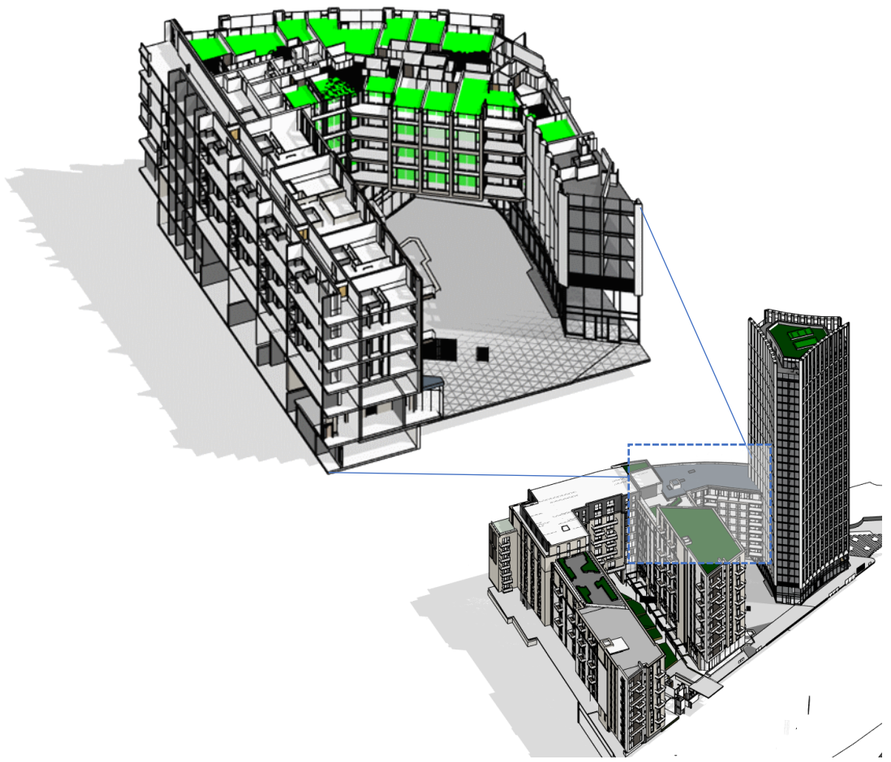
Parkgate St – Block B2 Amendment



Daylight & Sunlight Analysis

IN2 Project No. D1861

18/10/2023

Revision History

Date	Revision	Description
18/10/2023	00	Issued for Planning

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1.0 Executive Summary

This report compiles the daylight and sunlight analysis as undertaken by IN2 Engineering Design Partnership for the Proposed amendment to Block B2 at Parkgate Street, Dublin 8.

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

Analysis Type	Relevance	Assessment Methodology	Compliance Guidelines Targets	Reference section of this report
Daylight	Existing Neighbouring Buildings	Vertical Sky component	BR 209 (2022 Edition)	Section 5.0 – Impact on Neighbouring Buildings
Daylight	Proposed Development	Spatial Daylight Autonomy	BR 209 (2022 Edition)	Section 6.0 – Internal Daylight Analysis
Sunlight	Permitted Development	Vertical Sky Component	BR 209 (2022 Edition)	Section 4.0 – Impact on Permitted scheme
Sunlight	Existing neighbouring Buildings	Annual Probable Sunlight Hours	BR 209 (2022 Edition)	Section 5.0 – Impact on Neighbouring Buildings
Sunlight	Proposed Development	Sunlight Exposure	BR 209 (2022 Edition)	Section 7.0 – Exposure to Sunlight

Section 4.0 outlines the analysed potential impact of the proposed amendment on the permitted scheme. Based on daylight analysis (Vertical Sky Component) there is negligible impact on the permitted scheme with spaces continuing to receive good daylight.

Impact of the proposed development with amended block B2 on the Neighbouring buildings is determined in Section 5.0. The results determined that due to the massing and careful placement of the proposed amendment, there would be no significant impact on neighbouring residences for daylight (VSC) or Sunlight (APSH).

Internal daylight analysis, as detailed in section 6.0, has been undertaken for all kitchen/ living/ dining (KLD) and bedroom spaces throughout the proposed amended block B2. Units have been assessed based on BRE Guide for the Spatial Daylight Autonomy (SDA) metric. **98%** of the rooms, were found to be compliant for BRE recommended guideline and detailed results are presented in Appendix A. As per Apartment Guidelines, where rooms were determined to not comply with the BRE guidelines (total 2 no. rooms), these have been identified and compensatory measures provided in Appendix A.

Section 7.0 included the results for the Exposure to Sunlight Analysis. This metric assesses the sunlight availability to each unit. The proposed amended block B2 achieves a compliance rate of **80%** of units exceeding the minimum recommendations. Detailed results are included in Appendix B.

Shadow Diagrams have been provided in Appendix C. These diagrams illustrate the site shading for the equinox and both winter and summer solstice. This was provided for information only. For quantitative analysis section 5.0 can be referred.

In summary, this report confirms that best practice Sunlight and Daylight availability have been ensured for the proposed development with amendment on Block B2, with no impact on the existing neighbouring environment or previously permitted scheme.

2.0 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 (2023 version) (the **"2023 Apartment Guidelines").** These are guidelines issued under section 28 of the 2000 Planning and Development Act (as amended).
b) Dublin City Development Plan 2022-2028, ("**DCC Development Plan**").
c) 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").**
d) British Standard BS EN 17037:2018 – Daylight in Buildings (the "**2018 British EN Standard**").
e) Irish Standard IS EN 17037:2018 (the "**2018 Irish EN Standard**").

It should be noted at the outset that the 2008 British Standard has been superseded by the 2018 British Standard, and BRE Guide 2nd Edition has been superseded by BRE Guide 2022 edition. Both previous revisions have now been withdrawn.

EN 17037:2018, which was approved by the Comité Européen de Normalisation (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.

This report has been therefore carried out based on the guidance contained within 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")**. This document is specifically designed to facilitate good building design within the planning context and is referenced in both the 2023 Apartment Guidelines and the DCC Development Plan. The BRE Guide clarifies and expands on the methodologies contained in IS EN 17037 and BS EN 17037 with specific relevance to residential buildings, and as such has been deemed to take precedence over these other documents.

The 2023 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 ensure appropriate expert advice and input where necessary, and have regard to quantitative performance approaches to daylight provision outlined in guides like A New European Standard for Daylighting in Buildings EN17037 or UK National Annex BS EN17037 and the associated BRE Guide 209 2022 Edition (June 2022), or any relevant future guidance specific to the Irish context, 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."*

DCC Development Plan

The Development Plan notes:

3.6 Understanding and Expectations

> *The planning authority understand that, at present, there is some ambiguity in what may be considered the appropriate standard to apply for daylight and sunlight assessments. There is a period of transition at present, during which BS 8206-2 has been superseded, but the relevant guidance within BR 209 has not yet been updated. Thus, both BS 8206-2 and BS EN 17037 have relevance. As such, both for clarity and as an interim measure during this transition period, the planning authority will look to receive relevant metrics from BR 209, BS 8206-2 and BS EN 17037.* ***If, over the coming years, a revised version of BR 209 is to be issued, the guidance within this new version will take precedence. (EMPHASIS ADDED)***

The Document notes in 4.0 Relevant Metrics that "Where the text below is unclear or where there is ambiguity over a particular piece of information, the relevant standard and guidance document shall always take precedence." Therefore, "Section 5.0 Assessment Methodologies" for proposed development included in the plan have been superseded and correct methodologies are noted below:

5.1 Performance of the Proposed Development		**Correct Methodology as per BR209 2022**
Annual Probable Sunlight Hours on all relevant windows	*Not an applicable metric for the proposed development as per BR209 (2022) instead Exposure to Sunlight assessment should be utilised.*	Exposure to Sunlight for each dwelling.
Winter Sunlight Hours on all relevant windows	*Not an applicable metric for the proposed development as per BR209 (2022) instead Exposure to Sunlight assessment should be utilised.*	Exposure to Sunlight for each dwelling.
Sunlight on Ground in all amenity spaces	*Correct Methodology*	Sunlight on Ground in all amenity spaces
Average Daylight Factor in all habitable rooms	*Not an applicable metric for the proposed development as per BR209 (2022)*	Spatial Daylight Autonomy (to achieve Target Illuminance) or Median Daylight Factor in all habitable rooms.
No Sky Line in all habitable rooms	*Not an applicable metric for the proposed development as per BR209 (2022)*	
Target Illuminance in all habitable rooms	*Spatial Daylight Autonomy (to achieve Target Illuminance) or Median Daylight Factor in all habitable rooms.*	

Section 5.2 Impact on the Surrounding Properties, remains unchanged in the BRE Guide and is correct as included in the Development Plan.

The BRE Guide (2022 Edition)

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. However, the Guide does not impose absolute standards that must be achieved under all circumstances. 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 BRE Guide, the targets for internal daylight are provided for both optional methodologies, Climate Based Daylight Modelling (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."

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."

3.0 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.

Climate Based Daylight Modelling

Climate based daylight modelling, also referred to as CBDM, 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, CBDM 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). CBDM is utilised for compliance with EN 17037 method 2 Spatial Daylight Autonomy (SDA).

Spatial Daylight Autonomy

Climate based daylight modelling, also referred to as CBDM, 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, CBDM 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). CBDM is utilised for compliance with EN 17037 method 2 Spatial Daylight Autonomy (SDA).

Sunlight Exposure

Sunlight exposure is assessed on a window of at least one habitable room per dwelling (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 a 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.

4.0 Impact on Permitted scheme

As the B2 massing has been altered since the previous assessment provided with the permitted planning documentation, an assessment of the impact of the new B2 block on the adjacent permitted units was carried out.

As the block B2 is located to the north of the site, there is no impact to the permitted sunlight availability to the amenity areas which are located to the south, as the site is located in the northern hemisphere, as shown in Figure 4.0.1.

In relation to daylight availability, the mezzanine and first floors were assessed as they were identified to be the floors with the greatest potential impact. Any decision to test floors above those levels was contingent on the outcome of the assessments on the mezzanine and first floor. The areas assessed are highlighted in figure 4.0.2, for both VSC and SDA, as set out in the BRE Guide Appendix F which notes the following:

"F7 In assessing the loss of light to an existing building, the VSC is generally recommended as the appropriate parameter to use. This is because the VSC depends only on obstruction, and is therefore a measure of the daylit environment as a whole. The daylight factor and daylight illuminance (Appendix C) also depend on the room and window dimensions, the reflectances of interior surfaces and the type of glass, as well as the obstructions outside. These are appropriate measures to use in new buildings because most of these factors are within the developer's control.

F8 Use of the daylight factor or daylight illuminance for loss of light to existing buildings is not generally recommended. This tends to penalise well-daylit existing buildings, because they can take a much bigger and closer obstruction and remain above the minimum recommendations in BS EN 17037[F1]. Because BS EN 17037 quotes a number of recommended values for different qualities of daylight provision, such a reduction in light would still constitute a loss of amenity to the room. Conversely if daylight factor and/or daylight illuminance values in an existing building were only just over the recommended minimum, even a tiny reduction in light from a new development would cause them to go below the minimum, restricting what could be built nearby."

"F9 However, there are some situations where meeting set daylight factor or illuminance target values (Appendix C) with the new development in place could be appropriate as a criterion for loss of light:

(i) Where the existing building is one of a series of new buildings that are being built one after another, and each building has been designed as part of the larger group.

(ii) As a special case of (i), where the existing building is proposed but not built. A typical situation might be where the neighbouring building has received planning permission but not yet been constructed".

