of which was then determined the space compliance.

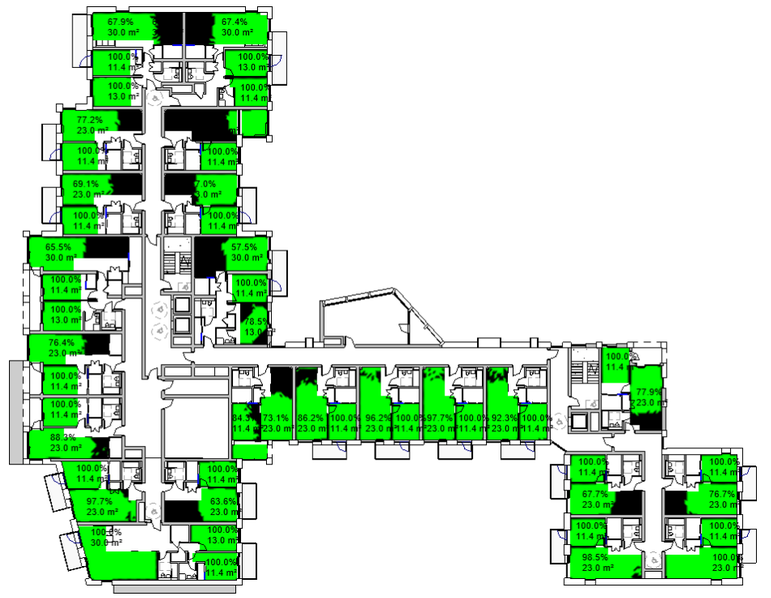


Fig 7.1.1 –Daylight Analysis Results

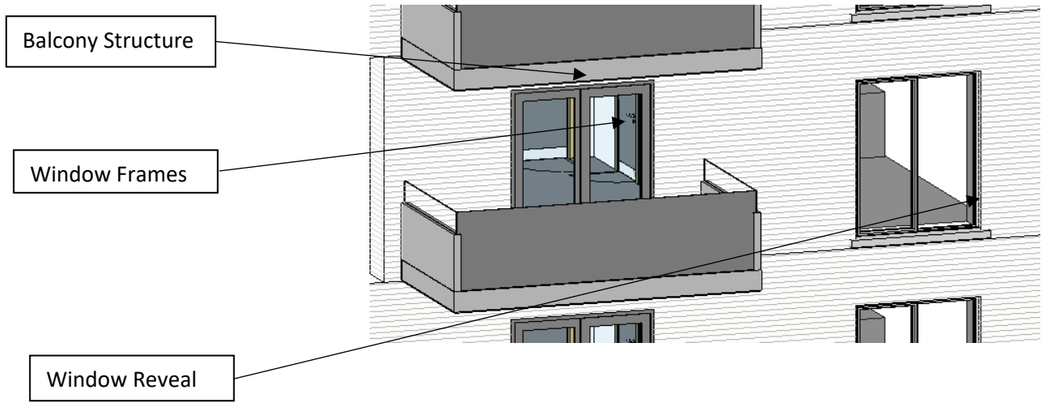


Fig 7.1.2 – Building Details included within Daylight Analysis (Sample)

7.1 Methodology (Continued)

The rooms have been assessed to the minimum areas as prescribed in the 2020 Apartment Guidelines, Fig 7.1.3 taking consideration for the notes in the BRE Guide which stipulate:

> *"Where a room has a shared use, the highest target should apply. For example in a bed sitting room in student accommodation, the value for a living room should be used if students would often spend time in their rooms during the day. Local authorities could use discretion here. For example, the target for a living room could be used for a combined living/dining/kitchen area if the kitchens are not treated as habitable spaces, as it may avoid small separate kitchens in a design.* ***The kitchen space would still need to be included in the assessment area****" (****Emphasis added****)*

Fig 7.1.4 shows an example of how this has been delineated, with green areas included to minimum required areas (including the kitchen) and blue areas (circulation etc.) excluded..

Minimum aggregate floor areas for living/dining/kitchen rooms, and minimum widths for the main living/dining rooms

Apartment type ***	Width of living/dining room	Aggregate floor area of living / dining / kitchen area*
Studio	4m**	30 sq m**
One bedroom	3.3 m	23 sq m
Two bedrooms (3 person)	3.6m	28 sq m
Two bedrooms (4 person)	3.6 m	30 sq m
Three bedrooms	3.8 m	34 sq m

** Note: An enclosed (separate) kitchen should have a minimum floor area of 6.5 sq. metres*
***Note: Combined living/dining/bedspace, also includes circulation*
**** Note: Variation of up to 5% can be applied to room areas and widths subject to overall compliance with required minimum overall apartment floor areas.*

Minimum bedroom floor areas/widths***

Type	Minimum width	Minimum floor area
Studio	4m**	30 sq m**
Single bedroom	2.1 m	7.1 sq m
Double bedroom	2.8 m	11.4 sq m
Twin bedroom	2.8 m	13 sq m

** Note: Minimum floor areas exclude built-in storage presses that are contributing to storage space requirements*
***Note: Combined living/dining/bedspace*

Minimum aggregate bedroom floor areas

One bedroom	11.4 sq m
Two bedrooms (3 person)	13 + 7.1 sq m = 20.1 sq m
Two bedrooms (4 person)	11.4 + 13 sq m = 24.4 sq m
Three bedrooms	11.4 + 13 + 7.1 sq m = 31.5 sq m

Fig 7.1.3 – Apartment Guidelines Extract

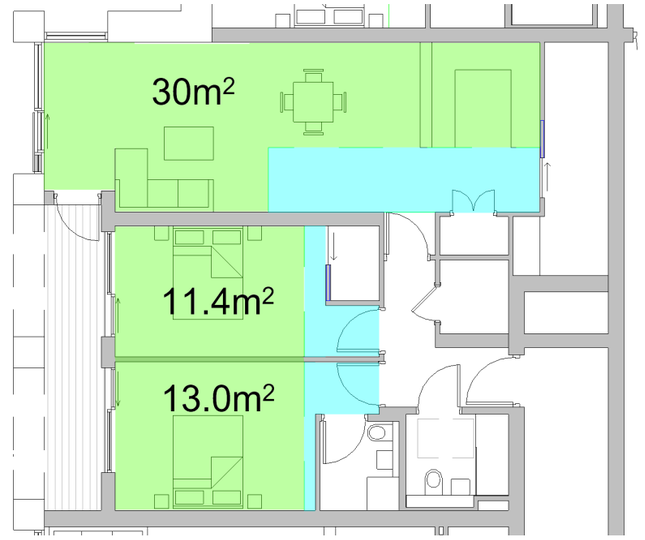


Fig 7.1.4 – Space Delineation

7.2 Results Summary

The tables below summarise the results for the scheme as assessed.

The proposed development is shown to achieve 98% pass rate, with only 4 rooms below minimum requirements.

Stradbrook Road	Pass	Fail	Total
Ground Floor	31	0	31
First Floor	50	1	51
Second Floor	50	1	51
Third Floor	42	1	43
Fourth Floor	29	1	30
Fifth Floor	22	0	22
Sixth Floor	13	0	13
98%	237	4	241

7.3 Compensatory Measures

The 2020 Apartment Guidelines state the following:

> *"[6.7] Where an applicant cannot fully meet all of the requirements of the daylight provisions above, this must be clearly identified and a rationale for any alternative, compensatory design solutions must be set out, which planning authorities should apply their discretion in accepting taking account of its assessment of specific. This may arise due to a design constraint associated with the site or location and the balancing of that assessment against the desirability of achieving wider planning objectives. Such objectives might include securing comprehensive urban regeneration and or an effective urban design and streetscape solution."*

Compensatory Design Solutions

Any space which does not achieve the 50% SDA for shared Kitchen/Living/Dining (KLD) or for bedrooms, has been identified in the following section and includes compensatory measures in accordance with the requirements of the Sustainable Urban Housing – Design Standards for New Apartments 2020.

As noted within the table in section 7.2, 4 units are not achieving the minimum targets for daylight, these units are of a single type and have the same compensatory measures. These units are all oversized at 50.3m$^{2.}$

The compensatory measures look to determine a balance between the spaces with reduced daylight by identifying how other metrics for sunlight and/or the unit's aspects can compensate for this reduction and for each unit are illustrated below and summarised as follows: -

1 Winter Gardens

The one bed units in question, A105, A205, A305 and A405 have been provided with extra-large (8m^2) sheltered winter garden. This space achieves full SDA compliance and will enjoy an aspect onto the playing fields adjacent to the site and can be utilised all year round.

2 Sunlight Exposure (see section 8.0 for further information)

The rooms with below target Spatial Daylight Autonomy have also been assessed for exposure to sunlight as per the BRE Guide. The results determined that all windows would receive greater than the minimum direct sunlight (1.5 hours) with windows on the second, third and fourth floors, achieving the medium level of recommendations at >3 hours. Fig 7.3.1 & 7.3.2 illustrates the windows in question with the calculated exposure to sunlight values provided showing all above 1.5 hours for the exterior and interior windows.

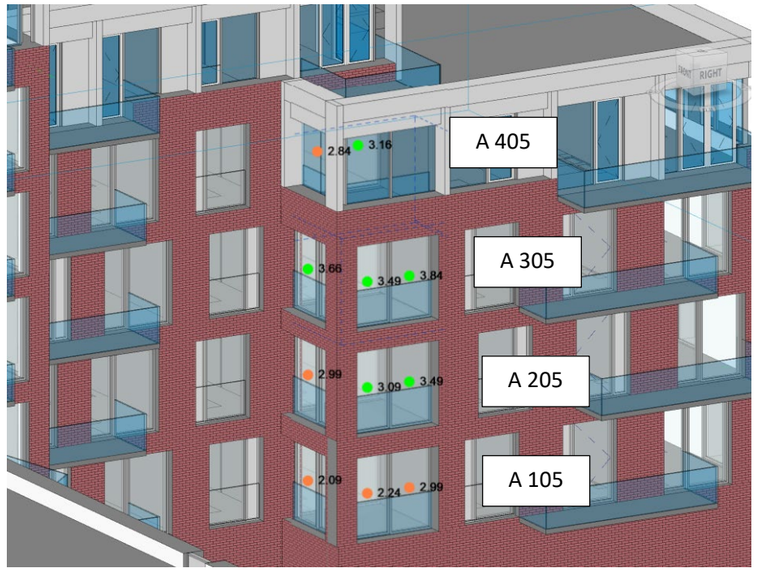


Fig 7.3.1 – Sunlight Exposure (hours) external windows

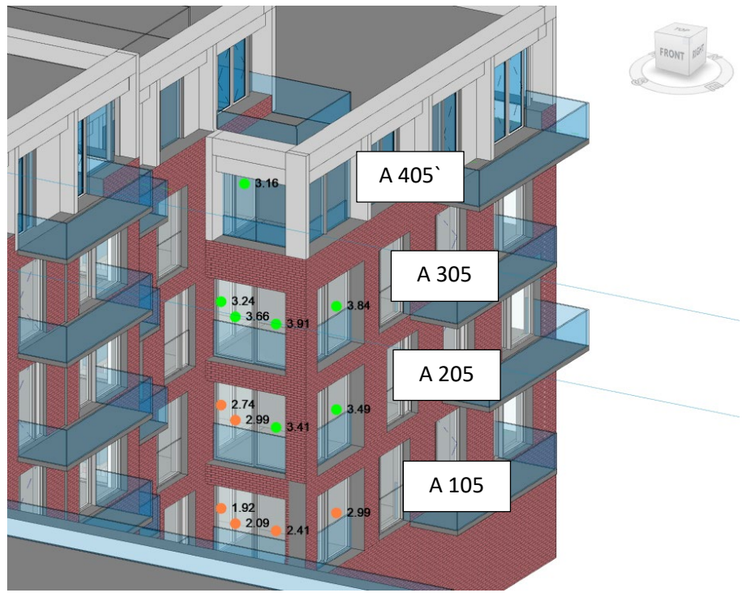
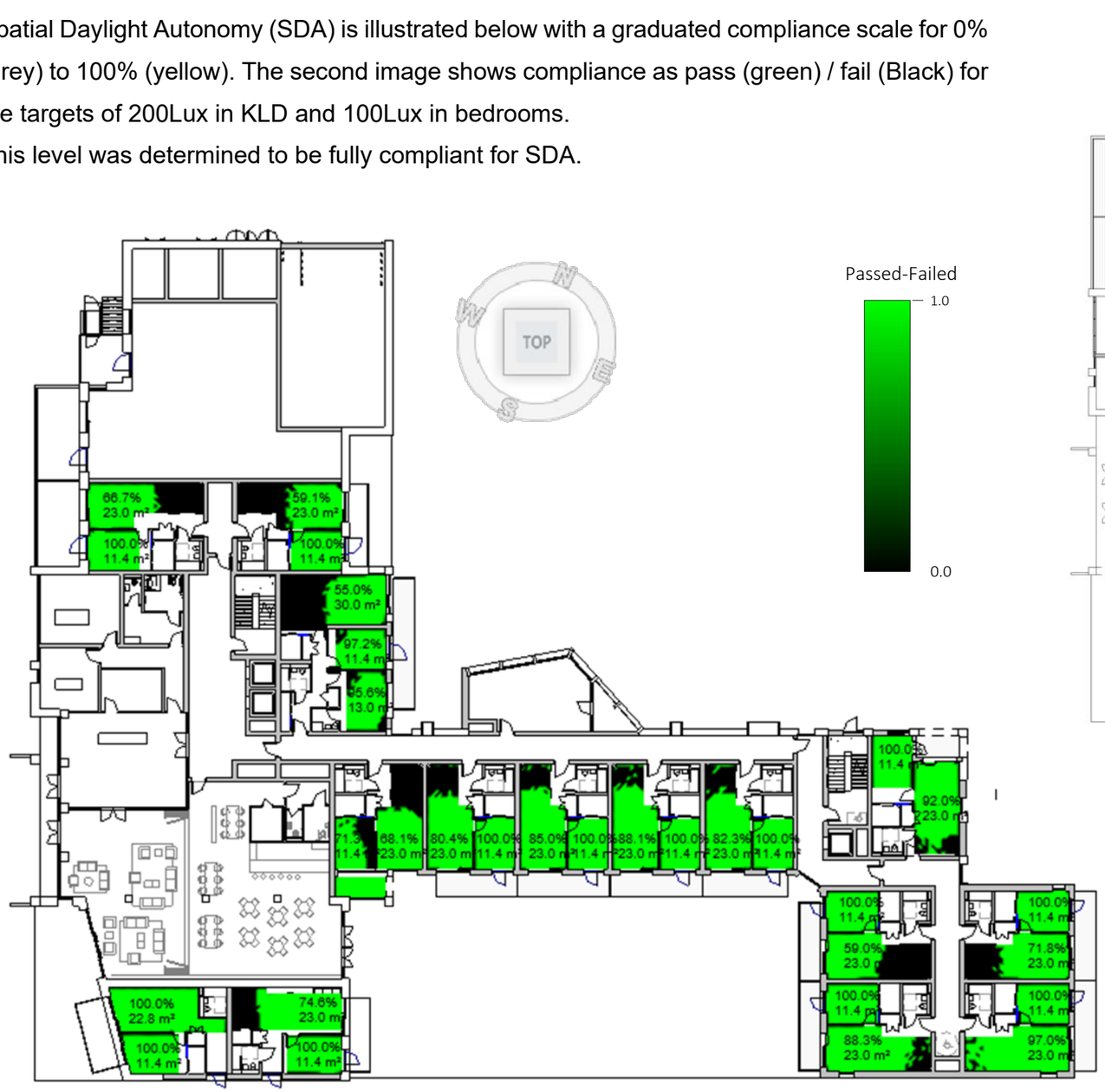


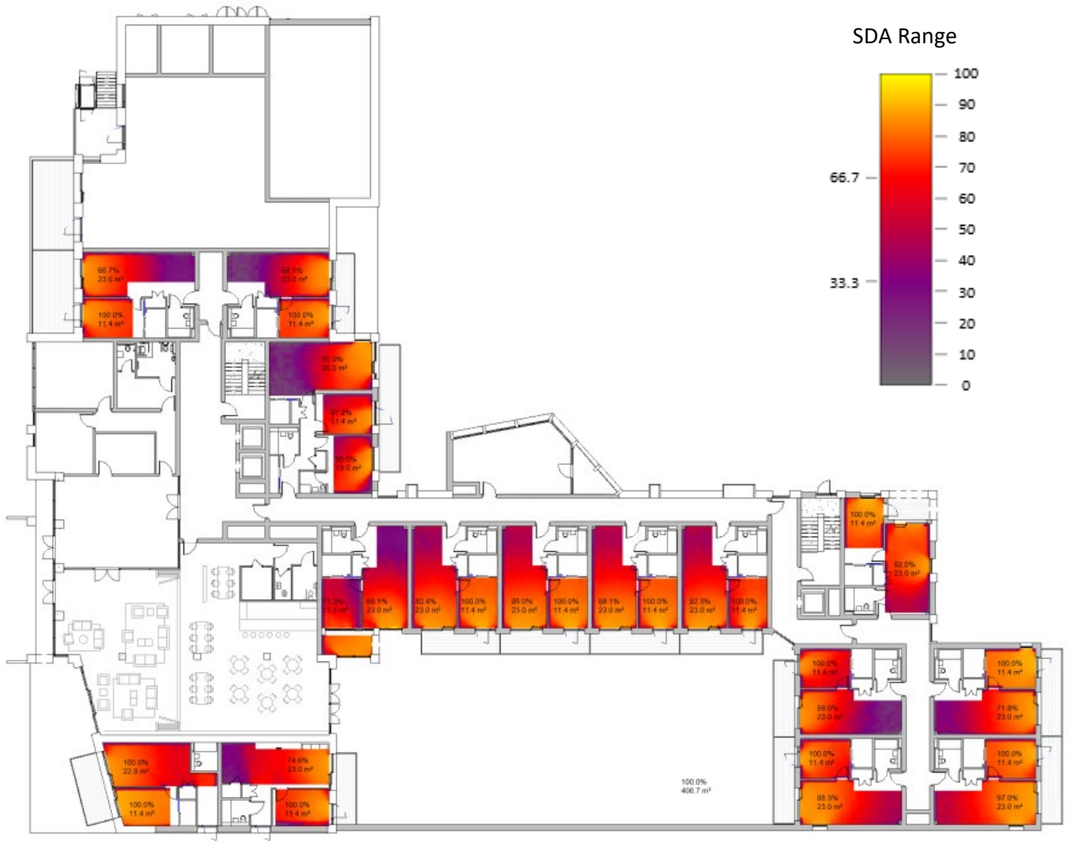
Fig 7.3.2 – Sunlight Exposure (hours) external windows & Internal Windows

7.4 Results

Ground Floor

Spatial Daylight Autonomy (SDA) is illustrated below with a graduated compliance scale for 0% (grey) to 100% (yellow). The second image shows compliance as pass (green) / fail (Black) for the targets of 200Lux in KLD and 100Lux in bedrooms.
This level was determined to be fully compliant for SDA.