Fig 4.0.1 – New Tower Shadow at 12:00 and 13:00 on 21st March showing no overshadowing to permitted amenity space.

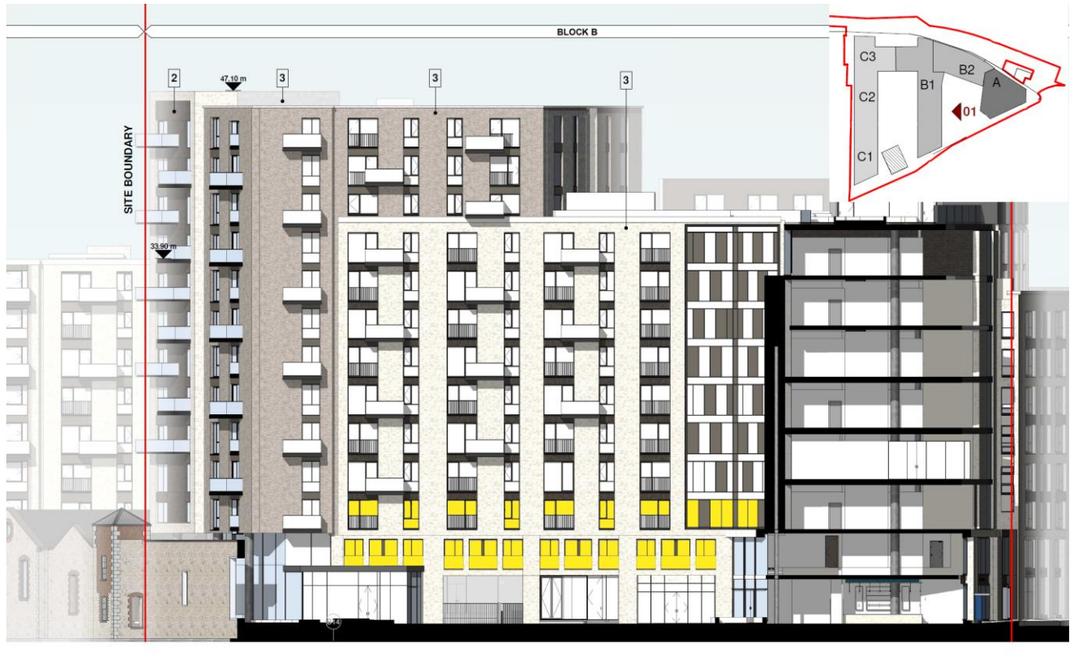


Fig 4.0.2 – Sample Units on Mezzanine and First Floor of Permitted scheme that have been assessed for impact due to new tower massing.

Results

Assessment was carried out on selected units on the mezzanine and first floors to provide an understanding of the impact of any potential impact. The results determined that whilst there would be some reduction in VSC availability, the works carried out on the previously permitted scheme to ensure good daylight availability to the units has resulted in the ADF being consistent with previous results, with every space still achieving ADF's above the BRE minimum guidance. Due to these results for the lower floors and an understanding that daylight will improve on the upper floors, it is concluded that the proposed amended block B2 has only negligible impact on permitted scheme.

Room Ref	Window Ref	VSC Permitted (%)	VSC Proposed (%)	Propsed/ Permitted (%)	Criterion 1 VSC Permitted < 27%	Criterion 1 VSC Proposed < 27%	OVERALL COMPLIANCE	Daylight Permitted (%)	Daylight Proposed (%)	Daylight Proposed/ Permitted	Comment
1st B Bed 1	W41	5.4	5.3	0.99	No	No	Negligible	1	1	100%	No material change in results (rounded to 0.1)
1st B Bed 2	W59	7.0	7.0	1.00	No	No	None	1.8	1.8	100%	No material change in results (rounded to 0.1)
1st B Bed 3	W58	10.5	10.5	1.00	No	No	None	0.7	0.7	100%	No material change in results (rounded to 0.1)
1st B Bed 4	W56	14.9	14.9	1.00	No	No	None	1	1	100%	No material change in results (rounded to 0.1)
1st B Bed 5	W55	20.3	20.3	1.00	No	No	None	1.4	1.4	100%	No material change in results (rounded to 0.1)
1st B Living 1	W65	9.8	9.8	1.00	No	No	None	1	1	100%	No material change in results (rounded to 0.1)
1st B Living 2	W57	13.3	13.3	1.00	No	No	None	1.4	1.4	100%	No material change in results (rounded to 0.1)
1st B Living 3	W66	18.1	18.1	1.00	No	No	None	1.9	1.9	100%	No material change in results (rounded to 0.1)
1st B Living 4	W54	22.9	22.9	1.00	No	No	None	2.7	2.7	100%	No material change in results (rounded to 0.1)
Mezz B Bed 1	W1	6.1	5.9	0.97	No	No	Negligible	1	1	100%	No material change in results (rounded to 0.1)
Mezz B Bed 1	W2	6.0	5.8	0.97	No	No	Negligible				
Mezz B Bed 2	W3	9.7	9.5	0.99	No	No	Negligible	1.5	1.5	100%	No material change in results (rounded to 0.1)
Mezz B Bed 2	W4	9.4	9.3	0.99	No	No	Negligible				
Mezz B Bed 3	W13	14.0	14.0	1.00	No	No	None	2.2	2.2	100%	No material change in results (rounded to 0.1)
Mezz B Bed 3	W14	14.3	14.3	0.99	No	No	Negligible				
Mezz B Bed 4	W11	19.4	19.4	1.00	No	No	None	2.8	2.8	100%	No material change in results (rounded to 0.1)
Mezz B Bed 4	W12	17.2	17.2	1.00	No	No	None				
Mezz B Living 1	W29	8.5	8.2	0.97	No	No	Negligible	1	1	100%	No material change in results (rounded to 0.1)
Mezz B Living 1	W30	7.1	6.8	0.96	No	No	Negligible				
Mezz B Living 2	W31	12.4	12.4	0.99	No	No	Negligible	1.4	1.4	100%	No material change in results (rounded to 0.1)
Mezz B Living 2	W32	11.0	10.8	0.99	No	No	Negligible				
Mezz B Living 3	W33	17.4	17.4	1.00	No	No	None	2	2	100%	No material change in results (rounded to 0.1)
Mezz B Living 3	W34	15.5	15.4	0.99	No	No	Negligible				
Mezz B Living 4	W35	21.4	21.4	1.00	No	No	None	2.5	2.5	100%	No material change in results (rounded to 0.1)
Mezz B Living 4	W36	21.3	21.4	1.00	No	No	None				

5.0 Impact on Neighbouring Buildings

5.1 Guidance

As set out within the introduction, the impact on existing buildings can be assessed utilising quantitative assessment method as detailed in the BRE publication "Site Layout Planning for Daylight and Sunlight – A guide to good Practice (Third Edition)" which includes the following methodologies:

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 (APSH), 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."*

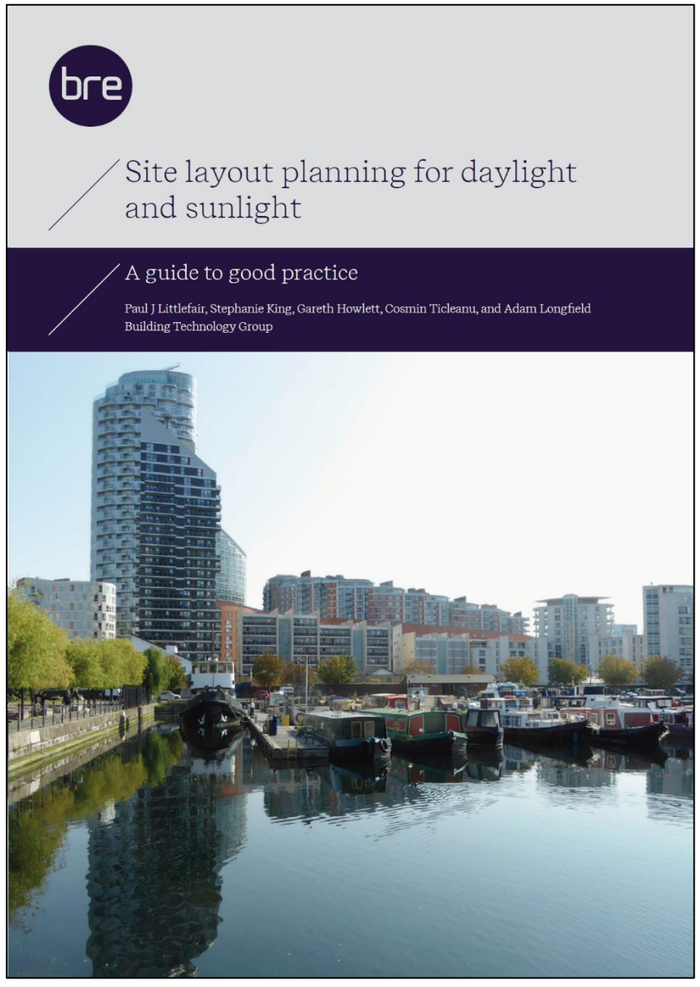


Fig 5.1.1 – BRE publication "Site Layout Planning for Daylight and Sunlight – A guide to good practice (Third Edition)

5.2 Methodology

The analysis therefore looked at existing windows for both daylight and sunlight.

The following neighbouring buildings were assessed.

- Montpelier Hill (as indicated)

Analysis was undertaken by calculating sunlight availability permitted and proposed development (with amended block B2) for indicative window locations centred on the façade of each dwelling as illustrated in Figure 5.2.1 below. It can be noted from the google maps image, fig 5.2.2, that the existing mature trees would have significant impact on the daylight and sunlight to the dwellings on Montpelier Hill, however, for the purpose of the analysis these trees have been excluded from this assessment as per BRE guide recommendations.

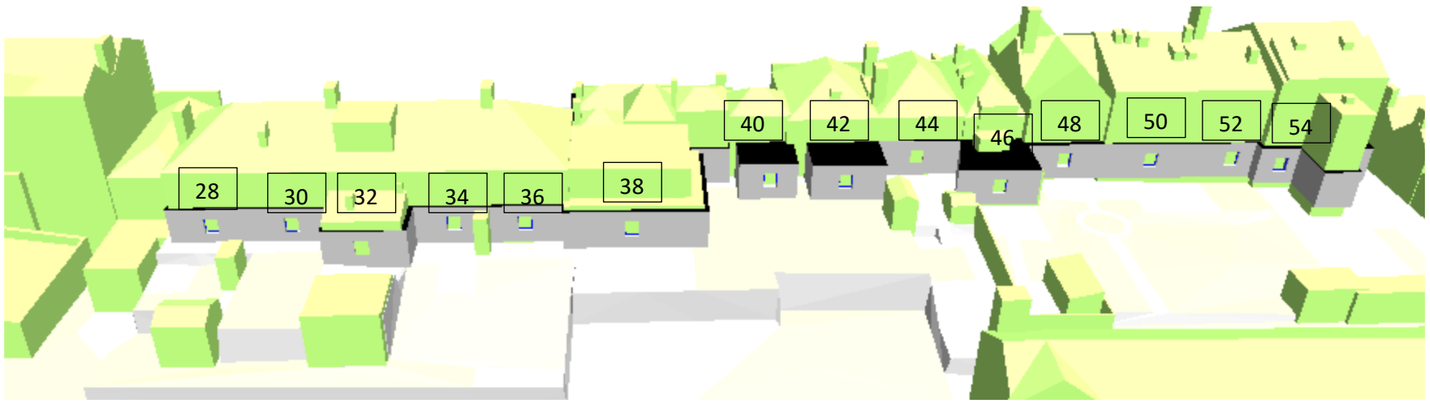


Fig 5.2.1 – Indicative Window Locations assessed for adjacent dwellings at Montpelier Hill North of Proposed Development

Fig 5.2.2 – Google Maps Image for Neighboring Dwellings on Montpelier Hill

5.3 Results – VSC (Daylight) to Neighbouring Dwellings

The below tables present the VSC results for all neighbouring dwellings analysed against the Permitted scheme as the baseline condition. The assessment is based on the following criteria:

- **Improved**: if the proposed development (with amended block B2) provides higher daylighting against the permitted development building.
- **None:** If there is no change in daylighting availability.
- **Negligible:** if the impact of the permitted development building vs the proposed (with amended block B2) is between 0.95-1.
- **Minor:** if the impact of the permitted development building vs the proposed (with amended block B2) is between 0.95 – 0.80.
- **Moderate:** if the impact of the permitted development building vs the proposed (with amended block B2) is between 0.80 – 0.50.
- **Major Adverse:** if the impact of the permitted development building vs the proposed (with amended block B2) is below 0.5.