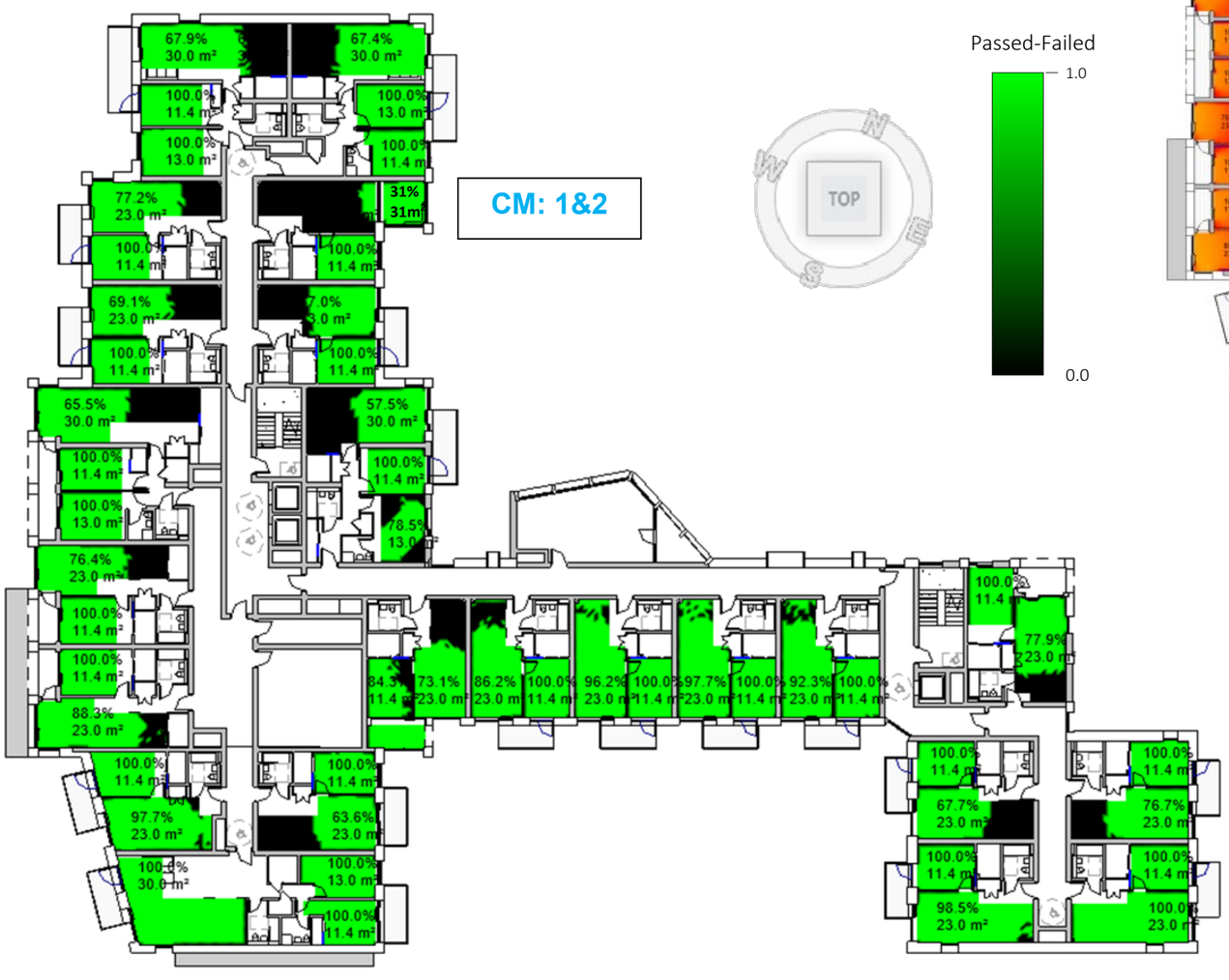


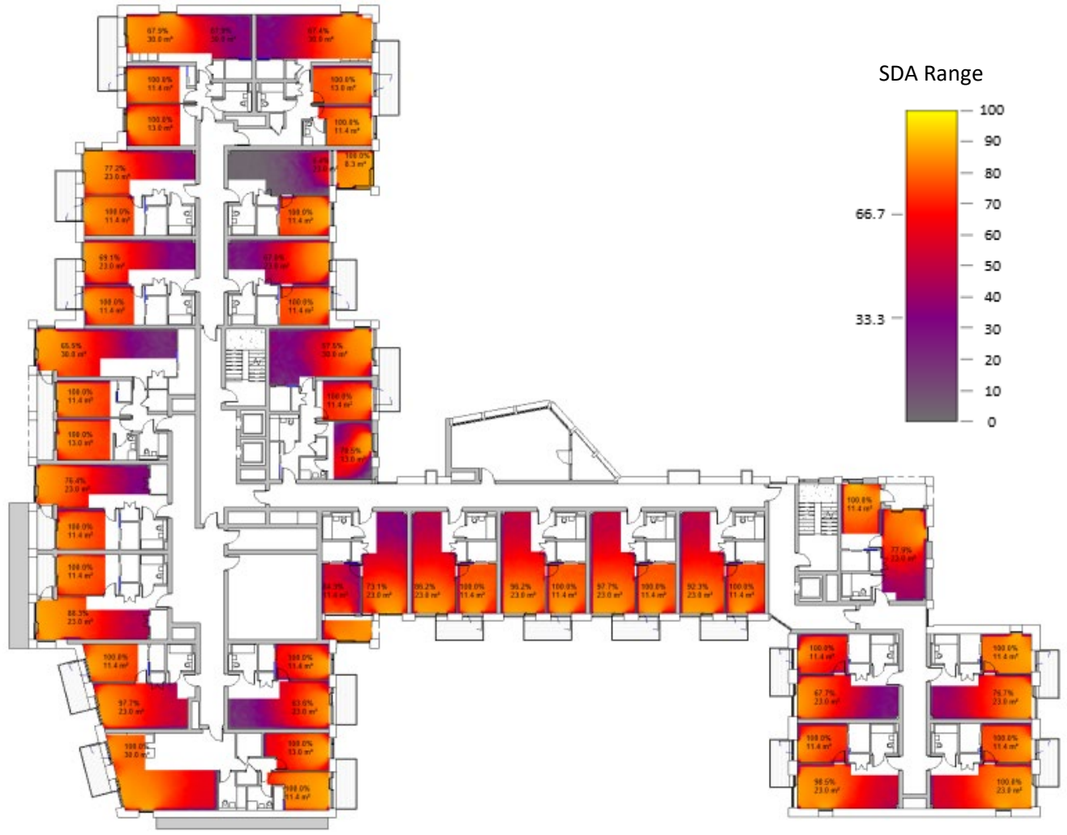


Area type	> 50% of Space Above
Bedrooms	100 Lux
K/L/D Areas	200 Lux

First Floor

Spatial Daylight Autonomy (SDA) is illustrated below with a graduated compliance scale for 0% (grey) to 100% (yellow). The second image shows compliance as pass (green) / fail (Black) for the targets of 200Lux in KLD and 100Lux in bedrooms. All except one space on the level were determined to be fully compliant for SDA.





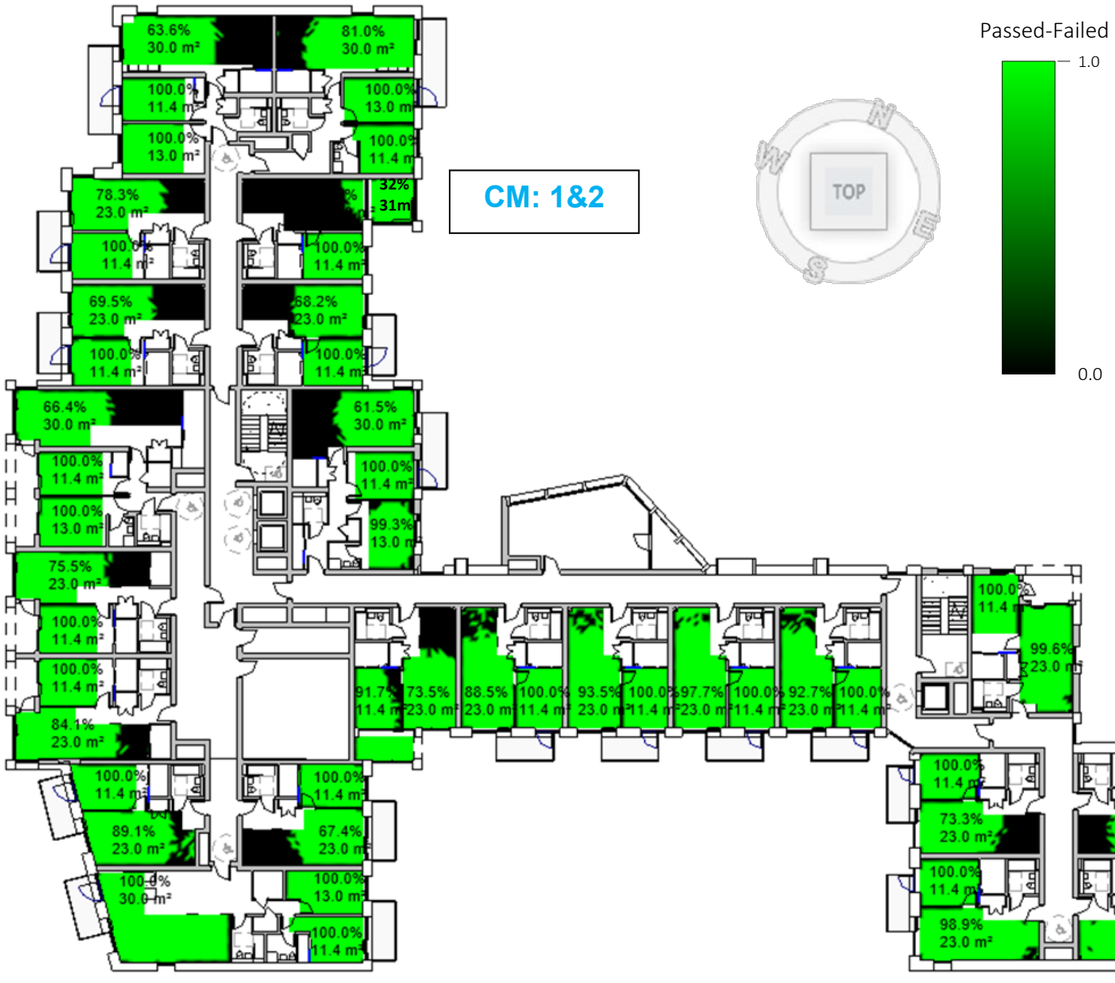
Compensatory Measures:

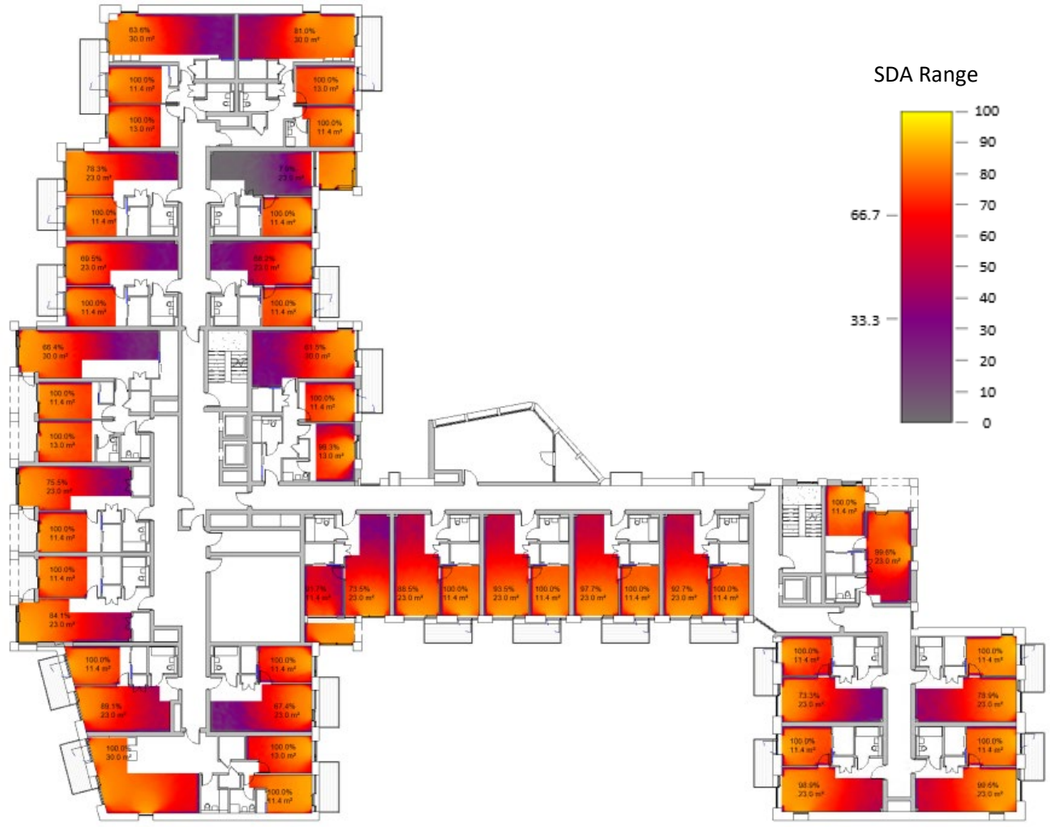
1: Winter Garden

2: Sunlight Exposure

Second Floor

Spatial Daylight Autonomy (SDA) is illustrated below with a graduated compliance scale for 0% (grey) to 100% (yellow). The second image shows compliance as pass (green) / fail (Black) for the targets of 200Lux in KLD and 100Lux in bedrooms. All except one space on the level were determined to be fully compliant for SDA.





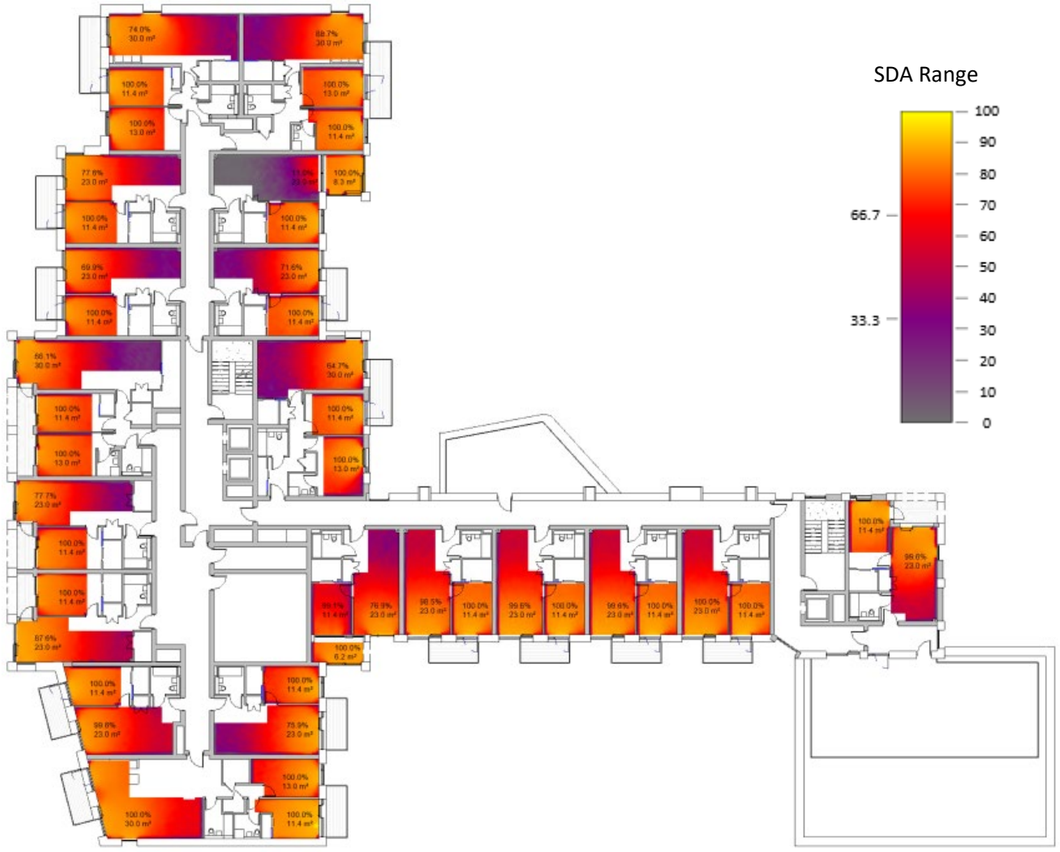
Compensatory Measures:

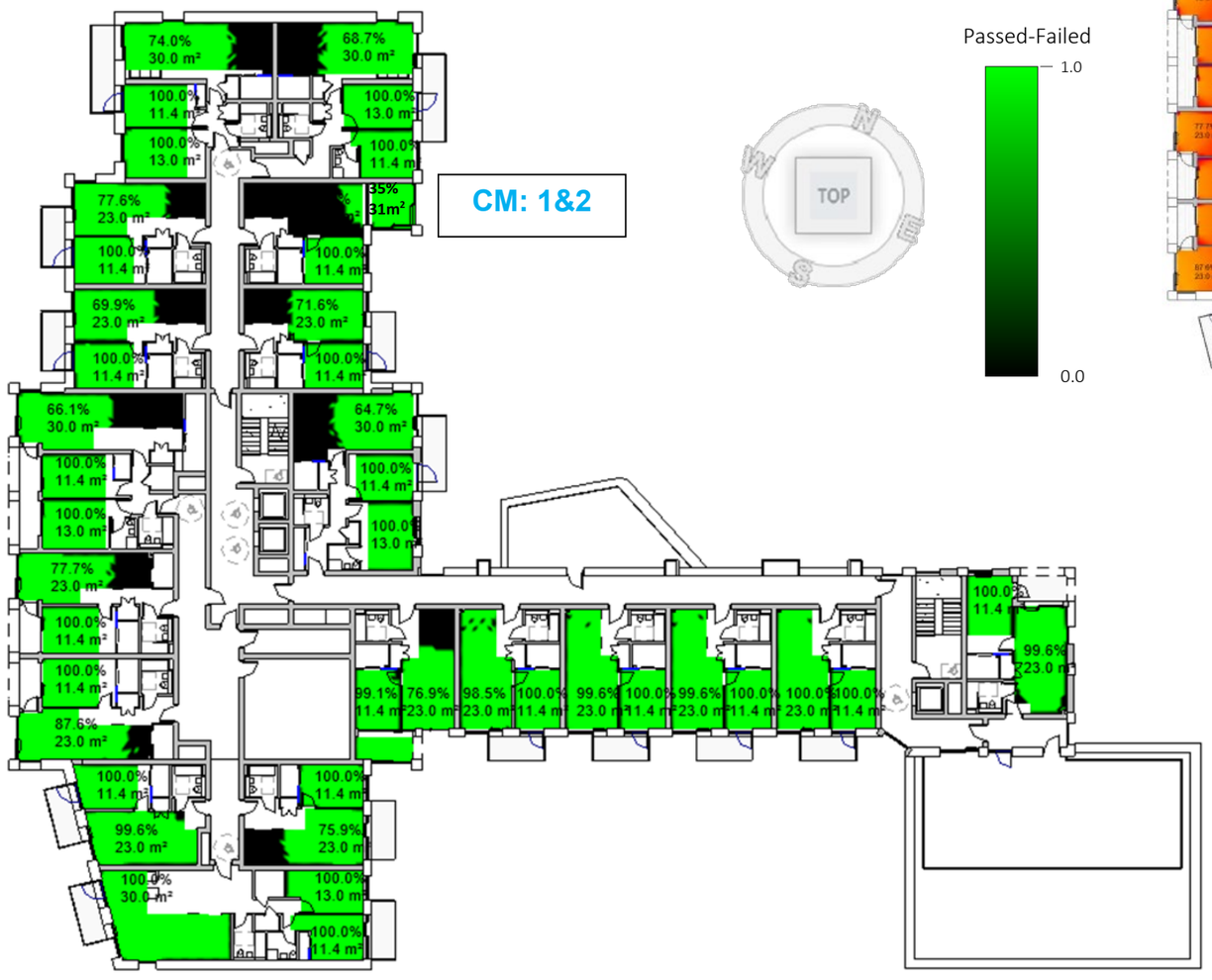
1: Winter Garden

2: Sunlight Exposure

Third Floor

Spatial Daylight Autonomy (SDA) is illustrated below with a graduated compliance scale for 0% (grey) to 100% (yellow). The second image shows compliance as pass (green) / fail (Black) for the targets of 200Lux in KLD and 100Lux in bedrooms. All except one space on the level were determined to be fully compliant for SDA.





Compensatory Measures:

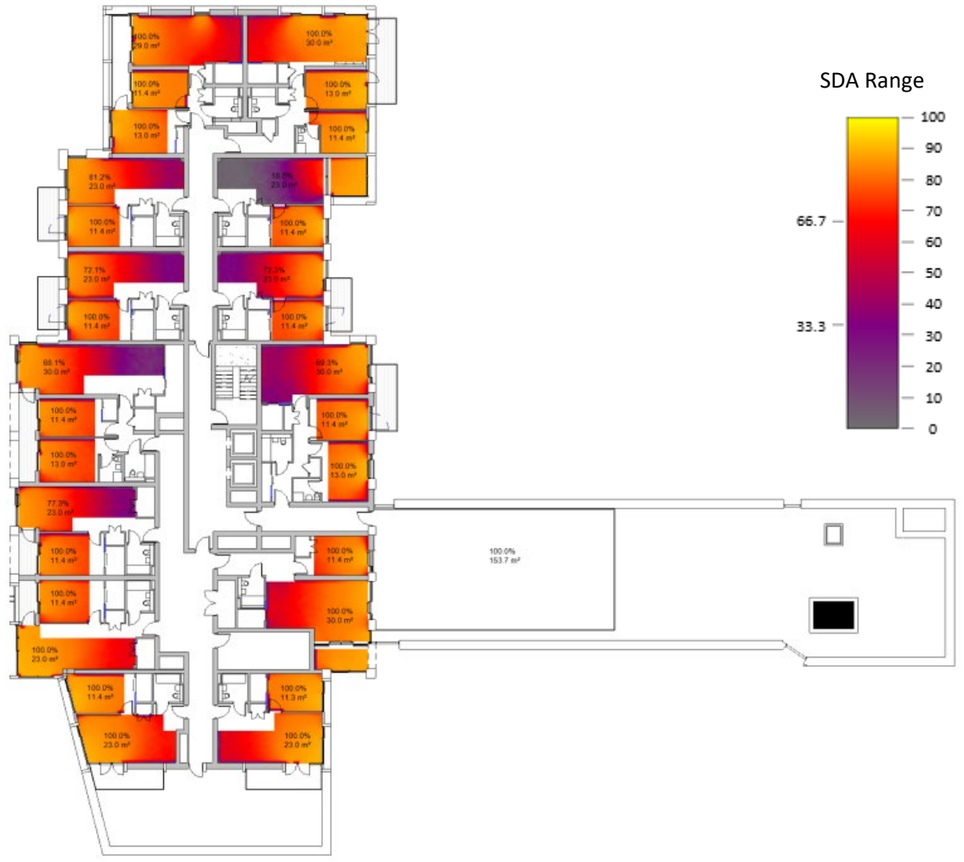
1: Winter Garden

2: Sunlight Exposure

Fourth Floor

Spatial Daylight Autonomy (SDA) is illustrated below with a graduated compliance scale for 0% (grey) to 100% (yellow). The second image shows compliance as pass (green) / fail (Black) for the targets of 200Lux in KLD and 100Lux in bedrooms. All except one space on the level were determined to be fully compliant for SDA.

CM: 1&2



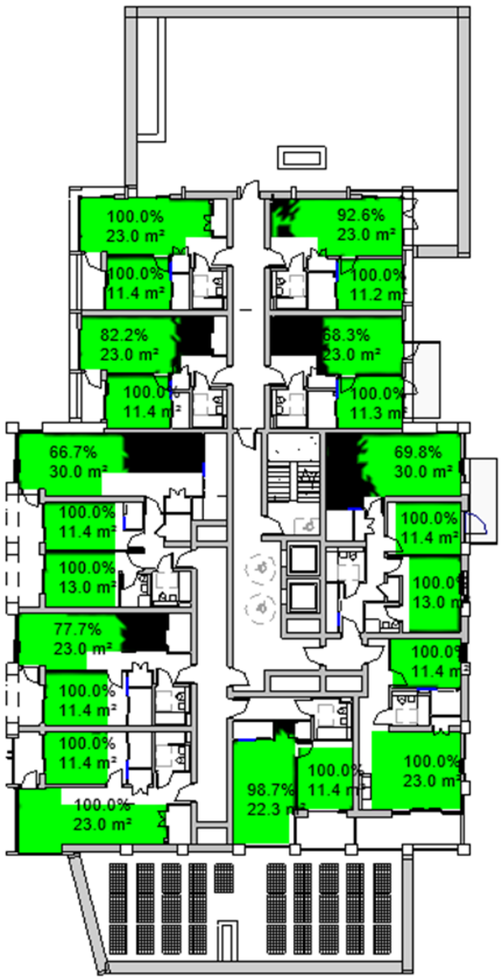
Compensatory Measures:

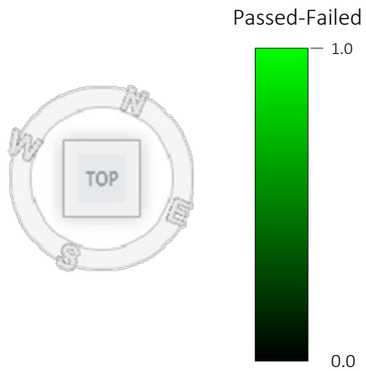
1: Winter Garden

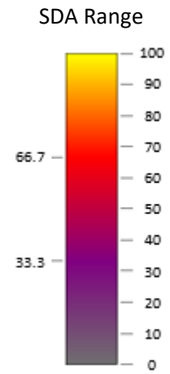
2: Sunlight Exposure

Fifth Floor

Spatial Daylight Autonomy (SDA) is illustrated below with a graduated compliance scale for 0% (grey) to 100% (yellow). The second image shows compliance as pass (green) / fail (Black) for the targets of 200Lux in KLD and 100Lux in bedrooms.
This level was determined to be fully compliant for SDA.

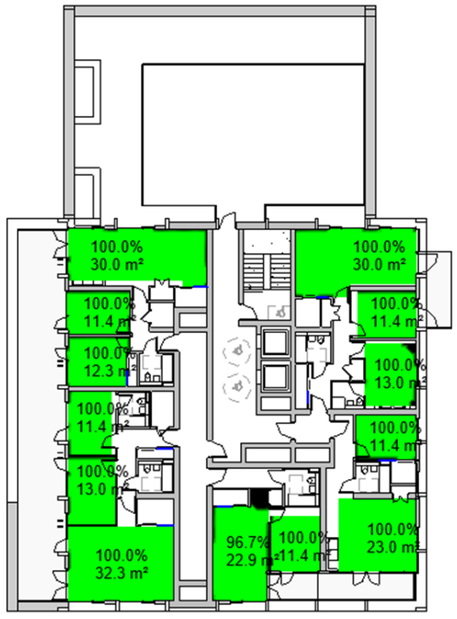


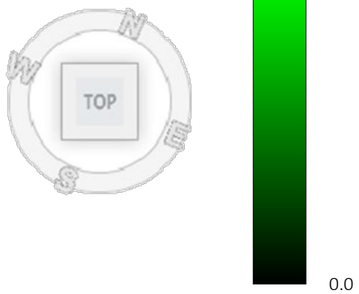


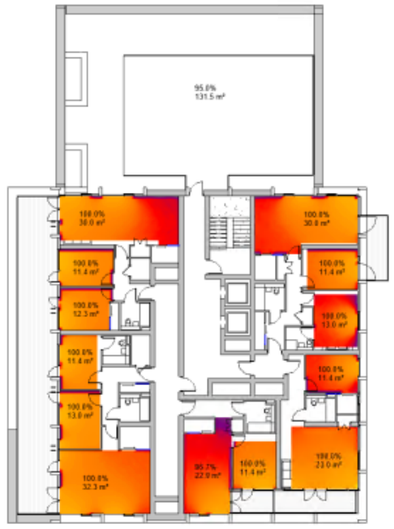


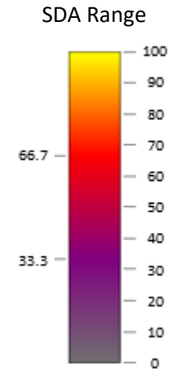
Sixth Floor

Spatial Daylight Autonomy (SDA) is illustrated below with a graduated compliance scale for 0% (grey) to 100% (yellow). The second image shows compliance as pass (green) / fail (Black) for the targets of 200Lux in KLD and 100Lux in bedrooms.
This level was determined to be fully compliant for SDA.