The analysis indicated that all existing residences on Montpelier Hill assessed for daylight impact were found to achieve full compliance with BRE recommendations, as VSC values were predicted to be either remain above 27% and or any reduction was less than 20%. These dwellings would therefore not be adversely affected by the proposed development (with amended block B2) in terms of receipt of natural light.

Room Ref	VSC Permitted (%)	VSC Proposed (%)	Propsed/ Permitted (%)	Criterion 1 VSC Permitted < 27%	Criterion 1 VSC Proposed < 27%	Impact
Mount 28	28.2	28.2	1.00	No	No	None
Mount 30	25.1	25.1	1.00	No	No	None
Mount 32	27.9	27.8	1.00	No	No	None
Mount 34	23.5	23.5	1.00	No	No	None
Mount 36	27.9	27.9	1.00	No	No	None
Mount 38	27.9	27.9	1.00	No	No	None
Mount 40	26.8	26.8	1.00	No	No	None
Mount 42	26.9	26.9	1.00	No	No	None
Mount 44	24.6	24.6	1.00	No	No	None
Mount 46	28.1	28.1	1.00	No	No	None
Mount 48	27.5	27.5	1.00	No	No	None
Mount 50	29.0	29.0	1.00	No	No	None
Mount 52	25.7	25.7	1.00	No	No	None
Mount 54	18.4	18.4	1.00	No	No	None

Fig 53.1 – Predicted VSC Results

5.4 Results - Sunlight

Mount 28	76	76	1	21	21	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 30	65	65	1	16	16	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 32	79	79	1	23	23	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 34	59	59	1	17	17	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 36	71	71	1	22	22	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 38	80	80	1	25	25	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 40	71	71	1	24	24	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 42	76	76	1	21	21	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 44	63	63	1	14	14	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 46	82	82	1	26	26	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 48	77	77	1	25	25	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 50	78	78	1	25	25	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 52	64	64	1	20	20	1	1277	51	0	Yes	Yes	Yes	**Pass**
Mount 54	48	48	1	11	11	1	1277	51	0	Yes	Yes	Yes	**Pass**

Fig 5.4.1 – Predicted ASHP Results

Similarly, analysis undertaken for sunlight availability determined BRE compliance with regards to all existing dwellings assessed on Montpelier Hill, confirming their currently received sunlight would not be adversely affected by the proposed development (with amended block B2).

6.0 Internal Daylight Analysis

6.1 Spatial Daylight Autonomy Methodology

Spatial Daylight Autonomy (SDA) is a climate-based daylight assessment methodology utilised in the BRE Guide. These guidelines and standards have been outlined in Section 2.0.

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 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 6.1.1 indicates overall compliance comparison, with green contours illustrating where daylight was predicted to achieve 100 Lux for bedroom 150 Lux for Livingroom and 200 Lux for KLD and Kitchen. These are the illuminance recommendations for dwellings included in Section C16 of the BR.209 2022 edition, based on BS.EN.17037:2018. 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 typical Building Details as exampled in Figure 6.1.2 such as balcony structures, window frames, reveal and cill depth etc. in accordance with the architectural design. As the window frames have been explicitly 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 (as defined in BR.209 2022 edition) to enable a detailed calculation within each room, the medium of which was then determined the space compliance.

Fig 6.1.1 –Daylight Analysis Results

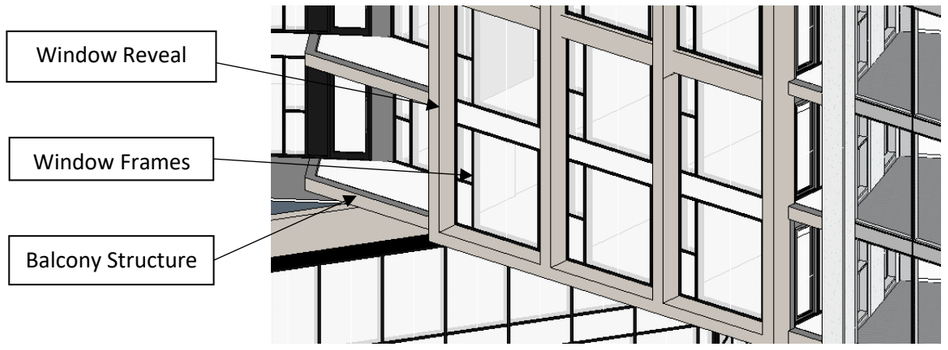


Fig 6.1.2 – Building Details included within Daylight Analysis (Sample)

6.1 Spatial Daylight Autonomy Methodology (Cont'd)

The rooms have been assessed to the minimum areas as prescribed in the 2022 Apartment Guidelines, Fig 6.1.3 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****)*

BR.209 2022 provides additional guidance on room definitions, identifying that corridors/ annexed entrances can be excluded from the assessment area as illustrated in Fig. 6.1.4.

Fig 6.1.5 illustrates an example of how the above has been interpreted to define areas of assessment (highlighted green) ensuring:

- Minimum required room area as defined in Apartment Guidelines (i.e., min. 30m^2 in this instance for 2 Bed Apartment KLD).
- Inclusion of kitchen area within KLD (i.e. assessment to rear of room).
- Exclusion of circulation/ annexed entrances (i.e., adjacent to doors illustrated).

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.

Fig 6.1.3 – Apartment Guidelines – Minimum Room Sizes

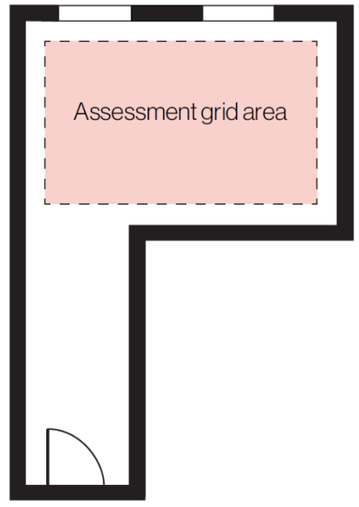


Fig 6.1.4 – BR 209 Figure C3 – Assessment Area excluding Corridor

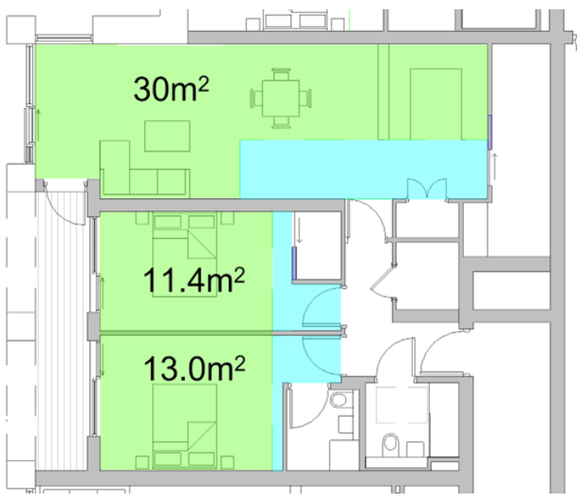
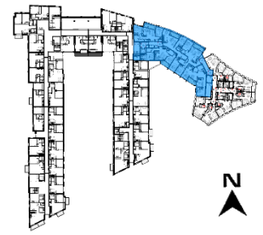


Fig 6.1.5 – Assessment Space Delineation

6.2 Results Summary – SDA



KEY MAP

The table below gives a breakdown of compliance rates for every room in the proposed amended block B2 of Parkgate development based on Spatial Daylight Autonomy (SDA).
98% of spaces analysed were determined to be compliant with the methodology utilised.
2no. non-complying rooms were identified with compensatory measures in Appendix A.

Parkgate B2	Pass	Fail	Total
Level 01	14	1	15
Level 02	14	1	15
Level 03	15	0	15
Level 04	15	0	15
Level 05	15	0	15
Level 06	15	0	15
Level 07	15	0	15
Level 08	15	0	15
Total	118	2	120
	98%	**2%**	

Overall SDA for the proposed scheme

6.3 Compensatory Measures

The 2022 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

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 reduced daylight.

Total 2no. rooms across the proposed development were identified with compensatory measures in accordance with the requirements of the *Sustainable Urban Housing – Design Standards for New Apartments 2022*.

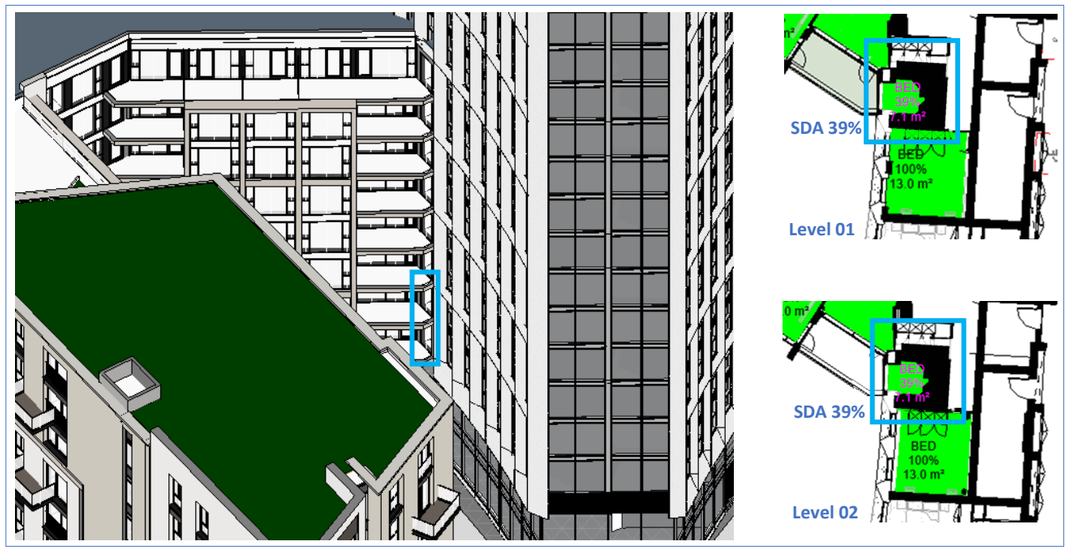


Fig 6.3.1 – 2no. non-compliant rooms

Each non-compliant room was identified, and compensatory measures are set out in Appendix A as per:

1. Daylight Adjacency

   In the cases where a room is below target, there are adjacent room/rooms with the apartment which were found to be comfortably compliant. Therefore, these units each have room/rooms that are well daylit, despite the assessed room being slightly below target.

2. Sunlight

   The KLDs or bedrooms with below target Spatial Daylight Autonomy receive over 1.5 hours of sunlight (Minimum exposure). Therefore, whilst the rooms were found to be non-compliant for daylight, their apartment units achieve the above the requisite sunlight availability for compliance. (See Appendix B – Exposure to Sunlight Results of this reports.)