Compensatory Measures:

1: Winter Garden

2: Sunlight Exposure

8.0 Exposure To Sunlight

The BRE Guide suggests that:

> *3.1.15 In general a dwelling, or non-domestic building that has a particular requirement for sunlight, will appear reasonably sunlit provided:*
>
> - *at least one main window wall faces within 90° of due south and*
> - *a habitable room, preferably a main living room, can receive a total of at least 1.5 hours of sunlight on 21 March. This is assessed at the inside centre of the window(s); sunlight received by different windows can be added provided they occur at different times and sunlight hours are not double counted.*
>
> *3.1.16 Where groups of dwellings are planned, site layout design should aim to maximise the number of dwellings with a main living room that meets the above recommendations.*

The guide further notes that:

> *3.1.10 For interiors, access to sunlight can be quantified. BS EN 17037[1] recommends that a space should receive a minimum of 1.5 hours of direct sunlight on a selected date between 1 February and 21 March with cloudless conditions. It is suggested that 21 March (equinox) be used. The medium level of recommendation is three hours and the high level of recommendation four hours. For dwellings, at least one habitable room, preferably a main living room, should meet at least the minimum criterion.*

An analysis has been undertaken for each unit in the proposed development to assess the exposure to sunlight that each unit can receive.

The results below show the calculated values for each relevant window. As noted above, windows on different facades can be added where the occur at different times. Blue dots indicate an exposure to sunlight less than 1.5 hours , green, between 1.5 and 3.0 hours (minimum), yellow between 3.0 and 4.0 hours (medium level) with orange indicating windows which receive in excess of 4.0 hours (high level).

The results table (fig 8.1.2) shows a high level of compliance for exposure to sunlight, 92%, for the proposed scheme. It can be noted that the 9 units that do not meet the minimum target all achieved good daylight as per section 7.0.

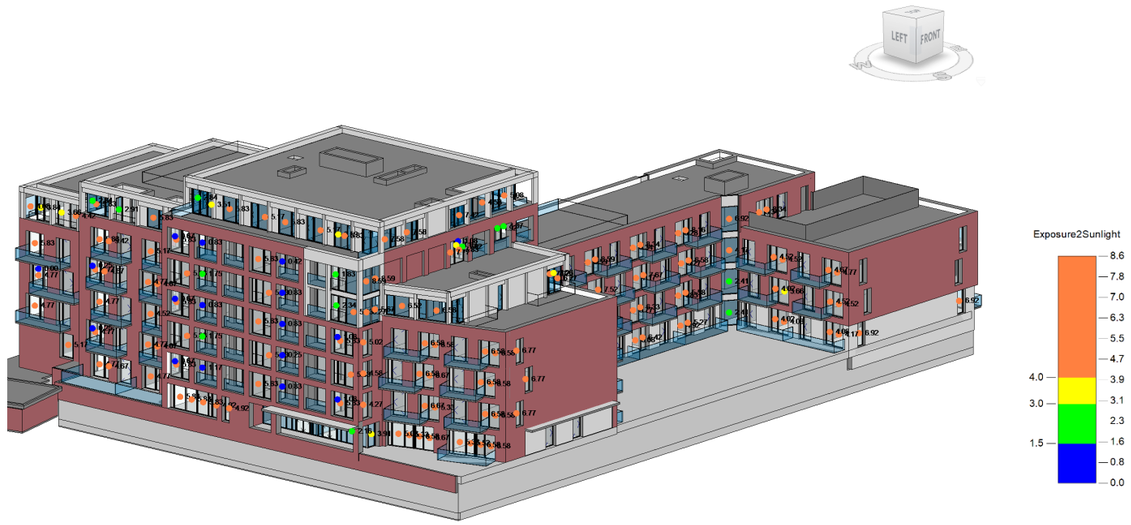


Fig 8.1.1 – Sunlight Exposure (hours) external windows

Stradbrook Road	Pass	Fail	Total
Ground Floor	11	3	14
First Floor	20	3	23
Second Floor	20	3	23
Third Floor	19	0	19
Fourth Floor	13	0	13
Fifth Floor	10	0	10
Sixth Floor	5	0	5
92%	98	9	107

Fig 8.1.2 – Sunlight Exposure – Compliance table

Exposure to Sunlight

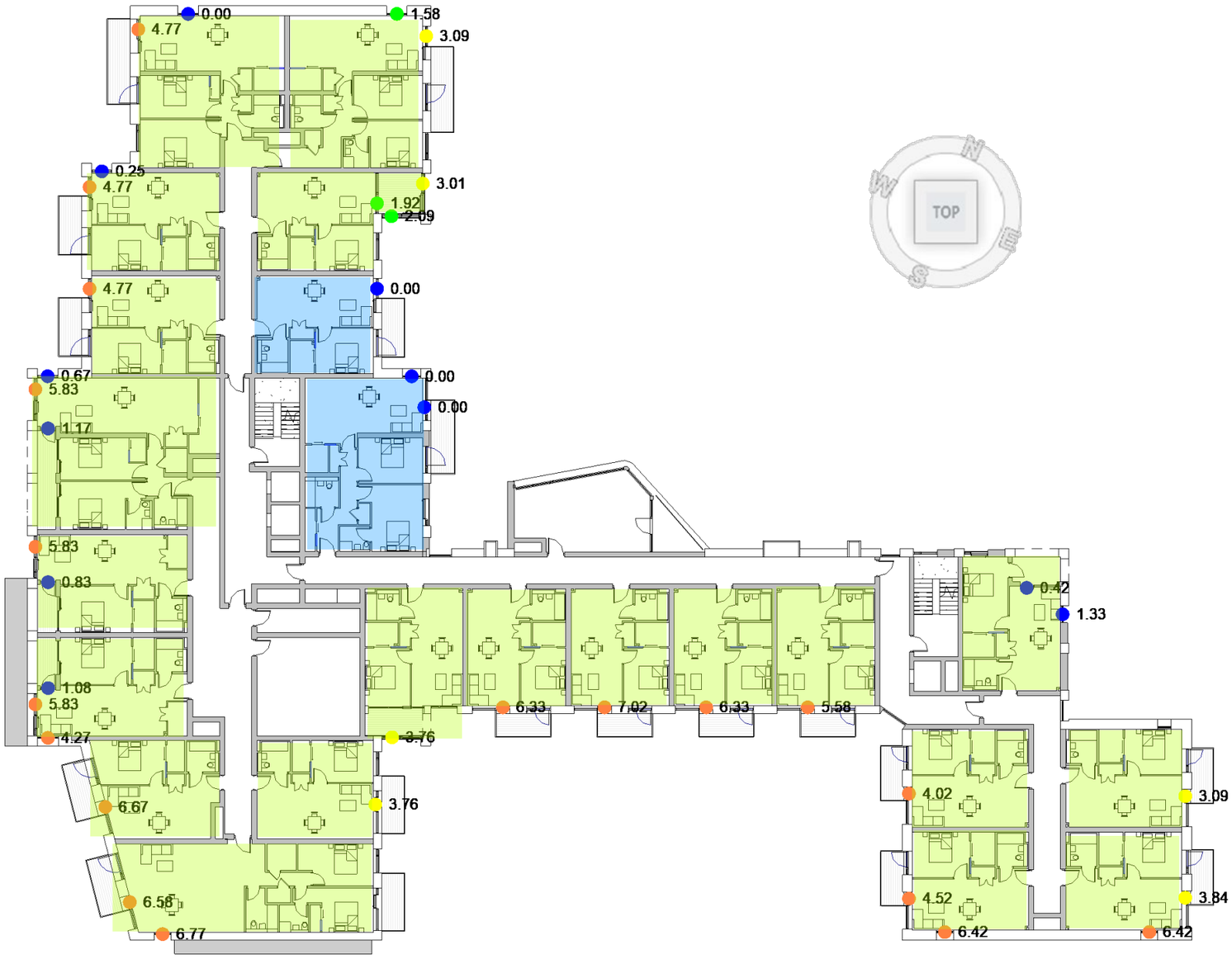
Ground Floor

Sunlight Analysis as illustrated below, determined 11 of the 14 units on this floor achieve the minimum recommendations.

Exposure to Sunlight

First Floor

Sunlight Analysis as illustrated below, determined 20 of the 23 units on this floor achieve the minimum recommendations.



Exposure to Sunlight

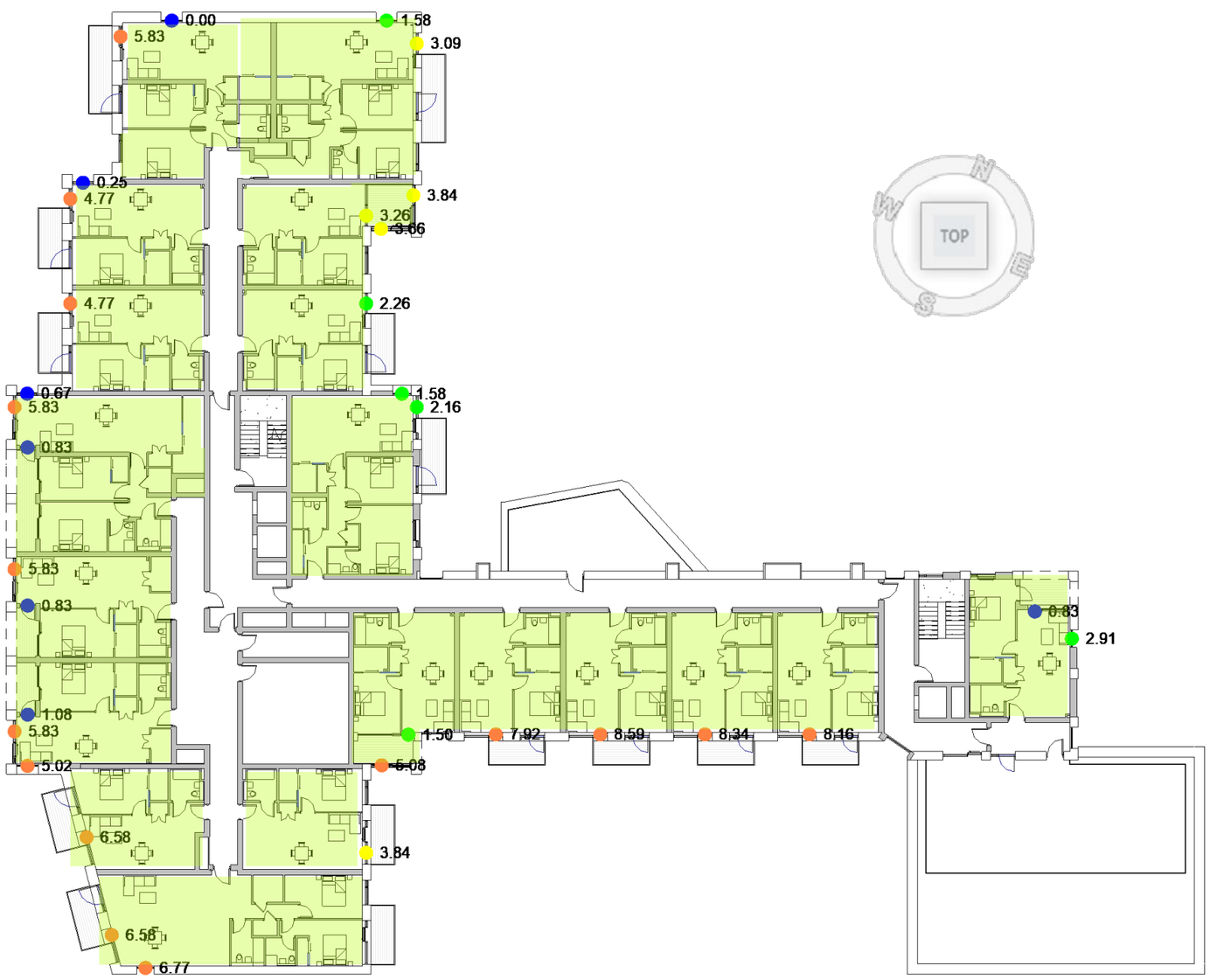
Second Floor

Sunlight Analysis as illustrated below, determined 20 of the 23 units on this floor achieve the minimum recommendations.