3. Aspect

   In addition to their private amenity space, a number of units have direct aspect out onto landscaped communal / river or public open space providing an excellent view from the KLD space or Bedroom.

4. Unit Size

   The *Sustainable Urban Housing – Design Standards for New Apartments 2020* require that the majority of units in a development exceed the minimum floor area standards by 10%. Some of the units which receive reduced daylight might exceed the minimum floor areas by >10%.

5. Private Amenity Space

   All apartments have been designed to allow direct access to a balcony for private amenity space.

7.0 Sunlight Analysis

7.1 Exposure to Sunlight

The BRE Guide outlines 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."*

As with Sunlight Amenity, the BRE methodology therefore utilises the Equinox as being representative of the solar mid-position throughout the year, with the calculation of potential received sunlight during that day enabling a quantitative assessment in addition to idealised configuration of ensuring southerly aspect – preferably for living areas as described below:

> *"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 was undertaken for each unit of the proposed development to assess the exposure to sunlight that each unit can receive, assessing initially KLD's and where these were found to be non-compliant, a check was undertaken to determine whether a Bedroom could achieve adequate sunlight in accordance with the methodology. It may be noted therefore that the tables and diagrams below indicate compliance for Exposure to Sunlight based on assessment of apartment units as opposed to individual rooms, as is the case for Daylight analysis.

Figure 7.1.1 below is an example of how the results are illustrated, as presented within the report to indicate their Exposure to Sunlight classification in accordance with BR.209/ EN.17037 may be interpreted as follows:

- Orange – High (4.0 hrs+)
- Yellow – Medium (3.0 - 4.0 hrs)
- Green – Minimum (1.5 - 3.0 hrs)
- Blue – Low/ Non-Compliant (<1.5 hrs)

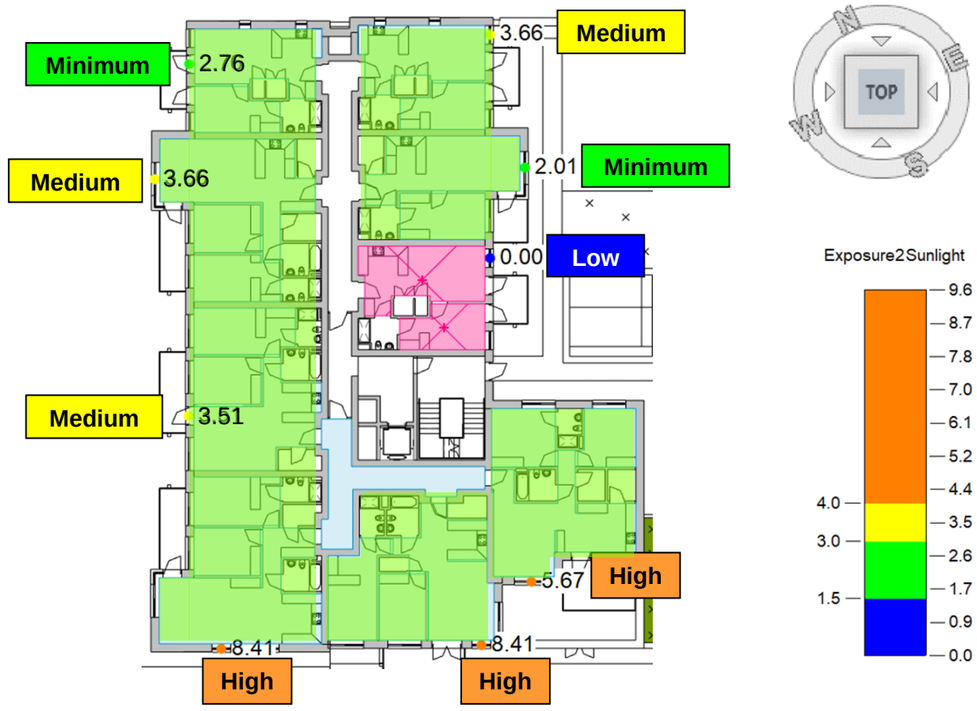
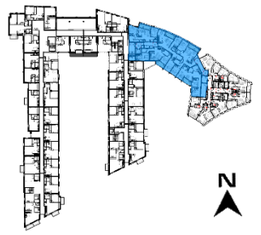


Fig 7.1.1 – Exposure to Sunlight Results – Example Analysis

In the example above, most KLD were determined to receive Medium to High range of Exposure to Sunlight, one unit was determined non-compliant and identified in light red.

7.2 Results Summary – ETS

The table below shows a summary of the Exposure to Sunlight (ETS) results for the proposed amended block B2 of Parkgate development. Detail results can be found in Appendix B. It was determined that 80% of the units in block B2 achieve compliance for the recommended sunlight availability from BRE Guide.



KEY MAP

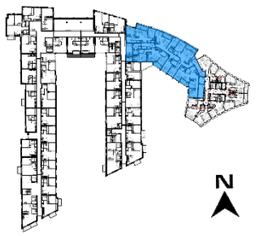
Parkgate B2	Pass	Fail	Total
Level 01	4	1	5
Level 02	4	1	5
Level 03	4	1	5
Level 04	4	1	5
Level 05	4	1	5
Level 06	4	1	5
Level 07	4	1	5
Level 08	4	1	5
Total	32	8	40
	80%	**20%**	

Exposure to Sunlight Results Summary

Appendix A

Spatial Daylight Autonomy (SDA)

Appendix A - Results Summary (SDA)



KEY MAP

The table below gives a breakdown of compliance rates for every room in the proposed amended block B2 of Parkgate development based on Spatial Daylight Autonomy (SDA).
98% of spaces analysed are determined to be compliant with the methodology utilised.
2no. non-complying rooms were identified with compensatory measures in Appendix A.

Parkgate B2	Pass	Fail	Total
Level 01	14	1	15
Level 02	14	1	15
Level 03	15	0	15
Level 04	15	0	15
Level 05	15	0	15
Level 06	15	0	15
Level 07	15	0	15
Level 08	15	0	15
Total	118	2	120
	98%	**2%**	

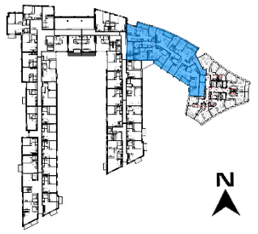
Overall SDA for the proposed scheme

Results: Level 01

Daylight analysis results are illustrated below with green shaded area receiving targeted illuminance, 200Lux for KLDs and 100Lux for Bedrooms.

Black shade is showing area where it's receiving less than targeted illuminance. A space is deemed compliant where >50% of areas achieve target illuminance.

1 room was found to be non-compliant, and the rest of the rooms were determined to be compliant for SDA on this level.



KEY MAP

Compensatory Measures:

1. Daylight Adjacency
2. Sunlight
3. Aspect
4. Unit Size
5. Private Amenity Space

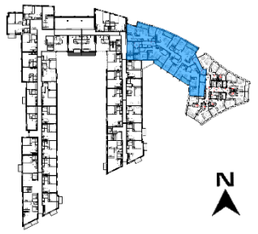
Parkgate B2	Pass	Fail	Total
Level 01	14	1	15
Level 02	14	1	15
Level 03	15	0	15
Level 04	15	0	15
Level 05	15	0	15
Level 06	15	0	15
Level 07	15	0	15
Level 08	15	0	15
Total	118	2	120
	98%	**2%**	

Passed-Failed

SDA Targets	> 50% at
Bedrooms	> 100 Lux
Living rooms	> 150 Lux
K/L/D / Kitchen	> 200 Lux

Results: Level 02

Daylight analysis results are illustrated below with green shaded area receiving targeted illuminance, 200Lux for KLDs and 100Lux for Bedrooms.
Black shade is showing area where it's receiving less than targeted illuminance. A space is deemed compliant where >50% of areas achieve target illuminance.
1 room was found to be non-compliant and the rest of the rooms were determined to be compliant for SDA on this level.



KEY MAP

Compensatory Measures:

1. Daylight Adjacency
2. Sunlight
3. Aspect
4. Unit Size
5. Private Amenity Space

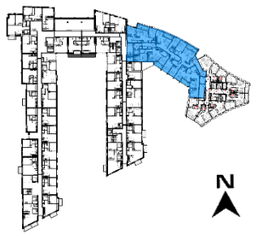
Parkgate B2	Pass	Fail	Total
Level 01	14	1	15
Level 02	14	1	15
Level 03	15	0	15
Level 04	15	0	15
Level 05	15	0	15
Level 06	15	0	15
Level 07	15	0	15
Level 08	15	0	15
Total	118	2	120
	98%	**2%**	

Passed-Failed

SDA Targets	> 50% at
Bedrooms	> 100 Lux
Living rooms	> 150 Lux
K/L/D / Kitchen	> 200 Lux

Results: Level 03

Daylight analysis results are illustrated below with green shaded area receiving targeted illuminance, 200Lux for KLDs and 100Lux for Bedrooms.
Black shade is showing area where it's receiving less than targeted illuminance. A space is deemed compliant where >50% of areas achieve target illuminance.
Every room was determined to be compliant for SDA on this level.



KEY MAP

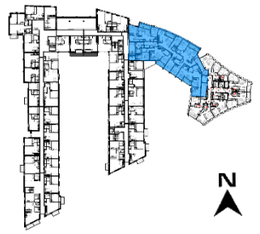
Parkgate B2	Pass	Fail	Total
Level 01	14	1	15
Level 02	14	1	15
Level 03	15	0	15
Level 04	15	0	15
Level 05	15	0	15
Level 06	15	0	15
Level 07	15	0	15
Level 08	15	0	15
Total	118	2	120
	98%	**2%**	

Passed-Failed

SDA Targets	> 50% at
Bedrooms	> 100 Lux
Living rooms	> 150 Lux
K/L/D / Kitchen	> 200 Lux

Results: Level 04

Daylight analysis results are illustrated below with green shaded area receiving targeted illuminance, 200Lux for KLDs and 100Lux for Bedrooms.
Black shade is showing area where it's receiving less than targeted illuminance. A space is deemed compliant where >50% of areas achieve target illuminance.
Every room was determined to be compliant for SDA on this level.



KEY MAP

Parkgate B2	Pass	Fail	Total
Level 01	14	1	15
Level 02	14	1	15
Level 03	15	0	15
Level 04	15	0	15
Level 05	15	0	15
Level 06	15	0	15
Level 07	15	0	15
Level 08	15	0	15
Total	118	2	120
	98%	**2%**	

Passed-Failed

SDA Targets	> 50% at
Bedrooms	> 100 Lux
Living rooms	> 150 Lux
K/L/D / Kitchen	> 200 Lux

Results: Level 05

Daylight analysis results are illustrated below with green shaded area receiving targeted illuminance, 200Lux for KLDs and 100Lux for Bedrooms.
Black shade is showing area where it's receiving less than targeted illuminance. A space is deemed compliant where >50% of areas achieve target illuminance.
Every room was determined to be compliant for SDA on this level.

KEY MAP

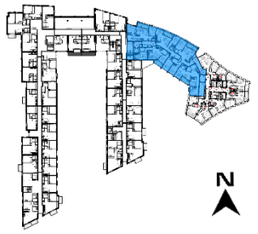
Parkgate B2	Pass	Fail	Total
Level 01	14	1	15
Level 02	14	1	15
Level 03	15	0	15
Level 04	15	0	15
Level 05	15	0	15
Level 06	15	0	15
Level 07	15	0	15
Level 08	15	0	15
Total	118	2	120
	98%	**2%**	

Passed-Failed

SDA Targets	> 50% at
Bedrooms	> 100 Lux
Living rooms	> 150 Lux
K/L/D / Kitchen	> 200 Lux

Results: Level 06

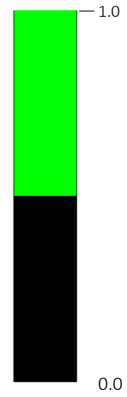
Daylight analysis results are illustrated below with green shaded area receiving targeted illuminance, 200Lux for KLDs and 100Lux for Bedrooms.
Black shade is showing area where it's receiving less than targeted illuminance. A space is deemed compliant where >50% of areas achieve target illuminance.
Every room was determined to be compliant for SDA on this level.



KEY MAP

Parkgate B2	Pass	Fail	Total
Level 01	14	1	15
Level 02	14	1	15
Level 03	15	0	15
Level 04	15	0	15
Level 05	15	0	15
Level 06	15	0	15
Level 07	15	0	15
Level 08	15	0	15
Total	118	2	120
	98%	**2%**	

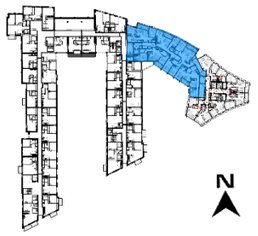
Passed-Failed



SDA Targets	> 50% at
Bedrooms	> 100 Lux
Living rooms	> 150 Lux
K/L/D / Kitchen	> 200 Lux

Results: Level 07

Daylight analysis results are illustrated below with green shaded area receiving targeted illuminance, 200Lux for KLDs and 100Lux for Bedrooms.
Black shade is showing area where it's receiving less than targeted illuminance. A space is deemed compliant where >50% of areas achieve target illuminance.
Every room was determined to be compliant for SDA on this level.



KEY MAP

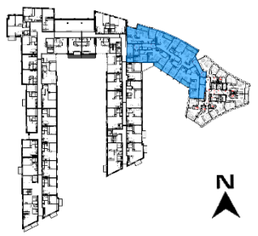
Parkgate B2	Pass	Fail	Total
Level 01	14	1	15
Level 02	14	1	15
Level 03	15	0	15
Level 04	15	0	15
Level 05	15	0	15
Level 06	15	0	15
Level 07	15	0	15
Level 08	15	0	15
Total	118	2	120
	98%	**2%**	

Passed-Failed

SDA Targets	> 50% at
Bedrooms	> 100 Lux
Living rooms	> 150 Lux
K/L/D / Kitchen	> 200 Lux

Results: Level 08

Daylight analysis results are illustrated below with green shaded area receiving targeted illuminance, 200Lux for KLDs and 100Lux for Bedrooms.
Black shade is showing area where it's receiving less than targeted illuminance. A space is deemed compliant where >50% of areas achieve target illuminance.
Every room was determined to be compliant for SDA on this level.



KEY MAP

Parkgate B2	Pass	Fail	Total
Level 01	14	1	15
Level 02	14	1	15
Level 03	15	0	15
Level 04	15	0	15
Level 05	15	0	15
Level 06	15	0	15
Level 07	15	0	15
Level 08	15	0	15
Total	118	2	120
	98%	**2%**	

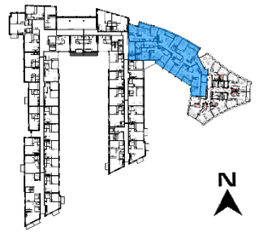
Passed-Failed

SDA Targets	> 50% at
Bedrooms	> 100 Lux
Living rooms	> 150 Lux
K/L/D / Kitchen	> 200 Lux

Appendix B

Exposure to Sunlight (ETS)

Appendix B - Results Summary (ETS)



KEY MAP

Below table shows a summary of the Exposure to Sunlight (ETS) results for the proposed amended block B2 of Parkgate development.

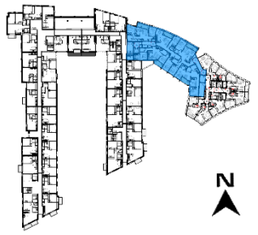
It was determined that 80% of the assessed units were compliant for recommended sunlight availability from BRE Guide.

Parkgate B2	Pass	Fail	Total
Level 01	4	1	5
Level 02	4	1	5
Level 03	4	1	5
Level 04	4	1	5
Level 05	4	1	5
Level 06	4	1	5
Level 07	4	1	5
Level 08	4	1	5
Total	32	8	40
	80%	**20%**	

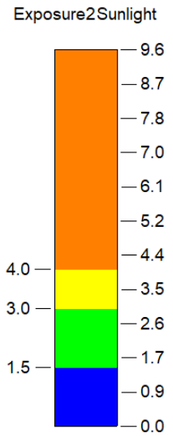
Exposure to Sunlight Results Summary

Results: Level 01

Sunlight Analysis as illustrated below, determined 1 unit was found to be non-compliant, and the rest of the units found to achieve the minimum recommendations on this level.



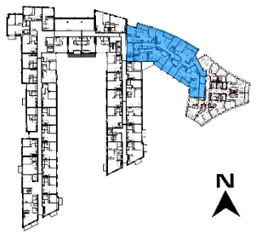
KEY MAP



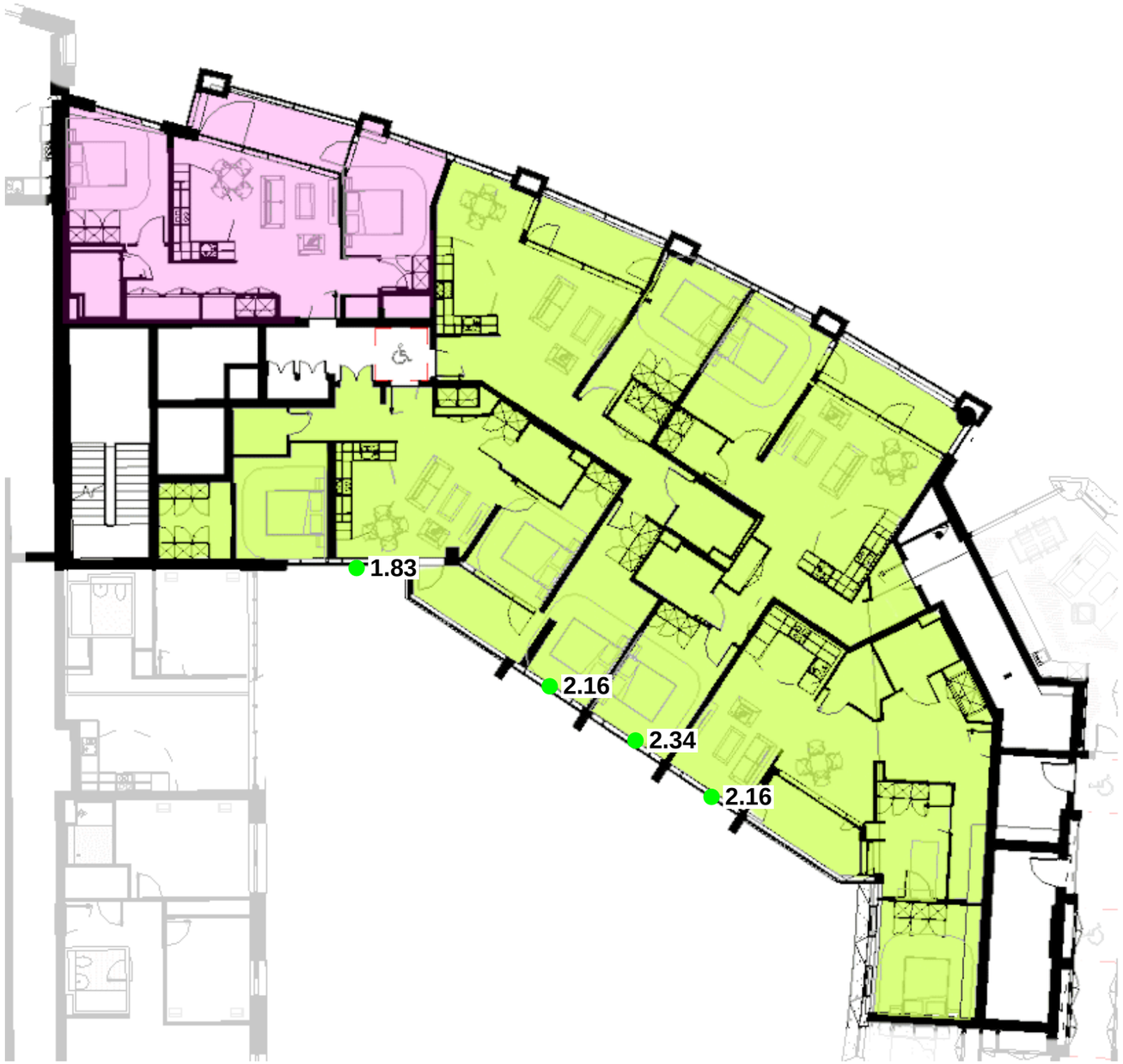
Parkgate B2	Pass	Fail	Total
Level 01	4	1	5
Level 02	4	1	5
Level 03	4	1	5
Level 04	4	1	5
Level 05	4	1	5
Level 06	4	1	5
Level 07	4	1	5
Level 08	4	1	5
Total	32	8	40
	80%	**20%**	

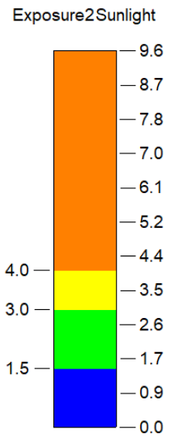
Results: Level 02

Sunlight Analysis as illustrated below, determined 1 unit was found to be non-compliant, and the rest of the units found to achieve the minimum recommendations on this level.