Exposure to Sunlight

Third Floor

Sunlight Analysis as illustrated below, determined all units on this floor achieve the minimum recommendations.



Exposure to Sunlight

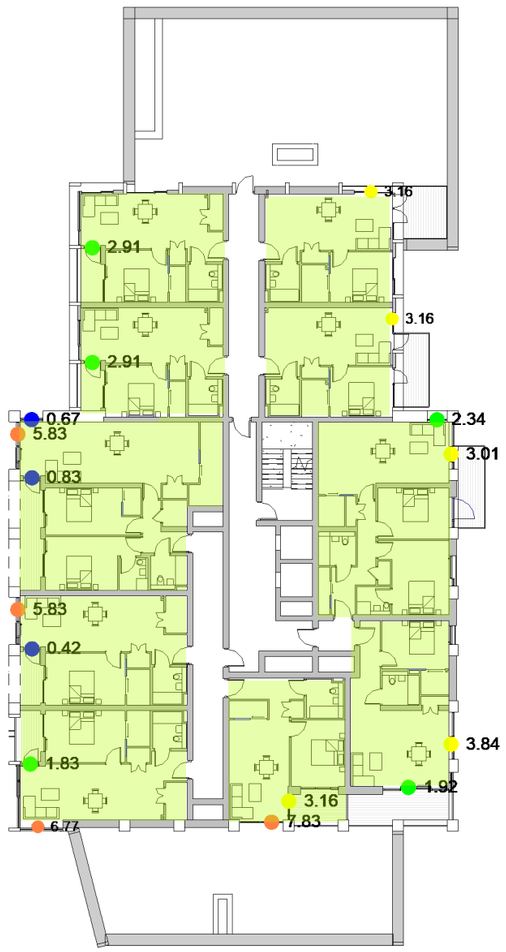
Ground Floor

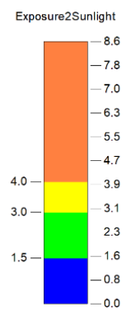
Sunlight Analysis as illustrated below, determined all units on this floor achieve the minimum recommendations.

Exposure to Sunlight

Ground Floor

Sunlight Analysis as illustrated below, determined all units on this floor achieve the minimum recommendations.

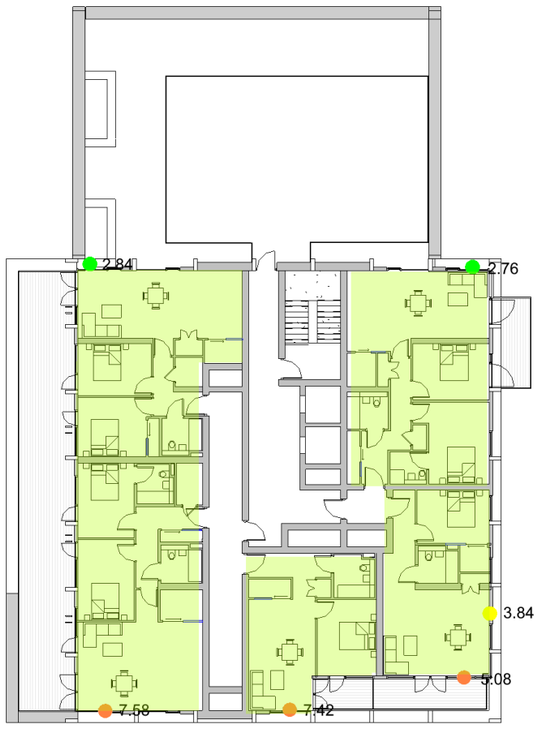


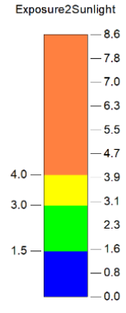


Exposure to Sunlight

Ground Floor

Sunlight Analysis as illustrated below, determined all units on this floor achieve the minimum recommendations.





Appendix A - Average Daylight Factor

By way of comparative analysis, a full average daylight factor (ADF) assessment was also carried out for the proposed development. ADF is the metric that was utilised for the now superseded BRE BR 209 Second Edition. It has been replaced with either median daylight factor (MDF) or spatial daylight autonomy (SDA) as per BRE BR 209 2022 Edition, as detailed in section 3.0.

Although ADF has been superseded, it has been common for planning submissions for many years and this section is intended to allow readers an understanding of the relationship between the old and new metrics.

Methodology

Average Daylight Factor (ADF) is a long-established metric utilised in Daylighting analysis. The Daylight Factor is the percentage of the predicted internal illumination at a point within the room (at the working plane height of 0.85m above finished floor level) divided by the unobstructed external illuminance. Predicted daylight factors at each point are then averaged to determine ADF for a room or space.

The ADF methodology utilises a CIE Overcast Sky, typically providing an external, unobstructed ground illumination level of 10,000 Lux. CIE Overcast skies are theoretical sky models, with brightness highest at the zenith and reducing to the horizon, but also unidirectional (as illustrated in Figure A.1).

Therefore, ADF's do not differ for façade orientation, with North facing rooms achieving identical metric performance to South facing, (all else being equal), as results account for diffuse natural light only and exclude any direct sunlight effects.

Fig A.2 illustrates ADF results determined for Level 02 (contours 0-5% blue to red) and it can be seen how there was no discernible difference determined between the E and W facing rooms.

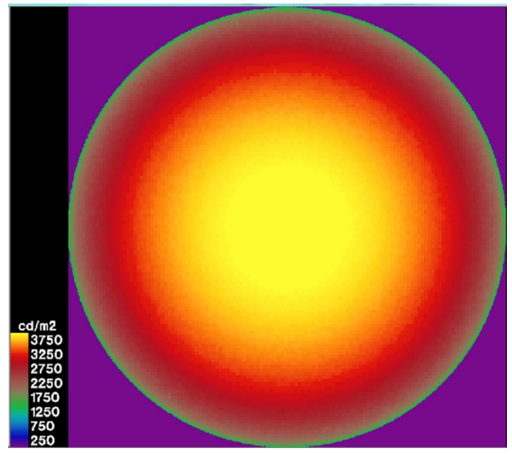


Fig A.1– CIE Overcast Sky (viewed from below)

Fig A.2– Level 01 – DF Contours

8.1 Results Summary – ADF

The table below gives a breakdown of compliance rates on each floor based on Average Daylight Factor (ADF) for the proposed development.

All apartment KLDs and Bedrooms have been assessed for this report.

The simulation results for the development indicated a high pass rate of 98% of the rooms were determined to be compliant to ADF target values.

It can be noted that all rooms that did not achieve the minimum ADF targets all achieved compliance with the SDA targets. Conversely, the spaces that did not achieve SDA all achieved compliance with ADF. The compensatory measures have been identified for the current standard (SDA) as included in section 7.3 and the following results are provided for information only.

Stradbrook Road	Pass	Fail	Total
Ground Floor	28	3	31
First Floor	50	1	51
Second Floor	49	2	51
Third Floor	43	0	43
Fourth Floor	30	0	30
Fifth Floor	22	0	22
Sixth Floor	13	0	13
98%	235	6	241

Ground Floor

Daylighting Analysis as illustrated below, determined the following daylighting performance with associated Average Daylight Factors (ADF's).

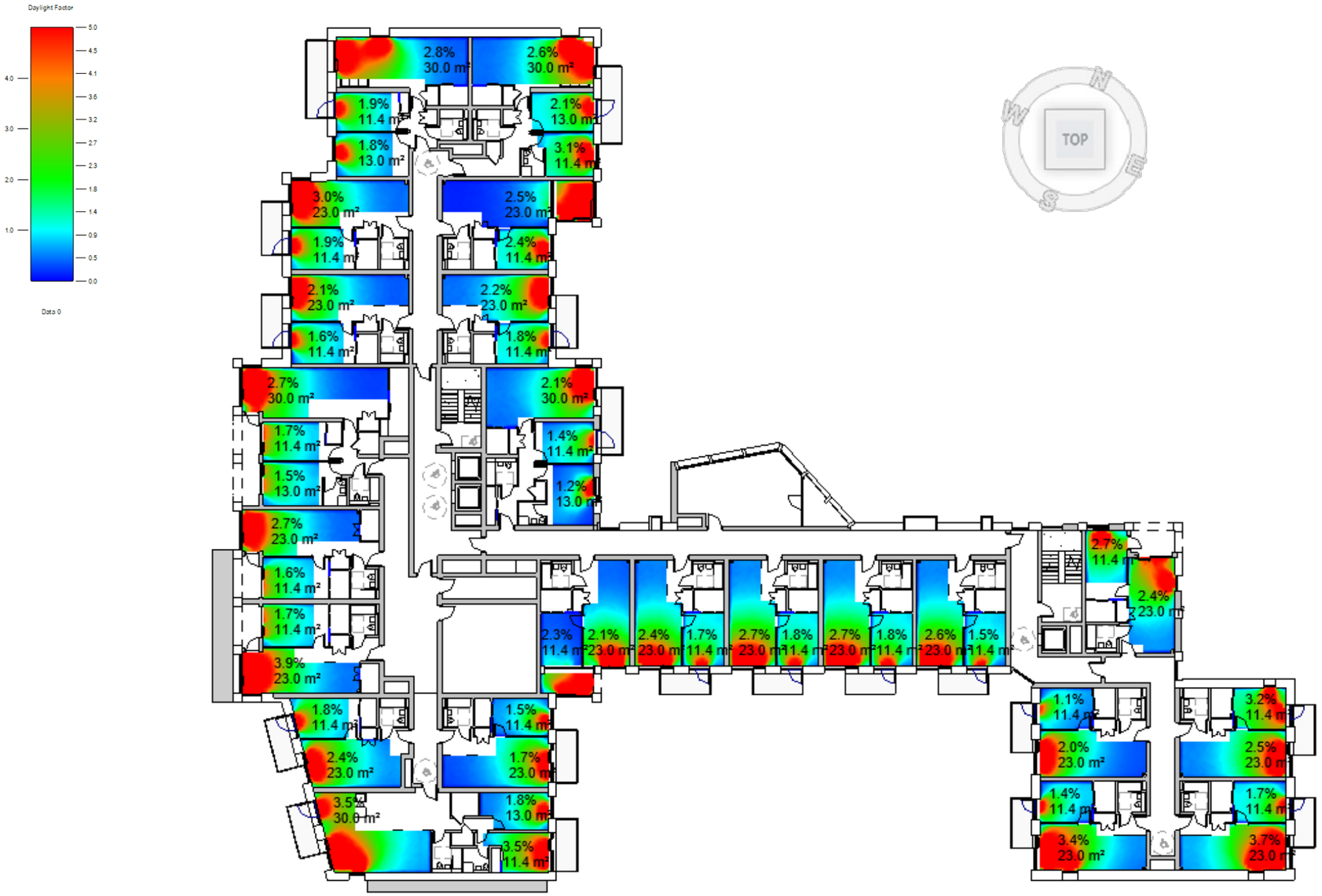
28 of 31 rooms analysed exceed the BRE guidelines on the Ground floor.

Area type	Targeted ADF
Bedrooms	> 1.0%
K/L/D Areas	> 2.0%

First Floor

Daylighting Analysis as illustrated below, determined the following daylighting performance with associated Average Daylight Factors (ADF's).