KEY MAP

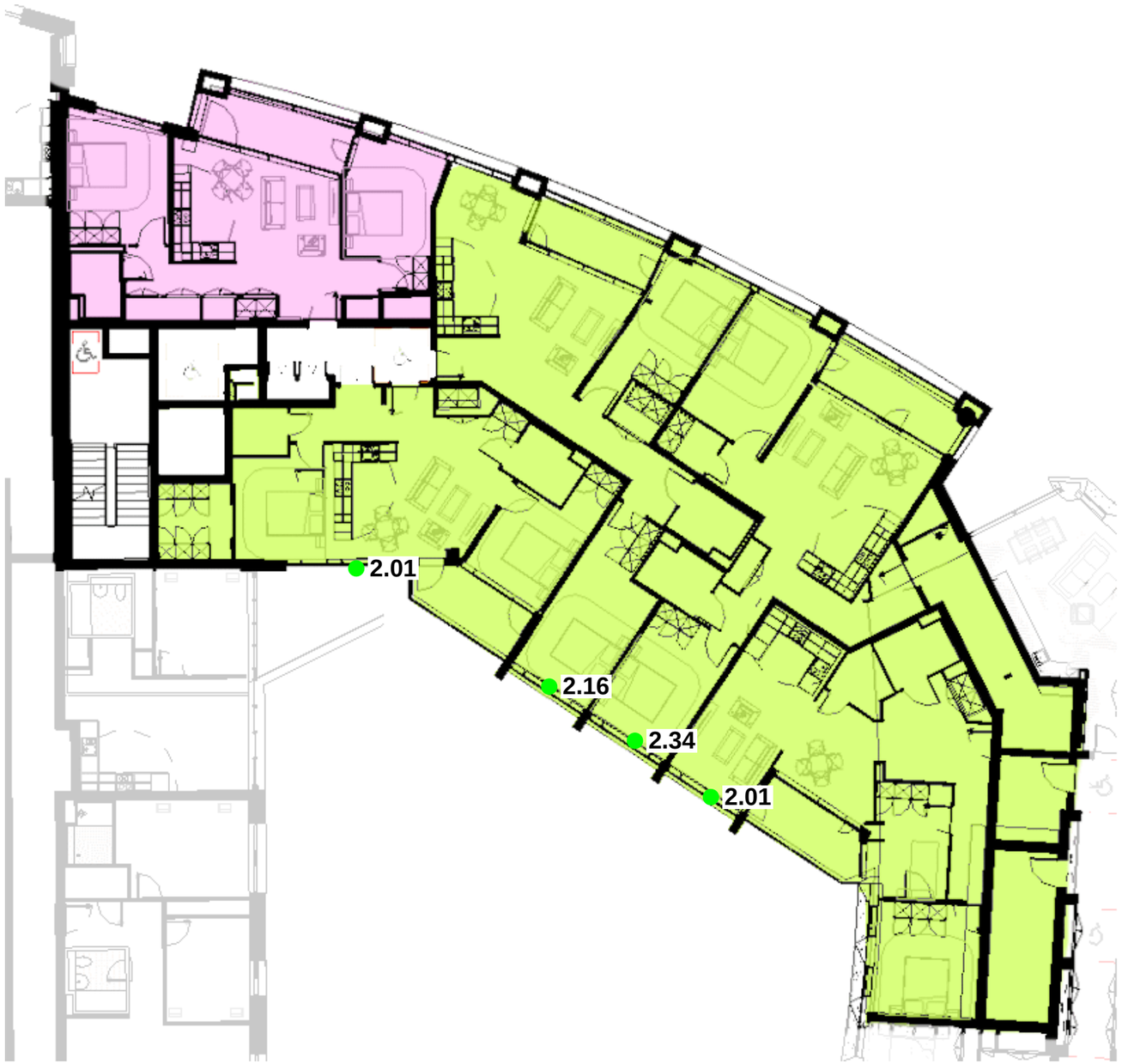


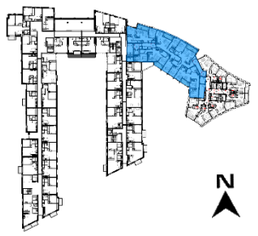


Parkgate B2	Pass	Fail	Total
Level 01	4	1	5
Level 02	4	1	5
Level 03	4	1	5
Level 04	4	1	5
Level 05	4	1	5
Level 06	4	1	5
Level 07	4	1	5
Level 08	4	1	5
Total	32	8	40
	80%	**20%**	

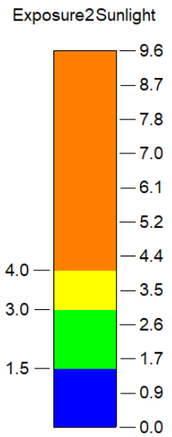
Results: Level 03

Sunlight Analysis as illustrated below, determined 1 unit was found to be non-compliant, and the rest of the units found to achieve the minimum recommendations on this level.





KEY MAP

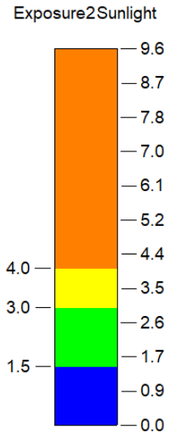


Parkgate B2	Pass	Fail	Total
Level 01	4	1	5
Level 02	4	1	5
Level 03	4	1	5
Level 04	4	1	5
Level 05	4	1	5
Level 06	4	1	5
Level 07	4	1	5
Level 08	4	1	5
Total	32	8	40
	80%	**20%**	

Results: Level 04

Sunlight Analysis as illustrated below, determined 1 unit was found to be non-compliant, and the rest of the units found to achieve the minimum recommendations on this level.

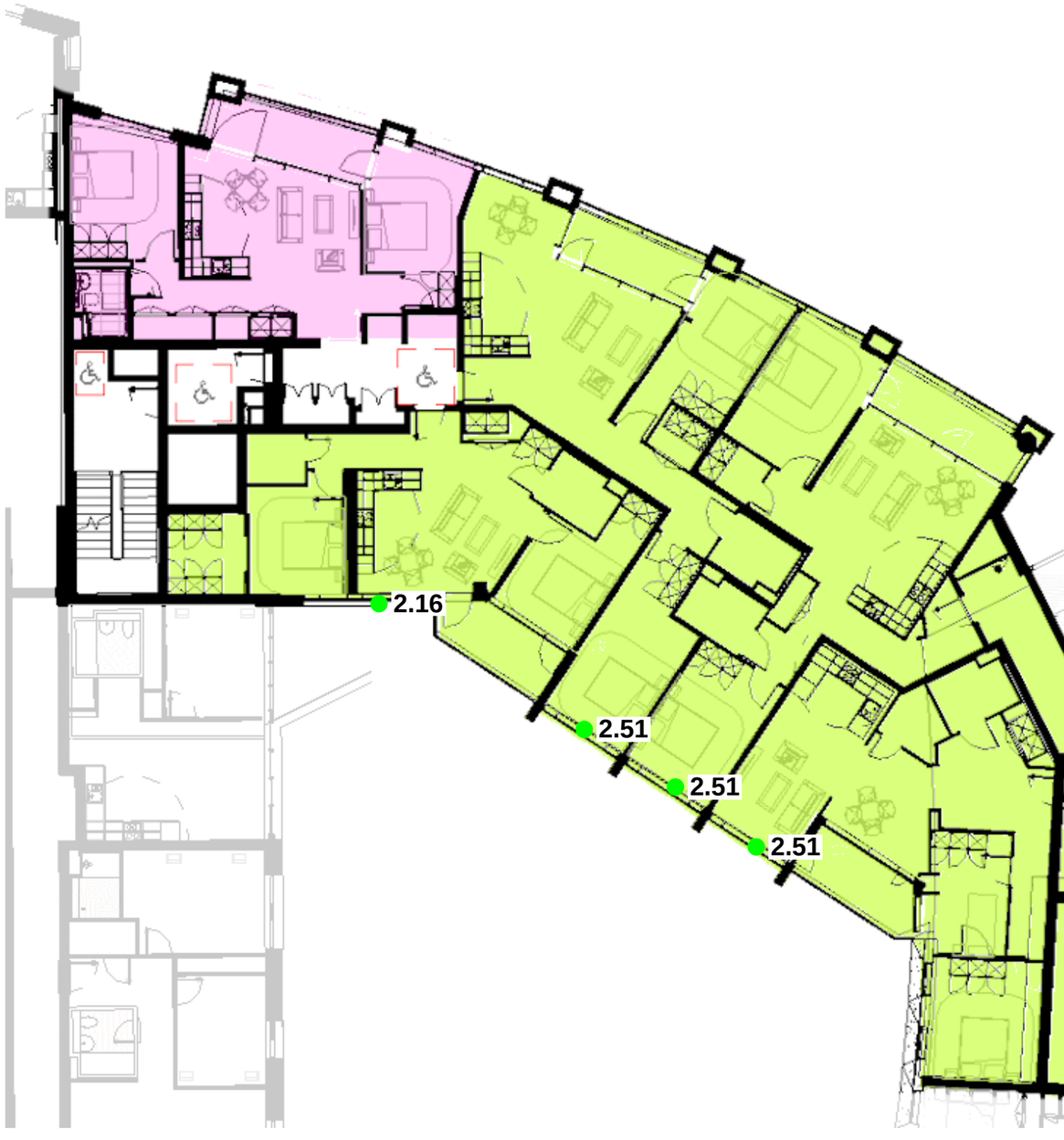
KEY MAP

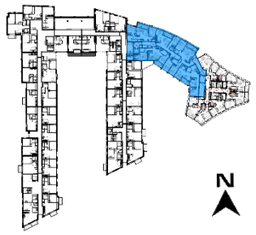


Parkgate B2	Pass	Fail	Total
Level 01	4	1	5
Level 02	4	1	5
Level 03	4	1	5
Level 04	4	1	5
Level 05	4	1	5
Level 06	4	1	5
Level 07	4	1	5
Level 08	4	1	5
Total	32	8	40
	80%	**20%**	

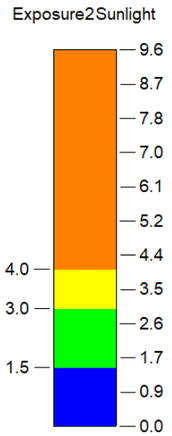
Results: Level 05

Sunlight Analysis as illustrated below, determined 1 unit was found to be non-compliant, and the rest of the units found to achieve the minimum recommendations on this level.





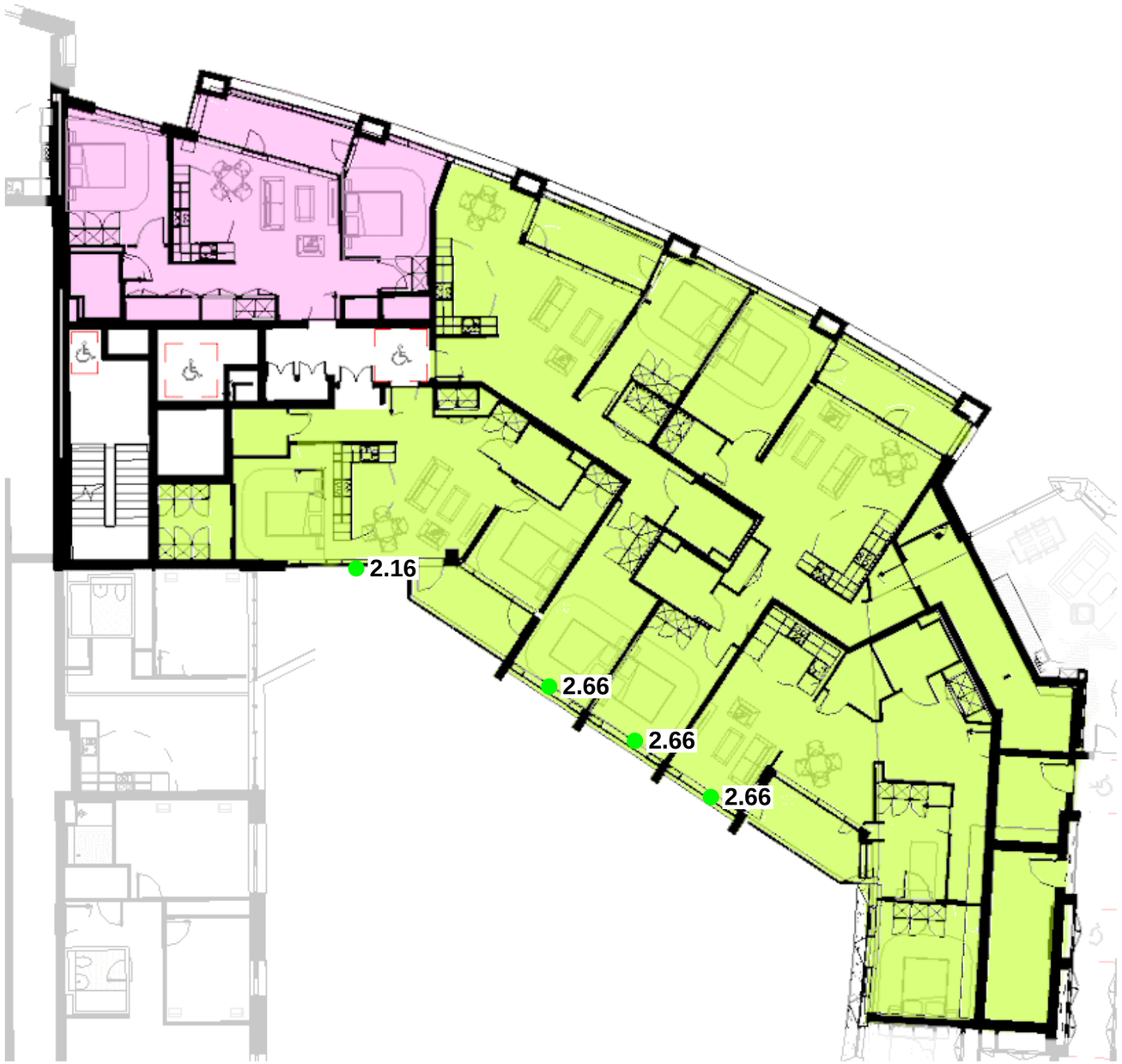
KEY MAP

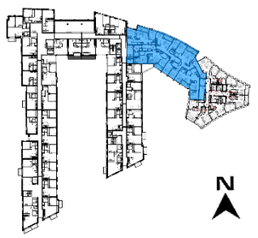


Parkgate B2	Pass	Fail	Total
Level 01	4	1	5
Level 02	4	1	5
Level 03	4	1	5
Level 04	4	1	5
Level 05	4	1	5
Level 06	4	1	5
Level 07	4	1	5
Level 08	4	1	5
Total	32	8	40
	80%	**20%**	

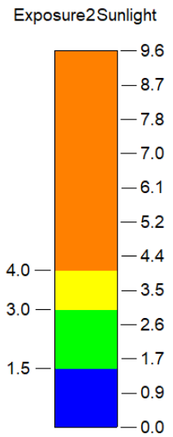
Results: Level 06

Sunlight Analysis as illustrated below, determined 1 unit was found to be non-compliant, and the rest of the units found to achieve the minimum recommendations on this level.





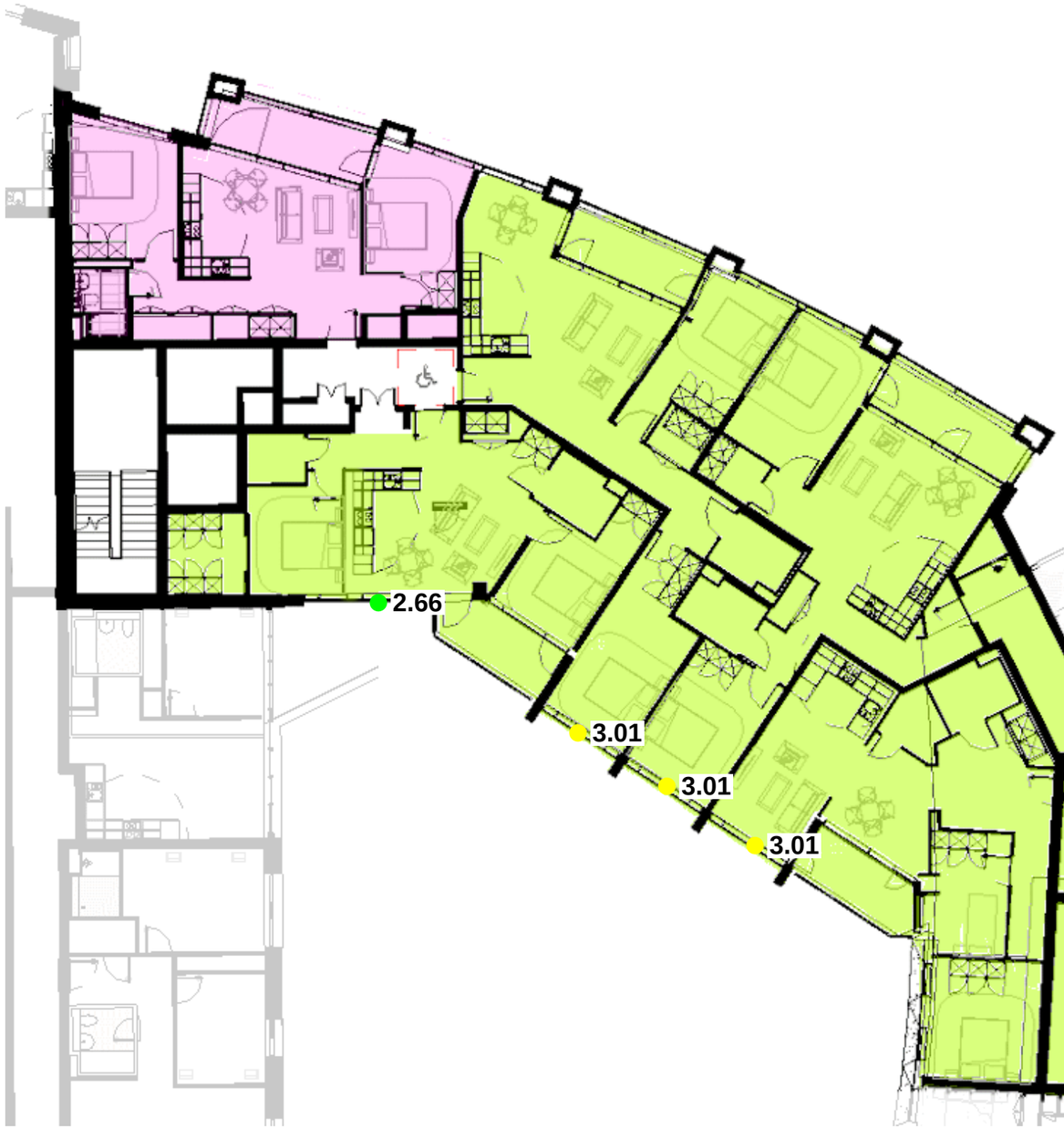
KEY MAP

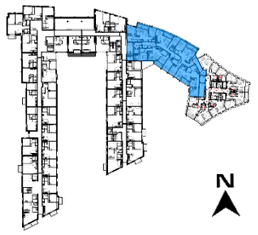


Parkgate B2	Pass	Fail	Total
Level 01	4	1	5
Level 02	4	1	5
Level 03	4	1	5
Level 04	4	1	5
Level 05	4	1	5
Level 06	4	1	5
Level 07	4	1	5
Level 08	4	1	5
Total	32	8	40
	80%	**20%**	

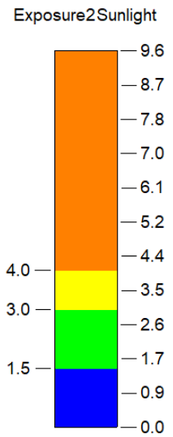
Results: Level 07

Sunlight Analysis as illustrated below, determined 1 unit was found to be non-compliant, and the rest of the units found to achieve the minimum recommendations on this level.





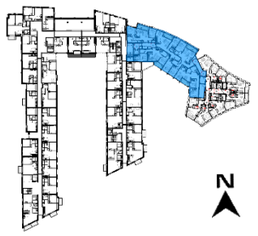
KEY MAP



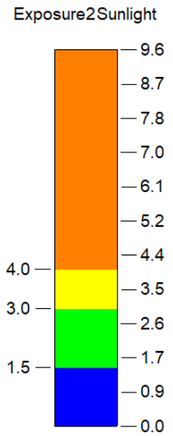
Parkgate B2	Pass	Fail	Total
Level 01	4	1	5
Level 02	4	1	5
Level 03	4	1	5
Level 04	4	1	5
Level 05	4	1	5
Level 06	4	1	5
Level 07	4	1	5
Level 08	4	1	5
Total	32	8	40
	80%	**20%**	

Results: Level 08

Sunlight Analysis as illustrated below, determined 1 unit was found to be non-compliant, and the rest of the units found to achieve the minimum recommendations on this level.



KEY MAP



Parkgate B2	Pass	Fail	Total
Level 01	4	1	5
Level 02	4	1	5
Level 03	4	1	5
Level 04	4	1	5
Level 05	4	1	5
Level 06	4	1	5
Level 07	4	1	5
Level 08	4	1	5
Total	32	8	40
	80%	**20%**	

Appendix C

Site Shading Diagrams

APPENDIX C – Site Shading Diagrams

Equinox March 21st

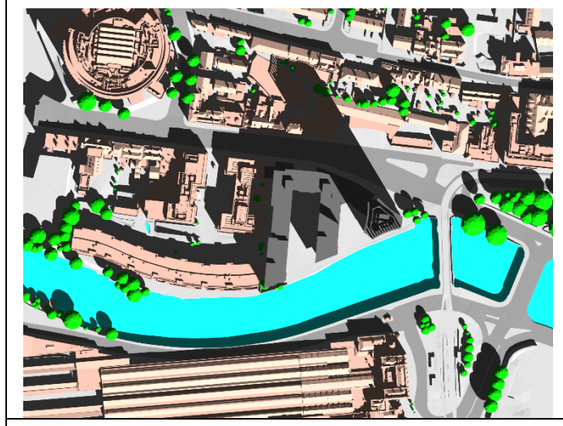
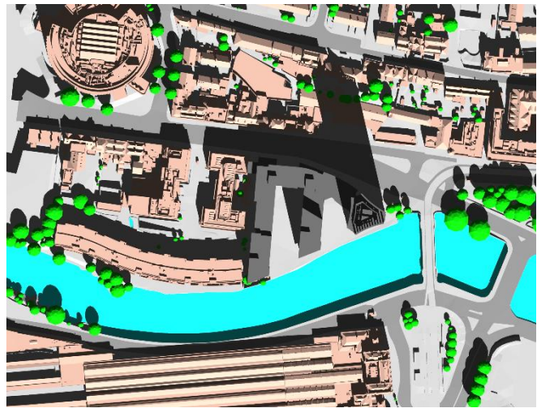
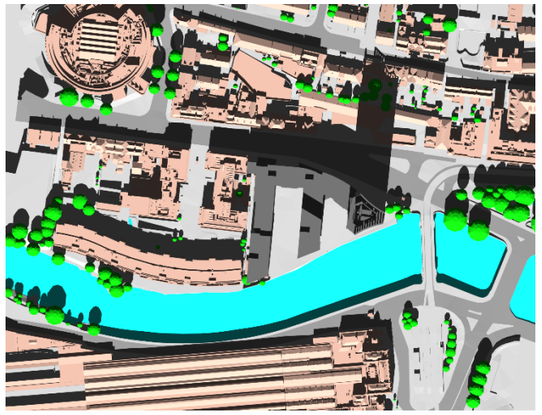
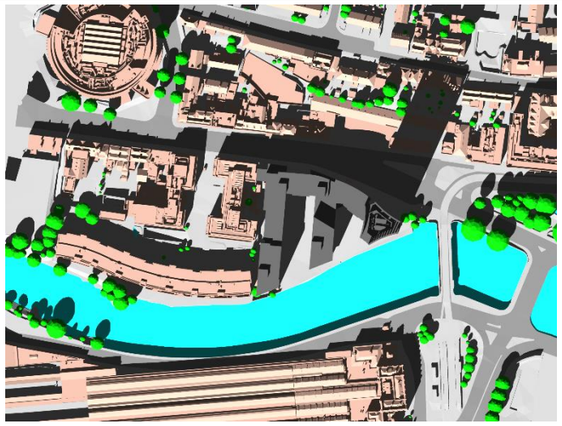
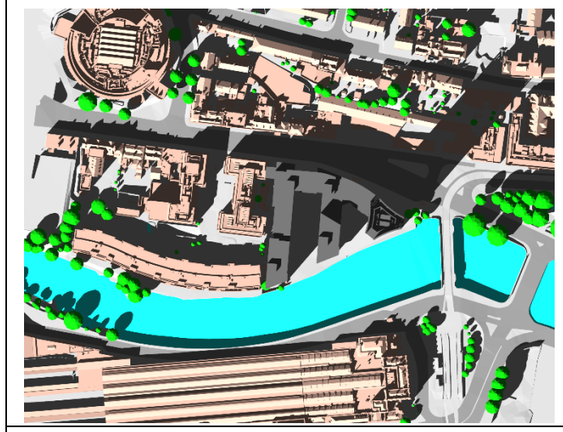
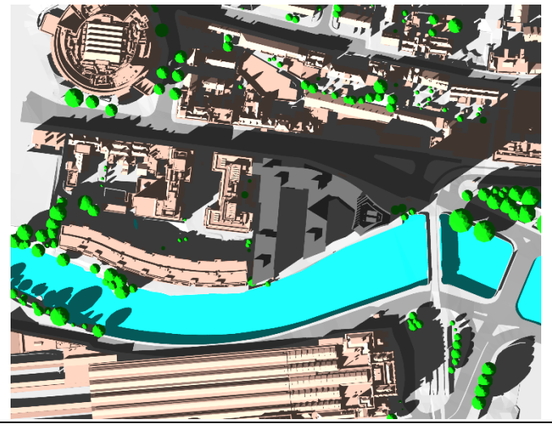
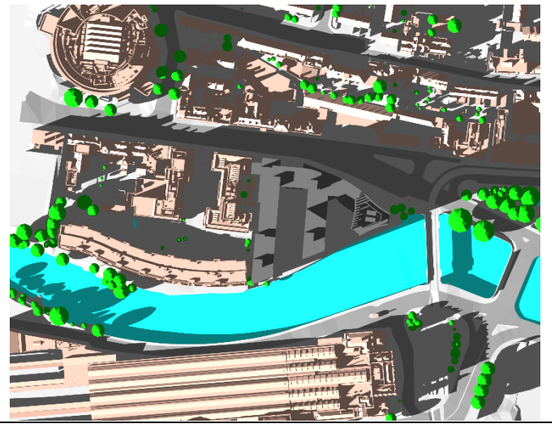
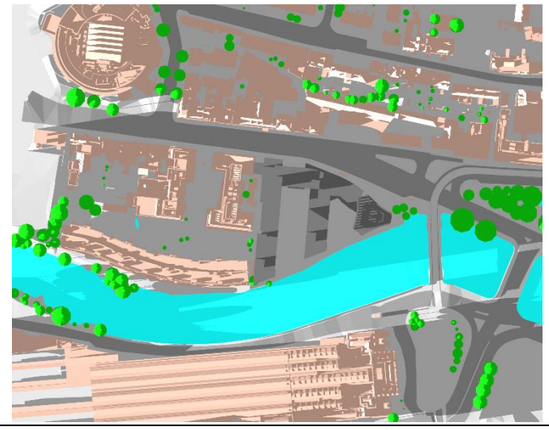
			