50 of 51 rooms analysed exceed the BRE guidelines on the First floor.



Area type	Targeted ADF
Bedrooms	> 1.0%
K/L/D Areas	> 2.0%

Second Floor

Daylighting Analysis as illustrated below, determined the following daylighting performance with associated Average Daylight Factors (ADF's).

49 of 51 rooms analysed exceed the BRE guidelines on second floor.

Area type	Targeted ADF
Bedrooms	> 1.0%
K/L/D Areas	> 2.0%

Third Floor

Daylighting Analysis as illustrated below, determined the following daylighting performance with associated Average Daylight Factors (ADF's).

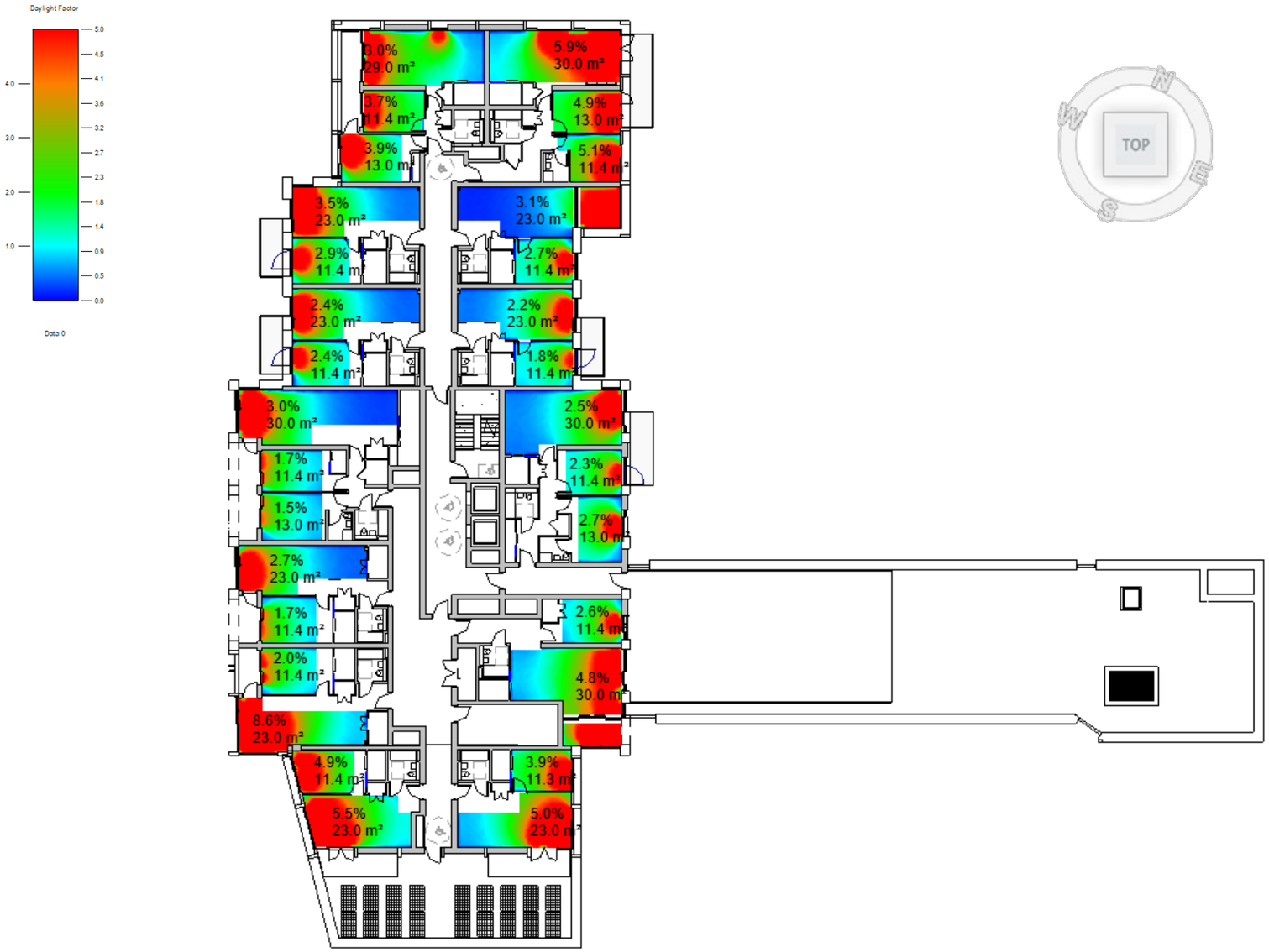
All rooms were determined to be compliant with targeted ADF on the Third floor.

Area type	Targeted ADF
Bedrooms	> 1.0%
K/L/D Areas	> 2.0%

Fourth Floor

Daylighting Analysis as illustrated below, determined the following daylighting performance with associated Average Daylight Factors (ADF's).

Every room was determinted to be compliant for targeted ADF on this floor.

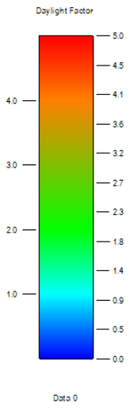


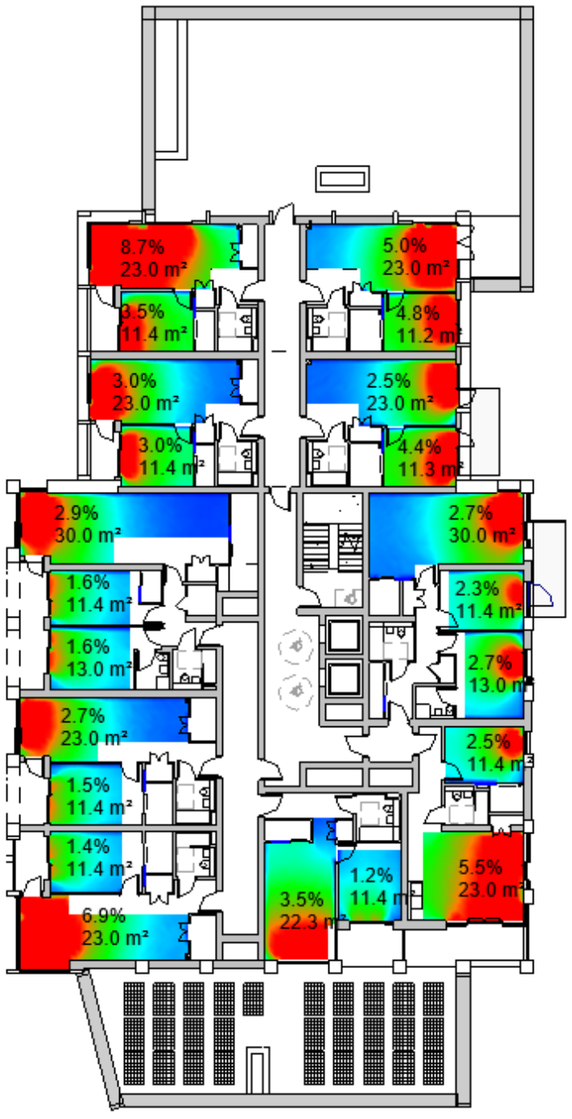
Area type	Targeted ADF
Bedrooms	> 1.0%
K/L/D Areas	> 2.0%

Fifth Floor

Daylighting Analysis as illustrated below, determined the following daylighting performance with associated Average Daylight Factors (ADF's).

Every room was analysed exceeding the BRE guidelines on this Fifth floor.



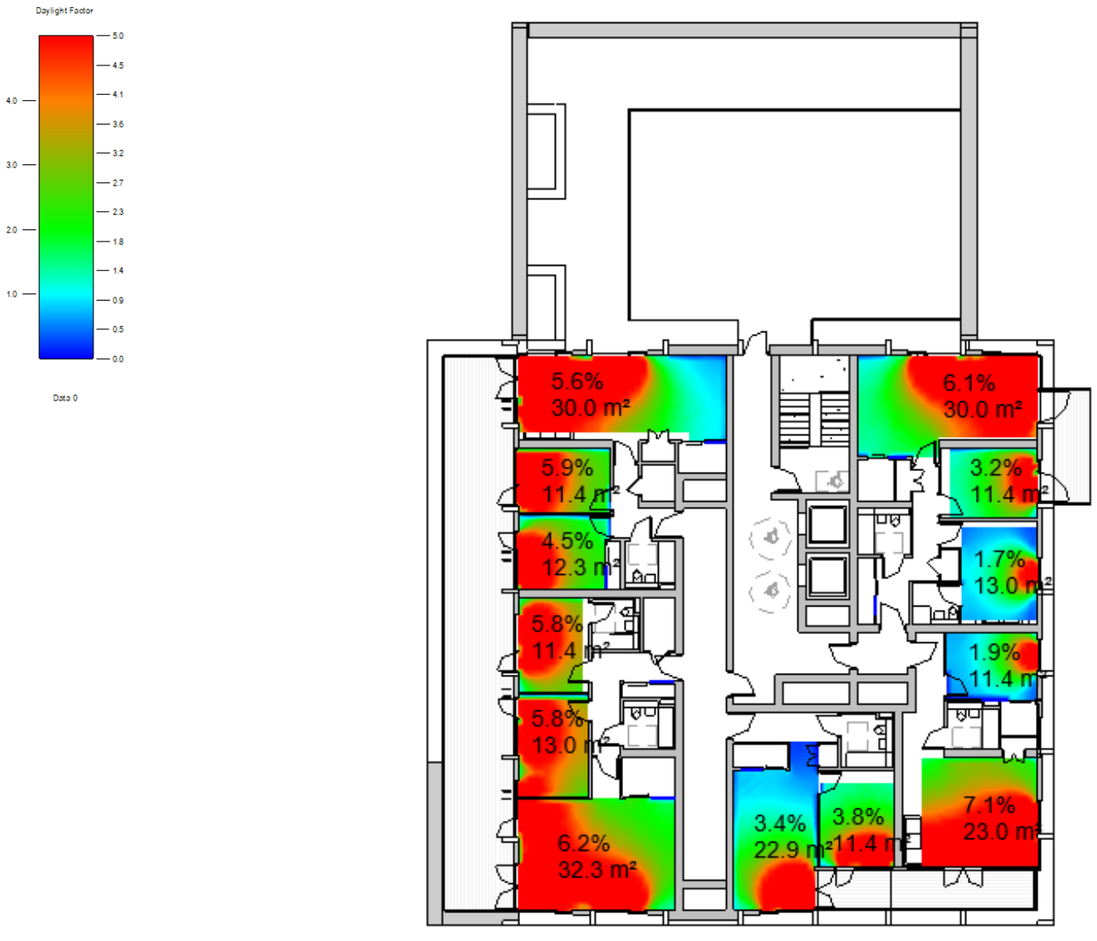


Area type	Targeted ADF
Bedrooms	> 1.0%
K/L/D Areas	> 2.0%

Sixth Floor

Daylighting Analysis as illustrated below, determined the following daylighting performance with associated Average Daylight Factors (ADF's).

All rooms were determined to be compliant for targeted ADF on the Sixth floor.



Area type	Targeted ADF
Bedrooms	> 1.0%
K/L/D Areas	> 2.0%

APPENDIX B – Site Shading Diagrams

Equinox March 21st

The shadow diagram shows no undue impact on neighbouring buildings and amenities. Refer to section 5.0 for quantitative assessments.

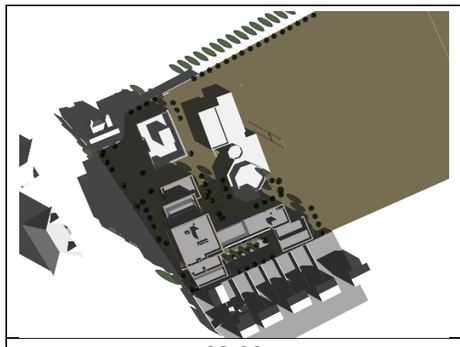
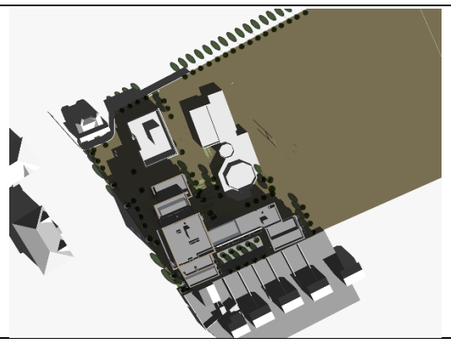
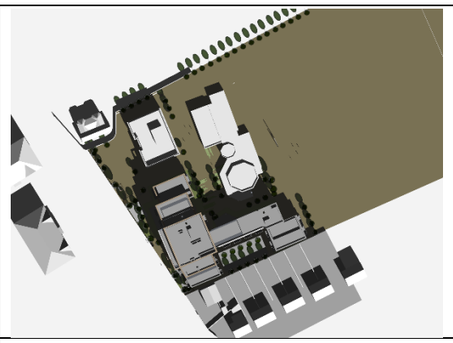
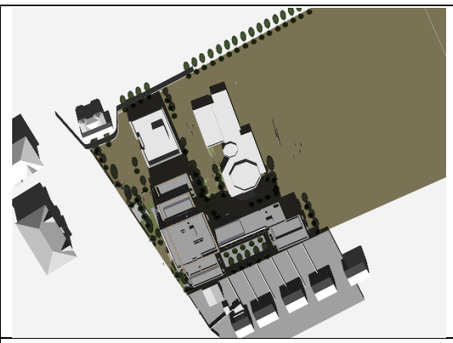
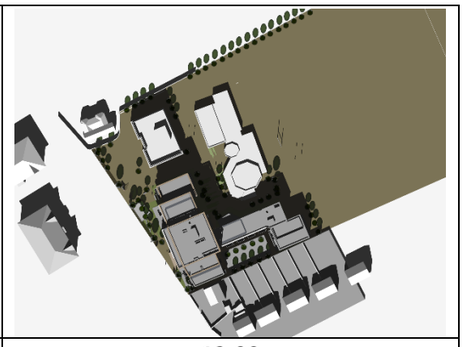
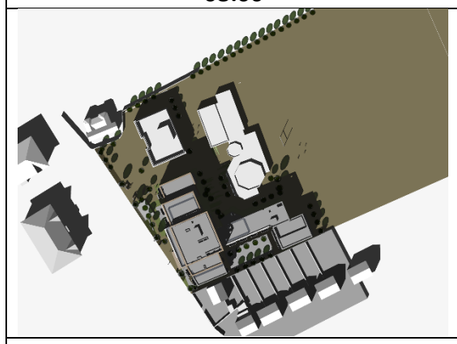
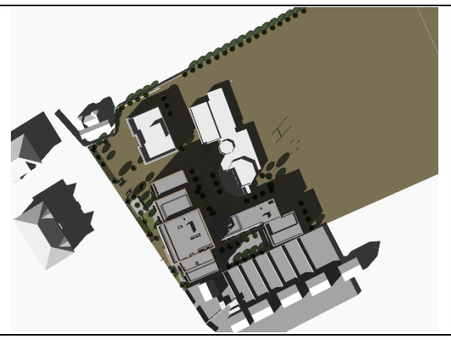
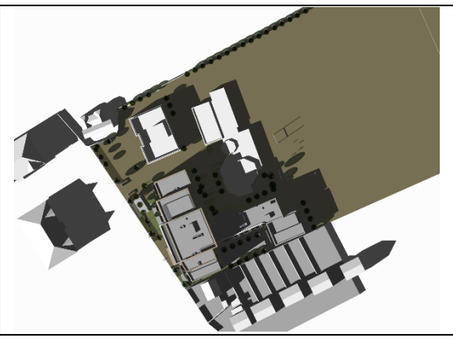
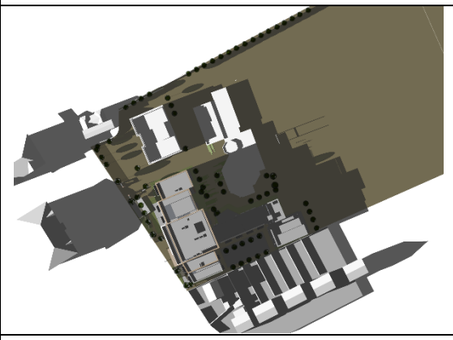
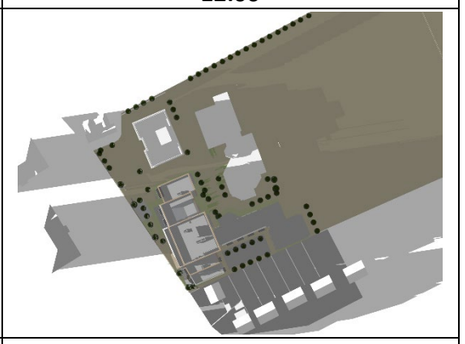
				
08:00	**09:00**	**10:00**	**11:00**	**12:00**
				
13:00	**14:00**	**15:00**	**16:00**	**17:00**

Fig B1: Sunlight and Site Shading Diagrams - Equinox (March 21st): 08:00-17:00 hrs

The diagrams illustrate that the house to the south, Windsor Park, of the proposed development will not be overshadowed due to the proposed building's location to the north of these dwellings. Other buildings will experience transient shadowing for minimal periods.

Summer Solstice June 21st

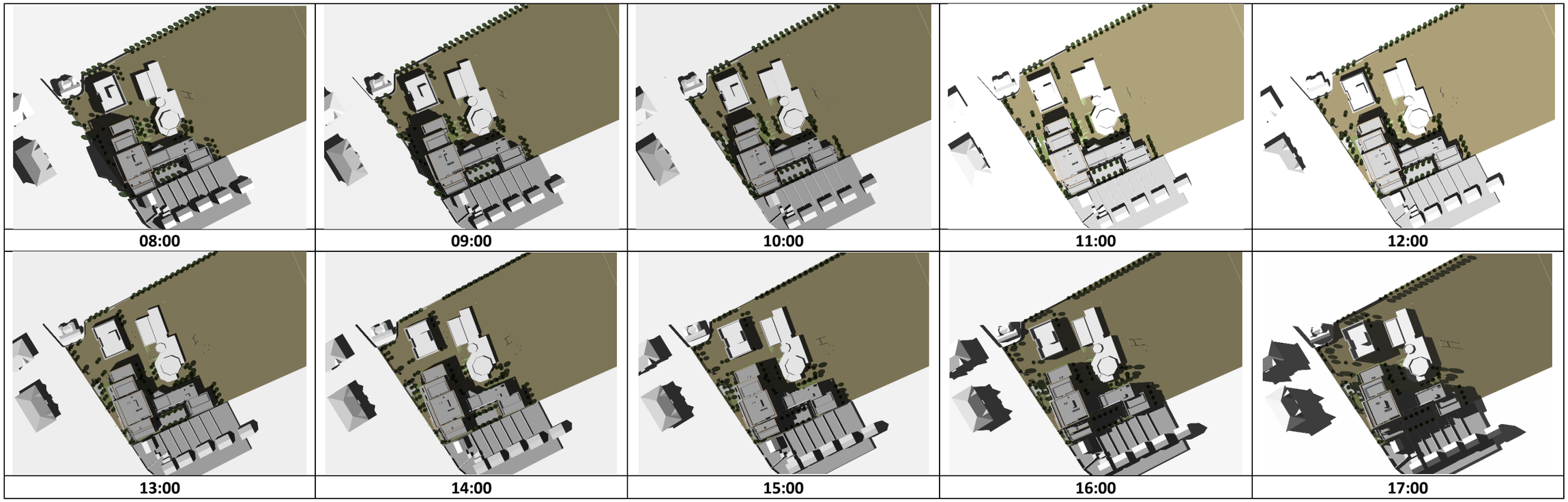


Fig B2: Sunlight and Site Shading Diagrams - Summer Solstice (June 21st): 08:00-17:00 hrs

Whilst both winter and summer solstices have been included, it should be noted that the statistics of Met Eireann, the Irish Meteorological Service, indicate that the sunniest months in Ireland are May and June. During December, Dublin receives a mean daily duration of 1.7 hours of sunlight out of a potential 7.4 hours sunlight each day (i.e. only 22% of potential sunlight hours). This can be compared with a mean daily duration of 6.4 hours of sunlight our of a potential 16.7 hours each day received by Dublin during June (i.e. 38% of potential sunlight hours). Therefore, impacts caused by overshadowing are generally most noticeable during the summer months and least noticeable during the winter months. Due to the low angle of the sun in mid-winter, the shadow environment in all urban and suburban areas are generally dense tending to make the images confusing and superfluous.

Winter Solstice December 21st

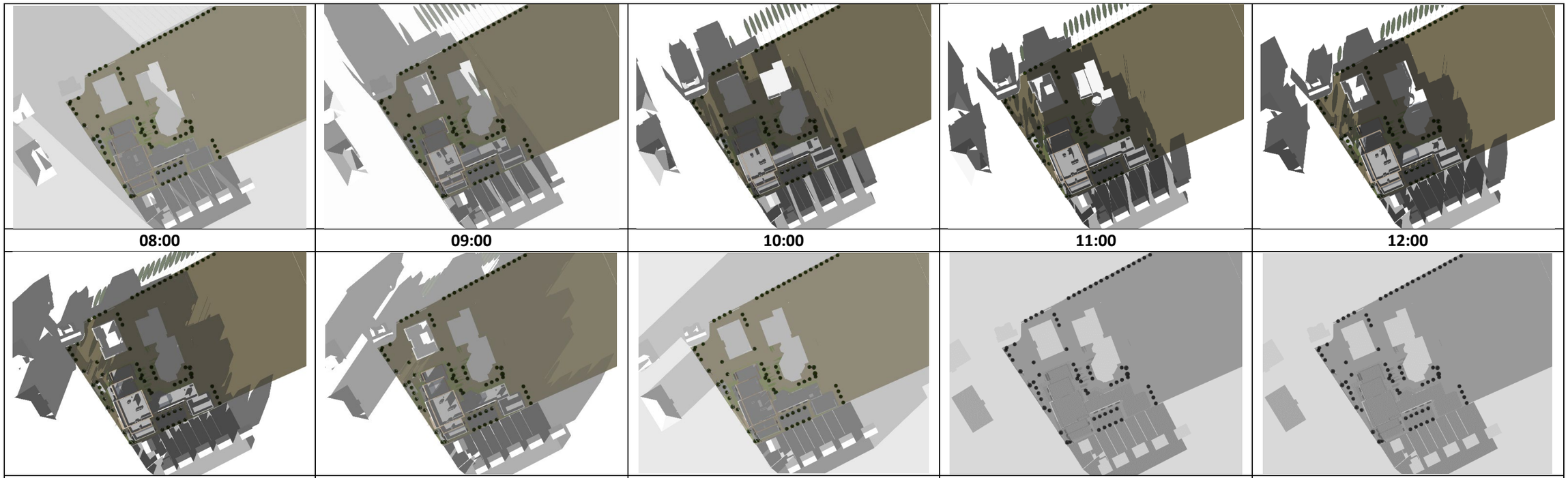


Fig B3: Sunlight and Site Shading Diagrams - Winter Solstice (December 21st): 08:00-17:00 hrs

Whilst both winter and summer solstices have been included, it should be noted that the statistics of Met Eireann, the Irish Meteorological Service, indicate that the sunniest months in Ireland are May and June. During December, Dublin receives a mean daily duration of 1.7 hours of sunlight out of a potential 7.4 hours sunlight each day (i.e. only 22% of potential sunlight hours). This can be compared with a mean daily duration of 6.4 hours of sunlight our of a potential 16.7 hours each day received by Dublin during June (i.e. 38% of potential sunlight hours). Therefore, impacts caused by overshadowing are generally most noticeable during the summer months and least noticeable during the winter months. Due to the low angle of the sun in mid-winter, the shadow environment in all urban and suburban areas are generally dense tending to make the images confusing and superfluous.