10:00	11:00	12:00	13:00
			
14:00	15:00	16:00	17:00

Fig C.1: Sunlight and Site Shading Diagrams - Equinox (March 21st): 10:00-17:00 hrs

Site Shading diagrams in Fig C.1 illustrates the shadows with the proposed amended Block B2 model. There is negligible to no change in the extent of the shadow of the proposed compared to the previously permitted design.

Summer Solstice June 21st

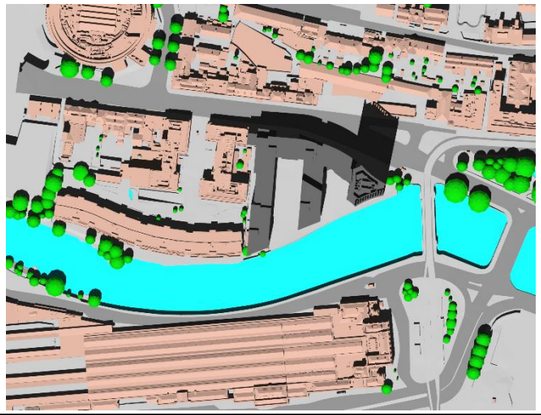
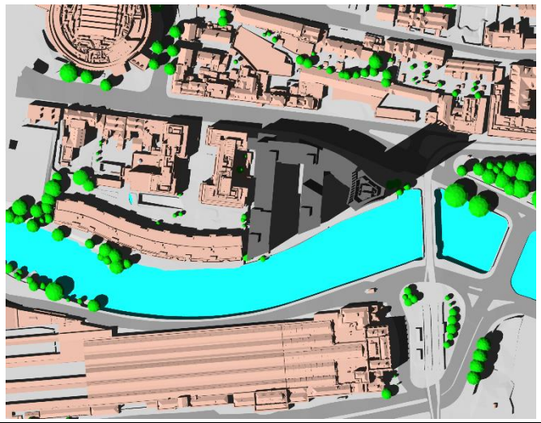
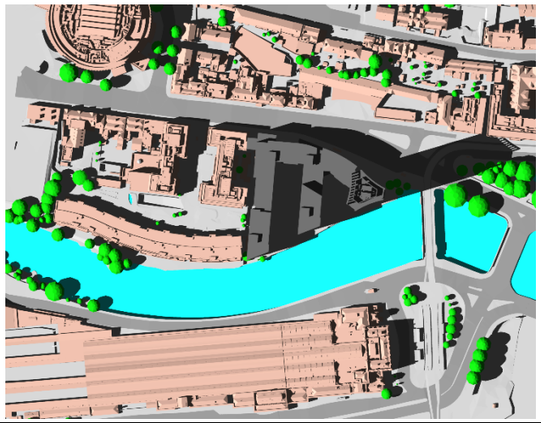
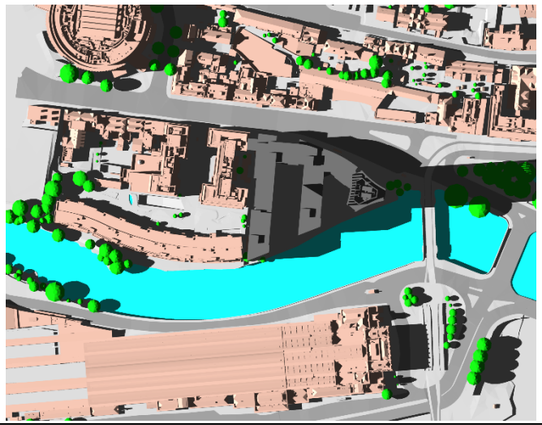
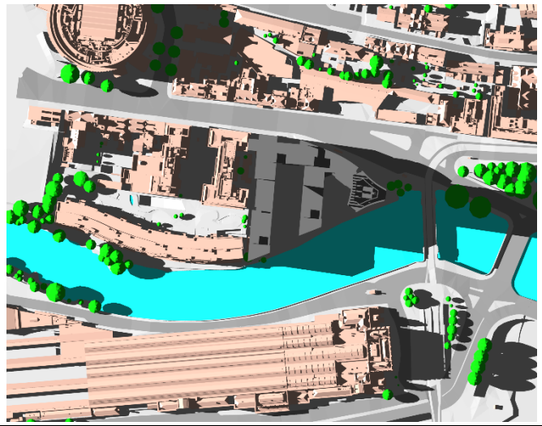
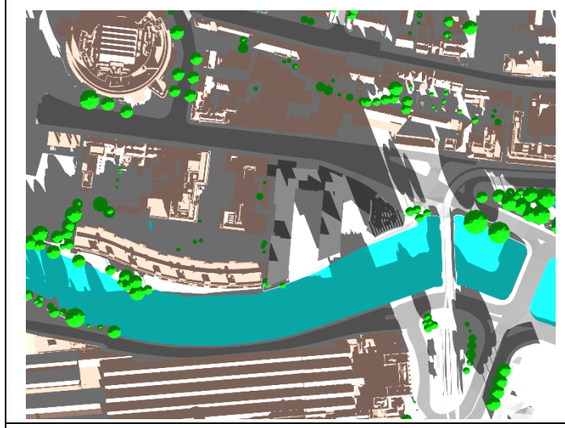
			
10:00	11:00	12:00	13:00
			
14:00	15:00	16:00	17:00

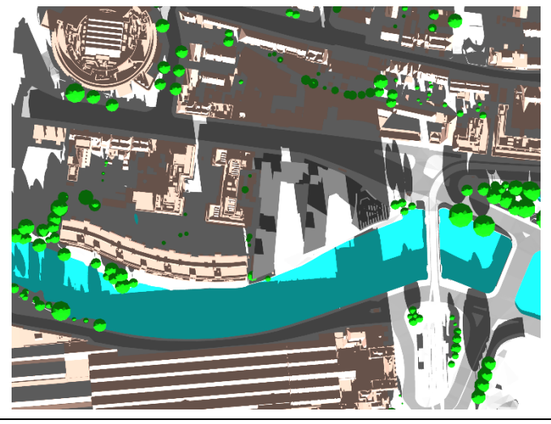
Fig C.2: Sunlight and Site Shading Diagrams – Summer Solstice (June 21st): 10:00-17:00 hrs

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.

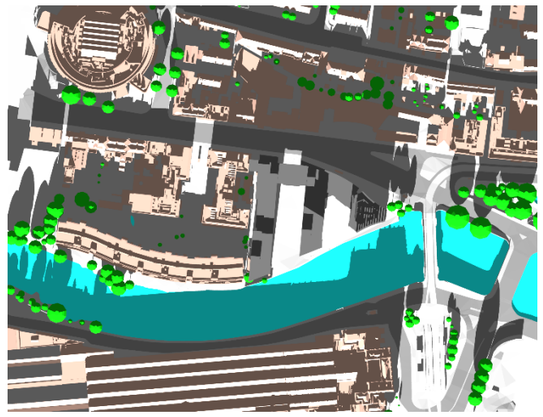
Winter Solstice December 21st



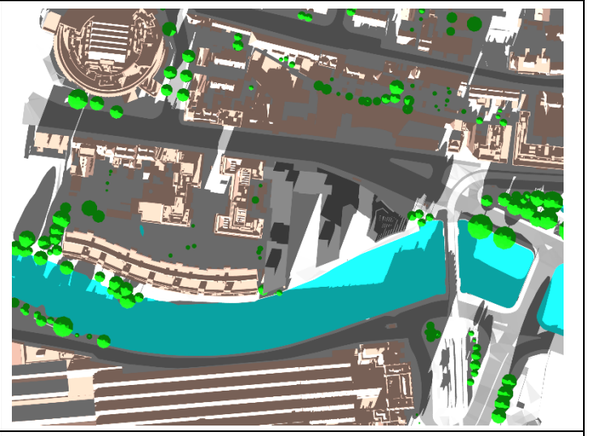
10:00



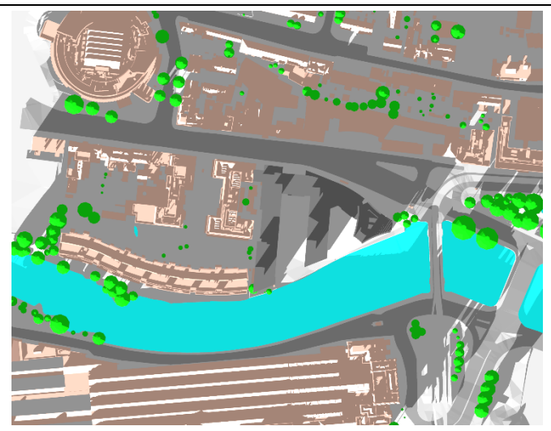
11:00



12:00



13:00



14:00

15:00

16:00

17:00

Fig C.3: Sunlight and Site Shading Diagrams - Winter Solstice (December 21st): 10:00-17:00 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.